

THERMOFIT[®] SILICONE RUBBER MOLDED COMPONENTS FLAME-RETARDED, FLEXIBLE, HEAT-SHRINKABLE

1. SCOPE

This specification covers the requirements for one type of highly flexible, electrical insulating, molded components whose expanded dimensions will reduce to predetermined sizes upon the application of heat in excess of 135°C (275°F).

2. APPLICABLE DOCUMENTS

The specifications and standards listed in Table I under "Method of Test" shall form a part of this specification to the extent specified herein.

3. REQUIREMENTS

3.1 MATERIAL

The molded components shall be fabricated from a cross-linked, stabilized, flame resistant, modified silicone rubber composition. They shall be homogeneous and essentially free from flaws, defects, pinholes, bubbles, seams, cracks or inclusions.

3.2 COLOR

The molded components shall be black, unless otherwise specified.

3.3 PROPERTIES

The molded components and the material from which they are fabricated shall meet the requirements of Table I.

4. QUALITY ASSURANCE PROVISIONS

4.1 CLASSIFICATION OF TESTS

4.1.1 QUALIFICATION TESTS

Qualification tests are those performed on samples submitted for qualification as satisfactory products and shall consist of all tests listed in this specification.

4.1.2 ACCEPTANCE TESTS

Acceptance tests are those performed on molded slabs and components submitted for acceptance under contract. Acceptance tests shall consist of the following tests: dimensional recovery, tensile strength, elongation, heat shock and hardness. Other tests may be carried out as often as necessary to insure compliance with all requirements of this specification.

4.2 SAMPLING INSTRUCTIONS

4.2.1 QUALIFICATION TEST SAMPLES

Qualification test samples shall consist of six molded slabs, 6" x 6" x .075" \pm .010", and the molded components specified. The slabs shall be fabricated from the same lot of material and shall be subjected to the same degree of cross-linking as the molded components.

4.2.2 ACCEPTANCE TEST SAMPLES

Acceptance test samples shall consist of specimens cut from a molded slab, 6" x 6" x .075" \pm .010", and molded components selected at random in accordance with MIL-STD-105, inspection level S-2, AQL 6.5. The molded slab shall be fabricated from the same lot of material and shall be subjected to the same degree of cross-linking as the molded components. When purchased, molded slabs shall accompany the components in each lot. A lot shall consist of all molded components from the same lot of material, from the same production run and offered for inspection at the same time.

4.3 TEST PROCEDURES

4.3.1 DIMENSIONAL RECOVERY

Molded components as supplied shall be measured for dimensions in accordance with ASTM D 876. These specimens shall be conditioned for 10 minutes at 175 \pm 3°C (347 \pm 5°F) in either a glycerin bath or an oven, and then shall be removed and cooled for a minimum of 2 minutes in water at room temperature. The specimens then shall be wiped dry with a clean cloth and re-measured.

4.3.2 ELASTIC MEMORY

A 6-inch by 1/8-inch specimen cut from a molded slab shall be marked with two parallel gage lines 1 inch apart in the central portion of the specimen. The 2-inch portion of the specimen including both gage marks then shall be heated for 1 minute in a 150 \pm 2°C (302 \pm 4°F) glycerin bath, removed from the bath and stretched within 10 seconds until the gage lines are 5 inches apart. The extended specimen shall be cooled in water for 1 minute at 20-30°C, released from tension, removed from the water, and wiped dry. After 24 hours at room temperature, the distance between the gage marks shall be measured and recorded as the extended length. The portion of the specimen including both gage marks then shall be reheated for 1 minute in a glycerin bath at 150 \pm 2°C (302 \pm 4°F), removed from the bath and allowed to retract. The specimen again shall be cooled for 1 minute in water at 20-30°C, removed from the water and wiped dry. The distance between gage lines then shall be measured and recorded as the retracted length. Expansion and retraction shall be calculated as follows:

Expansion = (extended length - 1) x 100 percent

Retraction = $\frac{\text{extended length} - \text{retracted length}}{\text{extended length} - 1}$ x 100 percent

4.3.3 HEAT SHOCK

A 6-inch by 1/4-inch specimen cut from a molded slab shall be conditioned for 4 hours in a $250 \pm 5^{\circ}\text{C}$ ($482 \pm 9^{\circ}\text{F}$) oven. After this conditioning, the specimen shall be visually examined for evidence of dripping, flowing, or cracking.

4.3.4 HEAT AGING

Three specimens, prepared and measured in accordance with ASTM D 412, shall be conditioned for 96 hours in a $175 \pm 3^{\circ}\text{C}$ ($347 \pm 5^{\circ}\text{F}$) oven with an air velocity of from 100 to 200 feet per minute past the specimens. After conditioning, the specimens shall be removed from the oven, cooled to room temperature and tested for tensile strength and elongation.

4.3.5 SOLVENT RESISTANCE

Three specimens, prepared and measured in accordance with ASTM D 412, shall be completely immersed in each listed solvent for the time specified at $25 \pm 3^{\circ}\text{C}$ ($77 \pm 5^{\circ}\text{F}$). The volume of the fluid shall be not less than 20 times that of the specimens. After immersion, the specimens shall be lightly wiped and air dried for 30-60 minutes at room temperature. The specimens then shall be tested for tensile strength and elongation.

4.4 REJECTION AND RETEST

Failure of any sample to conform to any one of the requirements of this specification shall be cause for rejection of the lot represented. Material which has been rejected may be replaced or reworked to correct the defects and resubmitted for acceptance. Before resubmitting, full particulars concerning previous rejection and action taken to correct the defects shall be furnished the inspector.

5. PREPARATION FOR DELIVERY

5.1 PACKAGING

The molded components shall be packaged in conformance with good commercial practice unless otherwise specified. The exterior shipping container shall be not less than 125 pound-test fiberboard .

5.2 MARKING

Each molded component shall be distinctly identified with the manufacturer's name or symbol and the manufacturer's part number.

TABLE 1
Requirements

PROPERTY	UNIT	REQUIREMENTS	TEST METHOD
PHYSICAL			
Dimensions	Inches (<i>mm</i>)	In accordance with applicable specification control drawing	Section 4.3.1 ASTM D 876
Dimensional Recovery	Inches (<i>mm</i>)	In accordance with applicable specification control drawing	
Elastic Memory	Percent	250 minimum expansion 90 minimum retraction	Section 4.3.2
Tensile Strength	psi (<i>MPa</i>)	600 minimum (<i>10.3</i>)	ASTM D 412
Ultimate Elongation	Percent	200 minimum	
Specific Gravity	---	1.35 maximum	ASTM D 792
Hardness	Shore A	80 ± 10	ASTM D 676
Low Temperature Flexibility at -75°C (<i>-103°F</i>)	percent	50 failure, max.	ASTM D 746 Method B
Heat Shock 4 hours at 250°C (<i>482°F</i>)	---	No dripping, flowing o cracking.	Section 4.3.3
Heat Aging 96 hours at 175°C (<i>347°F</i>) Followed by tests for:	---	---	Section 4.3.4
Tensile Strength	psi (<i>MPa</i>)	480 minimum (<i>8.3</i>)	
Ultimate Elongation	Percent	120 minimum	
ELECTRICAL			
Dielectric Strength	Volts/mil (<i>kV/mm</i>)	200 minimum (<i>7.9</i>)	ASTM D 149
Volume Resistivity	ohm-cm	10 ¹⁰ minimum	ASTM D 257
CHEMICAL			
Flammability		Self-extinguishing	ASTM D 635
Fungus Resistance	---	Must not support fungus growth	Mil-I-7444
Water Absorption 24 hours at 23°C (<i>73°F</i>)	Percent	1.0 maximum	ASTM D 570
Fluid Resistance 24 hours at 25°C (<i>77°F</i>) in: Lubricating Oil (MIL-L-7080) Aviation Gasoline (100/130) Water 4 hours at 25°C (<i>77°F</i>) in: JP-4 Fuel (MIL-T-5624) Followed by tests for:	---	---	Section 4.3.5
Tensile Strength	psi (<i>MPa</i>)	480 minimum (<i>8.3</i>)	
Ultimate Elongation	Percent	120 minimum	