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Raychem

Specification

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Issue 3

THERMOFIT NS ADHESIVE S-1264 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. When used with other compatible components, this adhesive is suitable for use in wire harness systems requiring resistance to the effects of nuclear, biological and chemical agent exposure and decontamination as defined herein and in RT-700.

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 GOVERNMENT FURNISHED DOCUMENTS

Military

MIL-H-5606 Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordnance
MIL-T-5624 Turbine Fuel, Aviation, Grades JP-4 and JP-5

2.2 OTHER PUBLICATIONS

American Society for Testing and Materials (ASTM)

D 149 Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies

D1876 Standard Test Method for Peel Resistance of Adhesives (T-Peel Test)

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

Raychem Corporation

RT-700 Harness System Chemical Agent Exposure & Decontamination

(Copies of Raychem publications may be obtained from Raychem Corporation, Literature Department, 300 Constitution Drive, Menlo Park, California 94025-1164.)

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3. REQUIREMENTS

3.1 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.

3.4 SYSTEMS PERFORMANCE

When used with other compatible components, the performance of harness systems fabricated with this adhesive shall satisfy the requirements of Systems Specification RT-700.

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.

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 the adhesive for 5 minutes at $23 \pm 3^{\circ}\text{C}$ ($73 \pm 5^{\circ}\text{F}$) prior to testing.

4.3.1 Visual Inspection

Visually examine the adhesive 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 in accordance with 4.3.2.4. The substrates shall be a 1-inch (25-mm) outer diameter mandrel of 2024-T3 aluminum alloy and an extruded piece of 1-1/2 inch DCNS heat shrinkable tubing in accordance with Raychem RT-1333. In the event DCNS tubing is not available it is acceptable to use 1 1/2 inch DR-25 tubing manufactured per RT-1116 as an alternate.

4.3.2.1 Aluminum Substrate Preparation

Clean the 6-inch aluminum mandrel with a Number 320 emery cloth and wipe with a lint-free cloth or paper towel moistened with 1,1,1-trichloroethane.

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 moistened with 1,1,1-trichloroethane.

4.3.2.3 Assembly Procedure

Uniformly 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 (0.25 mm) thick. Place a strip of 3/4-inch (19-mm) wide masking tape lengthwise over the adhesive on the mandrel to provide unbonded ends to insert into the tensile tester. Then place the heat shrinkable tubing over the aluminum mandrel and rapidly recover with a heat gun. Cure the assembly for 1 hour at $85 \pm 3^{\circ}\text{C}$ ($185 \pm 5^{\circ}\text{F}$). Postcure for at least 72 hours at $23 \pm 3^{\circ}\text{C}$ ($73 \pm 5^{\circ}\text{F}$). 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 (50 mm) per minute as the mandrel rotates (Figure A). Conduct the test at a temperature of $23 \pm 3^{\circ}\text{C}$ ($73 \pm 5^{\circ}\text{F}$). 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 ($150 \times 150 \times 0.05\text{ mm}$), 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 ($25\text{ to }75\text{ mm}$) 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 ($150 \times 150\text{-mm}$) metal plates and press the plates together until the disk of adhesive is from 0.005 to 0.025 inches ($0.13 \times 0.64\text{ mm}$) thick. Cure the assembly for 1 hour in a $85 \pm 3^{\circ}\text{C}$ ($185 \pm 5^{\circ}\text{F}$) mechanical convection oven in which air passes the assembly at a velocity of 100 to 200 feet ($30\text{ to }60\text{ m}$) per minute. After removal from the oven, remove the disk of adhesive from the assembly and postcure for 72 hours at $23 \pm 3^{\circ}\text{C}$ ($73 \pm 5^{\circ}\text{F}$). Test for dielectric strength in accordance with the short-time test of ASTM D 149.

4.3.4 Pot Life

Thoroughly mix ten grams of the adhesive per 4.3 and let sit for 60 minutes at $23 \pm 3^{\circ}\text{C}$ ($73 \pm 5^{\circ}\text{F}$). Prepare specimens and 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 $23 \pm 3^{\circ}\text{C}$ ($73 \pm 5^{\circ}\text{F}$). 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 Radiation Resistance

The specimens prepared in accordance with Section 4.3.6 shall be subjected to gamma radiation for a total dosage of 10 Mrad at a rate of less than 0.5 Mrad per hour and shall be measured for peel strength in accordance with Section 4.3.6.

4.4 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.

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.

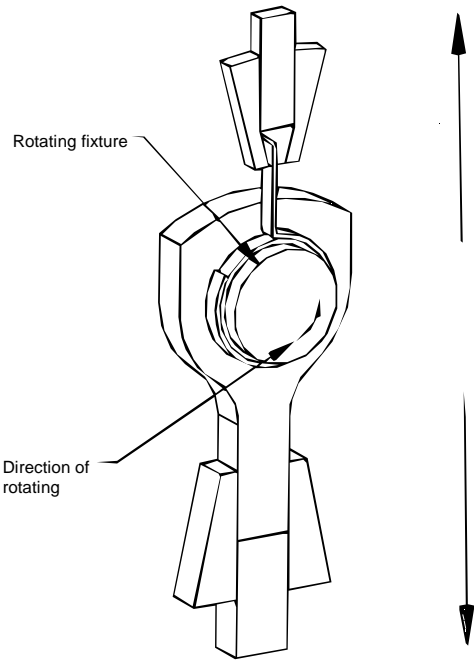


Figure A

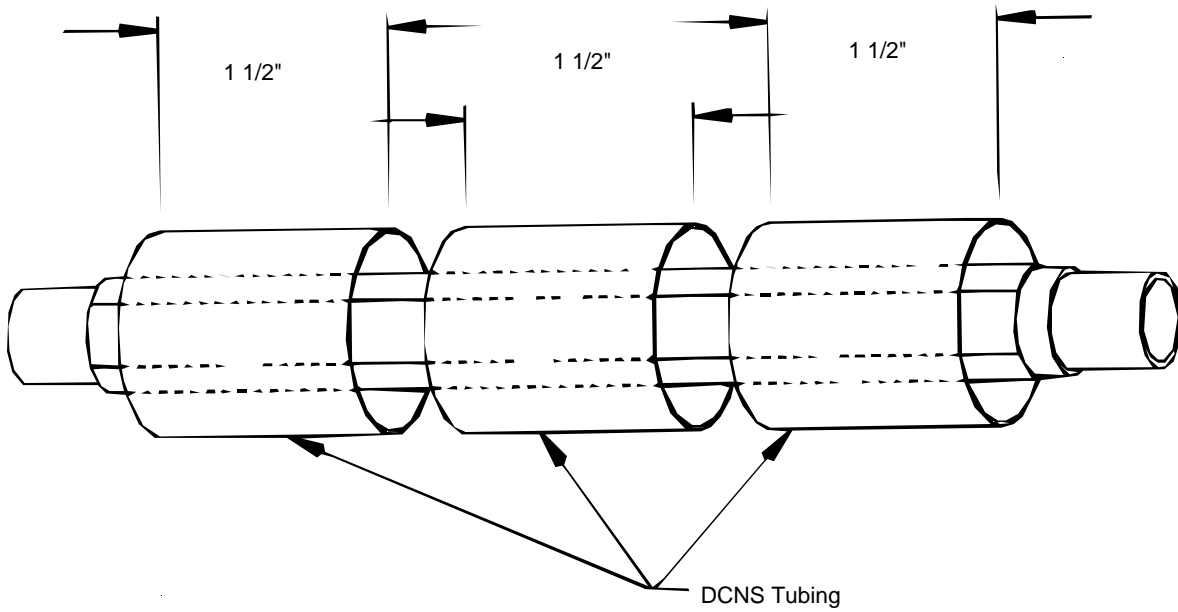


Figure B

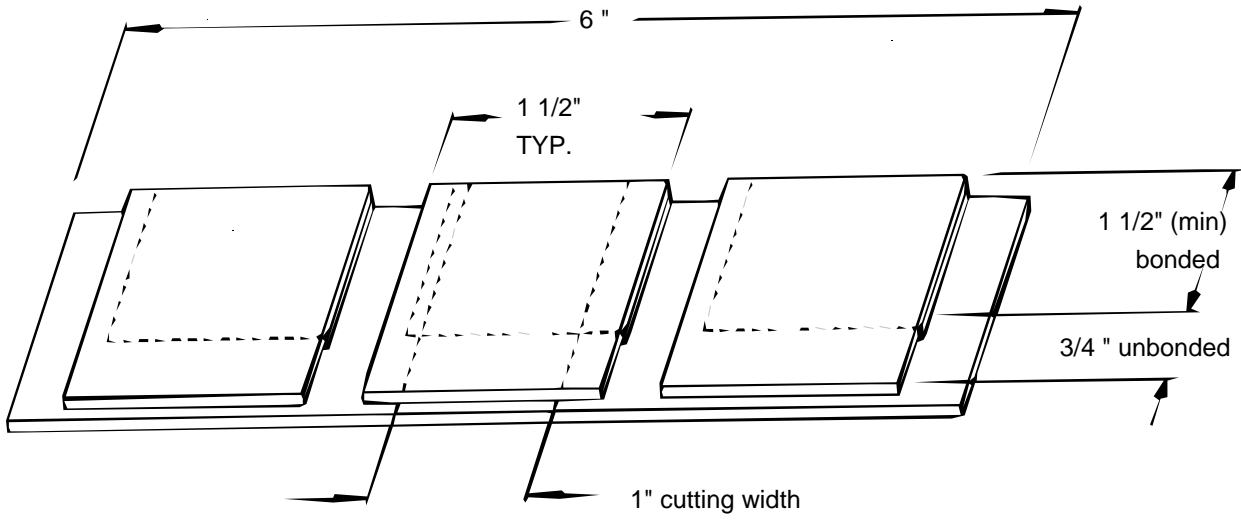


Figure C

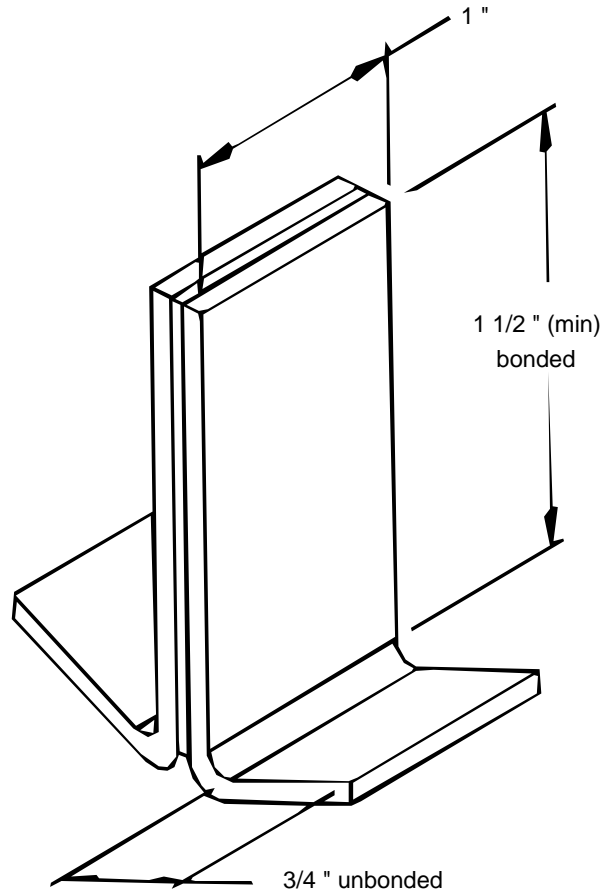


Figure D

TABLE 1
Requirements

PROPERTY	UNIT	REQUIREMENT	TEST METHOD
PHYSICAL Visual Inspection	---	Homogeneous, no foreign particles or contaminants	Section 4.3.1
Peel Strength	lbs/in width (<i>N/cm</i>)	15 minimum (<i>26.0</i>)	Section 4.3.2
ELECTRICAL Dielectric Strength	Volts/mil (<i>kV/mm</i>)	500 minimum (<i>19.69</i>)	Section 4.3.3 ASTM D 149
CHEMICAL Pot Life 60 minutes at $23 \pm 3^{\circ}\text{C}$ ($73 \pm 5^{\circ}\text{F}$) Followed by test for: Peel Strength			Section 4.3.4
	lbs/in width (<i>N/cm</i>)	15 minimum (<i>26.0</i>)	Section 4.3.2
Fluid Resistance 24 hours at $23 \pm 3^{\circ}\text{C}$ ($73^{\circ} \pm 5\text{F}$) in: MIL-T-5624, JP-4 Fuel Skydrol* 500 MIL-H-5606, Hydraulic Fluid Water Followed by test for: Peel Strength			Section 4.3.5
	lbs/in width (<i>N/cm</i>)	10 minimum (<i>17.3</i>)	Section 4.3.2.4
NUCLEAR Radiation Resistance Followed by test(s) for: Peel Strength			Section 4.3.7
	lbs/in width (<i>N/cm</i>)	10 minimum (<i>17.3</i>)	Section 4.3.2.4

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