



SAFETY DATA SHEETS



DUREZ CORPORATION

Durez Corporation
Durez Canada Company, LTD
SumiDurez Canada GP



Material Safety Data Sheet

MSDS#: M8458

DUREZ 791 Phenolic Novolac Thermosetting Molding Compound

Revision Date: 9/17/03

*** Section 1 - Chemical Product and Company Identification ***

MSDS Number: M8458

Material Name: DUREZ 791 Phenolic Novolac Thermosetting Molding Compound

Synonyms: None

Formula: Complex

Product Use: Molded Plastic Parts

Manufacturer Information:

Durez Corporation
14131 Midway Rd., Ste. 500
Addison, TX 75001

Emergency Phone Number (24 hours):
To request an MSDS - Customer Service:

1-888-211-4441
1-800-699-0169
email: info@durez.com

*** Section 2 - Composition / Information on Ingredients ***

CAS #	Component	Wt. Percent
9003-35-4	Phenol-formaldehyde polymer	30-60
100-97-0	Hexamethylenetetramine	5-10
108-95-2	Phenol	1-5
1305-62-0	Calcium hydroxide	1-5

COMPONENT INFORMATION

A: General Product Information

This product is considered hazardous under 29 CFR 1910.1200 (Hazard Communication).

Neither the Occupational Safety and Health Administration (OSHA) nor the American Conference of Governmental Industrial Hygienists (ACGIH) has developed exposure limits for this product. Exposure limits exist for the following individual ingredients.

Formaldehyde is a specifically regulated chemical, consult OSHA 29 CFR 1910.1048 for specific regulations.

Trace amounts of formaldehyde may be released during the curing process. The air concentration will be dictated by curing conditions, room ventilation and production rates. Airborne monitoring should be conducted to accurately determine the level of this substance in the air. The symptoms of formaldehyde exposure, including eye, nose, throat, and upper respiratory tract irritation, tearing and nose stuffiness, are usually initially experienced at air concentrations in the range of 0.2-1.0 ppm and become more severe above 1 ppm. For exceptionally sensitive individuals, symptoms may appear at far lower concentrations.

In laboratory tests, formaldehyde has been shown to be carcinogenic in rats. There is no conclusive evidence regarding the carcinogenicity of formaldehyde in man. Formaldehyde is listed by NTP as reasonably anticipated to be carcinogenic, and by IARC as a group 2A carcinogen. OSHA, in its formaldehyde Standard (29 CFR 1910.1048) considers formaldehyde to be a potential carcinogen.

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B: Component Exposure Limits

Phenol (108-95-2)

ACGIH: 5 ppm TWA
skin - potential for cutaneous absorption
OSHA: 5 ppm TWA; 19 mg/m³ TWA
Prevent or reduce skin absorption
NIOSH: 5 ppm TWA; 19 mg/m³ TWA
15.6 ppm Ceiling (15 minute); 60 mg/m³ Ceiling (15 minute)
Potential for dermal absorption

Calcium hydroxide (1305-62-0)

ACGIH: 5 mg/m³ TWA
OSHA: 5 mg/m³ TWA (not in effect as a result of reconsideration)
NIOSH: 5 mg/m³ TWA

*** Section 3 - Hazards Identification ***

EMERGENCY OVERVIEW

Black, brown, or red granules with a slight phenolic odor. Dust or vapors may be irritating to eyes, skin and respiratory tract. Dust may reduce lung function. Product may form explosive dust/air mixtures if high concentration of product dust is suspended in air. Contains phenol which causes skin darkening, kidney, liver, CNS, and heart effects. Repeated skin contact may cause dermatitis.

POTENTIAL HEALTH EFFECTS

Eyes

Dust or vapors may be irritating to the eyes.

Skin

Dust or vapors may irritate the skin. Prolonged and/or repeated skin contact may cause irritation or dermatitis.

Ingestion

Ingestion of a significant amount of hazardous ingredients from this product is unlikely. Weakly toxic by ingestion. Ingesting significant amounts may cause severe irritation of the mouth and throat, marked abdominal pain, vomiting and diarrhea.

Inhalation

Dust or vapors may be irritating to the respiratory tract.

Chronic

Prolonged or repeated contact may cause dermatitis, skin darkening, kidney, liver, neurological and heart effects. Repeated breathing of dust or vapors may reduce lung function.

HMIS Ratings: Health: 1* Fire: 1 Reactivity: 0

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

Please Note: HMIS ratings involve interpretations of data that may vary from company to company. HMIS ratings are intended for rapid, general identification of the magnitude of the specific hazard. To deal adequately with the safe handling of this material, all the information contained in this MSDS must be assessed.

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*** Section 4 - First Aid Measures ***

Eyes

IMMEDIATELY flush eyes with a directed stream of water while forcibly holding eyelids open to ensure complete irrigation of all eye and lid tissue. Washing eyes within several seconds of exposure is essential to achieve maximum effectiveness. IF IRRITATION OCCURS, SEEK MEDICAL ATTENTION IMMEDIATELY.

Skin

For skin contact, wash immediately with soap and water. Wash contaminated clothing before reuse. IF IRRITATION OCCURS, SEEK MEDICAL ATTENTION IMMEDIATELY.

Ingestion

No specific intervention is indicated as compound is not likely to be hazardous by ingestion. However, if swallowed, DO NOT INDUCE VOMITING. Give the patient quantities of water or milk to minimize potential irritation. NEVER give anything by mouth to an unconscious person. SEEK MEDICAL ATTENTION IMMEDIATELY.

Inhalation

If inhaled, IMMEDIATELY remove the affected person to fresh air. If breathing is difficult, have qualified person administer oxygen. If the affected person is not breathing, apply artificial respiration. SEEK MEDICAL ATTENTION IMMEDIATELY.

*** Section 5 - Fire Fighting Measures ***

Flash Point: Not Determined

Upper Flammable Limit (UFL): Not Determined

Auto Ignition: Not Determined

Method Used: Not Applicable

Lower Flammable Limit (LFL): Not Determined

Flammability Classification: Non-flammable

General Fire Hazards

Dusts may form an explosive mixture with air. Electrostatic charge may build up during handling. Grounding of equipment is recommended.

Hazardous Combustion Products

Complete combustion yields carbon dioxide, nitrogen oxides, and water. Incomplete combustion yields carbon monoxide, olefinic acid and paraffinic compounds. Varying amounts of ketones, aldehydes, alcohols and aromatics may also be formed.

Extinguishing Media

Use water spray, dry chemical, carbon dioxide, Halon, or alcohol foam.

Fire Fighting Equipment/Instructions

Firefighters should wear NIOSH/MSHA approved positive pressure self-contained breathing apparatus and full protective clothing. Keep unauthorized personnel upwind.

*** Section 6 - Accidental Release Measures ***

Containment Procedures

Keep unnecessary personnel away. Eliminate all sources of ignition. Do not allow the spilled product to enter sewers or open waterways.

Clean-Up Procedures

Avoid the generation of dusts during clean-up. Sweep or vacuum spills. To minimize dust, vacuum cleaning is preferred.

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*** Section 7 - Handling and Storage ***

Handling Procedures

Use good housekeeping practices. Use this product with adequate ventilation. Contain material and prevent accumulations of dust.

Storage Procedures

Store in a cool, dry place to avoid the effects of heat and moisture on resin agglomeration. Eliminate all sources of ignition. Keep the container tightly closed in a well-ventilated place.

*** Section 8 - Exposure Controls / Personal Protection ***

ENGINEERING CONTROLS

General room ventilation plus local exhaust at points of emission to maintain levels of airborne contaminants below exposure limits.

PERSONAL PROTECTION

Eyes/Face Protection

Wear safety glasses with side shields or chemical safety goggles (ANSI Z87.1).

Skin Protection

Wear protective gloves such as leather, canvas, or cotton to minimize skin contact. During molding operations, wear heat resistant gloves.

Respiratory Protection

A NIOSH/MSHA approved respirator, following manufacturer's recommendations, should be used as a precautionary measure where airborne contaminants may occur.

General Personal Protective Equipment

Eye wash facility and emergency shower should be in close proximity (ANSI Z358.1).

*** Section 9 - Physical & Chemical Properties ***

Appearance:	Black, brown, or red granules	Odor:	Slight phenolic
Physical State:	Solid	pH:	9 - 11 @ 100 gm/l
Vapor Pressure:	Not Determined	Vapor Density:	Not Determined
Boiling Point:	Not Determined	Melting Point:	Not Determined
Solubility (H2O):	<10%	Specific Gravity:	1.33 - 1.75

*** Section 10 - Chemical Stability & Reactivity Information ***

Chemical Stability

This is a stable product.

Chemical Stability - Conditions to Avoid

Keep away from heat, sparks or open flame.

Incompatibility

None identified.

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Hazardous Decomposition

Complete combustion yields carbon dioxide, nitrogen oxides and water. Trace amounts of ammonia, formaldehyde, and phenol may be released in the resin curing process. The air concentration will be dictated by curing conditions, room ventilation and production rates. Airborne monitoring should be conducted to accurately determine the level of these substances in the air. For formaldehyde, symptoms of exposure including eye, nose, throat, and upper respiratory tract irritation, tearing and nose stuffiness usually are initially experienced at air concentrations in the range of 0.2-1.0 ppm and become more severe above 1 ppm. For exceptionally sensitive individuals, symptoms may appear at far lower concentrations. For additional information, see Section 2. In laboratory tests, formaldehyde has been shown to be carcinogenic in rats. There is no conclusive evidence regarding the carcinogenicity of formaldehyde in man. Formaldehyde is listed by NTP as reasonably anticipated to be carcinogenic, and by IARC as a group 2A carcinogen. OSHA, in its formaldehyde Standard (29 CFR 1910.1048) considers formaldehyde to be a potential carcinogen. Phenol vapors are irritating to the eyes, skin, and respiratory tract. At airborne levels of up to at least 4 ppm, all phenol absorbed in the lung is excreted within 24 hours. Ammonia causes only slight eye, nose, throat, and respiratory irritation at concentrations up to about 50 ppm and moderate irritation with tearing at about 125 ppm.

Hazardous Polymerization

Resin will polymerize exothermically at temperatures in excess of 150°F. Hazardous polymerization will not occur under storage conditions recommended in Section 7.

* * * Section 11 - Toxicological Information * * *

ACUTE AND CHRONIC TOXICITY

A: General Product Information

Phenol-formaldehyde polymer is used in the manufacture of this product. The following acute toxicology data are based on tests done for one product from a family of products. This substance is practically non-toxic by the oral, dermal, and inhalation routes. It is slightly irritating to the eyes. It is non-irritating to the skin.

Hexamethylenetetramine is a human skin and lung sensitizer. Inhalation may cause an asthma-like condition in previously sensitized individuals.

Phenol is an irritant of the eyes, mucous membranes and skin; systemic absorption causes nervous system toxicity as well as liver and kidney damage. Signs and symptoms can develop rapidly with consequences, including shock, collapse, coma, convulsions, cyanosis, respiratory arrest and death.

Calcium hydroxide may be irritating by all routes of entry. In large doses it can cause burns to the eyes, skin, and respiratory and digestive tracts.

B: Component Analysis - LD50/LC50

Hexamethylenetetramine (100-97-0)

Oral LD50 Mouse: 569 mg/kg

Phenol (108-95-2)

Inhalation LC50 Rat: 316 mg/m³;

Inhalation LC50 Mouse: 177 mg/m³;

Oral LD50 Rat: 317 mg/kg;

Oral LD50 Mouse: 270 mg/kg;

Dermal LD50 Rabbit: 630 mg/kg

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Calcium hydroxide (1305-62-0)

Oral LD50 Rat: 7340 mg/kg;

Oral LD50 Mouse: 7300 mg/kg

CARCINOGENICITY

A: General Product Information

Not known to be carcinogenic.

B: Component Carcinogenicity

Phenol (108-95-2)

ACGIH: A4 - Not Classifiable as a Human Carcinogen

IARC: Monograph 71, 1999; Monograph 47, 1989 (Group 3 (not classifiable))

TERATOGENICITY

Phenol has been reported to be embryotoxic or fetotoxic, but not teratogenic, in experimental animals.

OTHER TOXICOLOGICAL INFORMATION

This product may generate "nuisance" dust. The number of factors associated with retention of pulmonary dusts are large. The most important factors appear to be (1) dust overload, (2) particle size, (3) solubility, and (4) the toxic potency. The product is comprised of relatively insoluble materials of low toxic potency. The dust in breathing air must be reduced so that lung burdens are well below 1000 nl/g lung. Lung clearance occurs by dissolution and by alveolar-macrophage mediated clearance. A study in mice indicated that dust overloading compromised pulmonary immune function. The exposure limits for nuisance dust are:

PEL = 15 mg/m³ (total) 8 hour TWA

PEL = 5 mg/m³ (resp) 8 hour TWA

TLV = 10 mg/m³ (total) 8 hour TWA

*** Section 12 - Ecological Information ***

ECOTOXICITY

A: General Product Information

No ecotoxicity testing has been performed on this material. Ecotoxicity data for certain individual components are listed below.

B: Component Analysis - Ecotoxicity - Aquatic Toxicity

Hexamethylenetetramine (100-97-0)

Test & Species	Data	Conditions
96 Hr LC50 fathead minnow	49800 mg/l	flow-through

Phenol (108-95-2)

Test & Species	Data	Conditions
96 Hr LC50 fathead minnow	24 mg/l	flow-through
96 Hr LC50 rainbow trout	8.9 mg/l	flow-through
96 Hr LC50 bluegill	23.88 mg/l	Static
5 min EC50 Photobacterium phosphoreum	28.8 mg/l	
15 min EC50 Photobacterium phosphoreum	31.6 mg/l	
48 Hr LC50 water flea	23.0 mg/l	

ENVIRONMENTAL FATE

There is no significant environmental fate and effects data available. This product may have trace levels of chemicals that have fate and effects properties of their own. Due caution should be exercised to avoid accidental releases of this product to aquatic or terrestrial environments.

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*** Section 13 - Disposal Considerations ***

US EPA WASTE NUMBER & DESCRIPTIONS

A: General Product Information

Waste product is not considered to be listed hazardous waste under 40 CFR Part 261. However, wastes should be tested using methods contained in 40 CFR Part 261 to determine if the waste meets applicable definitions of characteristic hazardous waste.

B: Component Waste Numbers

Phenol (108-95-2)

RCRA: waste number U188

DISPOSAL INSTRUCTIONS

Dispose of all waste and contaminated material in accordance with all applicable federal, state and local health and environmental regulations.

*** Section 14 - Transportation Information ***

SHIPPING INFORMATION

This product may be regulated by the DOT because it could contain a reportable quantity (RQ) of a Hazardous Substance. Please examine the quantity per package for the Hazardous Substance(s).

Contact (716) 297-7239 (ext. 244) for classification assistance.

*** Section 15 - Regulatory Information ***

US FEDERAL REGULATIONS

Component Analysis

This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 355 Appendix A), SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4). SARA Section 313 requires a notice to be sent to customers that repackage or redistribute this product.

Phenol (108-95-2)

SARA 302: 500 lb TPQ (lower threshold); 10,000 lb TPQ (upper threshold)

SARA 313: 1.0 percent de minimis concentration

CERCLA: 1000 lb final RQ; 454 kg final RQ

Acute Health: No **Chronic Health:** Yes **Fire:** No **Pressure:** No **Reactive:** No

STATE REGULATIONS

Component Analysis - State

The following components appear on one or more of the following state hazardous substances lists:

Component	CAS	CA	MA	MN	NJ	PA	RI
Hexamethylenetetramine	100-97-0	No	No	No	Yes	No	No
Phenol	108-95-2	Yes	Yes	Yes	Yes	Yes	Yes
Calcium hydroxide	1305-62-0	Yes	Yes	Yes	Yes	Yes	Yes

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CANADIAN WHMIS INFORMATION

Component Analysis - WHMIS IDL

The following components are identified under the Canadian Hazardous Products Act Ingredient Disclosure List:

Component	CAS #	Minimum Concentration
Hexamethylenetetramine	100-97-0	0.1%; English Item 997; French Item 1104
Phenol	108-95-2	1%; English Item 1261; French Item 1374
Calcium hydroxide	1305-62-0	1%; English Item 302; French Item 991

WHMIS Classification: D1A, D2B

ADDITIONAL REGULATORY INFORMATION

Component Analysis - Inventory

Component	CAS #	TSCA	DSL	EINECS
Phenol-formaldehyde polymer	9003-35-4	Yes	Yes	No
Hexamethylenetetramine	100-97-0	Yes	Yes	Yes
Phenol	108-95-2	Yes	Yes	Yes
Calcium hydroxide	1305-62-0	Yes	Yes	Yes

NOTE: Polymers composed entirely of EINECS listed monomers are exempt from notification on the EINECS list (67/548/EEC).

* * * Section 16 - Other Information * * *

Other Information

Reasonable care has been taken in the preparation of this information, but the manufacturer makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The manufacturer makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use.

The exact composition of this material is a Trade Secret. The components are listed in the TSCA Chemical Substance Inventory. In case of a medical emergency, the specific chemical identity of the material will be provided to the treating physician or nurse when the information is needed for proper emergency or first aid treatment. A written statement of confidentiality agreement will be required as soon as circumstances permit as provided by 20CFR 1910.1200.

For additional non-emergency health, safety or environmental information:

Telephone: (716) 773-8184

Write to: Durez Corporation
Technical Information
2801 Long Road
Grand Island, NY 14072

FOR INDUSTRIAL USE ONLY.

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Key/Legend

ACGIH = American Conference of Governmental Industrial Hygienists
CAS = Chemical Abstracts Services Registry Number
C = Ceiling Limit (Duration is for 15 minutes, unless otherwise noted.)
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
CNS = Central Nervous System
DOT = Department of Transportation
DSL = Canada Inventory - Domestic Substance List
EINECS = European Inventory of Existing Commercial Chemical Substances
EPA = Environmental Protection Agency
HEPA = High Efficiency Particulate Air
HMIS = Hazardous Material Information System
IARC = International Agency for Research on Cancer
IDL = Canadian Hazardous Products Act Ingredient Disclosure List
NDSL = Canada Inventory - Non-Domestic Substance List
NIOSH = National Institute of Occupational Safety and Health
NTP = National Toxicology Program
OSHA = Occupational Safety and Health Administration
PEL = Permissible Exposure Limit (OSHA)
RCRA = Resource Conservation and Recovery Act
RQ = Reportable Quantity
SARA = Title III of the Superfund Amendments and Reauthorization Act of 1986
STEL = Short Term Exposure Limit (Duration is for 15 minutes, unless otherwise noted.)
TLV = Threshold Limit Value
TSCA = Toxic Substance Control Act
TSCA Inventory = United States TSCA Section 8(b) Inventory
TDG = Transportation of Dangerous Goods (Canada)
TPQ = Threshold Planning Quantity
TWA = Time Weighted Average (8 hr)
WHMIS = Worker Hazardous Material Information System (Canada)

DUREZ THERMOSET MOLDING COMPOSITES

00110

Black Phenolic
* Restricted *

Durez 110 Black Phenolic is a two-stage, general purpose molding material. With good mechanical properties, it is suitable for many diverse applications. The injection grade material has exceptional molding latitude and barrel life. The compression grade preforms easily and has good flowability in the mold.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.36 ft lb/in	19 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	250 V/mil	9.8 MV/m
Step by Step	250 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

February 1998

DUREZ THERMOSET MOLDING COMPOSITES

00110
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1.0x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	330 °F	165 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.52	.52
@ 1 KHZ	.26	.26
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	15.0	15.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	7 x 10 ¹² ohm cm	7 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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Durez Division
5005 LBJ Freeway, Dallas, TX 75380-9050

IMPORTANT! The information presented herein, while not guaranteed, was prepared by technical personnel and is true and accurate to the best of our knowledge. No warranty or guaranty, expressed or implied is made regarding performance stability or otherwise. This information is not intended to be all inclusive as the manner and conditions of use, handling, storage, and other factors may involve other or additional safety or performance considerations. While our technical personnel will be happy to respond to questions regarding safe handling and use procedures, safe handling and use remains the responsibility of the customer. No suggestions for use are intended as and nothing herein shall be construed as a recommendation to infringe any existing patents or violate any Federal, State or local laws.

DUREZ THERMOSET MOLDING COMPOSITES

00115
Black Phenolic

Durez 115 Black Phenolic is a two-stage, general purpose molding material. It exhibits improved flammability ratings, heat resistance and molded finish over the typical general purpose phenolic. It also offers extremely good dimensional stability in after-bake situations, making it an excellent choice for many appearance and appliance applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
U.L. Temperature Index: 150°C
U.L. Flammability: 94V-0 @ 0.120"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.39	1.39
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.6 Gpa
Izod Impact (D256)	0.33 ft lb/in	18 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.12	.12
@ 1 KHZ	.08	.08
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.5	6.5
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

00115
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.39	1.39
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	33,000 psi	228 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.29 ft lb/in	15 J/m
Deflection Temperature (D648)	365 °F	185 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.50	.50
@ 1 KHZ	.25	.25
@ 1 MHZ	.08	.08
Dielectric Constant (D150)		
@ 60 HZ	13.5	13.5
@ 1 KHZ	9.0	9.0
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



Occidental Chemical Corporation

Durez Division

5005 LBJ Freeway, Dallas, TX 75380-9050

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DUREZ THERMOSET MOLDING COMPOSITES

00118
Black Phenolic

Durez 118 Black Phenolic is a two-stage, general purpose molding material. It exhibits improved impact strength and resistance to flexural fatigue for demanding automotive, electrical and appliance applications. Shrinkage and mechanical strengths are closely controlled to meet part reliability requirements.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.12"
Mil-M-14G, Type CFG
ASTM D700 Type 2,3

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.7 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	400 V/mil	15.7 MV/m
Step by Step	350 V/mil	13.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.05	.05
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	5.9	5.9
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.31 ft lb/in	16 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	225 V/mil	8.8 MV/m
Step by Step	175 V/mil	6.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.65	.65
@ 1 KHZ	.35	.35
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	17.0	17.0
@ 1 KHZ	9.5	9.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹¹ ohm cm	1 x 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

00123
Black Phenolic

Durez 123 Black Phenolic is a two-stage, medium impact molding material. It exhibits versatile moldability, good machinability and improved shock resistance for applications such as electrical circuit breakers, automotive terminal blocks, and appliance motor bases and covers.

Molding Properties:

Bulk Factor (D1895)	2.8
Apparent Density (g/cc)(D1895)	0.50
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Medium Impact

Agency Recognition

ASTM D700 Type 3
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.24"
Mil-M-14G, Type CFG

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.37 ft lb/in	20 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.07	.07
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.2	6.2
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 X 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.3 X 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	200 V/mil	7.9 MV/m
Step by Step	175 V/mil	6.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.60	.60
@ 1 KHZ	.30	.30
@ 1 MHZ	.10	.10
Dielectric Constant (D150)		
@ 60 HZ	17.0	17.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 X 10 ¹¹ ohm cm	1 X 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Durez 123 is Fungus Resistant per Mil-I-631D and Mil-E-5272C.
Coefficient of Thermal Expansion: 30 to 60°C 41 in/in x10⁻⁶
Coefficient of Thermal Conductivity: Cal -CM/sec -CM⁻² °C 9.5 x 10⁻⁴
Specific Heat: Cal/gm/°C 0.316



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DUREZ THERMOSET MOLDING COMPOSITES

00152
Black Phenolic

Durez 152 Phenolic is a two-stage, heat resistant/ electrical molding material. It exhibits superior dimensional stability, good strength retention at elevated temperature and good molded appearance and machinability which account for it's widespread use on electrical, telecommunication and appliance applications.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.68
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM Type 13
 U.L. Temperature index of 160°C
 U.L. Flammability: 94V-1 @ 0.058"
 94V-0 @ 0.120"
 Mil-M-14G, Type CFG

Plasticities available for compression, transfer, and injection molding.
 Durez 152 is also available in Brown.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.7 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.07	.07
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.0	6.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.20	.20
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	7.6	7.6
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking index (CTI): 190 V.

Durez 152 is Fungus resistant per Mil-I-631D and Mil-E-5272C.



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DUREZ THERMOSET MOLDING COMPOSITES

00153
Black Phenolic

Durez 153 Black Phenolic is a two-stage, heat resistant/electrical molding material. It exhibits good molded appearance and shock resistance for use on a wide variety of electrical and appliance applications.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

U.L. Temperature Index of 155°C
 U.L. Flammability: 94V-1 @ 0.040"
 94V-0 @ 0.058"
 Mil-M-14G, Type CFG

Plasticities available for compression, transfer, and injection molding. Durez 153 is also available in Brown.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.53	1.53
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	26,000 psi	179 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.37 ft lb/in	20 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.04	.04
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.0	6.0
@ 1 KHZ	5.5	5.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.6 x 10 ⁶ psi	11.0 Gpa
Izod Impact (D256)	0.29 ft lb/in	15 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.45	.45
@ 1 KHZ	.15	.15
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	9.0	9.0
@ 1 KHZ	6.8	6.8
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 225V



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DUREZ THERMOSET MOLDING COMPOSITES

00156
Black Phenolic

Durez 156 Black Phenolic is a two-stage, heat resistant/electrical molding material. It exhibits excellent dimensional stability, high heat resistance, excellent molded appearance, and UL flammability rating. Typical applications include automotive carburetor spacers, sealing rings, thrust washers, speedometer sleeves, appliance terminals, probe controls, insulators, light baffles, etc.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.65
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM D700 Type 13
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.020"
94V-0 @ 0.040"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.58	1.58
Molding Shrinkage* (D955)	0.004 in/in	0.004 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	28,500 psi	196 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.12	.12
@ 1 KHZ	.08	.08
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.006 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.54	1.54
Molding Shrinkage* (D955)	0.0080 in/in	0.0080 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	28,000 psi	194 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.18	.18
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 180 V.
ASTM D-495 Arc Resistance: 180 sec.
Durez 156 is Fungus Resistant per Mil-E-5272C.



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DUREZ THERMOSET MOLDING COMPOSITES

00791
Black Phenolic

Durez 791 Black Phenolic is a two-stage, general purpose molding material. It exhibits a balance of mechanical and electrical properties plus versatile moldability which account for its widespread use on many diverse applications. Durez 791 Black is an "industrial standard" for GP phenolic molding materials.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @0.24"
94HB @0.12"

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.36	1.36
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	330 °F	166 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.04	.04
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	5.6	5.6
@ 1 KHZ	5.3	5.3
@ 1 MHZ	4.6	4.6
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.010 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
 Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

02963
Black Phenolic

Durez 2963 Black Phenolic is a two stage, glass filled, special purpose molding compound. It is designed for applications requiring high physical strengths, dimensional stability, and heat resistance. Typical applications include small motor and gear housings, brush holders, commutators, and underhood automotive applications.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.75
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.78	1.78
Molding Shrinkage* (D955)	.0015 in/in	.0015 m/m
Tensile Strength (D638)	17,000 psi	120 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	50,000 psi	345 Mpa
Tensile Modulus (D638)	2.3 x 10 ⁶ psi	15.8 Gpa
Izod Impact (D256)	0.90 ft lb/in	48 J/m
Deflection Temperature (D648)	380 °F	193 °C
Water Absorption (D570)	0.1 %	0.1 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.6 MV/m
Step by Step	400 V/mil	15.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.04	.04
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.5	6.5
@ 1 KHZ	5.8	5.8
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is .0030 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.78	1.78
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	30,000 psi	172 Mpa
Compressive Strength (D695)	40,000 psi	276 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17.2 Gpa
Izod Impact (D256)	0.80 ft lb/in	43 J/m
Deflection Temperature (D648)	370 °F	188 °C
Water Absorption (D570)	0.1 %	0.1 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.6 MV/m
Step by Step	375 V/mil	11.4 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.20	.20
@ 1 KHZ	.13	.13
@ 1 MHZ	.13	.13
Dielectric Constant (D150)		
@ 60 HZ	7.6	7.6
@ 1 KHZ	6.6	6.6
@ 1 MHZ	5.3	5.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

13856
AF Black Phenolic

Durez 13856 AF Black Phenolic is a single-stage, special purpose molding material. It exhibits excellent chemical resistance and steam cracking resistance along with good impact strength which makes it most suitable for applications exposed to harsh chemicals or wet/dry conditions. Typical applications include pump housings and impellers, spray nozzles, humidifier housings, chemical solution containers, etc.

Molding Properties:

Bulk Factor (D1895)	2.9
Apparent Density (g/cc)(D1895)	0.49
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	3 Months

Material Type:

Special Purpose

Agency Recognition

ASTM D700 Type 12-SS
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.44	1.44
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	9,500 psi	66 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.60 ft lb/in	32 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	175 V/mil	6.9 MV/m
Step by Step	175 V/mil	6.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.25	.25
@ 1 KHZ	.10	.10
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.007 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

13856
AF Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.46	1.46
Molding Shrinkage* (D955)	0.0075 in/in	0.0075 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	400 °F	205 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	175 V/mil	6.9 MV/m
Step by Step	125 V/mil	4.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.25	.25
@ 1 MHZ	.08	.08
Dielectric Constant (D150)		
@ 60 HZ	20.0	20.0
@ 1 KHZ	10.0	10.0
@ 1 MHZ	6.5	6.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 185 V.

Chemical Resistance*	Avg. Change in Weight and Dimensions		
	Weight	Thickness	Diameter
water	4.60	1.72	1.17
10% H ₂ SO ₄	4.45	1.72	1.08
0.5% NaOH	4.71	1.82	1.27
5% Soap	3.85	1.75	1.00

* Tested after 96 Hrs. in boiling solution (1/8" thk. x 2" dia. disc)



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DUREZ THERMOSET MOLDING COMPOSITES

18420
Black Phenolic

Durez 18420 Black Phenolic is a single-stage, non-bleeding molding material. It exhibits good pourability, fast cure, and good appearance for closure applications usually compression molded on automatic equipment.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.56
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Non-Bleeding

Agency Recognition

ASTM D700 Type 11-SS

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.37	1.37
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	370 °F	188 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	200 V/mil	7.9 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.15	.15
@ 1 KHZ	.06	.06
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	7.5	7.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

18441
Black Phenolic

Durez 18441 Black Phenolic is a single-stage, electrical grade molding material. It is recommended for electrical applications such as switch cases, coil forms, terminal plates, etc. where absence of ammonia out gassing is required to prevent corrosion of metal contacts. Due to its CTI of 180V, it is also recommended for wiring devices (damp and wet locations).

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.59
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Electrical

Agency Recognition

ASTM D700, Type 2-SS
 U.L. Temperature Index of 150°C
 U.L. Flammability: 94V-1 @ 0.120"
 94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.35	1.35
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.26 ft lb/in	14 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.05	.05
@ 1 KHZ	.03	.03
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	6.2	6.2
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.37	1.37
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	82 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.26 ft lb/in	14 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	.080 %	.080 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	150 V/mil	5.9 MV/m
Step by Step	100 V/mil	3.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.80	.80
@ 1 KHZ	.30	.30
@ 1 MHZ	.07	.07
Dielectric Constant (D150)		
@ 60 HZ	20.0	20.0
@ 1 KHZ	11.0	11.0
@ 1 MHZ	6.3	6.3
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 180V



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DUREZ THERMOSET MOLDING COMPOSITES

21206
Black Phenolic

Durez 21206 Black Phenolic is a two-stage, general purpose molding material. It is formulated for automatic compression molding where good pourability, fast cure, and easy part ejection are desired.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
U.L. Temperature Index of 150°C

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.35	1.35
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	9,500 psi	66 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.26 ft lb/in	14 J/m
Deflection Temperature (D648)	330 °F	166 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.08	.08
@ 1 KHZ	.04	.04
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	5.9	5.9
@ 1 KHZ	5.4	5.4
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	--- psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	-- °F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
 Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

150



DUREZ THERMOSET MOLDING COMPOSITES

21210
Black Phenolic

Durez 21210 Black Phenolic is a two-stage, electrical grade molding material. It exhibits good pourability, fast cure, good dimensional stability, and high strength for automotive Ignition applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Electrical

Agency Recognition

ASTM D700 Type 2

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.36	1.36
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	31,000 psi	214 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	320 °F	160 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.04	.04
@ 1 KHZ	.03	.03
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	5.4	5.4
@ 1 KHZ	5.1	5.1
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

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Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
 Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

21955
Black Phenolic

Durez 21955 Black is a two stage, phenolic molding material. It exhibits improved impact strength and resistance to flexural fatigue for demanding automotive applications. Shrinkage and mechanical strengths are closely controlled to meet part reliability requirements.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Improved Impact

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.41	1.41
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.7 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	400 V/mil	15.7 MV/m
Step by Step	350 V/mil	13.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.05	.05
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	5.9	5.9
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

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DUREZ THERMOSET MOLDING COMPOSITES

21955
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

22257
Black Phenolic

Durez 22257 Black Phenolic is a two-stage, medium impact molding material. It is designed for appliance and electrical applications where additional mechanical strength is required. Typical applications include circuit breakers, small motor bases and housings, appliance panels, terminal blocks, barrier strips, etc.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.57
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Medium Impact

Agency Recognition

ASTM D700 Type 3, 12
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	27,500 psi	190 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.47 ft lb/in	25 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.08	.08
@ 1 KHZ	.05	.05
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.3	6.3
@ 1 KHZ	5.4	5.4
@ 1 MHZ	4.5	4.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

22257
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.39	1.39
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.45 ft lb/in	24 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	225 V/mil	8.9 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.55	.55
@ 1 KHZ	.30	.30
@ 1 MHZ	.08	.08
Dielectric Constant (D150)		
@ 60 HZ	16	16
@ 1 KHZ	9.5	9.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Durez 22257 is fungus resistant per Mil-I-631D and Mil-810 A/E-5272	
Coefficient of Thermal Expansion: °C x 10 ⁻⁶ 23°C to 60°C	42.2
Coefficient of Thermal Conductivity: Cal/(Sec)(CM ²)(°C/CM)x10 ⁻⁴	9.6
Specific Heat: Cal/gm/°C	0.34
Shear Strength, psi as molded	11,000
Dimensional Stability: Mil-M14, %	0.54



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Durez Division

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DUREZ THERMOSET MOLDING COMPOSITES

23570
Black Phenolic

Durez 23570 Black Phenolic is a glass and mineral filled two-stage, special purpose molding material. It is designed for high strength, good dimensional stability, and electrical properties even after long term exposure to elevated temperatures. It is designed to meet the requirements of Mil-M-14G, Type MFH. Typical uses are connectors, automotive transmission components, computer parts and brush holders.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.058"
94V-5 @ 0.058"
Mil-M-14G, Type MFH

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.77	1.77
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	13,000 psi	90 Mpa
Flexural Strength (D790)	18,000 psi	124 Mpa
Compressive Strength (D695)	36,000 psi	248 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.50 ft lb/in	26 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	425 V/mil	16.7 MV/m
Step by Step	375 V/mil	14.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.04	.04
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	5.7	5.7
@ 1 KHZ	5.4	5.4
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.004 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

25002
Black Phenolic

Durez 25002 is a two-stage, general purpose molding material. It is designed for injection molding of applications requiring good mechanical strength and low water absorption.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	.56
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 - Type 2
Underwriters Laboratories

Plasticities available for injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

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DUREZ THERMOSET MOLDING COMPOSITES

25002
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.38	1.38
Molding Shrinkage* (D955)	0.0130 in/in	0.0130 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	32,000 psi	220 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.33 ft lb/in	18 J/m
Deflection Temperature (D648)	330 °F	165 °C
Water Absorption (D570)	.30 %	.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.5	0.5
@ 1 KHZ	0.2	0.2
@ 1 MHZ	0.07	0.07
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

25016
Black Phenolic

Durez 25016 Black phenolic is a two stage, heat resistant/electrical molding material. It exhibits good molded appearance and shock resistance for use on a wide variety of electrical and appliance applications. Durez 25016 will withstand intermittent exposure to 500°F.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.65
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant/ Electrical
(500 F)

Agency Recognition

ASTM Type 13
Underwriters Laboratory

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.47	1.47
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	370 °F	188 °C
Water Absorption (D570)	0.3 %	0.3 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.06	.06
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.2	6.2
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.47	1.47
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.3 %	0.3 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.20	.20
@ 1 MHZ	.07	.07
Dielectric Constant (D150)		
@ 60 HZ	13.0	13.0
@ 1 KHZ	8.5	8.5
@ 1 MHZ	5.7	5.7
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI) - 190V



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DUREZ THERMOSET MOLDING COMPOSITES

25152
Black Phenolic

Durez 25152 Black phenolic is a two stage, general purpose molding material. With a Tracking Index of 175+ volts, it is recommended for wiring device applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.62
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700, Type 2
Underwriters Laboratories

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.42	1.42
Molding Shrinkage* (D955)	0.0060 in/in	0.0060 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.35 ft lb/in	18 J/m
Deflection Temperature (D648)	370 °F	187 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.08	.08
@ 1 KHZ	.05	.05
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.7	6.7
@ 1 KHZ	6.0	6.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0090 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

25152
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.42	1.42
Molding Shrinkage* (D955)	0.0130 in/in	0.0130 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.33 ft lb/in	17.6 J/m
Deflection Temperature (D648)	310 °F	155 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	250 V/mil	9.8 MV/m
Step by Step	225 V/mil	8.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.2	0.2
@ 1 KHZ	0.2	0.2
@ 1 MHZ	0.06	0.06
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	7.2	7.2
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	5 X 10 ¹² ohm cm	5 X 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC TRACKING INDEX (CTI) 175 Volts



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DUREZ THERMOSET MOLDING COMPOSITES

25352
Black Phenolic

Durez 25352 is a two stage, heat resistant molding material. It is designed to provide an excellent balance of thermal, electrical, and dimensional properties.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM Type 13
Underwriters Laboratories

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.53	1.53
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	26,000 psi	182 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	.25 %	.25 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.14	0.14
@ 1 KHZ	0.07	0.07
@ 1 MHZ	0.05	0.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.006 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.53	1.53
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	25,000 psi	172 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	335 °F	169 °C
Water Absorption (D570)	.25 %	.25 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	225 V/mil	8.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.40	0.40
@ 1 KHZ	0.20	0.20
@ 1 MHZ	0.07	0.07
Dielectric Constant (D150)		
@ 60 HZ	14.0	14.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 Volts
ASTM D-495 Arc Resistance 120 Sec.



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DUREZ THERMOSET MOLDING COMPOSITES

25378
Black Phenolic

Durez 25378 Black is a two stage heat resistant / electrical grade molding material having an excellent molded finish, low shrinkage and good heat resistance. Durez 25378 has exceptional U.L. flammability ratings and good comparative tracking index.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.68
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM Type 10, 13, 22
Underwriters Laboratories

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.61	1.61
Molding Shrinkage* (D955)	0.004 in/in	0.004 m/m
Tensile Strength (D638)	6,500 psi	44 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	23,000 psi	158 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	425 V/mil	16.7 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.15	.15
@ 1 KHZ	.08	.08
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	7.4	7.4
@ 1 KHZ	6.1	6.1
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is .0050 in/in or m/m

See reverse for injection molding values.

May 1999

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.61	1.61
Molding Shrinkage* (D955)	0.0085 in/in	0.0085 m/m
Tensile Strength (D638)	7,800 psi	54 Mpa
Flexural Strength (D790)	13,000 psi	89 Mpa
Compressive Strength (D695)	24,000 psi	165 Mpa
Tensile Modulus (D638)	1.9 x 10 ⁶ psi	13.1 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	375 °F	190 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.45	.45
@ 1 KHZ	.22	.22
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	14.0	14.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	5.6	5.6
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI) 220 Volts
ASTM D-495 Arc Resistance 180 Sec.



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DUREZ THERMOSET MOLDING COMPOSITES

25450
Black Phenolic

Durez 25450 is a two stage impact molding compound designed for improved heat resistance and mechanical strength. This material can be compression, transfer, and injection molded.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Impact

Agency Recognition

Underwriters Laboratories
ASTM D700, Type 9
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.062"
94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	24,000 psi	165 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.6 Gpa
Izod Impact (D256)	0.55 ft lb/in	27 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.7 %	0.7 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.10	0.10
@ 1 KHZ	0.06	0.06
@ 1 MHZ	0.05	0.05
Dielectric Constant (D150)		
@ 60 HZ	7.4	7.4
@ 1 KHZ	6.6	6.6
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is .008 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

25450
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	6,800 psi	47 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	23,000 psi	160 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	325 °F	163 °C
Water Absorption (D570)	0.7 %	0.7 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	225 V/mil	8.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.40	0.40
@ 1 KHZ	0.20	0.20
@ 1 MHZ	0.07	0.07
Dielectric Constant (D150)		
@ 60 HZ	12.5	12.5
@ 1 KHZ	9.6	9.6
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1.0 x 10 ¹² ohm cm	1.0 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

29053
Black Phenolic

Durez 29053 Black Phenolic is a glass and mineral filled two-stage, special purpose molding material. It is specially designed for applications that require good heat resistance, strength, electrical properties, and dimensional stability. Typical applications include connectors, computer components, and automobile transmission parts.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.95
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special purpose (glass filled)

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ .050"
94V-5 @ .050"
Mil-M-14G, Type MFH
ASTM D700 Type 9

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.93	1.93
Molding Shrinkage* (D955)	0.0020 in/in	0.0020 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	13,000 psi	90 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	2.4 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.03	.03
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.7	5.7
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.002 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

29053
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.93	1.93
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	10,000 psi	69 Mpa
Flexural Strength (D790)	16,000 psi	110 Mpa
Compressive Strength (D695)	33,000 psi	228 Mpa
Tensile Modulus (D638)	2.4 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	425 V/mil	16.7 MV/m
Step by Step	375 V/mil	14.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.06	0.06
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.7	5.7
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 v.	ASTM D-495 Arc Resistance: 180 sec.
Coefficient of Thermal Expansion °C x 10 ⁻⁶ -40°C to 26°C	14.8
Coefficient of Thermal Conductivity x 10 ⁻⁴ 30°C to 140°C	17.3
	Cal/(sec)(CM ²)(°C/CM)
Specific Heat Cal/GM/°C	11.1
	0.25
Shear Strength PSI as Molded	12,000 82 MPA
Shear Strength PSI After Bake 16 hrs. @ 350°F	13,000 89 MPA
Tested @ 300°F	7,500 51 MP



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DUREZ THERMOSET MOLDING COMPOSITES

29237
Black Phenolic

Durez 29237 Black Phenolic is a two stage, medium impact molding material having excellent molding qualities. It has excellent impact strength for a granular phenolic.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.52
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Impact

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.24"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.36	1.36
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	9,000 psi	62 Mpa
Compressive Strength (D695)	25,000 psi	172 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.55 ft lb/in	29 J/m
Deflection Temperature (D648)	330 °F	166 °C
Water Absorption (D570)	1.2 %	1.2 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.05	.05
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	5.8	5.8
@ 1 KHZ	5.3	5.3
@ 1 MHZ	4.5	4.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.36	1.36
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	9,000 psi	62 Mpa
Compressive Strength (D695)	25,000 psi	172 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	275 °F	135 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	200 V/mil	7.9 MV/m
Step by Step	125 V/mil	4.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.55	.55
@ 1 KHZ	.25	.25
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	15.2	15.2
@ 1 KHZ	8.5	8.5
@ 1 MHZ	5.3	5.3
Volume Resistivity (D257)	1 x 10 ¹⁰ ohm cm	1 x 10 ⁸ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Durez 29237 is Fungus resistant per Mil-E-5272C.



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DUREZ THERMOSET MOLDING COMPOSITES

29502
Brown Phenolic

Durez 29502 Brown Phenolic is a two stage, glass filled, special purpose molding material. It is formulated for close tolerance applications such as transmission valve bodies, and disc brake pistons where good dimensional stability and compatibility with transmission and brake fluid is essential. This product can be ground to accurate finished dimensions.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Mil-M-14-G, Type MFH

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.12	2.12
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	3.0 x 10 ⁶ psi	20.7 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	2.11	2.11
Molding Shrinkage* (D955)	0.0052 in/in	0.0052 m/m
Tensile Strength (D638)	8,900 psi	61 Mpa
Flexural Strength (D790)	13,550 psi	92 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.7 x 10 ⁶ psi	11.7 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	325 °F	162 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Linear Coefficient of Thermal Expansion (30-60°C Range): 14 x 10⁻⁶ cm/cm/°C

***** Injection Values are Tentative *****



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DUREZ THERMOSET MOLDING COMPOSITES

30190
Brown Phenolic

Durez 30190 Phenolic is a two stage, mineral and glass filled, special purpose molding material. It is formulated for applications requiring good dimensional stability and high heat resistance.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.12	2.12
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	2.75 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

30417
Black Phenolic

Durez 30417 Black Phenolic is a single stage, non-bleeding molding material. It is specially formulated for pourability, fast cure and good appearance for closure applications. It is recommended that this material be compression molded.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.63
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Non-Bleeding

Agency Recognition

ASTM D700, Type 11-SS

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.41	1.41
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	200 V/mil	7.9 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.15	.15
@ 1 KHZ	.06	.06
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	7.5	7.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	--- psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	-- °F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

30725
Black Phenolic

Durez 30725 Black Phenolic is a two stage, general purpose molding material. with a tracking Index of 175+ volts, it is recommended for wiring device applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.61
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.24"

Plasticities available for compression, transfer, and injection molding. Durez 30725 is also available in brown.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	15.1 Gpa
Izod Impact (D256)	0.35 ft lb/in	18 J/m
Deflection Temperature (D648)	325 °F	163 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.08	.08
@ 1 KHZ	.06	.06
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	5.8	5.8
@ 1 KHZ	5.4	5.4
@ 1 MHZ	4.8	4.8
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.010 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.6 %	0.6 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.4	0.4
@ 1 KHZ	0.1	0.1
@ 1 MHZ	0.5	0.5
Dielectric Constant (D150)		
@ 60 HZ	9.6	9.6
@ 1 KHZ	6.9	6.9
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 175+ voltes



Occidental Chemical Corporation
Durez Division
 5005 LBJ Freeway, Dallas, TX 75380-9050

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DUREZ THERMOSET MOLDING COMPOSITES

30948
Black Phenolic
tentative

Durez 30948 Black Phenolic is two-stage, general purpose molding material. With good mechanical properties, it is suitable for many diverse applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.36 ft lb/in	19 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	250 V/mil	9.8 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

30948
Black Phenolic
tentative

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	330 °F	165 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.52	.52
@ 1 KHZ	.26	.26
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	15.0	15.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	7 x 10 ¹² ohm cm	7 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

30953
Black Phenolic
* Restricted *

Durez 30953 Black Phenolic is a two-stage, heat resistant/electrical molding material. It exhibits excellent dimensional stability, high heat resistance, good molded appearance, and UL flammability rating.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.65
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM D700 Type 13
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.020"
94V-0 @ 0.040"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.58	1.58
Molding Shrinkage* (D955)	0.004 in/in	0.004 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	28,500 psi	196 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.12	.12
@ 1 KHZ	.08	.08
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.006 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

30953
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.54	1.54
Molding Shrinkage* (D955)	0.0080 in/in	0.0080 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	28,000 psi	194 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.18	.18
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 180 V.
ASTM D-495 Arc Resistance: 180 sec.
Durez 30953 is Fungus Resistant per Mil-E-5272C.



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DUREZ THERMOSET MOLDING COMPOSITES

31228
Black Phenolic

Durez 31228 Black Phenolic is a two stage, heat resistant/electrical grade molding material. Specially formulated to offer excellent heat resistance and dimensional stability, it maintains 50% of its strength after 1000 hrs. @ 425°F. It offers excellent gloss and lustrous finish for appearance parts and molds well on compression, transfer, and injection molds.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.70
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM D700 Type 13
UL Temperature Index:160°C @0.12"
UL Temperature Index:170°C @0.24"
UL Flammability: 94V-0 @ 0.04"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.60	1.60
Molding Shrinkage* (D955)	0.004 in/in	0.004 m/m
Tensile Strength (D638)	5,000 psi	34 Mpa
Flexural Strength (D790)	8,000 psi	55 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.12	.12
@ 1 KHZ	.08	.08
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@1 KHZ	6.7	6.7
@1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.005 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.58	1.58
Molding Shrinkage* (D955)	0.0060 in/in	0.0060 m/m
Tensile Strength (D638)	5,500 psi	38 Mpa
Flexural Strength (D790)	8,500 psi	59 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.27 ft lb/in	14 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	350 V/mil	13.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.20	.20
@ 1 KHZ	.10	.10
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	8.0	8.0
@ 1 KHZ	7.0	7.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 v.
ASTM D-495 Arc Resistance: 180 sec.



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DUREZ THERMOSET MOLDING COMPOSITES

31342
Black Phenolic
* Restricted *

Durez 31342 Phenolic is a two stage, general purpose molding material. This material is designed to provide a balance of mechanical properties for selective applications. It has good molding latitude in compression, transfer, and injection molding.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
U.L. Temperature Index of 150°C

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.7 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	400 V/mil	15.7 MV/m
Step by Step	350 V/mil	13.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.05	.05
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	5.9	5.9
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31342
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.31 ft lb/in	16 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	225 V/mil	8.8 MV/m
Step by Step	175 V/mil	6.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.65	.65
@ 1 KHZ	.35	.35
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	17.0	17.0
@ 1 KHZ	9.5	9.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹¹ ohm cm	1 x 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

31345

Black Phenolic
* Restricted *

Durez 31345 Phenolic is a two stage, heat resistant molding material. It is specially formulated to provide an excellent balance of thermal, electrical, and dimensional properties, making it an excellent choice for electrical and appliance applications.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	0.70
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant/Electrical

Agency Recognition

ASTM D700 Type 13

U.L. temperature Index of 150°C

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.49	1.49
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.6 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.07	.07
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.0	6.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31345
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.49	1.49
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.50	.50
@ 1 KHZ	.30	.30
@ 1 MHZ	.10	.10
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 volts



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DUREZ THERMOSET MOLDING COMPOSITES

31354
Black Phenolic

Durez 31354 Black phenolic is a two stage, general purpose molding material. This material is designed to provide a balance of mechanical properties for selective applications. It has good molding latitude in compression, and injection molding.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
Underwriters Laboratory

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.35	1.35
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	9,500 psi	66 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	370 °F	188 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.15	.15
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.7	6.7
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.010 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.35	1.35
Molding Shrinkage* (D955)	0.0120 in/in	0.0120 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	25,000 psi	172 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.25 ft lb/in	13 J/m
Deflection Temperature (D648)	320 °F	160 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	150 V/mil	5.9 MV/m
Step by Step	125 V/mil	4.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.50	.50
@ 1 KHZ	.40	.40
@ 1 MHZ	.10	.10
Dielectric Constant (D150)		
@ 60 HZ	40.0	40.0
@ 1 KHZ	16.0	16.0
@ 1 MHZ	8.0	8.0
Volume Resistivity (D257)	1 x 10 ¹¹ ohm cm	1 x 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F
 Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

31356
Black Phenolic
* Restricted *

Durez 31356 Phenolic is a two-stage, heat resistant / electrical grade molding material. This material is designed to provide a balance of mechanical, heat resistance and electrical properties. With its good surface finish, it is well suited for the appliance industry. This material has good barrel life and molding latitude.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.68
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM D-700, Type 13
U.L. Temperature index of 160°C
U.L. Flammability: 94V-1 @ 0.058"
94V-0 @ 0.120"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.7 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.07	.07
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.0	6.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31356
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.20	.20
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	7.6	7.6
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

31701
Black Phenolic
* Restricted *

Durez 31701 Black Phenolic is a two stage, heat resistant/electrical grade molding material. Durez 31701 has good appearance and molds well in live sprue and tunnel gates.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant /Electrical

Agency Recognition

U.L. Temperature Index of 155°C
U.L. Flammability: 94 V-1 @ 0.040"
94 V-0 @ 0.058"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.53	1.53
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	26,000 psi	179 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.37 ft lb/in	20 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.04	.04
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.0	6.0
@ 1 KHZ	5.5	5.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31701
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.6 x 10 ⁶ psi	11.0 Gpa
Izod Impact (D256)	0.29 ft lb/in	15 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.45	0.45
@ 1 KHZ	0.15	0.15
@ 1 MHZ	0.05	0.05
Dielectric Constant (D150)		
@ 60 HZ	9.0	9.0
@ 1 KHZ	6.8	6.8
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

ASTM D-495 Arc Resistance: 182 seconds
IEC Tracking Index (CTI): 225 v.



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DUREZ THERMOSET MOLDING COMPOSITES

31735
Black Phenolic

Durez 31735 is a special purpose phenolic molding compound developed for automotive and industrial pulleys. This material is designed to optimize pulley performance relating to belt life, dimensional tolerance, impact strength, and other properties required in pulley applications.

Molding Properties:

Bulk Factor (D1895)	2.9
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special

Agency Recognition

ASTM D700 Type 12

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.52 ft lb/in	28 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.20	.20
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	7.5	7.5
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31735
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	12,500 psi	86 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	325 °F	163 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.44	.44
@ 1 KHZ	.17	.17
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	9.2	9.2
@ 1 KHZ	7.2	7.2
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Poisson's Ratio 0.33	* Young's Modulus 1.16 x 10 ⁶	* Flexural Modulus 1.2 x 10 ⁶
Coefficient of Thermal Conductivity Cal/(Sec)(CM ²)(°C/CM) x 10 ⁻⁴		8.8 Cenco Fitch
Coefficient of Thermal Expansion x 10 ⁻⁶ °DC Range 30 - 150°C		36.0 ASTM D696
Specific Heat, Cal/°C/Gram		0.28 Astm C351
Heat Resistance, 2 Hrs. at Temp.		450°F
Long Term Heat Test 350°F	As Is	1000 Hours
	Flexure (psi)	11,700
	Tensile (psi)	8,200
		6,400
		5,300



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DUREZ THERMOSET MOLDING COMPOSITES

31906
Black Phenolic

Durez 31906 Black Phenolic is a medium impact, molding compound. It is designed for applications where additional mechanical strength is required.

Molding Properties:

Bulk Factor (D1895)	2.9
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Impact

Agency Recognition

ASTM D700 Type 12
Underwriters Laboratories
Flammability 94HB @ 0.060"
94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	13,000 psi	90 Mpa
Compressive Strength (D695)	31,000 psi	214 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.65 ft lb/in	35 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.25	.25
@ 1 KHZ	.10	.10
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	10 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.007 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31906
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	8,500 psi	59 Mpa
Flexural Strength (D790)	13,000 psi	90 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.40 ft lb/in	191 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.25	.25
@ 1 MHZ	.08	.08
Dielectric Constant (D150)		
@ 60 HZ	20.0	20.0
@ 1 KHZ	10.0	10.0
@ 1 MHZ	6.5	6.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32110
Black Phenolic

Durez 32110 Black Phenolic is a single stage, special purpose molding material. It is designed for automotive applications where additional mechanical strength, such as impact strength, is required.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	3 Months

Material Type:

Special Purpose - Impact

Agency Recognition

ASTM D700 Type 12

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.45	1.45
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,600 psi	52 Mpa
Flexural Strength (D790)	10,300 psi	71 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	10.8 MV/m
Step by Step	250 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.27	0.27
@ 1 KHZ	0.11	0.11
@ 1 MHZ	0.06	0.06
Dielectric Constant (D150)		
@ 60 HZ	9.6	9.6
@ 1 KHZ	6.7	6.7
@ 1 MHZ	5.3	5.3
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.007 in/in or m/m

See reverse for injection molding values.

February 1998

DUREZ THERMOSET MOLDING COMPOSITES

32110
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.45	1.45
Molding Shrinkage* (D955)	0.0080 in/in	0.0080 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	12,000 psi	82 Mpa
Compressive Strength (D695)	28,000 psi	192 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	225 V/mil	8.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.43	0.43
@ 1 KHZ	0.21	0.21
@ 1 MHZ	0.07	0.07
Dielectric Constant (D150)		
@ 60 HZ	14.0	14.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	5.8	5.8
Volume Resistivity (D257)	7.5 x 10 ¹² ohm cm	7.5 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32245
Black Phenolic

Durez 32245 Black Phenolic is a two-stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. Typical applications include heavy duty switch gear, connectors, and commutators.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	0.85
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special Purpose (glass filled)

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0025 in/in	0.0025 m/m
Tensile Strength (D638)	10,000 psi	69 Mpa
Flexural Strength (D790)	15,000 psi	103 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.70 ft lb/in	38 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.7 MV/m
Step by Step	350 V/mil	13.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.04	.04
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	12,500 psi	86 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.06	0.06
@ 1 KHZ	0.04	0.04
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Post Bake Properties - 8 Hours @ 350°F



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DUREZ THERMOSET MOLDING COMPOSITES

32424
Black Phenolic

Durez 32424 Black Phenolic is a single stage, electrical grade molding material. It is recommended for electrical applications where the absence of ammonia out gassing is required to prevent corrosion of metal contacts.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.62
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Electrical

Agency Recognition

Underwriters Laboratories
ASTM Type, 2 SS

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0055 in/in	0.0055 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	9,000 psi	62 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.26 ft lb/in	14 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.05	.05
@ 1 KHZ	.04	.04
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.0	6.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0070 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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Durez Division

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DUREZ THERMOSET MOLDING COMPOSITES

32633
Black Phenolic

Durez 32633 Black Phenolic is a two-stage, glass filled, special purpose molding compound. It is designed for applications requiring high physical strengths, dimensional stability, and heat resistance. Typical applications include small motor and gear housings, brush holders, commutators, and under hood automotive applications.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.77	1.77
Molding Shrinkage* (D955)	0.0015 in/in	0.0015 m/m
Tensile Strength (D638)	17,500 psi	120 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	50,000 psi	345 Mpa
Tensile Modulus (D638)	2.3 x 10 ⁶ psi	15.8 Gpa
Izod Impact (D256)	0.90 ft lb/in	48 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.6 MV/m
Step by Step	400 V/mil	15.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.03	.03
@ 1 KHZ	.02	.02
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	4.4	4.4
@ 1 KHZ	4.4	4.4
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0030 in/in or m/m

See reverse for injection molding values.

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Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.78	1.78
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	33,000 psi	228 Mpa
Compressive Strength (D695)	40,000 psi	276 Mpa
Tensile Modulus (D638)	2.7 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.75 ft lb/in	40 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.6 MV/m
Step by Step	400 V/mil	15.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.03	.03
@ 1 KHZ	.02	.02
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	4.4	4.4
@ 1 KHZ	4.4	4.4
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Compressive Modulus @250°F (psi x 10 ⁶)	1.53
Flexural Modulus @73°F (psi x 10 ⁶)	2.2
Shear strength (psi)	6870



DUREZ THERMOSET MOLDING COMPOSITES

32694
Black Phenolic

Durez 32694 Black Phenolic is a medium impact, molding compound. It is designed for applications where excellent mechanical strength is required.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Impact

Agency Recognition

ASTM D700, Type 12

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0065 in/in	0.0065 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	14,000 psi	96 Mpa
Compressive Strength (D695)	34,000 psi	234 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.47 ft lb/in	25 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.25	0.25
@ 1 KHZ	0.10	0.10
@ 1 MHZ	0.06	0.06
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32694
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32875
Brown Phenolic

Durez 32875 Brown Phenolic is a two stage, glass and mineral filled molding compound. It is formulated for close tolerance applications such as disk brake pistons, where good dimensional stability and compatibility with under hood fluid and brake fluid is essential. This product has superior thermal properties and wear characteristics in brake calipers of the latest design.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.12	2.12
Molding Shrinkage* (D955)	.001 in/in	.001 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	3 x 10 ⁶ psi	20.7 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	425 °F	218 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	14 MV/m
Step by Step	320 V/mil	13 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
 Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32945
Black Phenolic

Durez 32945 is a special purpose phenolic molding compound developed for automotive pulleys. This material is designed for optimal performance, belt life, dimensional tolerance, strength and properties required in pulley applications.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special

Agency Recognition

ASTM D700, Type 12

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.46	1.46
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.20	.20
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	7.5	7.5
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32962
Black Phenolic
Tentative

Durez 32962 Black Phenolic is a medium impact, molding compound. It is designed for applications where additional mechanical strength is required. Typical applications include appliance housings where strength and appearance are important.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Impact

Agency Recognition

ASTM D700, Type 12

Plasticities available for compression, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.45	1.45
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32962
Black Phenolic
Tentative

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.45	1.45
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	250 V/mil	9.8 MV/m
Step by Step	225 V/mil	8.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32966
Black Phenolic
Tentative

Durez 32966 black Phenolic is a medium impact molding compound. It is designed for applications where mechanical strength is required. It has excellent dimensional stability.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.56
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Impact

Agency Recognition

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0065 in/in	0.0065 m/m
Tensile Strength (D638)	10,000 psi	69 Mpa
Flexural Strength (D790)	15,000 psi	103 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	1 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.55 ft lb/in	29 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32966
Black Phenolic
Tentative

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32971
Brown Phenolic
* Tentative *

Durez 32971 brown phenolic is a two stage, mineral and glass filled molding compound. It is formulated for close tolerance applications where good dimensional stability and heat resistance is required.

Molding Properties:

Bulk Factor (D1895)	2.01
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.12	2.12
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	3.0 x 10 ⁶ psi	20.7 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	425 °F	218 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	14 MV/m
Step by Step	320 V/mil	13 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is .004 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32971
Brown Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	2.11	2.11
Molding Shrinkage* (D955)	0.0050 in/in	0.0050 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	13,000 psi	90 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.7 x 10 ⁶ psi	11.7 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	375 °F	190 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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Durez Division
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DUREZ THERMOSET MOLDING COMPOSITES

32973
Black Phenolic
* Tentative *

Durez 32973 black phenolic is a glass and mineral filled molding compound specially formulated for excellent wear resistance for idler pulleys. It exhibits high strength, and low thermal conductivity, and it works well in dusty environments.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.78
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.003 in/in	0.003 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	15,000 psi	103 Mpa
Compressive Strength (D695)	32,000 psi	220 Mpa
Tensile Modulus (D638)	1.6 x 10 ⁶ psi	11.0 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	176 °C
Water Absorption (D570)	0.10 %	0.10 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.03	.03
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.7	5.7
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.003 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32973
Black Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	15,000 psi	103 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.6 x 10 ⁶ psi	11.0 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	325 °F	162 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.11	.11
@ 1 KHZ	.06	.06
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.3	6.3
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



Occidental Chemical Corporation

Durez Division

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DUREZ THERMOSET MOLDING COMPOSITES

32986
Black Phenolic
* Tentative *

Durez 32986 black is a cellulose filled phenolic molding material specially formulated for dimensionally stability, both short and long term, wear resistance and low specific gravity. These properties make it the ideal choice for the very demanding application of automotive idler pulleys.

Molding Properties:

Bulk Factor (D1895)	2.9
Apparent Density (g/cc)(D1895)	.50
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	7.0 Gpa
Izod Impact (D256)	0.50 ft lb/in	26.7 J/m
Deflection Temperature (D648)	375 °F	190 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.25	.25
@ 1 KHZ	.10	.10
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.006 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32986
Black Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32996
Black Phenolic
* Tentative *

Durez 32996 Black Phenolic is a glass and mineral filled two-stage, special purpose molding material. It is specially designed for applications that require good heat and chemical resistance, electrical properties, and dimensional stability. Typical applications include connectors, computer components, and automotive parts.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.95
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.90	1.90
Molding Shrinkage* (D955)	0.002 in/in	0.002 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.10 %	0.10 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.03	.03
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.7	5.7
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.002 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32996
Black Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.90	1.90
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	14,000 psi	96 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	2.8 x 10 ⁶ psi	19.3 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.10 %	0.10 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	425 V/mil	16.7 MV/m
Step by Step	375 V/mil	14.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.11	.11
@ 1 KHZ	.06	.06
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.3	6.3
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 v. ASTM D-495 Arc Resistance: 180 sec.



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DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 350 P
Brown Phenolic
* Tentative *

Durez 350 P is a two stage, mineral and glass filled, special purpose molding compound. It is designed for brake piston applications where improved dimensional stability and surface finish are required.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.10	2.10
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	2.7 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	375 °F	176 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 350 P
Brown Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 400 P
Brown Phenolic
* Tentative *

Durez 400 P is a glass and mineral filled, single stage molding compound designed for use in automotive disk brake pistons. It is formulated for dimensional stability and heat resistance and is designed to withstand short term exposures to 400°C.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	2.10	2.10
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	7,250 psi	50 Mpa
Flexural Strength (D790)	12,750 psi	88 Mpa
Compressive Strength (D695)	35,000 psi	240 Mpa
Tensile Modulus (D638)	2.8 x 10 ⁶ psi	19.0 Gpa
Izod Impact (D256)	0.38 ft lb/in	20 J/m
Deflection Temperature (D648)	525 °F	275 °C
Water Absorption (D570)	0.01 %	0.01 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 400 P
Brown Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 450 P
Brown Phenolic
* Tentative *

Durez 450 P Brown phenolic is a two-stage, glass and mineral filled, special purpose molding compound. It is formulated for close tolerance applications such as automotive disc brake pistons, where good dimensional stability and exceptional heat resistance are necessary.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	1.05
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.08	2.08
Molding Shrinkage* (D955)	.002 in/in	.002 m/m
Tensile Strength (D638)	11,000 psi	76 Mpa
Flexural Strength (D790)	18,000 psi	124 Mpa
Compressive Strength (D695)	48,000 psi	330 Mpa
Tensile Modulus (D638)	3.0 x 10 ⁶ psi	20.7 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 450 P
Brown Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Tg = 575°F (302°C)
CLTE = 24.3 in/in/°F (13.5 m/m/°C)



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-2951J
Black Phenolic

Durez "SUMIKON" PM-2951J black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. Typical applications include brush holders, housings, and heat insulators.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.90
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0024 in/in or m/m

See reverse for injection molding values.

January 1998

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-2951J
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.77	1.77
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	16,000 psi	110 Mpa
Flexural Strength (D790)	29,000 psi	200 Mpa
Compressive Strength (D695)	43,000 psi	300 Mpa
Tensile Modulus (D638)	2.8 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.47 ft lb/in	25 J/m
Deflection Temperature (D648)	400 °F	205 °C
Water Absorption (D570)	0.06 %	0.06 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	460 V/mil	18 MV/m
Step by Step	406 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.20	0.20
@ 1 KHZ	0.07	0.07
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	8.1	8.1
@ 1 KHZ	6.7	6.7
@ 1 MHZ	5.6	5.6
Volume Resistivity (D257)	1 x 10 ¹¹ ohm cm	1 x 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Coefficient of Thermal Expansion: °C x 10⁻⁶ (23°-60°C) 22



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Durez Division

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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-2963
Black Phenolic

Durez "SUMIKON" PM-2963 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. PM-2963 is widely used in automotive applications. Typical applications include motor housings, brush holders, and heat insulators.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.90
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.032"
94V-0 @ 0.063"

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)

Short Time

Step by Step

V/mil

MV/m

V/mil

MV/m

Dissipation Factor (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Dielectric Constant (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Volume Resistivity (D257)

ohm cm

ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0025 in/in or m/m

See reverse for injection molding values.

August 1999

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-2963
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.78	1.78
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	33,000 psi	230 Mpa
Flexural Strength (D790)	17,000 psi	120 Mpa
Compressive Strength (D695)	44,000 psi	300 Mpa
Tensile Modulus (D638)	2.9 x 10 ⁶ psi	20 Gpa
Izod Impact (D256)	0.84 ft lb/in	45 J/m
Deflection Temperature (D648)	410 °F	210 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	430 V/mil	17 MV/m
Step by Step	380 V/mil	15 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.08	0.08
@ 1 KHZ	0.04	0.04
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	7.1	7.1
@ 1 KHZ	6.3	6.3
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Coefficient of Thermal Expansion: °C x 10⁻⁶ (23-60°C) 24
Rockwell Hardness (M scale): 120



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-5610

Black Phenolic
* Restricted *

Durez "SUMIKON" PM-5610 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. PM-5610 also has excellent wear resistance. Typical applications include clutch disks and pulleys.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.62
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

April 1999

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-5610
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.64	1.64
Molding Shrinkage* (D955)	0.0040 in/in	0.0040 m/m
Tensile Strength (D638)	17,000 psi	117 Mpa
Flexural Strength (D790)	26,000 psi	179 Mpa
Compressive Strength (D695)	36,000 psi	248 Mpa
Tensile Modulus (D638)	1.9 x 10 ⁶ psi	13 Gpa
Izod Impact (D256)	0.65 ft lb/in	35 J/m
Deflection Temperature (D648)	390 °F	200 °C
Water Absorption (D570)	0.15 %	0.15 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	360 V/mil	14 MV/m
Step by Step	300 V/mil	12 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.06	0.06
@ 1 KHZ	0.04	0.04
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.0	5.0
@ 1 KHZ	4.7	4.7
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6430
Black Phenolic

Durez "SUMIKON" PM-6430 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include commutators.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.70
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.85	1.85
Molding Shrinkage* (D955)	0.0015 in/in	0.0015 m/m
Tensile Strength (D638)	12,000 psi	83 Mpa
Flexural Strength (D790)	17,000 psi	117 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	2.2 x 10 ⁶ psi	15 Gpa
Izod Impact (D256)	0.90 ft lb/in	48 J/m
Deflection Temperature (D648)	440 °F	227 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	5.2	5.2
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.6	4.6
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6430
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.85	1.85
Molding Shrinkage* (D955)	0.0005 in/in	0.0005 m/m
Tensile Strength (D638)	15,000 psi	103 Mpa
Flexural Strength (D790)	17,000 psi	117 Mpa
Compressive Strength (D695)	26,000 psi	179 Mpa
Tensile Modulus (D638)	2.2 x 10 ⁶ psi	15 Gpa
Izod Impact (D256)	0.60 ft lb/in	32 J/m
Deflection Temperature (D648)	440 °F	227 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	5.2	5.2
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.6	4.6
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Comparative Tracking Index (CTI)	175 volts
Arc Resistance	170 sec.



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6440
Black Phenolic

Durez "SUMIKON" PM-6440 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include commutators for starter and other motors.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.70
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.83	1.83
Molding Shrinkage* (D955)	0.0020 in/in	0.0020 m/m
Tensile Strength (D638)	15,000 psi	103 Mpa
Flexural Strength (D790)	19,000 psi	131 Mpa
Compressive Strength (D695)	45,000 psi	310 Mpa
Tensile Modulus (D638)	2.7 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	1.00 ft lb/in	53 J/m
Deflection Temperature (D648)	450 °F	232 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	5.6	5.6
@ 1 KHZ	5.4	5.4
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6440
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.83	1.83
Molding Shrinkage* (D955)	0.0010 in/in	0.0010 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	30,000 psi	207 Mpa
Compressive Strength (D695)	40,000 psi	276 Mpa
Tensile Modulus (D638)	2.9 x 10 ⁶ psi	20 Gpa
Izod Impact (D256)	0.70 ft lb/in	37 J/m
Deflection Temperature (D648)	450 °F	232 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	5.6	5.6
@ 1 KHZ	5.4	5.4
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6600
Black Phenolic

Durez "SUMIKON" PM-6600 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include commutators and switch housings.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	0.85
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0034 in/in	0.0034 m/m
Tensile Strength (D638)	13,000 psi	90 Mpa
Flexural Strength (D790)	19,000 psi	131 Mpa
Compressive Strength (D695)	34,000 psi	234 Mpa
Tensile Modulus (D638)	2.2 x 10 ⁶ psi	15 Gpa
Izod Impact (D256)	0.80 ft lb/in	43 J/m
Deflection Temperature (D648)	380 °F	193 °C
Water Absorption (D570)	0.06 %	0.06 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	18 MV/m
Step by Step	400 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	4.4	4.4
@ 1 KHZ	4.4	4.4
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6600
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0025 in/in	0.0025 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	29,000 psi	200 Mpa
Compressive Strength (D695)	38,000 psi	262 Mpa
Tensile Modulus (D638)	2.2 x 10 ⁶ psi	15 Gpa
Izod Impact (D256)	0.75 ft lb/in	40 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.06 %	0.06 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	18 MV/m
Step by Step	400 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	4.4	4.4
@ 1 KHZ	4.4	4.4
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6930H
Black Phenolic

Durez "SUMIKON" PM-6930H black Phenolic is a single stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and toughness. It is suitable for applications with post inserts. Typical applications include commutators and slip rings.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	6 Months

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.84	1.84
Molding Shrinkage* (D955)	0.0015 in/in	0.0015 m/m
Tensile Strength (D638)	14,000 psi	97 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	34,000 psi	235 Mpa
Tensile Modulus (D638)	2.3 x 10 ⁶ psi	16 Gpa
Izod Impact (D256)	0.70 ft lb/in	37 J/m
Deflection Temperature (D648)	>570 °F	>300 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.8	4.8
Volume Resistivity (D257)	1 x 10 ¹⁴ ohm cm	1 x 10 ¹² ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6930H
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.84	1.84
Molding Shrinkage* (D955)	0.0005 in/in	0.0005 m/m
Tensile Strength (D638)	16,000 psi	110 Mpa
Flexural Strength (D790)	23,000 psi	159 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	2.0 x 10 ⁶ psi	14 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	500 °F	260 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.8	4.8
Volume Resistivity (D257)	1 x 10 ¹⁴ ohm cm	1 x 10 ¹² ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Comparative Tracking Index (CTI)	200 volts
Arc Resistance	181 sec.



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9501
Black Phenolic

Durez "SUMIKON" PM-9501 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. Typical applications include brush holders, housings, and heat insulators.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.76	1.76
Molding Shrinkage* (D955)	0.0020 in/in	0.0020 m/m
Tensile Strength (D638)	12,000 psi	83 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	2.0 x 10 ⁶ psi	14 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	18 MV/m
Step by Step	400 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.05	0.05
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.01	0.01
Dielectric Constant (D150)		
@ 60 HZ	5.0	5.0
@ 1 KHZ	4.7	4.7
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9501
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.76	1.76
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	18,000 psi	124 Mpa
Flexural Strength (D790)	29,000 psi	200 Mpa
Compressive Strength (D695)	42,000 psi	290 Mpa
Tensile Modulus (D638)	2.6×10^6 psi	18 Gpa
Izod Impact (D256)	0.47 ft lb/in	25 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	18 MV/m
Step by Step	400 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.05	0.05
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.01	0.01
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	4.7	4.7
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1×10^{13} ohm cm	1×10^{11} ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Coefficient of Thermal Expansion: °C x 10^{-6} (23°-60°C) 22



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9505
Black Phenolic

Durez "SUMIKON" PM-9505 black Phenolic is a two stage glass and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and low specific gravity. Typical applications include brake components.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)

Short Time

Step by Step

V/mil

MV/m

V/mil

MV/m

Dissipation Factor (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Dielectric Constant (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Volume Resistivity (D257)

ohm cm

ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

April 1999

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9505
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.58	1.58
Molding Shrinkage* (D955)	0.0045 in/in	0.0045 m/m
Tensile Strength (D638)	17,000 psi	117 Mpa
Flexural Strength (D790)	29,000 psi	200 Mpa
Compressive Strength (D695)	48,000 psi	331 Mpa
Tensile Modulus (D638)	2.0 x 10 ⁶ psi	14 Gpa
Izod Impact (D256)	0.37 ft lb/in	20 J/m
Deflection Temperature (D648)	390 °F	200 °C
Water Absorption (D570)	0.09 %	0.09 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	430 V/mil	17 MV/m
Step by Step	380 V/mil	15 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	4.2	4.2
@ 1 KHZ	4.0	4.0
@ 1 MHZ	3.9	3.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9610
Black Phenolic

Durez "SUMIKON" PM-9610 black Phenolic is a two stage glass and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and higher dimensional stability with excellent heat resistance. Typical applications include brush holders for high temperature, and timing pulleys.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	0.96
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.02	2.02
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	13,000 psi	90 Mpa
Flexural Strength (D790)	19,000 psi	131 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	3.7 x 10 ⁶ psi	26 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.03 %	0.03 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	380 V/mil	15 MV/m
Step by Step	250 V/mil	10 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9610
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	2.02	2.02
Molding Shrinkage* (D955)	0.0025 in/in	0.0025 m/m
Tensile Strength (D638)	14,000 psi	97 Mpa
Flexural Strength (D790)	25,000 psi	172 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	3.9 x 10 ⁶ psi	27 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	410 °F	210 °C
Water Absorption (D570)	0.03 %	0.03 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	380 V/mil	15 MV/m
Step by Step	250 V/mil	10 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630
Black Phenolic

Durez "SUMIKON" PM-9630 black Phenolic is a single stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include coil bobbins, switches, and brush holders.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.79
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	6 Months

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.016"

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)

Short Time

Step by Step

V/mil

MV/m

V/mil

MV/m

Dissipation Factor (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Dielectric Constant (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Volume Resistivity (D257)

ohm cm

ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

April 1999

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.82	1.82
Molding Shrinkage* (D955)	0.0025 in/in	0.0025 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	28,000 psi	193 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	2.4 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	450 °F	232 °C
Water Absorption (D570)	0.15 %	0.15 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	4.9	4.9
@ 1 KHZ	4.9	4.9
@ 1 MHZ	4.8	4.8
Volume Resistivity (D257)	1 x 10 ¹⁴ ohm cm	1 x 10 ¹² ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630
Brown Phenolic

Durez "SUMIKON" PM-9630 black Phenolic is a single stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include coil bobbins, switches, and brush holders.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.90
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.016"

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0020 in/in or m/m

See reverse for injection molding values.

January 1998

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630
Brown Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.82	1.82
Molding Shrinkage* (D955)	0.0040 in/in	0.0040 m/m
Tensile Strength (D638)	15,000 psi	100 Mpa
Flexural Strength (D790)	26,000 psi	180 Mpa
Compressive Strength (D695)	39,000 psi	270 Mpa
Tensile Modulus (D638)	2.7 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	480 °F	250 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	330 V/mil	13 MV/m
Step by Step	300 V/mil	12 MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630 (JK)

Black Phenolic

Durez "SUMIKON" PM-9630JK black Phenolic is a single stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and creep resistance. Typical applications include brush holders, coil bobbins, and thermostat housings.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.90
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.016"

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0020 in/in or m/m

See reverse for injection molding values.

January 1998

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630 (JK)
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.82	1.82
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	16,000 psi	110 Mpa
Flexural Strength (D790)	26,000 psi	180 Mpa
Compressive Strength (D695)	44,000 psi	300 Mpa
Tensile Modulus (D638)	2.7 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	>570 °F	>300 °C
Water Absorption (D570)	0.06 %	0.06 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	330 V/mil	13 MV/m
Step by Step	300 V/mil	12 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	8.2	8.2
@ 1 KHZ	7.7	7.7
@ 1 MHZ	7.1	7.1
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Coefficient of Thermal expansion: °C x 10⁻⁶ (23-60°C) 18
Arc Resistance: 182 Sec.
Tracking resistance (CTI): 190



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DUREZ THERMOSET MOLDING COMPOSITES

00110

Black Phenolic
* Restricted *

Durez 110 Black Phenolic is a two-stage, general purpose molding material. With good mechanical properties, it is suitable for many diverse applications. The injection grade material has exceptional molding latitude and barrel life. The compression grade preforms easily and has good flowability in the mold.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.36 ft lb/in	19 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	250 V/mil	9.8 MV/m
Step by Step	250 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

February 1998

DUREZ THERMOSET MOLDING COMPOSITES

00110
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1.0x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	330 °F	165 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.52	.52
@ 1 KHZ	.26	.26
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	15.0	15.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	7 x 10 ¹² ohm cm	7 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

00115
Black Phenolic

Durez 115 Black Phenolic is a two-stage, general purpose molding material. It exhibits improved flammability ratings, heat resistance and molded finish over the typical general purpose phenolic. It also offers extremely good dimensional stability in after-bake situations, making it an excellent choice for many appearance and appliance applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
U.L. Temperature Index: 150°C
U.L. Flammability: 94V-0 @ 0.120"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.39	1.39
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.6 Gpa
Izod Impact (D256)	0.33 ft lb/in	18 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.12	.12
@ 1 KHZ	.08	.08
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.5	6.5
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.39	1.39
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	33,000 psi	228 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.29 ft lb/in	15 J/m
Deflection Temperature (D648)	365 °F	185 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.50	.50
@ 1 KHZ	.25	.25
@ 1 MHZ	.08	.08
Dielectric Constant (D150)		
@ 60 HZ	13.5	13.5
@ 1 KHZ	9.0	9.0
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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Durez Division

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DUREZ THERMOSET MOLDING COMPOSITES

00118
Black Phenolic

Durez 118 Black Phenolic is a two-stage, general purpose molding material. It exhibits improved impact strength and resistance to flexural fatigue for demanding automotive, electrical and appliance applications. Shrinkage and mechanical strengths are closely controlled to meet part reliability requirements.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.12"
Mil-M-14G, Type CFG
ASTM D700 Type 2,3

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.7 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	400 V/mil	15.7 MV/m
Step by Step	350 V/mil	13.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.05	.05
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	5.9	5.9
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.31 ft lb/in	16 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	225 V/mil	8.8 MV/m
Step by Step	175 V/mil	6.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.65	.65
@ 1 KHZ	.35	.35
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	17.0	17.0
@ 1 KHZ	9.5	9.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹¹ ohm cm	1 x 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

00123
Black Phenolic

Durez 123 Black Phenolic is a two-stage, medium impact molding material. It exhibits versatile moldability, good machinability and improved shock resistance for applications such as electrical circuit breakers, automotive terminal blocks, and appliance motor bases and covers.

Molding Properties:

Bulk Factor (D1895)	2.8
Apparent Density (g/cc)(D1895)	0.50
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Medium Impact

Agency Recognition

ASTM D700 Type 3
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.24"
Mil-M-14G, Type CFG

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.37 ft lb/in	20 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.07	.07
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.2	6.2
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 X 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.3 X 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	200 V/mil	7.9 MV/m
Step by Step	175 V/mil	6.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.60	.60
@ 1 KHZ	.30	.30
@ 1 MHZ	.10	.10
Dielectric Constant (D150)		
@ 60 HZ	17.0	17.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 X 10 ¹¹ ohm cm	1 X 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Durez 123 is Fungus Resistant per Mil-I-631D and Mil-E-5272C.
Coefficient of Thermal Expansion: 30 to 60°C 41 in/in x10⁻⁶
Coefficient of Thermal Conductivity: Cal -CM/sec -CM⁻² °C 9.5 x 10⁻⁴
Specific Heat: Cal/gm/°C 0.316



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Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.20	.20
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	7.6	7.6
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking index (CTI): 190 V.
Durez 152 is Fungus resistant per Mil-I-631D and Mil-E-5272C.



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DUREZ THERMOSET MOLDING COMPOSITES

00153
Black Phenolic

Durez 153 Black Phenolic is a two-stage, heat resistant/electrical molding material. It exhibits good molded appearance and shock resistance for use on a wide variety of electrical and appliance applications.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

U.L. Temperature Index of 155°C
 U.L. Flammability: 94V-1 @ 0.040"
 94V-0 @ 0.058"
 Mil-M-14G, Type CFG

Plasticities available for compression, transfer, and injection molding. Durez 153 is also available in Brown.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.53	1.53
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	26,000 psi	179 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.37 ft lb/in	20 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.04	.04
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.0	6.0
@ 1 KHZ	5.5	5.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.6 x 10 ⁶ psi	11.0 Gpa
Izod Impact (D256)	0.29 ft lb/in	15 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.45	.45
@ 1 KHZ	.15	.15
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	9.0	9.0
@ 1 KHZ	6.8	6.8
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 225V



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DUREZ THERMOSET MOLDING COMPOSITES

00156
Black Phenolic

Durez 156 Black Phenolic is a two-stage, heat resistant/electrical molding material. It exhibits excellent dimensional stability, high heat resistance, excellent molded appearance, and UL flammability rating. Typical applications include automotive carburetor spacers, sealing rings, thrust washers, speedometer sleeves, appliance terminals, probe controls, insulators, light baffles, etc.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.65
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM D700 Type 13
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.020"
94V-0 @ 0.040"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.58	1.58
Molding Shrinkage* (D955)	0.004 in/in	0.004 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	28,500 psi	196 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.12	.12
@ 1 KHZ	.08	.08
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.006 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.54	1.54
Molding Shrinkage* (D955)	0.0080 in/in	0.0080 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	28,000 psi	194 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.18	.18
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 180 V.
ASTM D-495 Arc Resistance: 180 sec.
Durez 156 is Fungus Resistant per Mil-E-5272C.



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DUREZ THERMOSET MOLDING COMPOSITES

00791
Black Phenolic

Durez 791 Black Phenolic is a two-stage, general purpose molding material. It exhibits a balance of mechanical and electrical properties plus versatile moldability which account for its widespread use on many diverse applications. Durez 791 Black is an "industrial standard" for GP phenolic molding materials.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @0.24"
94HB @0.12"

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.36	1.36
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	330 °F	166 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.04	.04
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	5.6	5.6
@ 1 KHZ	5.3	5.3
@ 1 MHZ	4.6	4.6
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.010 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



Occidental Chemical Corporation
Durez Division
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DUREZ THERMOSET MOLDING COMPOSITES

02963
Black Phenolic

Durez 2963 Black Phenolic is a two stage, glass filled, special purpose molding compound. It is designed for applications requiring high physical strengths, dimensional stability, and heat resistance. Typical applications include small motor and gear housings, brush holders, commutators, and underhood automotive applications.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.75
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.78	1.78
Molding Shrinkage* (D955)	.0015 in/in	.0015 m/m
Tensile Strength (D638)	17,000 psi	120 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	50,000 psi	345 Mpa
Tensile Modulus (D638)	2.3 x 10 ⁶ psi	15.8 Gpa
Izod Impact (D256)	0.90 ft lb/in	48 J/m
Deflection Temperature (D648)	380 °F	193 °C
Water Absorption (D570)	0.1 %	0.1 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.6 MV/m
Step by Step	400 V/mil	15.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.04	.04
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.5	6.5
@ 1 KHZ	5.8	5.8
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is .0030 in/in or m/m

See reverse for injection molding values.

March 1990

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.78	1.78
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	30,000 psi	172 Mpa
Compressive Strength (D695)	40,000 psi	276 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17.2 Gpa
Izod Impact (D256)	0.80 ft lb/in	43 J/m
Deflection Temperature (D648)	370 °F	188 °C
Water Absorption (D570)	0.1 %	0.1 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.6 MV/m
Step by Step	375 V/mil	11.4 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.20	.20
@ 1 KHZ	.13	.13
@ 1 MHZ	.13	.13
Dielectric Constant (D150)		
@ 60 HZ	7.6	7.6
@ 1 KHZ	6.6	6.6
@ 1 MHZ	5.3	5.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

13856
AF Black Phenolic

Durez 13856 AF Black Phenolic is a single-stage, special purpose molding material. It exhibits excellent chemical resistance and steam cracking resistance along with good impact strength which makes it most suitable for applications exposed to harsh chemicals or wet/dry conditions. Typical applications include pump housings and impellers, spray nozzles, humidifier housings, chemical solution containers, etc.

Molding Properties:

Bulk Factor (D1895)	2.9
Apparent Density (g/cc)(D1895)	0.49
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	3 Months

Material Type:

Special Purpose

Agency Recognition

ASTM D700 Type 12-SS
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.44	1.44
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	9,500 psi	66 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.60 ft lb/in	32 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	175 V/mil	6.9 MV/m
Step by Step	175 V/mil	6.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.25	.25
@ 1 KHZ	.10	.10
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.007 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

13856
AF Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.46	1.46
Molding Shrinkage* (D955)	0.0075 in/in	0.0075 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	400 °F	205 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	175 V/mil	6.9 MV/m
Step by Step	125 V/mil	4.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.25	.25
@ 1 MHZ	.08	.08
Dielectric Constant (D150)		
@ 60 HZ	20.0	20.0
@ 1 KHZ	10.0	10.0
@ 1 MHZ	6.5	6.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 185 V.

Chemical Resistance*	Avg. Change in Weight and Dimensions		
	Weight	Thickness	Diameter
water	4.60	1.72	1.17
10% H ₂ SO ₄	4.45	1.72	1.08
0.5% NaOH	4.71	1.82	1.27
5% Soap	3.85	1.75	1.00

* Tested after 96 Hrs. in boiling solution (1/8" thk. x 2" dia. disc)



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DUREZ THERMOSET MOLDING COMPOSITES

18420
Black Phenolic

Durez 18420 Black Phenolic is a single-stage, non-bleeding molding material. It exhibits good pourability, fast cure, and good appearance for closure applications usually compression molded on automatic equipment.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.56
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Non-Bleeding

Agency Recognition

ASTM D700 Type 11-SS

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.37	1.37
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	370 °F	188 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	200 V/mil	7.9 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.15	.15
@ 1 KHZ	.06	.06
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	7.5	7.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

18441
Black Phenolic

Durez 18441 Black Phenolic is a single-stage, electrical grade molding material. It is recommended for electrical applications such as switch cases, coil forms, terminal plates, etc. where absence of ammonia out gassing is required to prevent corrosion of metal contacts. Due to its CTI of 180V, it is also recommended for wiring devices (damp and wet locations).

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.59
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Electrical

Agency Recognition

ASTM D700, Type 2-SS
 U.L. Temperature Index of 150°C
 U.L. Flammability: 94V-1 @ 0.120"
 94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.35	1.35
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.26 ft lb/in	14 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.05	.05
@ 1 KHZ	.03	.03
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	6.2	6.2
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.37	1.37
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	82 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.26 ft lb/in	14 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	.080 %	.080 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	150 V/mil	5.9 MV/m
Step by Step	100 V/mil	3.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.80	.80
@ 1 KHZ	.30	.30
@ 1 MHZ	.07	.07
Dielectric Constant (D150)		
@ 60 HZ	20.0	20.0
@ 1 KHZ	11.0	11.0
@ 1 MHZ	6.3	6.3
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 180V



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DUREZ THERMOSET MOLDING COMPOSITES

21206
Black Phenolic

Durez 21206 Black Phenolic is a two-stage, general purpose molding material. It is formulated for automatic compression molding where good pourability, fast cure, and easy part ejection are desired.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
U.L. Temperature Index of 150°C

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.35	1.35
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	9,500 psi	66 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.26 ft lb/in	14 J/m
Deflection Temperature (D648)	330 °F	166 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.08	.08
@ 1 KHZ	.04	.04
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	5.9	5.9
@ 1 KHZ	5.4	5.4
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	--- psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	-- °F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

150



DUREZ THERMOSET MOLDING COMPOSITES

21210
Black Phenolic

Durez 21210 Black Phenolic is a two-stage, electrical grade molding material. It exhibits good pourability, fast cure, good dimensional stability, and high strength for automotive Ignition applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Electrical

Agency Recognition

ASTM D700 Type 2

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.36	1.36
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	31,000 psi	214 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	320 °F	160 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.04	.04
@ 1 KHZ	.03	.03
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	5.4	5.4
@ 1 KHZ	5.1	5.1
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

February 1998

DUREZ THERMOSET MOLDING COMPOSITES

21210
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

21955
Black Phenolic

Durez 21955 Black is a two stage, phenolic molding material. It exhibits improved impact strength and resistance to flexural fatigue for demanding automotive applications. Shrinkage and mechanical strengths are closely controlled to meet part reliability requirements.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Improved Impact

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.41	1.41
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.7 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	400 V/mil	15.7 MV/m
Step by Step	350 V/mil	13.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.05	.05
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	5.9	5.9
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

February 1998

DUREZ THERMOSET MOLDING COMPOSITES

21955
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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Durez Division

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DUREZ THERMOSET MOLDING COMPOSITES

22257
Black Phenolic

Durez 22257 Black Phenolic is a two-stage, medium impact molding material. It is designed for appliance and electrical applications where additional mechanical strength is required. Typical applications include circuit breakers, small motor bases and housings, appliance panels, terminal blocks, barrier strips, etc.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.57
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Medium Impact

Agency Recognition

ASTM D700 Type 3, 12
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	27,500 psi	190 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.47 ft lb/in	25 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.08	.08
@ 1 KHZ	.05	.05
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.3	6.3
@ 1 KHZ	5.4	5.4
@ 1 MHZ	4.5	4.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

22257
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.39	1.39
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.45 ft lb/in	24 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	225 V/mil	8.9 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.55	.55
@ 1 KHZ	.30	.30
@ 1 MHZ	.08	.08
Dielectric Constant (D150)		
@ 60 HZ	16	16
@ 1 KHZ	9.5	9.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Durez 22257 is fungus resistant per Mil-I-631D and Mil-810 A/E-5272	
Coefficient of Thermal Expansion: °C x 10 ⁻⁶ 23°C to 60°C	42.2
Coefficient of Thermal Conductivity: Cal/(Sec)(CM ²)(°C/CM)x10 ⁻⁴	9.6
Specific Heat: Cal/gm/°C	0.34
Shear Strength, psi as molded	11,000
Dimensional Stability: Mil-M14, %	0.54



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DUREZ THERMOSET MOLDING COMPOSITES

23570
Black Phenolic

Durez 23570 Black Phenolic is a glass and mineral filled two-stage, special purpose molding material. It is designed for high strength, good dimensional stability, and electrical properties even after long term exposure to elevated temperatures. It is designed to meet the requirements of Mil-M-14G, Type MFH. Typical uses are connectors, automotive transmission components, computer parts and brush holders.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.058"
94V-5 @ 0.058"
Mil-M-14G, Type MFH

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.77	1.77
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	13,000 psi	90 Mpa
Flexural Strength (D790)	18,000 psi	124 Mpa
Compressive Strength (D695)	36,000 psi	248 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.50 ft lb/in	26 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	425 V/mil	16.7 MV/m
Step by Step	375 V/mil	14.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.04	.04
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	5.7	5.7
@ 1 KHZ	5.4	5.4
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.004 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

25002
Black Phenolic

Durez 25002 is a two-stage, general purpose molding material. It is designed for injection molding of applications requiring good mechanical strength and low water absorption.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	.56
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 - Type 2
Underwriters Laboratories

Plasticities available for injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

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DUREZ THERMOSET MOLDING COMPOSITES

25002
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.38	1.38
Molding Shrinkage* (D955)	0.0130 in/in	0.0130 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	32,000 psi	220 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.33 ft lb/in	18 J/m
Deflection Temperature (D648)	330 °F	165 °C
Water Absorption (D570)	.30 %	.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.5	0.5
@ 1 KHZ	0.2	0.2
@ 1 MHZ	0.07	0.07
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

25016
Black Phenolic

Durez 25016 Black phenolic is a two stage, heat resistant/electrical molding material. It exhibits good molded appearance and shock resistance for use on a wide variety of electrical and appliance applications. Durez 25016 will withstand intermittent exposure to 500°F.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.65
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant/ Electrical
(500 F)

Agency Recognition

ASTM Type 13
Underwriters Laboratory

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.47	1.47
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	370 °F	188 °C
Water Absorption (D570)	0.3 %	0.3 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.06	.06
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.2	6.2
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

25016
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.47	1.47
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.3 %	0.3 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.20	.20
@ 1 MHZ	.07	.07
Dielectric Constant (D150)		
@ 60 HZ	13.0	13.0
@ 1 KHZ	8.5	8.5
@ 1 MHZ	5.7	5.7
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI) - 190V



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DUREZ THERMOSET MOLDING COMPOSITES

25152
Black Phenolic

Durez 25152 Black phenolic is a two stage, general purpose molding material. With a Tracking Index of 175+ volts, it is recommended for wiring device applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.62
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700, Type 2
Underwriters Laboratories

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.42	1.42
Molding Shrinkage* (D955)	0.0060 in/in	0.0060 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.35 ft lb/in	18 J/m
Deflection Temperature (D648)	370 °F	187 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.08	.08
@ 1 KHZ	.05	.05
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.7	6.7
@ 1 KHZ	6.0	6.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0090 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

25152
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.42	1.42
Molding Shrinkage* (D955)	0.0130 in/in	0.0130 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.33 ft lb/in	17.6 J/m
Deflection Temperature (D648)	310 °F	155 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	250 V/mil	9.8 MV/m
Step by Step	225 V/mil	8.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.2	0.2
@ 1 KHZ	0.2	0.2
@ 1 MHZ	0.06	0.06
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	7.2	7.2
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	5 X 10 ¹² ohm cm	5 X 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC TRACKING INDEX (CTI) 175 Volts



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DUREZ THERMOSET MOLDING COMPOSITES

25352
Black Phenolic

Durez 25352 is a two stage, heat resistant molding material. It is designed to provide an excellent balance of thermal, electrical, and dimensional properties.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM Type 13
Underwriters Laboratories

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.53	1.53
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	26,000 psi	182 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	.25 %	.25 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.14	0.14
@ 1 KHZ	0.07	0.07
@ 1 MHZ	0.05	0.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.006 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.53	1.53
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	25,000 psi	172 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	335 °F	169 °C
Water Absorption (D570)	.25 %	.25 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	225 V/mil	8.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.40	0.40
@ 1 KHZ	0.20	0.20
@ 1 MHZ	0.07	0.07
Dielectric Constant (D150)		
@ 60 HZ	14.0	14.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 Volts
ASTM D-495 Arc Resistance 120 Sec.



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DUREZ THERMOSET MOLDING COMPOSITES

25378
Black Phenolic

Durez 25378 Black is a two stage heat resistant / electrical grade molding material having an excellent molded finish, low shrinkage and good heat resistance. Durez 25378 has exceptional U.L. flammability ratings and good comparative tracking index.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.68
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM Type 10, 13, 22
Underwriters Laboratories

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.61	1.61
Molding Shrinkage* (D955)	0.004 in/in	0.004 m/m
Tensile Strength (D638)	6,500 psi	44 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	23,000 psi	158 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	425 V/mil	16.7 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.15	.15
@ 1 KHZ	.08	.08
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	7.4	7.4
@ 1 KHZ	6.1	6.1
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is .0050 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.61	1.61
Molding Shrinkage* (D955)	0.0085 in/in	0.0085 m/m
Tensile Strength (D638)	7,800 psi	54 Mpa
Flexural Strength (D790)	13,000 psi	89 Mpa
Compressive Strength (D695)	24,000 psi	165 Mpa
Tensile Modulus (D638)	1.9 x 10 ⁶ psi	13.1 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	375 °F	190 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.45	.45
@ 1 KHZ	.22	.22
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	14.0	14.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	5.6	5.6
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI) 220 Volts
ASTM D-495 Arc Resistance 180 Sec.



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DUREZ THERMOSET MOLDING COMPOSITES

25450
Black Phenolic

Durez 25450 is a two stage impact molding compound designed for improved heat resistance and mechanical strength. This material can be compression, transfer, and injection molded.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Impact

Agency Recognition

Underwriters Laboratories
ASTM D700, Type 9
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.062"
94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	24,000 psi	165 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.6 Gpa
Izod Impact (D256)	0.55 ft lb/in	27 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.7 %	0.7 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.10	0.10
@ 1 KHZ	0.06	0.06
@ 1 MHZ	0.05	0.05
Dielectric Constant (D150)		
@ 60 HZ	7.4	7.4
@ 1 KHZ	6.6	6.6
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is .008 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

25450
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	6,800 psi	47 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	23,000 psi	160 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	325 °F	163 °C
Water Absorption (D570)	0.7 %	0.7 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	225 V/mil	8.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.40	0.40
@ 1 KHZ	0.20	0.20
@ 1 MHZ	0.07	0.07
Dielectric Constant (D150)		
@ 60 HZ	12.5	12.5
@ 1 KHZ	9.6	9.6
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1.0 x 10 ¹² ohm cm	1.0 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

29053
Black Phenolic

Durez 29053 Black Phenolic is a glass and mineral filled two-stage, special purpose molding material. It is specially designed for applications that require good heat resistance, strength, electrical properties, and dimensional stability. Typical applications include connectors, computer components, and automobile transmission parts.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.95
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special purpose (glass filled)

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ .050"
94V-5 @ .050"

Mil-M-14G, Type MFH
ASTM D700 Type 9

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.93	1.93
Molding Shrinkage* (D955)	0.0020 in/in	0.0020 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	13,000 psi	90 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	2.4 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.03	.03
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.7	5.7
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.002 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

29053
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.93	1.93
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	10,000 psi	69 Mpa
Flexural Strength (D790)	16,000 psi	110 Mpa
Compressive Strength (D695)	33,000 psi	228 Mpa
Tensile Modulus (D638)	2.4 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	425 V/mil	16.7 MV/m
Step by Step	375 V/mil	14.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.06	0.06
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.7	5.7
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 v.	ASTM D-495 Arc Resistance: 180 sec.
Coefficient of Thermal Expansion °C x 10 ⁻⁶ -40°C to 26°C	14.8
Coefficient of Thermal Conductivity x 10 ⁻⁴ 30°C to 140°C	17.3
	Cal/(sec)(CM ²)(°C/CM)
Specific Heat Cal/GM/°C	11.1
	0.25
Shear Strength PSI as Molded	12,000 82 MPA
Shear Strength PSI After Bake 16 hrs. @ 350°F	13,000 89 MPA
Tested @ 300°F	7,500 51 MP



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DUREZ THERMOSET MOLDING COMPOSITES

29237
Black Phenolic

Durez 29237 Black Phenolic is a two stage, medium impact molding material having excellent molding qualities. It has excellent impact strength for a granular phenolic.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.52
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Impact

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.24"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.36	1.36
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	9,000 psi	62 Mpa
Compressive Strength (D695)	25,000 psi	172 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.55 ft lb/in	29 J/m
Deflection Temperature (D648)	330 °F	166 °C
Water Absorption (D570)	1.2 %	1.2 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.05	.05
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	5.8	5.8
@ 1 KHZ	5.3	5.3
@ 1 MHZ	4.5	4.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.36	1.36
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	9,000 psi	62 Mpa
Compressive Strength (D695)	25,000 psi	172 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	275 °F	135 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	200 V/mil	7.9 MV/m
Step by Step	125 V/mil	4.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.55	.55
@ 1 KHZ	.25	.25
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	15.2	15.2
@ 1 KHZ	8.5	8.5
@ 1 MHZ	5.3	5.3
Volume Resistivity (D257)	1 x 10 ¹⁰ ohm cm	1 x 10 ⁸ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Durez 29237 is Fungus resistant per Mil-E-5272C.



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DUREZ THERMOSET MOLDING COMPOSITES

29502
Brown Phenolic

Durez 29502 Brown Phenolic is a two stage, glass filled, special purpose molding material. It is formulated for close tolerance applications such as transmission valve bodies, and disc brake pistons where good dimensional stability and compatibility with transmission and brake fluid is essential. This product can be ground to accurate finished dimensions.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Mil-M-14-G, Type MFH

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.12	2.12
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	3.0 x 10 ⁶ psi	20.7 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	2.11	2.11
Molding Shrinkage* (D955)	0.0052 in/in	0.0052 m/m
Tensile Strength (D638)	8,900 psi	61 Mpa
Flexural Strength (D790)	13,550 psi	92 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.7 x 10 ⁶ psi	11.7 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	325 °F	162 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Linear Coefficient of Thermal Expansion (30-60°C Range): 14 x 10⁻⁶ cm/cm/°C

***** Injection Values are Tentative *****



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DUREZ THERMOSET MOLDING COMPOSITES

30190
Brown Phenolic

Durez 30190 Phenolic is a two stage, mineral and glass filled, special purpose molding material. It is formulated for applications requiring good dimensional stability and high heat resistance.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.12	2.12
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	2.75 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

30417
Black Phenolic

Durez 30417 Black Phenolic is a single stage, non-bleeding molding material. It is specially formulated for pourability, fast cure and good appearance for closure applications. It is recommended that this material be compression molded.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.63
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Non-Bleeding

Agency Recognition

ASTM D700, Type 11-SS

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.41	1.41
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.80 %	0.80 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	200 V/mil	7.9 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.15	.15
@ 1 KHZ	.06	.06
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	7.5	7.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	--- psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	-- °F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

30725
Black Phenolic

Durez 30725 Black Phenolic is a two stage, general purpose molding material. with a tracking Index of 175+ volts, it is recommended for wiring device applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.61
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.24"

Plasticities available for compression, transfer, and injection molding.
Durez 30725 is also available in brown.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	15.1 Gpa
Izod Impact (D256)	0.35 ft lb/in	18 J/m
Deflection Temperature (D648)	325 °F	163 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.08	.08
@ 1 KHZ	.06	.06
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	5.8	5.8
@ 1 KHZ	5.4	5.4
@ 1 MHZ	4.8	4.8
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.010 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.6 %	0.6 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.4	0.4
@ 1 KHZ	0.1	0.1
@ 1 MHZ	0.5	0.5
Dielectric Constant (D150)		
@ 60 HZ	9.6	9.6
@ 1 KHZ	6.9	6.9
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 175+ voltes



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Durez Division
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DUREZ THERMOSET MOLDING COMPOSITES

30948
Black Phenolic
tentative

Durez 30948 Black Phenolic is two-stage, general purpose molding material. With good mechanical properties, it is suitable for many diverse applications.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.36 ft lb/in	19 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	250 V/mil	9.8 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

30948
Black Phenolic
tentative

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	1 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	330 °F	165 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	200 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.52	.52
@ 1 KHZ	.26	.26
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	15.0	15.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	7 x 10 ¹² ohm cm	7 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

30953
Black Phenolic
* Restricted *

Durez 30953 Black Phenolic is a two-stage, heat resistant/electrical molding material. It exhibits excellent dimensional stability, high heat resistance, good molded appearance, and UL flammability rating.

Molding Properties:

Bulk Factor (D1895)	2.4
Apparent Density (g/cc)(D1895)	0.65
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM D700 Type 13
U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.020"
94V-0 @ 0.040"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.58	1.58
Molding Shrinkage* (D955)	0.004 in/in	0.004 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	28,500 psi	196 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.12	.12
@ 1 KHZ	.08	.08
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.006 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

30953
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.54	1.54
Molding Shrinkage* (D955)	0.0080 in/in	0.0080 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	28,000 psi	194 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.18	.18
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@ 1 KHZ	6.5	6.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 180 V.
ASTM D-495 Arc Resistance: 180 sec.
Durez 30953 is Fungus Resistant per Mil-E-5272C.



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DUREZ THERMOSET MOLDING COMPOSITES

31228
Black Phenolic

Durez 31228 Black Phenolic is a two stage, heat resistant/electrical grade molding material. Specially formulated to offer excellent heat resistance and dimensional stability, it maintains 50% of its strength after 1000 hrs. @ 425°F. It offers excellent gloss and lustrous finish for appearance parts and molds well on compression, transfer, and injection molds.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.70
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM D700 Type 13
 UL Temperature Index: 160°C @ 0.12"
 UL Temperature Index: 170°C @ 0.24"
 UL Flammability: 94V-0 @ 0.04"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.60	1.60
Molding Shrinkage* (D955)	0.004 in/in	0.004 m/m
Tensile Strength (D638)	5,000 psi	34 Mpa
Flexural Strength (D790)	8,000 psi	55 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.12	.12
@ 1 KHZ	.08	.08
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.5	7.5
@ 1 KHZ	6.7	6.7
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.005 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.58	1.58
Molding Shrinkage* (D955)	0.0060 in/in	0.0060 m/m
Tensile Strength (D638)	5,500 psi	38 Mpa
Flexural Strength (D790)	8,500 psi	59 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.27 ft lb/in	14 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	350 V/mil	13.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.20	.20
@ 1 KHZ	.10	.10
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	8.0	8.0
@ 1 KHZ	7.0	7.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 v.
ASTM D-495 Arc Resistance: 180 sec.



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DUREZ THERMOSET MOLDING COMPOSITES

31342
Black Phenolic
* Restricted *

Durez 31342 Phenolic is a two stage, general purpose molding material. This material is designed to provide a balance of mechanical properties for selective applications. It has good molding latitude in compression, transfer, and injection molding.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
U.L. Temperature Index of 150°C

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.007 in/in	0.007 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.7 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	400 V/mil	15.7 MV/m
Step by Step	350 V/mil	13.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.05	.05
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	5.9	5.9
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.7	4.7
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31342
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.31 ft lb/in	16 J/m
Deflection Temperature (D648)	300 °F	149 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	225 V/mil	8.8 MV/m
Step by Step	175 V/mil	6.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.65	.65
@ 1 KHZ	.35	.35
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	17.0	17.0
@ 1 KHZ	9.5	9.5
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹¹ ohm cm	1 x 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

31345

Black Phenolic
* Restricted *

Durez 31345 Phenolic is a two stage, heat resistant molding material. It is specially formulated to provide an excellent balance of thermal, electrical, and dimensional properties, making it an excellent choice for electrical and appliance applications.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	0.70
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant/Electrical

Agency Recognition

ASTM D700 Type 13

U.L. temperature Index of 150°C

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.49	1.49
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.6 Gpa
Izod Impact (D256)	0.32 ft lb/in	17 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.07	.07
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.0	6.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31345
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.49	1.49
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.50	.50
@ 1 KHZ	.30	.30
@ 1 MHZ	.10	.10
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 volts



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DUREZ THERMOSET MOLDING COMPOSITES

31354
Black Phenolic

Durez 31354 Black phenolic is a two stage, general purpose molding material. This material is designed to provide a balance of mechanical properties for selective applications. It has good molding latitude in compression, and injection molding.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

General Purpose

Agency Recognition

ASTM D700 Type 2
Underwriters Laboratory

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.35	1.35
Molding Shrinkage* (D955)	0.008 in/in	0.008 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	9,500 psi	66 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	370 °F	188 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.15	.15
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.7	6.7
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.010 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31354
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.35	1.35
Molding Shrinkage* (D955)	0.0120 in/in	0.0120 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	10,000 psi	69 Mpa
Compressive Strength (D695)	25,000 psi	172 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.25 ft lb/in	13 J/m
Deflection Temperature (D648)	320 °F	160 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	150 V/mil	5.9 MV/m
Step by Step	125 V/mil	4.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.50	.50
@ 1 KHZ	.40	.40
@ 1 MHZ	.10	.10
Dielectric Constant (D150)		
@ 60 HZ	40.0	40.0
@ 1 KHZ	16.0	16.0
@ 1 MHZ	8.0	8.0
Volume Resistivity (D257)	1 x 10 ¹¹ ohm cm	1 x 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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Durez Division
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DUREZ THERMOSET MOLDING COMPOSITES

31356
Black Phenolic
* Restricted *

Durez 31356 Phenolic is a two-stage, heat resistant / electrical grade molding material. This material is designed to provide a balance of mechanical, heat resistance and electrical properties. With its good surface finish, it is well suited for the appliance industry. This material has good barrel life and molding latitude.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.68
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant / Electrical

Agency Recognition

ASTM D-700, Type 13
U.L. Temperature index of 160°C
U.L. Flammability: 94V-1 @ 0.058"
94V-0 @ 0.120"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.4 x 10 ⁶ psi	9.7 Gpa
Izod Impact (D256)	0.30 ft lb/in	16 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	325 V/mil	12.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.10	.10
@ 1 KHZ	.07	.07
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.0	6.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31356
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.28 ft lb/in	15 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.20	.20
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	7.6	7.6
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

31701
Black Phenolic
* Restricted *

Durez 31701 Black Phenolic is a two stage, heat resistant/electrical grade molding material. Durez 31701 has good appearance and molds well in live sprue and tunnel gates.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.60
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Heat Resistant /Electrical

Agency Recognition

U.L. Temperature Index of 155°C
U.L. Flammability: 94 V-1 @ 0.040"
94 V-0 @ 0.058"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.53	1.53
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	26,000 psi	179 Mpa
Tensile Modulus (D638)	1.5 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.37 ft lb/in	20 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.04	.04
@ 1 MHZ	.04	.04
Dielectric Constant (D150)		
@ 60 HZ	6.0	6.0
@ 1 KHZ	5.5	5.5
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.009 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31701
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.50	1.50
Molding Shrinkage* (D955)	0.0110 in/in	0.0110 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.6 x 10 ⁶ psi	11.0 Gpa
Izod Impact (D256)	0.29 ft lb/in	15 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.45	0.45
@ 1 KHZ	0.15	0.15
@ 1 MHZ	0.05	0.05
Dielectric Constant (D150)		
@ 60 HZ	9.0	9.0
@ 1 KHZ	6.8	6.8
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

ASTM D-495 Arc Resistance: 182 seconds
IEC Tracking Index (CTI): 225 v.



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DUREZ THERMOSET MOLDING COMPOSITES

31735
Black Phenolic

Durez 31735 is a special purpose phenolic molding compound developed for automotive and industrial pulleys. This material is designed to optimize pulley performance relating to belt life, dimensional tolerance, impact strength, and other properties required in pulley applications.

Molding Properties:

Bulk Factor (D1895)	2.9
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special

Agency Recognition

ASTM D700 Type 12

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.52 ft lb/in	28 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.20	.20
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	7.5	7.5
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.008 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31735
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	12,500 psi	86 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	10.3 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	325 °F	163 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.44	.44
@ 1 KHZ	.17	.17
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	9.2	9.2
@ 1 KHZ	7.2	7.2
@ 1 MHZ	5.1	5.1
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Poisson's Ratio 0.33	* Young's Modulus 1.16 x 10 ⁶	* Flexural Modulus 1.2 x 10 ⁶
Coefficient of Thermal Conductivity Cal/(Sec)(CM ²)(°C/CM) x 10 ⁻⁴		8.8 Cenco Fitch
Coefficient of Thermal Expansion x 10 ⁻⁶ °DC Range 30 - 150°C		36.0 ASTM D696
Specific Heat, Cal/°C/Gram		0.28 Astm C351
Heat Resistance, 2 Hrs. at Temp.		450°F
Long Term Heat Test 350°F	As Is	1000 Hours
	Flexure (psi)	11,700
	Tensile (psi)	8,200
		6,400
		5,300



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DUREZ THERMOSET MOLDING COMPOSITES

31906
Black Phenolic

Durez 31906 Black Phenolic is a medium impact, molding compound. It is designed for applications where additional mechanical strength is required.

Molding Properties:

Bulk Factor (D1895)	2.9
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Impact

Agency Recognition

ASTM D700 Type 12
Underwriters Laboratories
Flammability 94HB @ 0.060"
94V-0 @ 0.240"

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	13,000 psi	90 Mpa
Compressive Strength (D695)	31,000 psi	214 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.65 ft lb/in	35 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.25	.25
@ 1 KHZ	.10	.10
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	10 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.007 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

31906
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0100 in/in	0.0100 m/m
Tensile Strength (D638)	8,500 psi	59 Mpa
Flexural Strength (D790)	13,000 psi	90 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.40 ft lb/in	191 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.40	.40
@ 1 KHZ	.25	.25
@ 1 MHZ	.08	.08
Dielectric Constant (D150)		
@ 60 HZ	20.0	20.0
@ 1 KHZ	10.0	10.0
@ 1 MHZ	6.5	6.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32110
Black Phenolic

Durez 32110 Black Phenolic is a single stage, special purpose molding material. It is designed for automotive applications where additional mechanical strength, such as impact strength, is required.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	3 Months

Material Type:

Special Purpose - Impact

Agency Recognition

ASTM D700 Type 12

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.45	1.45
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,600 psi	52 Mpa
Flexural Strength (D790)	10,300 psi	71 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.2 x 10 ⁶ psi	8.3 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	10.8 MV/m
Step by Step	250 V/mil	7.9 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.27	0.27
@ 1 KHZ	0.11	0.11
@ 1 MHZ	0.06	0.06
Dielectric Constant (D150)		
@ 60 HZ	9.6	9.6
@ 1 KHZ	6.7	6.7
@ 1 MHZ	5.3	5.3
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.007 in/in or m/m

See reverse for injection molding values.

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DUREZ THERMOSET MOLDING COMPOSITES

32110
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.45	1.45
Molding Shrinkage* (D955)	0.0080 in/in	0.0080 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	12,000 psi	82 Mpa
Compressive Strength (D695)	28,000 psi	192 Mpa
Tensile Modulus (D638)	1.1 x 10 ⁶ psi	7.6 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.70 %	0.70 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	225 V/mil	8.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.43	0.43
@ 1 KHZ	0.21	0.21
@ 1 MHZ	0.07	0.07
Dielectric Constant (D150)		
@ 60 HZ	14.0	14.0
@ 1 KHZ	9.0	9.0
@ 1 MHZ	5.8	5.8
Volume Resistivity (D257)	7.5 x 10 ¹² ohm cm	7.5 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32245
Black Phenolic

Durez 32245 Black Phenolic is a two-stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. Typical applications include heavy duty switch gear, connectors, and commutators.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	0.85
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special Purpose (glass filled)

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0025 in/in	0.0025 m/m
Tensile Strength (D638)	10,000 psi	69 Mpa
Flexural Strength (D790)	15,000 psi	103 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.70 ft lb/in	38 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.7 MV/m
Step by Step	350 V/mil	13.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.04	.04
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32245
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	12,500 psi	86 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.06	0.06
@ 1 KHZ	0.04	0.04
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.5	5.5
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Post Bake Properties - 8 Hours @ 350°F



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DUREZ THERMOSET MOLDING COMPOSITES

32424
Black Phenolic

Durez 32424 Black Phenolic is a single stage, electrical grade molding material. It is recommended for electrical applications where the absence of ammonia out gassing is required to prevent corrosion of metal contacts.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.62
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Electrical

Agency Recognition

Underwriters Laboratories
ASTM Type, 2 SS

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0055 in/in	0.0055 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	9,000 psi	62 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.3 x 10 ⁶ psi	9.0 Gpa
Izod Impact (D256)	0.26 ft lb/in	14 J/m
Deflection Temperature (D648)	340 °F	171 °C
Water Absorption (D570)	0.60 %	0.60 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	13.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.05	.05
@ 1 KHZ	.04	.04
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.0	6.0
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0070 in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32633
Black Phenolic

Durez 32633 Black Phenolic is a two-stage, glass filled, special purpose molding compound. It is designed for applications requiring high physical strengths, dimensional stability, and heat resistance. Typical applications include small motor and gear housings, brush holders, commutators, and under hood automotive applications.

Molding Properties:

Bulk Factor (D1895)	2.2
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.77	1.77
Molding Shrinkage* (D955)	0.0015 in/in	0.0015 m/m
Tensile Strength (D638)	17,500 psi	120 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	50,000 psi	345 Mpa
Tensile Modulus (D638)	2.3 x 10 ⁶ psi	15.8 Gpa
Izod Impact (D256)	0.90 ft lb/in	48 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.6 MV/m
Step by Step	400 V/mil	15.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.03	.03
@ 1 KHZ	.02	.02
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	4.4	4.4
@ 1 KHZ	4.4	4.4
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0030 in/in or m/m

See reverse for injection molding values.

May 1999

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.78	1.78
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	33,000 psi	228 Mpa
Compressive Strength (D695)	40,000 psi	276 Mpa
Tensile Modulus (D638)	2.7 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.75 ft lb/in	40 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	17.6 MV/m
Step by Step	400 V/mil	15.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.03	.03
@ 1 KHZ	.02	.02
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	4.4	4.4
@ 1 KHZ	4.4	4.4
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Compressive Modulus @250°F (psi x 10 ⁶)	1.53
Flexural Modulus @73°F (psi x 10 ⁶)	2.2
Shear strength (psi)	6870



DUREZ THERMOSET MOLDING COMPOSITES

32694
Black Phenolic

Durez 32694 Black Phenolic is a medium impact, molding compound. It is designed for applications where excellent mechanical strength is required.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Impact

Agency Recognition

ASTM D700, Type 12

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.40	1.40
Molding Shrinkage* (D955)	0.0065 in/in	0.0065 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	14,000 psi	96 Mpa
Compressive Strength (D695)	34,000 psi	234 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.47 ft lb/in	25 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	325 V/mil	12.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.25	0.25
@ 1 KHZ	0.10	0.10
@ 1 MHZ	0.06	0.06
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
 Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32875
Brown Phenolic

Durez 32875 Brown Phenolic is a two stage, glass and mineral filled molding compound. It is formulated for close tolerance applications such as disk brake pistons, where good dimensional stability and compatibility with under hood fluid and brake fluid is essential. This product has superior thermal properties and wear characteristics in brake calipers of the latest design.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.12	2.12
Molding Shrinkage* (D955)	.001 in/in	.001 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	3 x 10 ⁶ psi	20.7 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	425 °F	218 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	14 MV/m
Step by Step	320 V/mil	13 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
 Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32945
Black Phenolic

Durez 32945 is a special purpose phenolic molding compound developed for automotive pulleys. This material is designed for optimal performance, belt life, dimensional tolerance, strength and properties required in pulley applications.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.55
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special

Agency Recognition

ASTM D700, Type 12

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.46	1.46
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	6,500 psi	45 Mpa
Flexural Strength (D790)	10,500 psi	72 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	275 V/mil	10.8 MV/m
Step by Step	250 V/mil	9.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.20	.20
@ 1 KHZ	.09	.09
@ 1 MHZ	.05	.05
Dielectric Constant (D150)		
@ 60 HZ	10.0	10.0
@ 1 KHZ	7.5	7.5
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32945
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32962
Black Phenolic
Tentative

Durez 32962 Black Phenolic is a medium impact, molding compound. It is designed for applications where additional mechanical strength is required. Typical applications include appliance housings where strength and appearance are important.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.58
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Impact

Agency Recognition

ASTM D700, Type 12

Plasticities available for compression, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.45	1.45
Molding Shrinkage* (D955)	0.006 in/in	0.006 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.50 ft lb/in	27 J/m
Deflection Temperature (D648)	360 °F	182 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32962
Black Phenolic
Tentative

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.45	1.45
Molding Shrinkage* (D955)	0.0090 in/in	0.0090 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	11,000 psi	76 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	1.0 x10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.50 %	0.50 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	250 V/mil	9.8 MV/m
Step by Step	225 V/mil	8.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32966
Black Phenolic
Tentative

Durez 32966 black Phenolic is a medium impact molding compound. It is designed for applications where mechanical strength is required. It has excellent dimensional stability.

Molding Properties:

Bulk Factor (D1895)	2.5
Apparent Density (g/cc)(D1895)	0.56
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Impact

Agency Recognition

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.0065 in/in	0.0065 m/m
Tensile Strength (D638)	10,000 psi	69 Mpa
Flexural Strength (D790)	15,000 psi	103 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	1 x 10 ⁶ psi	6.9 Gpa
Izod Impact (D256)	0.55 ft lb/in	29 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.40 %	0.40 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32966
Black Phenolic
Tentative

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32971
Brown Phenolic
* Tentative *

Durez 32971 brown phenolic is a two stage, mineral and glass filled molding compound. It is formulated for close tolerance applications where good dimensional stability and heat resistance is required.

Molding Properties:

Bulk Factor (D1895)	2.01
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.12	2.12
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	7,000 psi	48 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	3.0 x 10 ⁶ psi	20.7 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	425 °F	218 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	350 V/mil	14 MV/m
Step by Step	320 V/mil	13 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is .004 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32971
Brown Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	2.11	2.11
Molding Shrinkage* (D955)	0.0050 in/in	0.0050 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	13,000 psi	90 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.7 x 10 ⁶ psi	11.7 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	375 °F	190 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32973
Black Phenolic
* Tentative *

Durez 32973 black phenolic is a glass and mineral filled molding compound specially formulated for excellent wear resistance for idler pulleys. It exhibits high strength, and low thermal conductivity, and it works well in dusty environments.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.78
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.003 in/in	0.003 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	15,000 psi	103 Mpa
Compressive Strength (D695)	32,000 psi	220 Mpa
Tensile Modulus (D638)	1.6 x 10 ⁶ psi	11.0 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	176 °C
Water Absorption (D570)	0.10 %	0.10 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.03	.03
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.7	5.7
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.003 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32973
Black Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	9,000 psi	62 Mpa
Flexural Strength (D790)	15,000 psi	103 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	1.6 x 10 ⁶ psi	11.0 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	325 °F	162 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.11	.11
@ 1 KHZ	.06	.06
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.3	6.3
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32986
Black Phenolic
* Tentative *

Durez 32986 black is a cellulose filled phenolic molding material specially formulated for dimensionally stability, both short and long term, wear resistance and low specific gravity. These properties make it the ideal choice for the very demanding application of automotive idler pulleys.

Molding Properties:

Bulk Factor (D1895)	2.9
Apparent Density (g/cc)(D1895)	.50
Form of Material	Granular
Feeding & Preforming	Fair
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.43	1.43
Molding Shrinkage* (D955)	0.005 in/in	0.005 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	27,000 psi	186 Mpa
Tensile Modulus (D638)	1.0 x 10 ⁶ psi	7.0 Gpa
Izod Impact (D256)	0.50 ft lb/in	26.7 J/m
Deflection Temperature (D648)	375 °F	190 °C
Water Absorption (D570)	0.30 %	0.30 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	11.8 MV/m
Step by Step	275 V/mil	10.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.25	.25
@ 1 KHZ	.10	.10
@ 1 MHZ	.06	.06
Dielectric Constant (D150)		
@ 60 HZ	11.0	11.0
@ 1 KHZ	8.0	8.0
@ 1 MHZ	6.0	6.0
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.006 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32986
Black Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

32996
Black Phenolic
* Tentative *

Durez 32996 Black Phenolic is a glass and mineral filled two-stage, special purpose molding material. It is specially designed for applications that require good heat and chemical resistance, electrical properties, and dimensional stability. Typical applications include connectors, computer components, and automotive parts.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.95
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.90	1.90
Molding Shrinkage* (D955)	0.002 in/in	0.002 m/m
Tensile Strength (D638)	6,000 psi	41 Mpa
Flexural Strength (D790)	12,000 psi	83 Mpa
Compressive Strength (D695)	30,000 psi	207 Mpa
Tensile Modulus (D638)	2.5 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.10 %	0.10 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.8 MV/m
Step by Step	300 V/mil	11.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.06	.06
@ 1 KHZ	.03	.03
@ 1 MHZ	.02	.02
Dielectric Constant (D150)		
@ 60 HZ	6.1	6.1
@ 1 KHZ	5.7	5.7
@ 1 MHZ	5.2	5.2
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.002 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

32996
Black Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.90	1.90
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	8,000 psi	55 Mpa
Flexural Strength (D790)	14,000 psi	96 Mpa
Compressive Strength (D695)	28,000 psi	193 Mpa
Tensile Modulus (D638)	2.8 x 10 ⁶ psi	19.3 Gpa
Izod Impact (D256)	0.35 ft lb/in	19 J/m
Deflection Temperature (D648)	350 °F	177 °C
Water Absorption (D570)	0.10 %	0.10 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	425 V/mil	16.7 MV/m
Step by Step	375 V/mil	14.8 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.11	.11
@ 1 KHZ	.06	.06
@ 1 MHZ	.03	.03
Dielectric Constant (D150)		
@ 60 HZ	7.0	7.0
@ 1 KHZ	6.3	6.3
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

IEC Tracking Index (CTI): 190 v. ASTM D-495 Arc Resistance: 180 sec.



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DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 350 P
Brown Phenolic
* Tentative *

Durez 350 P is a two stage, mineral and glass filled, special purpose molding compound. It is designed for brake piston applications where improved dimensional stability and surface finish are required.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.10	2.10
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	7,500 psi	52 Mpa
Flexural Strength (D790)	11,500 psi	79 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	2.7 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	375 °F	176 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	375 V/mil	14.7 MV/m
Step by Step	300 V/mil	11.7 MV/m
Dissipation Factor (D150)		
@ 60 HZ	.07	.07
@ 1 KHZ	.03	.03
@ 1 MHZ	.01	.01
Dielectric Constant (D150)		
@ 60 HZ	6.4	6.4
@ 1 KHZ	5.9	5.9
@ 1 MHZ	5.4	5.4
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 350 P
Brown Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 400 P
Brown Phenolic
* Tentative *

Durez 400 P is a glass and mineral filled, single stage molding compound designed for use in automotive disk brake pistons. It is formulated for dimensional stability and heat resistance and is designed to withstand short term exposures to 400°C.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	1.02
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.10	2.10
Molding Shrinkage* (D955)	0.001 in/in	0.001 m/m
Tensile Strength (D638)	7,250 psi	50 Mpa
Flexural Strength (D790)	12,750 psi	88 Mpa
Compressive Strength (D695)	35,000 psi	240 Mpa
Tensile Modulus (D638)	2.8 x 10 ⁶ psi	19.0 Gpa
Izod Impact (D256)	0.38 ft lb/in	20 J/m
Deflection Temperature (D648)	525 °F	275 °C
Water Absorption (D570)	0.01 %	0.01 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 400 P
Brown Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 450 P
Brown Phenolic
* Tentative *

Durez 450 P Brown phenolic is a two-stage, glass and mineral filled, special purpose molding compound. It is formulated for close tolerance applications such as automotive disc brake pistons, where good dimensional stability and exceptional heat resistance are necessary.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	1.05
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.08	2.08
Molding Shrinkage* (D955)	.002 in/in	.002 m/m
Tensile Strength (D638)	11,000 psi	76 Mpa
Flexural Strength (D790)	18,000 psi	124 Mpa
Compressive Strength (D695)	48,000 psi	330 Mpa
Tensile Modulus (D638)	3.0 x 10 ⁶ psi	20.7 Gpa
Izod Impact (D256)	0.34 ft lb/in	18 J/m
Deflection Temperature (D648)	375 °F	191 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

DUREZ 450 P
Brown Phenolic
* Tentative *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Tg = 575°F (302°C)
CLTE = 24.3 in/in/°F (13.5 m/m/°C)



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-2951J
Black Phenolic

Durez "SUMIKON" PM-2951J black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. Typical applications include brush holders, housings, and heat insulators.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.90
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0024 in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-2951J
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.77	1.77
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	16,000 psi	110 Mpa
Flexural Strength (D790)	29,000 psi	200 Mpa
Compressive Strength (D695)	43,000 psi	300 Mpa
Tensile Modulus (D638)	2.8 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.47 ft lb/in	25 J/m
Deflection Temperature (D648)	400 °F	205 °C
Water Absorption (D570)	0.06 %	0.06 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	460 V/mil	18 MV/m
Step by Step	406 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.20	0.20
@ 1 KHZ	0.07	0.07
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	8.1	8.1
@ 1 KHZ	6.7	6.7
@ 1 MHZ	5.6	5.6
Volume Resistivity (D257)	1 x 10 ¹¹ ohm cm	1 x 10 ⁹ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Coefficient of Thermal Expansion: °C x 10⁻⁶ (23°-60°C) 22



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-2963
Black Phenolic

Durez "SUMIKON" PM-2963 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. PM-2963 is widely used in automotive applications. Typical applications include motor housings, brush holders, and heat insulators.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.90
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-1 @ 0.032"
94V-0 @ 0.063"

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)

Short Time

Step by Step

V/mil

MV/m

V/mil

MV/m

Dissipation Factor (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Dielectric Constant (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Volume Resistivity (D257)

ohm cm

ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0025 in/in or m/m

See reverse for injection molding values.

August 1999

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-2963
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.78	1.78
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	33,000 psi	230 Mpa
Flexural Strength (D790)	17,000 psi	120 Mpa
Compressive Strength (D695)	44,000 psi	300 Mpa
Tensile Modulus (D638)	2.9 x 10 ⁶ psi	20 Gpa
Izod Impact (D256)	0.84 ft lb/in	45 J/m
Deflection Temperature (D648)	410 °F	210 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	430 V/mil	17 MV/m
Step by Step	380 V/mil	15 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.08	0.08
@ 1 KHZ	0.04	0.04
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	7.1	7.1
@ 1 KHZ	6.3	6.3
@ 1 MHZ	5.5	5.5
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Coefficient of Thermal Expansion: °C x 10⁻⁶ (23-60°C) 24
Rockwell Hardness (M scale): 120



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-5610

Black Phenolic
* Restricted *

Durez "SUMIKON" PM-5610 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. PM-5610 also has excellent wear resistance. Typical applications include clutch disks and pulleys.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.62
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)

Short Time

Step by Step

V/mil

MV/m

V/mil

MV/m

Dissipation Factor (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Dielectric Constant (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Volume Resistivity (D257)

ohm cm

ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

April 1999

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-5610
Black Phenolic
* Restricted *

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.64	1.64
Molding Shrinkage* (D955)	0.0040 in/in	0.0040 m/m
Tensile Strength (D638)	17,000 psi	117 Mpa
Flexural Strength (D790)	26,000 psi	179 Mpa
Compressive Strength (D695)	36,000 psi	248 Mpa
Tensile Modulus (D638)	1.9 x 10 ⁶ psi	13 Gpa
Izod Impact (D256)	0.65 ft lb/in	35 J/m
Deflection Temperature (D648)	390 °F	200 °C
Water Absorption (D570)	0.15 %	0.15 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	360 V/mil	14 MV/m
Step by Step	300 V/mil	12 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.06	0.06
@ 1 KHZ	0.04	0.04
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.0	5.0
@ 1 KHZ	4.7	4.7
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6430
Black Phenolic

Durez "SUMIKON" PM-6430 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include commutators.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.70
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.85	1.85
Molding Shrinkage* (D955)	0.0015 in/in	0.0015 m/m
Tensile Strength (D638)	12,000 psi	83 Mpa
Flexural Strength (D790)	17,000 psi	117 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	2.2 x 10 ⁶ psi	15 Gpa
Izod Impact (D256)	0.90 ft lb/in	48 J/m
Deflection Temperature (D648)	440 °F	227 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	5.2	5.2
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.6	4.6
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6430
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.85	1.85
Molding Shrinkage* (D955)	0.0005 in/in	0.0005 m/m
Tensile Strength (D638)	15,000 psi	103 Mpa
Flexural Strength (D790)	17,000 psi	117 Mpa
Compressive Strength (D695)	26,000 psi	179 Mpa
Tensile Modulus (D638)	2.2 x 10 ⁶ psi	15 Gpa
Izod Impact (D256)	0.60 ft lb/in	32 J/m
Deflection Temperature (D648)	440 °F	227 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	5.2	5.2
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.6	4.6
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Comparative Tracking Index (CTI)	175 volts
Arc Resistance	170 sec.



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6440
Black Phenolic

Durez "SUMIKON" PM-6440 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include commutators for starter and other motors.

Molding Properties:

Bulk Factor (D1895)	2.6
Apparent Density (g/cc)(D1895)	0.70
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.83	1.83
Molding Shrinkage* (D955)	0.0020 in/in	0.0020 m/m
Tensile Strength (D638)	15,000 psi	103 Mpa
Flexural Strength (D790)	19,000 psi	131 Mpa
Compressive Strength (D695)	45,000 psi	310 Mpa
Tensile Modulus (D638)	2.7 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	1.00 ft lb/in	53 J/m
Deflection Temperature (D648)	450 °F	232 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	5.6	5.6
@ 1 KHZ	5.4	5.4
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6440
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.83	1.83
Molding Shrinkage* (D955)	0.0010 in/in	0.0010 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	30,000 psi	207 Mpa
Compressive Strength (D695)	40,000 psi	276 Mpa
Tensile Modulus (D638)	2.9 x 10 ⁶ psi	20 Gpa
Izod Impact (D256)	0.70 ft lb/in	37 J/m
Deflection Temperature (D648)	450 °F	232 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	5.6	5.6
@ 1 KHZ	5.4	5.4
@ 1 MHZ	5.0	5.0
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6600
Black Phenolic

Durez "SUMIKON" PM-6600 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include commutators and switch housings.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	0.85
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0034 in/in	0.0034 m/m
Tensile Strength (D638)	13,000 psi	90 Mpa
Flexural Strength (D790)	19,000 psi	131 Mpa
Compressive Strength (D695)	34,000 psi	234 Mpa
Tensile Modulus (D638)	2.2 x 10 ⁶ psi	15 Gpa
Izod Impact (D256)	0.80 ft lb/in	43 J/m
Deflection Temperature (D648)	380 °F	193 °C
Water Absorption (D570)	0.06 %	0.06 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	18 MV/m
Step by Step	400 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	4.4	4.4
@ 1 KHZ	4.4	4.4
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6600
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.80	1.80
Molding Shrinkage* (D955)	0.0025 in/in	0.0025 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	29,000 psi	200 Mpa
Compressive Strength (D695)	38,000 psi	262 Mpa
Tensile Modulus (D638)	2.2 x 10 ⁶ psi	15 Gpa
Izod Impact (D256)	0.75 ft lb/in	40 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.06 %	0.06 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	18 MV/m
Step by Step	400 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	4.4	4.4
@ 1 KHZ	4.4	4.4
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6930H
Black Phenolic

Durez "SUMIKON" PM-6930H black Phenolic is a single stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and toughness. It is suitable for applications with post inserts. Typical applications include commutators and slip rings.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	6 Months

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression and transfer molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.84	1.84
Molding Shrinkage* (D955)	0.0015 in/in	0.0015 m/m
Tensile Strength (D638)	14,000 psi	97 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	34,000 psi	235 Mpa
Tensile Modulus (D638)	2.3 x 10 ⁶ psi	16 Gpa
Izod Impact (D256)	0.70 ft lb/in	37 J/m
Deflection Temperature (D648)	>570 °F	>300 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.8	4.8
Volume Resistivity (D257)	1 x 10 ¹⁴ ohm cm	1 x 10 ¹² ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-6930H
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.84	1.84
Molding Shrinkage* (D955)	0.0005 in/in	0.0005 m/m
Tensile Strength (D638)	16,000 psi	110 Mpa
Flexural Strength (D790)	23,000 psi	159 Mpa
Compressive Strength (D695)	29,000 psi	200 Mpa
Tensile Modulus (D638)	2.0 x 10 ⁶ psi	14 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	500 °F	260 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.8	4.8
Volume Resistivity (D257)	1 x 10 ¹⁴ ohm cm	1 x 10 ¹² ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Comparative Tracking Index (CTI)	200 volts
Arc Resistance	181 sec.



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Durez Division

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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9501
Black Phenolic

Durez "SUMIKON" PM-9501 black Phenolic is a two stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance. Typical applications include brush holders, housings, and heat insulators.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	1.76	1.76
Molding Shrinkage* (D955)	0.0020 in/in	0.0020 m/m
Tensile Strength (D638)	12,000 psi	83 Mpa
Flexural Strength (D790)	20,000 psi	138 Mpa
Compressive Strength (D695)	32,000 psi	221 Mpa
Tensile Modulus (D638)	2.0 x 10 ⁶ psi	14 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	18 MV/m
Step by Step	400 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.05	0.05
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.01	0.01
Dielectric Constant (D150)		
@ 60 HZ	5.0	5.0
@ 1 KHZ	4.7	4.7
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9501
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.76	1.76
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	18,000 psi	124 Mpa
Flexural Strength (D790)	29,000 psi	200 Mpa
Compressive Strength (D695)	42,000 psi	290 Mpa
Tensile Modulus (D638)	2.6×10^6 psi	18 Gpa
Izod Impact (D256)	0.47 ft lb/in	25 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.05 %	0.05 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	450 V/mil	18 MV/m
Step by Step	400 V/mil	16 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.05	0.05
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.01	0.01
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	4.7	4.7
@ 1 MHZ	4.3	4.3
Volume Resistivity (D257)	1×10^{13} ohm cm	1×10^{11} ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Coefficient of Thermal Expansion: °C x 10⁻⁶ (23°-60°C) 22



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9505
Black Phenolic

Durez "SUMIKON" PM-9505 black Phenolic is a two stage glass and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and low specific gravity. Typical applications include brake components.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.80
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)

Short Time

Step by Step

V/mil

MV/m

V/mil

MV/m

Dissipation Factor (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Dielectric Constant (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Volume Resistivity (D257)

ohm cm

ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

April 1999

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9505
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.58	1.58
Molding Shrinkage* (D955)	0.0045 in/in	0.0045 m/m
Tensile Strength (D638)	17,000 psi	117 Mpa
Flexural Strength (D790)	29,000 psi	200 Mpa
Compressive Strength (D695)	48,000 psi	331 Mpa
Tensile Modulus (D638)	2.0 x 10 ⁶ psi	14 Gpa
Izod Impact (D256)	0.37 ft lb/in	20 J/m
Deflection Temperature (D648)	390 °F	200 °C
Water Absorption (D570)	0.09 %	0.09 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	430 V/mil	17 MV/m
Step by Step	380 V/mil	15 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	4.2	4.2
@ 1 KHZ	4.0	4.0
@ 1 MHZ	3.9	3.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9610
Black Phenolic

Durez "SUMIKON" PM-9610 black Phenolic is a two stage glass and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and higher dimensional stability with excellent heat resistance. Typical applications include brush holders for high temperature, and timing pulleys.

Molding Properties:

Bulk Factor (D1895)	2.1
Apparent Density (g/cc)(D1895)	0.96
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	One Year

Material Type:

Special Purpose

Agency Recognition

Plasticities available for compression, transfer, and injection molding.

Compression Grade

Typical Physical Properties:

	Conventional Units	International System of Units
Specific Gravity (D792)	2.02	2.02
Molding Shrinkage* (D955)	0.0030 in/in	0.0030 m/m
Tensile Strength (D638)	13,000 psi	90 Mpa
Flexural Strength (D790)	19,000 psi	131 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	3.7 x 10 ⁶ psi	26 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	400 °F	204 °C
Water Absorption (D570)	0.03 %	0.03 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	380 V/mil	15 MV/m
Step by Step	250 V/mil	10 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9610
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	2.02	2.02
Molding Shrinkage* (D955)	0.0025 in/in	0.0025 m/m
Tensile Strength (D638)	14,000 psi	97 Mpa
Flexural Strength (D790)	25,000 psi	172 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	3.9 x 10 ⁶ psi	27 Gpa
Izod Impact (D256)	0.40 ft lb/in	21 J/m
Deflection Temperature (D648)	410 °F	210 °C
Water Absorption (D570)	0.03 %	0.03 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	380 V/mil	15 MV/m
Step by Step	250 V/mil	10 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.03	0.03
@ 1 MHZ	0.03	0.03
Dielectric Constant (D150)		
@ 60 HZ	5.1	5.1
@ 1 KHZ	5.0	5.0
@ 1 MHZ	4.9	4.9
Volume Resistivity (D257)	1 x 10 ¹² ohm cm	1 x 10 ¹⁰ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630
Black Phenolic

Durez "SUMIKON" PM-9630 black Phenolic is a single stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include coil bobbins, switches, and brush holders.

Molding Properties:

Bulk Factor (D1895)	2.3
Apparent Density (g/cc)(D1895)	0.79
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	6 Months

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.016"

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)

Short Time

Step by Step

V/mil

MV/m

V/mil

MV/m

Dissipation Factor (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Dielectric Constant (D150)

@ 60 HZ

@ 1 KHZ

@ 1 MHZ

Volume Resistivity (D257)

ohm cm

ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is in/in or m/m

See reverse for injection molding values.

April 1999

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.82	1.82
Molding Shrinkage* (D955)	0.0025 in/in	0.0025 m/m
Tensile Strength (D638)	20,000 psi	138 Mpa
Flexural Strength (D790)	28,000 psi	193 Mpa
Compressive Strength (D695)	35,000 psi	241 Mpa
Tensile Modulus (D638)	2.4 x 10 ⁶ psi	17 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	450 °F	232 °C
Water Absorption (D570)	0.15 %	0.15 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	300 V/mil	12 MV/m
Step by Step	270 V/mil	11 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.03	0.03
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	4.9	4.9
@ 1 KHZ	4.9	4.9
@ 1 MHZ	4.8	4.8
Volume Resistivity (D257)	1 x 10 ¹⁴ ohm cm	1 x 10 ¹² ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630
Brown Phenolic

Durez "SUMIKON" PM-9630 black Phenolic is a single stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and machineability. Typical applications include coil bobbins, switches, and brush holders.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.90
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.016"

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0020 in/in or m/m

See reverse for injection molding values.

January 1998

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630
Brown Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.82	1.82
Molding Shrinkage* (D955)	0.0040 in/in	0.0040 m/m
Tensile Strength (D638)	15,000 psi	100 Mpa
Flexural Strength (D790)	26,000 psi	180 Mpa
Compressive Strength (D695)	39,000 psi	270 Mpa
Tensile Modulus (D638)	2.7 x 10 ⁶ psi	19 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	480 °F	250 °C
Water Absorption (D570)	0.20 %	0.20 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	330 V/mil	13 MV/m
Step by Step	300 V/mil	12 MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	1 x 10 ¹³ ohm cm	1 x 10 ¹¹ ohm m

Injection properties determined with test specimens molded at 340°F
Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:



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DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630 (JK)

Black Phenolic

Durez "SUMIKON" PM-9630JK black Phenolic is a single stage glass fiber and mineral filled special purpose molding compound. It is especially designed for applications requiring high strength and dimensional stability with excellent heat resistance and creep resistance. Typical applications include brush holders, coil bobbins, and thermostat housings.

Molding Properties:

Bulk Factor (D1895)	2.0
Apparent Density (g/cc)(D1895)	0.90
Form of Material	Granular
Feeding & Preforming	Good
Storage Life	3 Months

Material Type:

Special Purpose

Agency Recognition

U.L. Temperature Index of 150°C
U.L. Flammability: 94V-0 @ 0.016"

Plasticities available for transfer, and injection molding.

Compression Grade

Typical Physical Properties:

Conventional Units

International System of Units

Specific Gravity (D792)		
Molding Shrinkage* (D955)	in/in	m/m
Tensile Strength (D638)	psi	Mpa
Flexural Strength (D790)	psi	Mpa
Compressive Strength (D695)	psi	Mpa
Tensile Modulus (D638)	psi	Gpa
Izod Impact (D256)	ft lb/in	J/m
Deflection Temperature (D648)	°F	°C
Water Absorption (D570)	%	%

Electrical Properties:

Dielectric Strength (D149)		
Short Time	V/mil	MV/m
Step by Step	V/mil	MV/m
Dissipation Factor (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Dielectric Constant (D150)		
@ 60 HZ		
@ 1 KHZ		
@ 1 MHZ		
Volume Resistivity (D257)	ohm cm	ohm m

Compression properties determined with test specimens molded at 340°F

* Typical transfer-molded shrinkage is 0.0020 in/in or m/m

See reverse for injection molding values.

January 1998

DUREZ THERMOSET MOLDING COMPOSITES

"SUMIKON" PM-9630 (JK)
Black Phenolic

Injection Grade

Typical Physical Properties:	Conventional Units	International System of Units
Specific Gravity (D792)	1.82	1.82
Molding Shrinkage* (D955)	0.0035 in/in	0.0035 m/m
Tensile Strength (D638)	16,000 psi	110 Mpa
Flexural Strength (D790)	26,000 psi	180 Mpa
Compressive Strength (D695)	44,000 psi	300 Mpa
Tensile Modulus (D638)	2.7×10^6 psi	19 Gpa
Izod Impact (D256)	0.56 ft lb/in	30 J/m
Deflection Temperature (D648)	>570 °F	>300 °C
Water Absorption (D570)	0.06 %	0.06 %

Electrical Properties:

Dielectric Strength (D149)		
Short Time	330 V/mil	13 MV/m
Step by Step	300 V/mil	12 MV/m
Dissipation Factor (D150)		
@ 60 HZ	0.04	0.04
@ 1 KHZ	0.02	0.02
@ 1 MHZ	0.02	0.02
Dielectric Constant (D150)		
@ 60 HZ	8.2	8.2
@ 1 KHZ	7.7	7.7
@ 1 MHZ	7.1	7.1
Volume Resistivity (D257)	1×10^{13} ohm cm	1×10^{11} ohm m

Injection properties determined with test specimens molded at 340°F

Refer to introduction for ASTM test methods.

Other Compression and Injection Grade Properties:

Coefficient of Thermal expansion: °C x 10^{-6} (23-60°C) 18
Arc Resistance: 182 Sec.
Tracking resistance (CTI): 190



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MSDS Number: **A2705** * * * * * *Effective Date: 11/02/01* * * * * * *Supercedes: 11/17/99*

MSDS MATERIAL SAFETY DATA SHEET
(USA) -----

Canada)

From: Mallinckrodt Baker, Inc
222 Red School Lane
Phillipsburg, NJ 08865

CANUTEC

event

Emergency Telephone Number: 908-859-2151

CHEMTREC: 800-424-9300

703-527-3887(Outside USA and

CANUTEC: 613-996-6666

NOTE: Use CHEMTREC and

phone numbers only in the

of a chemical emergency.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

J. T. B A K E R

ALUMINUM METAL (WIRE, FOIL, SHOT)

1. Product Identification

Synonyms: Aluminum wire; Aluminum foil; Aluminum shot; Aluminum uncrated nonpyrophoric

CAS No.: 7429-90-5

Molecular Weight: 26.98

Chemical Formula: Al

Product Codes: 0449, 0456

2. Composition/Information on Ingredients

Ingredient Hazardous	CAS No	Percent
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3. Hazards Identification

Emergency Overview

As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 0 - None
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 0 - None
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:

Not expected to be a health hazard.

Ingestion:

Not expected to be a health hazard.

Skin Contact:

No adverse effects expected.

Eye Contact:

No adverse effects expected.

Chronic Exposure:

No adverse effects expected.

Aggravation of Pre-existing Conditions:

No adverse health effects expected.

4. First Aid Measures

Inhalation:

Not expected to require first aid measures.

Ingestion:

Not expected to require first aid measures.

Skin Contact:

Not expected to require first aid measures.

Eye Contact:

Not expected to require first aid measures.

5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

Use protective clothing and breathing equipment appropriate for the surrounding fire.

6. Accidental Release Measures

Sweep, scoop or pick up spilled material. Package for reclamation or recovery. Package unreclaimable material for disposal in an approved waste disposal facility.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

-OSHA Permissible Exposure Limit (PEL):

15 mg/m³ (TWA) total dust and 5 mg/m³ (TWA)

respirable fraction for Aluminum metal as Al
-ACGIH Threshold Limit Value (TLV):
10 mg/m³ (TWA) Aluminum metal dusts

Ventilation System:

In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.

Personal Respirators (NIOSH Approved):

Not expected to require personal respirator usage.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Safety glasses.

9. Physical and Chemical Properties

Appearance:

Bright, silver-white metal.

Odor:

Odorless.

Solubility:

Insoluble in water.

Density:

2.70

pH:

No information found.

% Volatiles by volume @ 21C (70F):

0

Boiling Point:

2327C (4221F)

Melting Point:

660C (1220F)

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

1 @ 1284C (2343F)

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Toxic metal fumes may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Mercury, halocarbons, halogens, water (with bulk aluminum powder) strong oxidizing agents, some acids, bases and many other materials.

Conditions to Avoid:

Incompatibles.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

-----\Cancer Lists\-----

Ingredient Category	---NTP Carcinogen---		IARC
	Known	Anticipated	
Aluminum Metal (7429-90-5)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

```
-----\Chemical Inventory Status - Part 1\-----
-----
Ingredient                                TSCA  EC   Japan
Australia
-----
Aluminum Metal (7429-90-5)                Yes  Yes  No
Yes
```

```
-----\Chemical Inventory Status - Part 2\-----
-----
Ingredient                                Korea  --Canada--
Phil.                                     DSL   NDSL
-----
Aluminum Metal (7429-90-5)                Yes   Yes  No
Yes
```

```
-----\Federal, State & International Regulations - Part 1\-----
-----
313----- -SARA 302-  -----SARA
Ingredient                                RQ    TPQ   List
Chemical Catg.
-----
Aluminum Metal (7429-90-5)                No    No    Yes   No
```

```
-----\Federal, State & International Regulations - Part 2\-----
-----
Ingredient                                CERCLA  -RCRA-  -TSCA-
                                           261.33  8(d)
-----
Aluminum Metal (7429-90-5)                No      No      No
```

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: No Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 0 Flammability: 0 Reactivity: 0

Label Hazard Warning:

As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

Label Precautions:

None.

Label First Aid:

Not applicable.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

Prepared by: Environmental Health & Safety

Phone Number: (314) 654-1600 (U.S.A.)



NUEVA GENERACION MANUFACTURAS
CAPACITOR MANUFACTURER

Emergency Telephone: (800) 424-9300 (CHEMTREC)

SECTION 1 - PRODUCT INFORMATION

Liquid content of capacitors. Series 60, 61 for Motor Start all voltages

SECTION 2 - INGREDIENTS

Chemical Name	CAS#	% By Wt.	PEL/TLV
Ethylene Glycol	107-21-1	80.00	39.4 ppm Ceiling
Ammonium Pentaborate	12046-04-7	14.00	15 mg/m ³ Dust
Distilled Water	7732-18-5	5.00	None Established

SECTION 3 - PHYSICAL DATA

Color:	Amber
Form/Appearance:	Liquid
Odor:	Slight
Boiling Point:	>130 °C
Specific Gravity (H2O=1) @25°C	1.24
Vapor Density (air=1)	>2.00
Solubility in Water, % by Wt.	100
Percent Volatile By Volume:	100
Evaporation Rate (Butyl Acetate=1)	.17

SECTION 4 - FIRE AND EXPLOSION DATA

Flash Point and Method: 250 °F TCC

Flammable Limits: Lower: NA Upper: NA

Extinguishing Media: Water fog, Alcohol foam, Dry chemical, CO2

Fire Fighting Procedures:

Electrolyte will not burn unless preheated. Do not enter confined space without appropriate personal protective equipment including positive pressure NIOSH approved self-contained breathing apparatus. Cool fire exposed containers with water.

SECTION 5 - HEALTH EFFECTS

Routes of entry for liquids include eye and skin contact, ingestion and inhalation. Routes of entry for vapors include inhalation, eye and skin contact.

Acute Overexposure Effects:

Contact with the eyes and skin may result in moderate irritation. Electrolyte may be absorbed through the skin in toxic amounts.

Chronic Overexposure Effects:

Ethylene Glycol has been reported to be an experimental teratogen.

First Aid Procedures:

Eye Contact: Immediately flush with water for at least 15 minutes holding eyelid open. Get medical attention.

Skin Contact: Wash affected area with plenty of soap and water. Remove and launder contaminated clothing before reuse. If irritation develops, get medical attention.

Inhalation: Remove to fresh air and provide oxygen if breathing is difficult. Get medical attention.

Ingestion: Dilute with water and immediately induce vomiting. Never give fluid or induce vomiting if the victim is unconscious. Get immediate medical attention.

Aggravated Medical Conditions:

Pre-existing skin, eye and respiratory disorders may be aggravated by exposure to liquid or vapor content.

Carcinogenicity: This product contains no ingredients presently listed as carcinogenic by IARC, NTP, OSHA or ACGIH.

Acute Health: 3 Fire: 1 Reactivity: 0

SECTION 6 - REACTIVITY DATA

Stability: Stable

Incompatibility: Strong oxidizing agents and mineral acids.

Hazardous Decomposition Products: Carbon monoxide and unidentified organic compounds may be formed during combustion.

SECTION 7 - PERSONAL PROTECTION

Clothing: Gloves, apron, overalls or smocks as necessary to prevent contact.

Eyes: Safety glasses, chemical goggles, also face shield if splashing hazard exists.

Respiratory: If vapors or mists are generated, wear a NIOSH/MSHA approved organic vapor/mists respirator.

Ventilation: Use with adequate local exhaust ventilation to control vapors/mists below permissible exposure limits.

Other Personal Protection Data: Eyewash fountain should be easily accessible.

SECTION 8 LEAK/ENVIRONMENTAL**Spill/Leak Procedures - General:**

Spill should be contained, solidified and placed in suitable containers for disposal in a licensed facility. Wear appropriate respiratory protection and protective clothing and provide adequate ventilation during cleanup.

Waste Disposal:

Incinerate or bury in an approved licensed facility. Do not discharge into waterways or sewer systems without proper authorization.

SECTION 9 - STORAGE AND HANDLING**Storage and Handling - General:**

Keep containers closed. Consult other sections of this MSDS for information on reactivity and flammability.

SECTION 10 - FEDERAL REGULATORY INFORMATION

EPA - Comprehensive Environmental Response, Compensation and Liability Act. Under EPA - CERCLA ("superfund") release to air, land or water which exceed the reportable quantity must be reported the National Response Center, 800-424-8802.

The Reportable Quantity (RQ) for a release of this product is 5,000 LB., which is based on the presence of component #1.

The information contained herein is based on the data available to us and is believed to be correct. However, the data is not to be taken as a warranty or representation for which BCcomponents assumes legal liability. It is offered solely for your consideration, investigation and verification. Any use of this data and information must be determined by the user to be in accordance with applicable federal, state and local laws and regulations.



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Societa Chimica Larderello s.p.a.

AMMONIUM PENTABORATE OCTAHYDRATE TECHICAL INFORMATION

Larderel



Bulletin 8700
October 1993

BRAND NAME: AMMONIUM PENTABORATE OCTAHYDRATE
CHEMICAL NAMES: Ammonium pentaborate octahydrate
FORMULA: $(NH_4)_2B_{10}O_{18} \cdot 8H_2O$
MOLECULAR WEIGHT: 544.41
CAS NUMBER: 12007-89-5
DESCRIPTION: White, granular

TYPICAL PROPERTIES: The following properties are typical of normal production but are not intended for the preparation of specifications. If you require guidance in developing product specifications, please contact the supervisor of Assurance at 1-619-372-2243.

CHEMICAL ANALYSIS

SCREEN ANALYSIS

		TYPICAL ANALYSIS	U.S. STD SIEVE NO.	TYPICAL PERCENT CUMULATIVE
Ammonium Oxide	$(NH_4)_2O$	9.60%	+ 35	trace
Boron Oxide	(B_2O_3)	64.5%	+ 45	8
Water of Crystallization	(H_2O)	25.9%	+ 50	45
Sulfate	(SO_4)	< 1 ppm	+ 60	53
Chloride	(Cl)	< 0.4 ppm	+ 100	75
Iron	(FE)	< 2 ppm	+ 170	92
Lead	(Pb)	< 2 ppm		
Water Insolubles		< 10 ppm		

BULK DENSITY, poured
56 lb/ft

PACKAGING

25 Kg on heat-insulated basis

HANDLING

Information concerning the handling and use of this product is provided in a material safety data sheet (MSDS). This MSDS must be fully read and understood prior to any exposure, handling, or use of the product.

The information herein is believed to be reliable. However, no warranty, expressed or implied, is made as to its accuracy or completeness and none is made as to merchantability of the material or its fitness for any purpose. The manufacturer shall not be liable for consequential damages or for damage to persons or property resulting from its use. Nothing herein shall be construed as a recommendation for use in violation of any patent.

NO. 8700/REV 10/93

THEORETICAL PROPERTIES: The following properties are textbook theoretical data and are provided for convenience

code: 0001

and reference only. These properties are not normally tested for the commercial product and no representation is made relative to the commercial product.

THEORETICAL COMPOSITION

		<u>PERCENT</u>
Ammonium Oxide	(NH ₄) ₂ O	9.6%
Boron Oxide	(B ₂ O ₃)	64.5%
Water of Crystallization	(H ₂ O)	25.9%

SOLUBILITY IN WATER AS (NH₄)₂B₁₀O₁₆ · 8H₂O

TEMPERATURE		PERCENT BY WEIGHT OF SATURATED SOLUTION
°C	°F	
0	32	5.3
10	50	7.3
20	68	9.6
30	86	12.4
40	104	15.5
50	122	24.8
75	167	33.2
90	194	41.2

VENDOR

20315 NORTH AMERICAN CHEMICAL C

APPLICATIONS

A component of electrolyte used in electrolytic condensers, a ingredient of solid fire extinguishers, a flameproofing agent in textile and paper industry.



North American Chemical Company

A Harris Chemical Group Company

8300 Collage Blvd, Overland Park, KS 66210

1-800-637-2775

CODIGO: 06081

Material Safety Data Sheet

acc. to OSHA and ANSI

Printing date 05/30/2000

Reviewed on 05/05/2000

1 Identification of substance:

- **Product details:**
- **Trade name:** Ammonium pentaborate
- **Stock number:** 12294
- **Manufacturer/Supplier:**
Alfa Aesar, A Johnson Matthey Company
Johnson Matthey Catalog Company, Inc.
30 Bond Street
Ward Hill, MA 01835-8099
Emergency Phone: (978) 521-6300
CHEMTREC: (800) 424-9300
Web Site: www.alfa.com
- **Information department:** Health, Safety and Environmental Department
- **Emergency information:**
During normal hours the Health, Safety and Environmental Department. After normal hours call Chemtrec at (800) 424-9300.

2 Composition/Data on components:

- **Chemical characterization:**
Description: (CAS#)
Ammonium pentaborate, octahydrate (CAS# 12007-89-5), 100%
- **Identification number(s):**
- **EINECS Number:** 234-521-1

3 Hazards identification

- **Hazard description:** Xn Harmful
- **Information pertaining to particular dangers for man and environment**
 - R 22 Harmful if swallowed.
 - R 36/38 Irritating to eyes and skin.

4 First aid measures

- **After inhalation**
Supply fresh air. If required, provide artificial respiration. Keep patient warm.
Seek immediate medical advice.
- **After skin contact**
Immediately wash with water and soap and rinse thoroughly.
Seek immediate medical advice.
- **After eye contact**
Rinse opened eye for several minutes under running water.
Then consult a doctor.
- **After swallowing** Seek immediate medical advice.

5 Fire fighting measures

- **Suitable extinguishing agents**
Product is not flammable. Use fire fighting measures that suit the surrounding fire.
- **Special hazards caused by the material, its products of combustion or resulting gases:**
In case of fire, the following can be released:
Ammonia
Nitrogen oxides (NOx)
- **Protective equipment:**
Wear self-contained respirator.
Wear fully protective impervious suit.

6 Accidental release measures

- **Person-related safety precautions:**
Wear protective equipment. Keep unprotected persons away.
Ensure adequate ventilation
- **Measures for environmental protection:**
Do not allow material to be released to the environment
without proper governmental permits.
- **Measures for cleaning/collecting:**
Dispose contaminated material as waste according to item 13.
- **Additional information:**
See Section 7 for information on safe handling
See Section 8 for information on personal protection
equipment.
See Section 13 for disposal information.

7 Handling and storage

- **Handling**
- **Information for safe handling:**
Keep container tightly sealed.
Store in cool, dry place in tightly closed containers.
Ensure good ventilation at the workplace.
- **Information about protection against explosions and fires:**
The product is not flammable
- **Storage**
- **Requirements to be met by storerooms and receptacles:**
No special requirements.
- **Information about storage in one common storage facility:**
None known.
- **Further information about storage conditions:**
Keep container tightly sealed.
Store in cool, dry conditions in well sealed containers.

8 Exposure controls and personal protection

- **Additional information about design of technical systems:**
Properly operating chemical fume hood designed for hazardous chemicals and having an average face velocity of at least 100 feet per minute.

Components with limit values that require monitoring at the workplace:

Not required.

- **Additional information:** No data
- **Personal protective equipment**
- **General protective and hygienic measures**
The usual precautionary measures for handling chemicals should be followed.
Keep away from foodstuffs, beverages and feed.
Remove all soiled and contaminated clothing immediately.
Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.
- **Breathing equipment:**
Use suitable respirator when high concentrations are present.
- **Protection of hands:** Impervious gloves
- **Eye protection:**
Safety glasses
Tightly sealed goggles
Full face protection
- **Body protection:** Protective work clothing.

13 Disposal considerations

- **Product:**
- **Recommendation**
Consult state, local or national regulations for proper disposal.
- **Uncleaned packagings:**
- **Recommendation:**
Disposal must be made according to official regulations.

14 Transport information

Not a hazardous material for transportation.

- **DOT regulations:**
- **Hazard class:** None
- **Land transport ADR/RID (cross-border)**
- **ADR/RID class:** None
- **Maritime transport IMDG:**
- **IMDG Class:** None
- **Air transport ICAO-TI and IATA-DGR:**
- **ICAO/IATA Class:** None
- **Transport/Additional information:**
Not dangerous according to the above specifications.

9 Physical and chemical properties:

- **Form:** Powder
- **Color:** White
- **Odor:** Odorless

<u>Method</u>	<u>Value/Range</u>	<u>Unit</u>
• Change in condition		
• Melting point/Melting range:	Not determined	
• Boiling point/Boiling range:	Not determined	
• Sublimation temperature / start:	Not determined	
• Flash point:	Not applicable	
• Ignition temperature:	Not determined	
• Decomposition temperature:	Not determined	
• Danger of explosion: Product does not present an explosion hazard.		
• Explosion limits:		
• Lower:	Not determined	
• Upper:	Not determined	
• Vapor pressure:	Not determined	
• Density:	at 20 ° C	1.58 g/cm ³
• Solubility in / Miscibility with		
• Water:	Partly soluble	

10 Stability and reactivity

- **Thermal decomposition / conditions to be avoided:**
Decomposition will not occur if used and stored according to specifications.
- **Materials to be avoided:** None known.
- **Dangerous reactions** No dangerous reactions known
- **Dangerous products of decomposition:**
Nitrogen oxides
Ammonia

11 Toxicological information

- **Acute toxicity:**
- **Primary irritant effect:**
- **on the skin:** Irritant to skin and mucous membranes.
- **on the eye:** Irritating effect.
- **Sensitization:** No sensitizing effects known.
- **Subacute to chronic toxicity:**
Boron effects the central nervous system. Boron poisoning causes depression of the circulation, persistent vomiting and diarrhea, followed by profound shock and coma. The temperature may become subnormal and a scarletina form rash may cover the entire body.
- **Additional toxicological information:**
To the best of our knowledge the acute and chronic toxicity of this substance is not fully known.
No classification data on carcinogenic properties of this material is available from the EPA, IARC, NTP, OSHA or ACGIH.

12 Ecological information:

- **General notes:**
Do not allow material to be released to the environment without proper governmental permits.

15 Regulations

- **Product related hazard informations:**
- **Hazard symbols:** Xn Harmful
- **Risk phrases:**
 - 22 Harmful if swallowed.
 - 36/38 Irritating to eyes and skin.
- **Safety phrases:**
 - 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
 - 36 Wear suitable protective clothing.
- **National regulations**

All components of this product are listed in the U.S. Environmental Protection Agency Toxic Substances Control Act Chemical Substance Inventory.
- **Information about limitation of use:**

For use only by technically qualified individuals.

16 Other information:

Employers should use this information only as a supplement to other information gathered by them, and should make independent judgement of suitability of this information to ensure proper use and protect the health and safety of employees. This information is furnished without warranty, and any use of the product not in conformance with this Material Safety Data Sheet, or in combination with any other product or process, is the responsibility of the user.

- **Department issuing MSDS:** Health, Safety and Environmental Department.
- **Contact:** Darrell R. Sanders

Fosfato de Amonio, Monobásico

1. Identificación del Producto

Sinónimos: Bifosfato de Amonio

CAS No: 7722-76-1

Peso Molecular: 115.04

Fórmula Química: NH₄H₂PO₄

Códigos del producto:

J.T. Baker: 0776, 0777, 4931

Mallinckrodt: 3476

2. Composición/Información de los Ingredientes

Ingrediente	CAS No	Por Ciento	Peligroso
Ammonium Phosphate Monobasic	7722-76-1	98 - 100%	Si

3. Identificación de Peligros

Reseña de Emergencia

¡AVISO! CAUSA IRRITACION A PIEL, OJOS Y APARATO RESPIRATORIO. DAÑO SI SE TRAGASE O INHALASE.

Sistema J.T. Baker SAF-T-DATA^(tm) (Proporcionado aquí para su conveniencia)

Salud: 1 - Slight

Inflamabilidad: 0 - Ninguno

Reactividad: 1 - Slight

Contacto: 1 - Slight

Equipo de Protección para Laboratorio: ANTEOJOS PROTECTORES, UNIFORME PARA LABORATORIO

Código de Color para ANaranja (Almacenaje General)

Efectos Potenciales de Salud

Inhalación:

Causa irritación del tracto respiratorio con síntomas como tos, falta de respiración.

Ingestión:

Causa irritación del tracto gastrointestinal. Los síntomas pueden ser náuseas, vómitos y diarrea.

Contacto con la Piel:

Causa irritación de la piel. Los síntomas incluyen enrojecimiento, prurito y dolor.

Contacto con los Ojos:

Causa irritación, enrojecimiento y dolor.

Exposición Crónica:

No se encontró información.

Empeoramiento de las Condiciones Existentes:

No se encontró información.

4. Medidas de Primeros Auxilios

Inhalación:

Si inhalara, retirarse al aire fresco. Si la persona no respira, dar respiración artificial. Si respiración fuera difícil, dar oxígeno. Consiga atención médica.

Ingestión:

Induzca el vómito inmediatamente como lo indica el personal médico. Nunca administre nada por la boca a una persona inconsciente. Consiga atención médica.

Contacto con la Piel:

Lave la piel inmediatamente con agua abundante por lo menos 15 minutos. Quítese la ropa y zapatos contaminados. Busque atención médica. Lave la ropa antes de usarla nuevamente. Limpie los zapatos completamente antes de usarlos de nuevo.

Contacto con los Ojos:

Lave los ojos inmediatamente con abundante agua, por lo menos 15 minutos, elevando los párpados superior e inferior ocasionalmente. Busque atención médica.

5. Medidas Contra incendios

Incendio:

No considerado ser peligro de fuego. Un incendio puede producir vapores tóxicos.

Explosión:

No es considerado peligro de explosión.

Medios Extintores de Incendio:

Utilicen cualquier medio apropiado para extinguir fuego alrededor.

Información Especial:

En el evento de un fuego, vestidos protectores completos y aparato respiratorio autónomo con mascarilla completa operando en la demanda de presión u-otro modo de presión positiva.

6. Medidas de Escape Accidental

Ventile el área donde ocurrió la fuga o derrame. Use apropiado equipo protector personal como se especifica en la Sección 8. Derrames: Recoja y coloque en un recipiente apropiado para recuperación o desecho en una manera tal que no se produzca polvo.

7. Manejo y Almacenamiento

Guarde en un envase cerrado herméticamente, almacene en un área fresca, seca y bien ventilada. Proteja contra los daños físicos. Aísle de las sustancias incompatibles. Los recipientes de este material pueden ser peligrosos al vaciarse puesto que retienen residuos del producto (polvo, sólidos); observe todas las advertencias y precauciones listadas para el producto.

8. Controles de Exposición/Protección Personal

Limites de Exposición Aérea:

Ninguno establecido.

Sistema de Ventilación:

En general, la ventilación de dilución es un control satisfactorio del peligro para la salud para esta sustancia. Sin embargo, si las condiciones de uso crean incomodidad al trabajador, debe considerarse un sistema de aspiración local.

Respiradores Personales (Aprobados por NIOSH):

Si se va a utilizar en condiciones donde es aparente la exposición al polvo o rocío, y no son factibles los controles de Ingeniería, se puede usar un respirador para partículas (filtros de NIOSH tipo N95 o mejores). Si hay presencia de partículas aceitosas (por ejemplo lubricantes, fluidos de corte, glicerina, etc.), use un filtro NIOSH tipo R o P. Para emergencias o situaciones donde se desconocen los niveles de exposición, use un respirador abastecido por aire, de presión positiva y que cubra toda la cara. ADVERTENCIA: Los respiradores purificadores de aire no protegen a los trabajadores en atmósferas deficientes de oxígeno.

Protección de la Piel:

Usen vestimenta protectora impermeables, incluyendo botas, guantes, ropa de laboratorio, delantal o monos para evitar contacto con la piel.

Protección para los Ojos:

Utilice gafas protectoras contra productos químicos y/o un protector de cara completo donde el contacto sea posible. Mantener en el de trabajo una área instalación destinada al lavado, remojo y enjuague rápido de los ojos.

9. Propiedades Físicas y Químicas

Aspecto:

Cristales blancos brillantes o gránulos.

Olor:

Ligero olor ácido.

Solubilidad:

No se encontró información.

Peso Específico:

1.80

pH:

4.2

% de Volátiles por Volumen @ 21C (70F):

0

Punto de Ebullición:

No se encontró información.

Punto de Fusión:

190C (374F)

Densidad del Vapor (Air=1):

No se encontró información.

Presión de Vapor (mm Hg):

No se encontró información.

Tasa de Evaporación (BuAc=1):

No se encontró información.

10. Estabilidad y Reactividad

Estabilidad:

Estable en condiciones ordinarias de uso y almacenamiento.

Productos Peligrosos de Descomposición:

Cuando se quema puede producir amoníaco y óxidos de fósforo.

Polimerización Peligrosa:

No ocurrirá.

Incompatibilidades:

Sodium hypochlorite.

Condiciones a Evitar:

Incompatibles.

11. Información Toxicológica

No se obtuvo información sobre las LD50/LC50 relacionadas con las rutas normales de exposición ocupacional.

Ingrediente	--Carcinógeno NTP--		Categoría IARC
	Conocido	Anticipado	
Ammonium Phosphate Monobasic (7722-76-1)	No	No	Ninguno

12. Información Ecológica

Suerte Ecológica:

No se encontró información.

Toxicidad Ambiental:

No encontró información.

13. Consideraciones de Desecho

Lo que no pueda salvarse para recuperar o reciclar debe manejarse en una instalación de eliminación de residuos, aprobada y apropiada. El procesamiento, utilización o contaminación de este producto puede cambiar las opciones de administración de residuos. Las regulaciones de eliminación local o estatal pueden diferir de las regulaciones de eliminación federal. Deseche el envase y el contenido no usado de acuerdo con los requerimientos federales, estatales y locales.

14. Modos de Transportación

Not regulated.

15. Información Reguladora

```
-----\Estado de Inventario Químico - Parte 1\-----
Ingrediente                                     TSCA  EC   Japan  Australia
-----
Ammonium Phosphate Monobasic (7722-76-1)      Si   Si   Si     Si
```

```
----\Estado de Inventario Químico - Parte 2\-----
Ingrediente                                     Korea  --Canada--
                                                DSL   NDSL   Phil.
-----
Ammonium Phosphate Monobasic (7722-76-1)      Si   Si   No     Si
```

```
-----\Regulaciones Federales, Estatales e Internacionales - Parte 1\-----
Ingrediente                                     -SARA 302-  -SARA 313-
                                                RQ   TPQ   List  Chemical Catg.
-----
Ammonium Phosphate Monobasic (7722-76-1)      No   No   No     No
```

```
-----\Regulaciones Federales, Estatales e Internacionales - Parte 2\-----
Ingrediente                                     -RCRA-      -TSCA-
                                                261.33     8(d)
-----
Ammonium Phosphate Monobasic
(7722-76-1)                                     No          No       No
```

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Agudo: Si Crónico: No Inflamabilidad: No Presion: No
Reactividad: No (Puro / Sólido)

Australian Hazchem Code: None allocated.

Poison Schedule: None allocated.

WHMIS:

Esta HDSM ha sido preparada de acuerdo con el criterio de peligro de las Regulaciones de Productos Controlados (CPR siglas en inglés), y la Hoja de Datos de Seguridad del Material contiene toda la información requerida por las CPR.

16. Otra Información

Clasificaciones NFPA: Salud: **2** Inflamabilidad: **0** Reactividad: **0**

Etiqueta de Advertencia de Peligro:

¡AVISO! CAUSA IRRITACION A PIEL, OJOS Y APARATO RESPIRATORIO. DAÑO SI SE TRAGASE O INHALASE.

Etiqueta de Precauciones:

Evite contacto con ojos, piel y vestimentos.

Evite respirar el polvo.

Lave completamente después de manipuleo.

Mantenga recipiente cerrado.

Utilice solamente con ventilación adecuada.

Etiqueta de Primeros Auxilios:

Si hubo contacto, lave los ojos o piel inmediatamente con agua abundante por lo menos 15 minutos. Quítese la ropa y zapatos contaminados. Lave la ropa antes de usarla nuevamente. Si inhalara, retirarse al aire fresco. Si la persona no respira, dar respiración artificial. Si respiración fuera difícil, dar oxígeno. Si ingerido, induzca vomitar inmediatamente como indicado por personal médico. Nunca dar nada por boca a una persona inconciente. Busque atención médica en todos los casos.

Uso del Producto:

Reactivo de Laboratorio

Información de Revisión:

La Sección de HDSM cambiada desde la última revisión del documento incluye: 8.

Renuncia:

Mallinckrodt Baker, Inc. proporciona la información contenida aquí de buena fe, sin embargo, no hace ninguna representación en cuanto a su integridad o exactitud. Es intención que se utilice este documento sólo como una guía para el manejo del material con la precaución apropiada, por una persona adecuadamente capacitada en el uso de este producto. Los individuos que reciban la información deben ejercer su juicio independiente al determinar la conveniencia del producto para un uso particular. MALLINCKRODT BAKER, INC. NO GESTIONA O DA GARANTÍA ALGUNA, EXPRESA O IMPLÍCITA, INCLUYENDO SIN LIMITACIÓN CUALQUIER GARANTÍA DE COMERCIABILIDAD, O CONVENIENCIA PARA UN PROPÓSITO PARTICULAR, CON RESPECTO A LA INFORMACIÓN EXPUESTA EN EL PRESENTE DOCUMENTO O DEL PRODUCTO AL QUE SE REFIERE LA INFORMACIÓN. POR CONSIGUIENTE, MALLINCKRODT BAKER, INC. NO SERÁ RESPONSABLE DE DAÑOS

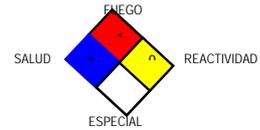
QUE RESULTEN DEL USO O CONFIANZA QUE SE TENGA EN ESTA INFORMACIÓN.

Preparado por: Departamento de Medioambiente, Salud y Seguridad

Número Telefónico: (314) 654-1600 (EE.UU.)



HOJA DE DATOS DE SEGURIDAD



ETILEN GLICOL
COD. 6047

SECCION I DATOS GENERALES DEL RESPONSABLE DEL MATERIAL

Fecha de elaboración: Febrero 24, 2003

Fecha revisión: Febrero, 04

Revisión: 1

De acuerdo a **Nom-018-STPS-2000**

Nombre del Fabricante: Química Delta S.A. de C.V.
Domicilio: Carretera Teoloyucan - Huehuetoca No. 259
 Bo. Santa María Caliacac, Estado de México C.P. 54770
Teléfono: 58-99-94-00
Teléfono SETIQ: (01 800)-00-214-00 (con 4 líneas sin costo)
 (01 555)-55-915-88 (con 4 líneas sin costo)

SECCION II DATOS GENERALES DE LA SUSTANCIA QUIMICA

Nombre Químico 1,2 ETANODIOL	Nombre Comercial MONOETILEN GLICOL
Sinónimos 1,2-DIHIROXIETANO; ALCOHOL GLICOL:M.E.G. TESCOLO	Familia Química GLICOLES
Formula HO-C2H4-OH	Otros Datos N/A

SECCION III IDENTIFICACION DE SUSTANCIA QUIMICA PELIGROSA

Nombre del Componente	%	No. de CAS	No. de ONU	IPVS	LMPE ppm	PPT mg/m3	LMP ppm	CCT O PICO ppm
ETILEN GLICOL	99,0%	107-21-1	1993	50ppm	N/D	N/D	N/D	N/D

IDENTIFICACION DE LOS PELIGROS
CLASIFICACION DE RIESGOS

NFPA				HMIS			
S	I	R	RE	S	I	R	EPP
2	1	0	N/A	2	1	N/A	G

COPIA NO CONTROLADA

SECCION IV PROPIEDADES FISICAS Y QUIMICAS

Temperatura de Ebullición (°C) 197.6°C (a 760mmHg)	Temperatura de Fusión (°C) -6°C
Temperatura de Inflamación (°C) 115°C(TAG COPA CERRADA)	Temperatura de Autoignición 300°C
Densidad Relativa 1.112 (a 25°C)	Peso Molecular 62,07
Estado Físico LIQUIDO	Color INCOLORO

Olor
INODORO
Velocidad de Evaporación (Butil Acetato=1)
N/D
Presión de Vapor (mm Hg) a 20°C
0.05mmHg (A 25°C)

Densidad de Vapor (AIRE=1)
3.55 (AIRE=1)
Solubilidad en Agua 20°C
7.8(% en peso a 20°C)
% Volatilidad
POCO VOLÁTIL

LIMITES DE INFLAMABILIDAD

Inferior
N/D
Otros Datos
N/A

Superior
N/D

SECCION V RIESGOS DE FUEGO O EXPLOSIÓN

Medio de Extinción:

INCENDIOS PEQUEÑOS: POLVO QUIMICO SECO, CO2, ROCIO DE AGUA O ESPUMA TIPO ALCOHOL.
INCENDIOS GRANDES: ROCIO DE AGUA, NIEBLA O ESPUMA TIPO ALCOHOL.

Equipo de protección personal específico a utilizar durante el combate de incendio:

USE EQUIPO DE PROTECCION PERSONAL Y EQUIPO DE AIRE AUTONOMO (SCBA) .

Procedimiento y precauciones especial en el Combate de Incendios:

APLICAR AGUA FRIA A LOS LADOS DE LOS CONTENEDORES, PARA REDUCIR LA INTENSIDAD DE LAS FLAMAS Y PARA DILUIR LOS DERRAMES A MEZCLAS NO INFLAMABLES.

Condiciones que conducen a otro riesgo especial:

EL CONTENEDOR PUEDE EXPLOTAR VIOLENTAMENTE EN EL CALOR DEL FUEGO. EL ESCURRIMIENTO A LAS ALCANTARILLAS O LA MEZCLA VAPOR/AIRE PUEDEN ENCONTRAR UNA FUENTE DE IGNICION.

Productos de la combustión nocivos para la salud:

MONOXIDO DE CARBONO Y/O DIOXIDO DE CARBONO

SECCION VI. DATOS DE REACTIVIDAD

Sustancia: ESTABLE

Condiciones a FUEGO, CHISPAS Y CALOR

Incompatibilidad FUERTES AGENTES OXIDA COMO: PEROXIDO DE HIDROGENO, ACIDO NITRICO, ACIDO PERCLORICO O TRIOXIDO DE CROMO; CLORURO DE ACETILO; PENTAFLUORURO DE BROMO; HIPOCLORITO DE CALCIO, BASES FUERTES.

Productos de de MONOXIDO DE CARBONO Y/O DIOXIDO DE CARBONO

Polimerización e NO OCURRIRA

y condiciones a NINGUNA

COPIA NO CONTROLADA

SECCION VII. RIESGOS PARA LA SALUD, EMERGENCIAS Y PRIMEROS AUXILIOS

1a. PARTE EFECTOS A LA SALUD (POR EXPOSICION AGUDA)

Ingestión Accid: PUEDE CAUSAR DOLOR DE CABEZA, ESTUPOR, IRRITACION DE LA BOCA Y GARGANTA CALAMBRES Y DOLOR ABDOMINAL, SOMNOLENCIA, VÉRTIGO, NAUSEAS,

Inhalación: LOS VAPORES SON IRRITANTES PARA LA NARIZ. PUEDE CAUSAR TOS Y DIFICULTAD RESPIRATORIA.

Piel contacto y a EL CONTACTO REPETIDO O PROLONGADO PUEDE CAUSAR LESIONES MODERADAS COMO ENROJECIMIENTO E HINCHAZON. SE PUEDE ABSORBER POR LA PIEL.

Contacto con lo: ENROJECIMIENTO POR IRRITACIÓN, DOLOR.

SUSTANCIA QUIMICA CONSIDERADA COMO:

NOM-010-STPS- NO

CANCERIGENA

No MUTAGENICA

No TERATOGENICA

No

Efectos por Exposición Crónica: DAÑA EL HIGADO

Información Complementaria: N/D

2a. PARTE EMERGENCIA Y PRIMEROS AUXILIOS

Ingestión: PROVOQUE EL VOMITO EN PACIENTES CONSCIENTES, DANDOLES DOS VASOS DE AGUA E INTRODUCIENDO EL DEDO A LA GARGANTA. CONTACTE A UN MEDICO INMEDIATAMENTE.

Inhalación: TRASLADAR A LA VICTIMA DONDE HAYA AIRE FRESCO, SI NO RESPIRA DELE RESPIRACION ARTIFICIAL, OXIGENO SI ES NECESARIO. CONTACTE A UN MEDICO INMEDIATAMENTE.

Piel contacto y a: RETIRE LA ROPA CONTAMINADA Y LAVE LA PIEL CONTAMINADA CON GRANDES CANTIDADES DE AGUA. SI LA IRRITACION PERSISTE CONTACTE A UN MEDICO.

Contacto con los ojos: LAVAR LOS OJOS CON AGUA CORRIENTE DURANTE 15 MINUTOS. CONTACTE A UN MEDICO INMEDIATAMENTE.

En todos los casos obtener atención medica inmediata

Otros riesgos o efectos para la salud: N/A

Antídotos: N/D

Otra información importante para la atención medica primaria: N/D

SECCION VIII. INDICACIONES EN CASO DE FUGA O DERRAME

EVITE EL CONTACTO CON LA PIEL Y OJOS. PONGA LOS CONTENEDORES CON FUGA EN UNA AREA BIEN VENTILADA. ELIMINE TODAS LAS FUENTES DE IGNICION. CONTenga EL DERRAME PARA MINIMIZAR EL AREA CONTAMINADA Y FACILITAR LA RECUPERACION O DISPOSICION DEL MATERIAL. PARA LIMPIAR LOS DERRAMES, LAVE EL AREA CON Poca AGUA O USE UN ABSORBENTE. TODAS LAS LIMPIEZAS Y DESECHOS DEBEN SER LLEVADAS A CABO DE ACUERDO A LAS REGULACIONES FEDERALES Y ESTATALES

SECCION IX. INFORMACIÓN SOBRE ECOLOGIA

DE ACUERDO CON LAS DISPOSICIONES DE LA SECRETARIA DE MEDIO AMBIENTE Y RECURSOS NATURALES EN MATERIA DE AGUA, AIRE, SUELO Y RESIDUO.

SECCION X. PROTECCIÓN ESPECIAL

EQUIPO DE PROTECCIÓN PERSONAL ESPECIFICO

Respiratoria: MASCARILLA CONTRA VAPORES ORGÁNICOS

Manos: GUANTES DE SEGURIDAD

Ojos: GOGGLES O LENTES DE SEGURIDAD

Cuerpo: ROPA DE ALGODÓN 100%

Otros: ZAPATOS DE SEGURIDAD, MANDIL

Ventilación: LOCAL

SECCION XI. INFORMACIÓN SOBRE TRANSPORTACION

Clasificación: LIGERAMENTE INFLAMABLE

Nombre de Emb: ETILEN GLICOL

Número de Nacio UN 1993

Número de DOT 26

En caso de accid: SETIQ 01 800 00 214 00

SECCION XII. PRECAUCIONES ESPECIALES

ALMACENECE EN AREAS BIEN VENTILADAS. MANTENGASE ALEJADO DE CHISPAS Y FUEGO. MANTENGA LOS CONTENEDORES CERRADOS. CUANDO SE TRANSFIERA MANTENGA LOS CONTENEDORES ATERRIZADOS. EVITE EL CONTACTO CON LOS OJOS, PIEL Y ROPA. DESPUES DE MANEJAR EL MATERIAL LAVESE CON AGUA Y JABON.

N/D= No disponible

N/A= No aplica

E.P.P= DE ACUERDO A LA NOM-018-STPS-2000

RENUNCIA DE RESPONSABILIDADES

La información anterior está basada en datos disponibles la cual se cree ser correcta. Sin embargo, ninguna garantía de comerciabilidad, aptitud para cualquier uso o alguna otra garantía está expresada o implicada con respecto a la exactitud de dicha información, los resultados a obtener de su uso, los riesgos relacionados con el uso de material o algún otro uso no infrigirá ninguna patente, ya que la información contenida aquí dentro puede ser aplicada bajo condiciones fuera de nuestro control y con las que no podemos estar familiarizados; no asumimos alguna responsabilidad del resultado de su uso. Esta información está ajustada sobre las condiciones que la persona que la reciba de hacer bajo sus propias determinaciones de la adaptabilidad del material para su trabajo en particular.

ELABORO

_____ 

SEGURIDAD Y ECOLOGÍA

REVISO

_____ 

CONTROL DE CALIDAD

APROBO

_____ 

DIRECCIÓN COMERCIAL

Material Safety Data Sheet

acc. to ISO/DIS 11014

Printing date 08/28/2003

Reviewed on 08/28/2003

1 Identification of substance**Product details****Trade name: OR-421 CORE***Application of the substance / the preparation: Flux cored solder***Manufacturer/Supplier:**Kester
515 E. Touhy Ave.
Des Plaines, IL 60018Tel.(847) 297-1600
Fax.(847) 390-9338**Information department:**

MSDS Coordinator

Tel. (847) 699-5755

Emergency information:

CHEMTREC 24-Hour Emergency Telephone Number:

(800)424-9300

CHEMTREC 24-Hour Emergency Telephone Number (Outside of the U.S. and Canada):

(703)527-3887

2 Composition/Data on components**Chemical characterization***Description: Mixture of the substances listed below with nonhazardous additions.***Dangerous components:**

7440-31-5	tin	0-100%
7439-92-1	lead	0-100%
7440-36-0	antimony	0-100%
7440-50-8	copper	0-100%
7440-22-4	silver	0-100%
7440-69-9	bismuth	0-100%
7440-66-6	Zinc	0-100%
57-13-6	urea	≤ 2.5%

Additional information:*Composition and weight percent of solder alloys varies widely and can be determined by product label.**Flux in core is typically 1-3% by weight.***3 Hazards identification****WHMIS Hazard Symbols****Information pertaining to particular dangers for man and environment:***The product has to be labelled due to the calculation procedure of international guidelines.**Harmful by inhalation and if swallowed.**Danger of cumulative effects.**Possible risk of impaired fertility.**Contains lead. Should not be used on surfaces liable to be chewed or sucked by children.*

(Contd. on page 2)

USA

Material Safety Data Sheet

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Reviewed on 08/28/2003

Trade name: OR-421 CORE

(Contd. of page 1)

Classification system:

NFPA ratings (scale 0 - 4)



Health = 2

Fire = 1

Reactivity = 0

HMIS-ratings (scale 0 - 4)

HEALTH	2
FIRE	1
REACTIVITY	0

Health = *2

Fire = 1

Reactivity = 0

4 First aid measures

General information:

Symptoms of poisoning may even occur after several hours; therefore medical observation for at least 48 hours after the accident.

After inhalation: *Supply fresh air; consult doctor in case of complaints.*

After skin contact: *Immediately wash with water and soap and rinse thoroughly.*

After eye contact: *Rinse opened eye for several minutes under running water.*

After swallowing: *Induce vomiting, if person is conscious. Seek medical help.*

5 Fire fighting measures

Suitable extinguishing agents:

CO₂, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.

Special hazards caused by the material, its products of combustion or resulting gases:

Melted solder above 1000°F will liberate toxic lead and/or antimony fumes.

In case of fire, the following can be released:

Carbon monoxide (CO)

Carbon dioxide (CO₂)

Aliphatic aldehydes

Protective equipment: *Wear self-contained respiratory protective device.*

Additional information *Flux in cored solder may ignite when the solder melts in a fire.*

6 Accidental release measures

Person-related safety precautions: *Ensure adequate ventilation*

Measures for environmental protection: *Do not allow product to reach sewage system or any water course.*

Measures for cleaning/collecting:

Melted solder will solidify on cooling and can be scraped up. Use caution to avoid breathing fumes if a gas torch is used to cut up large pieces.

7 Handling and storage

Handling:

Information for safe handling: *Ensure good ventilation/exhaustion at the workplace.*

(Contd. on page 3)

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Reviewed on 08/28/2003

Trade name: OR-421 CORE

(Contd. of page 2)

Information about protection against explosions and fires: *Keep respiratory protective device available.***Storage:****Requirements to be met by storerooms and receptacles:** *No special requirements.***Information about storage in one common storage facility:** *Not required.***Further information about storage conditions:***Store in dry conditions.**Exposure to sulfur or to high humidity will tarnish solder surface.***8 Exposure controls and personal protection****Additional information about design of technical systems:** *No further data; see item 7.***Components with limit values that require monitoring at the workplace:****7440-31-5 tin**

PEL	2 mg/m ³ Metal
REL	2 mg/m ³ Tin, Metal
TLV	2 mg/m ³

7439-92-1 lead

PEL	0.05* mg/m ³ as Pb
REL	<0.1* mg/m ³ as Pb; *Blood Pb <0.06 mg/100 g whole blood
TLV	0.05 mg/m ³ as Pb; BEI

7440-36-0 antimony

PEL	0.5 mg/m ³
REL	0.5 mg/m ³ as Sb
TLV	0.5 mg/m ³

7440-50-8 copper

PEL	0.1*,1** mg/m ³ *fume **dusts & mists
REL	0.1*,1** mg/m ³ *Copper fume, as Cu **Copper dusts & mists, as Cu
TLV	0.2*, 1** mg/m ³ *fume; ** dusts&mists, as Cu

7440-22-4 silver

PEL	0.01 mg/m ³
REL	0.01 mg/m ³
TLV	0.1 mg/m ³

(Contd. on page 4)

USA

Material Safety Data Sheet

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Trade name: OR-421 CORE

(Contd. of page 3)

Additional information:*PEL = Permissible Exposure Limit (OSHA)**REL= Recommended Exposure Limit (NIOSH)**TLV= Threshold Limit Value (ACGIH)**OSHA= Occupational Safety and Health Administration**ACGIH= American Conference of Governmental Industrial Hygienists**NIOSH= National Institute for Occupational Safety and Health***Personal protective equipment:****General protective and hygienic measures:***Keep away from foodstuffs, beverages and feed.**Wash hands before breaks and at the end of work.**Store protective clothing separately.***Breathing equipment:***When ventilation is not sufficient to remove fumes from the breathing zone, a safety approved respirator or self-contained breathing apparatus should be worn.***Protection of hands:***Protective gloves***Material of gloves:***Cloth gloves**Nitrile rubber, NBR**Natural rubber, NR***Penetration time of glove material:***The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.***Eye protection:***Tightly sealed goggles**Safety glasses***9 Physical and chemical properties****General Information**

Form:	<i>Solid</i>
Color:	<i>Silver grey</i>
Odor:	<i>Mild</i>

Change in condition**Melting point/Melting range:** *> 100°C (> 212°F)***Boiling point/Boiling range:** *Undetermined.***Flash point:** *> 93°C (> 199°F)***Danger of explosion:** *Product does not present an explosion hazard.*

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Material Safety Data Sheet

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Reviewed on 08/28/2003

Trade name: OR-421 CORE

(Contd. of page 4)

Density at 20°C (68°F): > 7 g/cm³**Solubility in / Miscibility with Water:** Insoluble.**10 Stability and reactivity****Thermal decomposition / conditions to be avoided:** No decomposition if used according to specifications.**Materials to be avoided:** Strong acids, strong oxidizers.**Dangerous reactions** No dangerous reactions known.**Dangerous products of decomposition:**

When heated to soldering temperatures, solvents will be evaporated and organic material may release aliphatic aldehydes and acids.

11 Toxicological information**Acute toxicity:****Primary irritant effect:**

on the skin: Possible local irritation by contact with flux or fumes.

on the eye: Smoke during soldering can cause eye irritation.

through inhalation: May cause respiratory irritation.

through ingestion: May be harmful if swallowed.

Sensitization: No sensitizing effects known.**Additional toxicological information:**

The product shows the following dangers according to internally approved calculation methods for preparations:

Harmful

12 Ecological information**General notes:** Do not allow product to reach ground water, water course or sewage system.**13 Disposal considerations****Product:****Recommendation:**

Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

Disposal must be made according to official regulations.

Uncleaned packagings:**Recommendation:** Disposal must be made according to official regulations.

—USA

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14 Transport information**DOT regulations:**

Hazard class: -
Not regulated.

Land transport ADR/RID (cross-border):

ADR/RID class: -
Not regulated.

Maritime transport IMDG:

IMDG Class: -
Not regulated.

Marine pollutant: No

Air transport ICAO-TI and IATA-DGR:

ICAO/IATA Class: -
Not regulated.

15 Regulations

USA The following information relates to product regulation specific to the USA.

SARA (Superfund Amendments and Reauthorization Act)

Section 355 (extremely hazardous substances):

None of the ingredient is listed.

Section 313 (Specific toxic chemical listings):

7439-92-1	lead
7440-36-0	antimony
7440-50-8	copper
7440-22-4	silver
7440-66-6	Zinc

TSCA (Toxic Substances Control Act):

All ingredients are listed.

California Proposition 65

Chemicals known to cause cancer:

WARNING: This product contains a chemical known to the State of California to cause cancer.

7439-92-1	lead
7440-43-9	cadmium
7440-02-0	nickel

Chemicals known to cause reproductive toxicity:

WARNING: This product contains a chemical known to the State of California to cause birth defects and/or other reproductive harm.

7439-92-1	lead
7440-43-9	cadmium

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Carcinogenicity categories

<i>EPA (Environmental Protection Agency)</i>		
7439-92-1	lead	B2
7440-50-8	copper	D
7440-22-4	silver	D
<i>IARC (International Agency for Research on Cancer)</i>		
7439-92-1	lead	2B
<i>NTP (National Toxicology Program)</i>		
None of the ingredients is listed.		
<i>TLV (Threshold Limit Value established by ACGIH)</i>		
None of the ingredients is listed.		
<i>NIOSH-Ca (National Institute for Occupational Safety and Health)</i>		
None of the ingredients is listed.		
<i>OSHA-Ca (Occupational Safety & Health Administration)</i>		
None of the ingredients is listed.		

CANADA: The following information relates to product regulation specific to Canada.

Workplace Hazardous Materials Identification (WHMIS):

This product has been classified in accordance with the hazard criteria of the Canadian Controlled Products Regulation (CPR) and the MSDS contains all of the information required by the CPR.

WHMIS Classification:

D2A

D2B

Components on Ingredient List for WHMIS:

lead

tin

antimony

copper

silver

EUROPEAN UNION

The following information relates to product regulation specific to the directives of the European Union.

Risk phrases:

Harmful by inhalation and if swallowed.

Danger of cumulative effects.

Possible risk of impaired fertility.

Safety phrases:

Avoid exposure - obtain special instructions before use.

Keep locked up and out of the reach of children.

Do not empty into drains, dispose of this material and its container at hazardous or special waste collection point.

Wear suitable protective clothing and gloves.

In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

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Special labeling of certain preparations:*Contains lead. Should not be used on surfaces liable to be chewed or sucked by children.***16 Other information**

The information contained herein is based on data considered accurate and is offered solely for information, consideration and investigation. Kester extends no warranties, makes no representations and assumes no responsibility as to the accuracy, completeness or suitability of this data for any purchaser's use. The data on this Material Safety Data Sheet relates only to this product and does not relate to use with any other material or in any process. All chemical products should be used only by, or under the direction of, technically qualified personnel who are aware of the hazards involved and the necessity for reasonable care in handling. Hazard communication regulations require that employees must be trained on how to use a Material Safety Data Sheet as a source for hazard information.

Department issuing MSDS: Product Safety**Contact:** Heather Holich, MSDS Coordinator

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USA