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Specification	**RT-1011**
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THERMOFIT® ADHESIVE S-1125
Epoxy, Flexible

1. SCOPE

This specification covers the requirements for one type of adhesive for use with heat-shrinkable, plastic and rubber tubing and molded components.

2. APPLICABLE DOCUMENTS

This specification takes precedence over documents referenced herein. Unless otherwise specified, the latest issue of referenced documents applies. The following documents form a part of this specification to the extent specified herein.

2.1 OTHER PUBLICATIONS

American Society for Testing and Materials (ASTM)
ASTM D 149 Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies

(Copies of ASTM Publications may be obtained from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

3. REQUIREMENTS

3. MATERIAL

The adhesive shall consist of a two-part modified epoxy resin.

3.2 COLOR

One component shall be black; the other shall be grey. The components shall be properly mixed when all streaks disappear and the color is uniform.

3.3 PROPERTIES

The adhesive shall meet the requirements of Table 1.

4. QUALITY ASSURANCE PROVISIONS

4.1 CLASSIFICATION OF TESTS

4.1.1 Qualification Tests

Qualification tests are those performed on adhesive submitted for qualification as a satisfactory product and shall consist of all tests listed in the specification.

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4.1.2 Acceptance Tests

Acceptance tests are those performed on adhesive submitted for acceptance under contract. Acceptance tests shall consist of the following:

Visual inspection
Peel strength

Other tests shall be performed as often as necessary to ensure compliance with all requirements of this specification.

4.2 SAMPLING INSTRUCTIONS

4.2.1 Qualification Test Samples

Qualification test samples shall consist of not less than 60 grams of adhesive.

4.2.2 Acceptance Test Samples

Acceptance test samples shall consist of not less than 30 grams of adhesive from each lot. A lot shall consist of all adhesive from the same production run offered for inspection at the same time.

4.3 TEST PROCEDURES

Thoroughly mix each specimen of adhesive for 3 to 5 minutes prior to testing.

4.3.1 Visual Inspection

Visually examine the test specimens to insure that the material is homogeneous and free of foreign particles or other contaminants.

4.3.2 Peel Strength

Determine peel strength by a rolling drum peel test according to 4.3.2.4. The substrates shall be a 1-inch outer diameter mandrel of 2024-T3 aluminum alloy and an extruded piece of 1-1/2 inch heat shrinkable tubing per RT-1116 (DR-25).

4.3.2.1 Aluminum Substrate Preparation

Clean the 6-inch aluminum mandrel in a solvent or alkaline solution and etch with a solution consisting of:

30 parts water
10 parts sulfuric acid(specific gravity 1.84)
1 part sodium dichromate

The etching solution temperature shall be 65 ± 3°C *(149 ± 5°F)*. Immerse the mandrel in this solution for 10 minutes, rinse in water and air dry at room temperature for 15 minutes. Force dry for 20 minutes in a 65 ± 10°C *(149 ± 18°F)* mechanical convection oven in which air passes the mandrel at a velocity of 100 to 200 feet per minute. Remove the mandrel from the oven, cool to room temperature and use within 2 hours.

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4.3.2.2 Polymeric Substrate Preparation

Lightly abrade the heat shrinkable tubing on the inner diameter with a Number 320 emery cloth and wipe with a lint-free cloth or paper towel wet with methyl ethyl ketone.

4.3.2.3 Assembly Procedure

Apply the mixed adhesive to the entire etched mandrel and the abraded tubing so that the adhesive on each substrate shall be approximately 0.010 inch thick. Then place the heat shrinkable tubing over the aluminum mandrel and recover in an oven at 150 ± 3°C *(270 ± 5°F)* for
20 minutes. Store the test specimens for a least 72 hours at 23 ± 3°C *(73 ± 5°F)* before testing. Prepare the test specimens by radially slitting the tubing in 1-inch widths on the aluminum mandrel.

4.3.2.4 Test Procedure

Slit the specimens axially and peel from the mandrel in a suitable tensile test machine such that the tubing peels off at a rate of 2 inches per minute as the mandrel rotates. Conduct the test at a temperature of 23 ± 2°C *(73 ± 4°F)*. Record the mean peel off force for each specimen. Report the average of 5 measurements as the peel strength.

4.3.3 Dielectric Strength

Coat two polyethylene films, 6 x 6 x 0.002 inches, on one side with a suitable release agent. Spread three grams of mixed adhesive on the coated side of one of the films as a disk 1 to 3 inches in diameter. Cover the adhesive with the other coated film, with the coated surface in contact with the adhesive. Place the assembly between two 6 x 6-inch metal plates and press the plates together until the disk of adhesive is from 0.005 to 0.025 inches thick. Cure the assembly for
1 hour in a 85 ± 3°C *(185 ± 5°F)* mechanical convection oven in which air passes the assembly at a velocity of 100 to 200 feet per minute. After removal from the oven, remove the disk of adhesive from the assembly and post cure for 72 hours at 23 ± 3°C *(73 ± 5°F)*. Test for dielectric strength in accordance with the short-time test of ASTM D 149.

4.3.4 Pot Life

Evaluate ten grams of the mixed adhesive for workable pot life of 60 minutes at 23 ± 3°C
(73 ± 5°F). Measure peel strength in accordance with 4.3.2.

4.3.5 Fluid Resistance

Completely immerse three specimens, prepared in accordance with 4.3.2, in each of the fluids listed in the applicable section of Table 1 for 24 hours at 23 ± 3°C *(73 ± 5°F)*. After immersion, lightly wipe the specimens and air dry for 30 to 60 minutes at room temperature. Test the specimens for peel strength in accordance with 4.3.2.

4.3.6 Rejection and Retest

Failure of any specimen of adhesive to comply with any one of the requirements of this specification shall be cause for rejection of the lot represented. Adhesive which has been rejected may be replaced or reworked to correct the defect and then resubmitted for acceptance. Before resubmitting, full particulars concerning the rejection and the action taken to correct the defect shall be furnished to the inspector.

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5. PREPARATION FOR DELIVERY

5.1 PACKAGING

Unless otherwise specified, the adhesive shall be packaged in mixer packages (containing a measured quantity of each adhesive part), which then shall be packed in cartons. If not specified, packaging shall be in accordance with good commercial practice.

5.2 MARKING

Each carton of adhesive, shall be identified with the manufacturer's name or symbol, the product number, the batch number, and other appropriate information.

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TABLE 1
Requirements

PROPERTY	UNIT	REQUIREMENT	TEST METHOD
PHYSICAL Visual Inspection	---	Homogeneous, no foreign particles or contaminants	Section 4.3.1
Peel Strength	lb/in. width	15 minimum	Section 4.3.2
ELECTRICAL Dielectric Strength	Volts/mil	500 minimum	Section 4.3.3 ASTM D 149
CHEMICAL Pot Life Followed by test for:	Minutes	60 minimum	Section 4.3.4
Peel Strength	lb/in. width	15 minimum	Section 4.3.2
Fluid Resistance 24 hours at 23°C *(73°F)* in: JP-4 Fuel (MIL-T-5624) Skydrol* 500 Hydraulic Fluid (MIL-H-5606) Water Followed by test for:	---	---	Section 4.3.5
Peel Strength	lb/in. width	15 minimum	Section 4.3.2.4

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