

	SURFACE VEHICLE STANDARD	
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Materials for Plastic Pistons for Hydraulic Disc Brake Cylinders		

RATIONALE

This technology is viewed as stable by the committee, and the standard will be reviewed for stabilization.

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1. **Scope**—The materials defined by this SAE Standard are glass-fiber-reinforced, mineral-filled phenolic molding compounds suitable for compression molding. Preforms may be radio frequency preheated or screw preheated slugs. Compound for use in hydraulic disc brake caliper pistons.

2. **References**

2.1 **Applicable Publications**—The following publications form a part of this specification to the extent specified herein.

2.1.1 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 543—Standard Test Method for Resistance of Plastics to Chemical Reagents

ASTM D 570—Standard Test Method for Water Absorption of Plastics

ASTM D 638—Test Method for Tensile Properties of Plastics

ASTM D 648—Standard Test Method for Deflection Temperature of Plastics Under Flexural Load

ASTM D 695—Standard Test Method for Comprehensive Properties of Rigid Plastics

ASTMD696—Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between – 30 Degrees C and 30 Degrees C

ASTM D 785—Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials

ASTMD790—Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials

ASTM D 794—Practice for Determining Permanent Effect of Heat on Plastics

2.1.2 ISO PUBLICATIONS—Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002.

ISO 62—Plastics—Determination of water absorption

ISO 175—Plastics—Determination of the effects of liquid chemicals, including water

ISO 178—Plastics—Determination of flexural properties of rigid plastics

ISO/R 527—Plastics—Determination of tensile properties

ISO 2039/2—Plastics—Determination of hardness—Rockwell hardness

3. General Material Requirements

- 3.1 **Conditioning**—All specimens shall be compression-molded and post-cured at $205\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for 16 h in an air-circulating oven prior to testing.

4. Test Requirements

- 4.1 **Hardness**—The material when tested by the procedure specified in 5.1 shall have a Rockwell Hardness of 90min.
- 4.2 **Compressive Strength**—The material when tested by the procedure specified in 5.2 shall have a Compressive Strength of not less than 187 MPa.
- 4.3 **Tensile Strength**—The material when tested by the procedure specified in 5.3 shall have a Tensile Strength of not less than 41 MPa.
- 4.4 **Modulus of Elasticity**—The material when tested by the procedure specified in 5.4 shall have a Tangent Modulus of Elasticity (Flexural Modulus) of not less than 19 GPa.
- 4.5 **Flexural Strength**—The material when tested by the procedure specified in 5.5 shall have a Flexural Strength of not less than 76 MPa.
- 4.6 **Coefficient of Linear Thermal Expansion**—The material when tested by the procedure specified in 5.6 shall have a Coefficient of Linear Thermal Expansion of not more than 20×10^{-6} mm/mm/ $^{\circ}\text{C}$.
- 4.7 **Heat Aging**—The material when tested by the procedure specified in 5.7 shall not crack or blister, shall have a volume change of not more than -0.6% and shall have a hardness change of not less than 0 nor more than +6.
- 4.8 **Fluid Aging**—The material when tested by the procedure specified in 5.8 shall have a weight change of not more than -0.5% , a volume change of not more than -0.3% , and a hardness change of not less than 0 nor more than +6.
- 4.9 **Water Aging**—The material when tested by the procedure specified in 5.9 shall have a weight change of not more than 0.15% and a volume change of not more than 0.20% .
- 4.10 **Deflection Temperature**—The material when tested by the procedure specified in 5.10 shall have a Deflection Temperature of not less than $250\text{ }^{\circ}\text{C}$.

5. Test Procedures

- 5.1 **Hardness**—Determine the Rockwell Hardness of the material by ASTM D 785 using scale E (ISO 2039/2).
- 5.2 **Compressive Strength**—Determine the Compressive Strength of the material by ASTM D 695 (ISO N/A).
- 5.3 **Tensile Strength**—Determine the Tensile Strength of the material by ASTM D 638 using a Type I specimen (ISO/R 527 Type 1 specimen).
- 5.4 **Modulus of Elasticity**—Determine the Tangent Modulus of Elasticity (Flexural Modulus) of the material by ASTM D 790 using Method I and Procedure A (ISO 178).
- 5.5 **Flexural Strength**—Determine the Flexural Strength of the material by ASTM D 790 using Method I and Procedure A (ISO 178).