

1.0 Scope

This specification covers the design, performance and qualification requirements for Raychem Side Entry Insulation Damage Repair Sleeve.

1.1 Description.

Raychem SEIDRS covered by this specification consist primarily of insulation sleeve and one meltable adhesive. These devices are a side entry repair kit to repair damaged primary wire that is either chaffed or has a radial crack on the insulation.

1.2 Classification.

SEIDRS devices shall be as specified on the applicable Tyco Electronics Customer Drawing (TECD).

1.3 Temperature Rating

The maximum continuous operating temperature SEIDRS devices shall be rated -65° C to 150° C as specified on the applicable TECD.

2.0 Applicable Documents

2.1 Issues of Documents

The latest issue of those specifications and standards referenced below or on the applicable Raychem specification control drawing shall form part of this document to the extent specified.

2.2 Specifications

QPL-5606-1	Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordnance
MIL-DTL-5624	Turbine Fuel, Aviation, Grades JP-5
MIL-PRF-7808	Lubricating Oil, Aircraft Turbine Engine, Synthetic Base
SAE-AMS1424	Anti-Icing and Deicing/Defrosting Fluid
MIL-PRF-23699	Lubricating Oil, Aircraft Turbine Engines, Synthetic Base
MIL-PRF-87937	Cleaning Compound, Aircraft Surface, Alkaline, Water Base
SAE-AS81824	Splices, Electric, Permanent, Crimp Style, Copper, Insulated, Environment Resistant
SAE-AS83519	Shield Termination, Solder Style, Insulated, Heat- Shrinkable, Environment Resistant, General Specification for
MIL-STD-202	Test Methods for Electronic Component Parts
NCSL-Z540.1	Calibration System Requirements

(Copies of Department of Defense documents may be obtained from the Standardization Document Order Desk, 700 Robbins Ave., Building 4, Section D, Philadelphia, PA 19111-5094.)

Other

IPC-J001 Requirements for Soldered Electrical and Electronic Assemblies

ANSI/ASQC Z1.4 Sampling Procedures and Tables for Inspection by Attributes

3.0 Requirements

3.1 Detail Requirements

Detail requirements or exceptions applicable to a particular style of SEIDRS device shall be as specified on the applicable Raychem specification control drawing. In the event of any conflict between requirements of this specification and the specification control drawing, the latter shall take precedence.

3.2 Materials

The materials used in the manufacture of SEIDRS devices shall be as specified on the applicable specification control drawing and shall conform to the requirements specified herein.

3.2.1 Insulation Sleeve. Insulation sleeves shall consist of heat-shrinkable tubing of the type and color specified on the applicable specification control drawing.

3.2.2 Meltable Adhesive. Slit Adhesive shall consist of thermoplastic material as defined on the applicable specification control drawing...

3.3 Design and Construction.

Solder Sleeve devices shall conform to the design, construction, and physical dimensions specified on the applicable specification control drawing.

3.4 Performance.

SEIDRS devices shall conform to the requirements specified herein and on the applicable specification control drawing. Unless otherwise specified, room temperature shall be $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$. Values given as "after conditioning" refer to requirements after any of the environmental exposures of Table I.

3.4.1 Insulation Resistance. When installed SEIDRS devices are tested in accordance with 4.6.10, the insulation resistance shall be not less than 5000 megohms

3.4.2 Dielectric Withstanding Voltage. When installed SEIDRS devices are tested in accordance with 4.6.5, the insulation shall withstand the 2500 Vrms, 60 Hz potential for 60 seconds with no evidence of arcing or breakdown. Leakage current shall be 2.0 milliamperes maximum.

3.4.3 Vibration. When installed SEIDRS devices are subjected to 15 g peak sine vibration in accordance with 4.5.6, there shall be no evidence of cracking, breaking or loosening of the SEIDRS termination, and the termination shall meet the insulation resistance and dielectric withstanding voltage specified in 3.6.1 and 3.6.2.

- 3.4.4 Thermal Shock. When installed SEIDRS devices are subjected to five thermal shock cycles between the maximum rated temperature and minus 65°C in accordance with 4.6.7, there shall be no evidence of damage to the SolderSleeve termination, and the termination shall meet the insulation resistance and dielectric withstanding voltage requirements specified in 3.4.1 and 3.4.2. Discoloration of the SEIDRS device insulation shall not be cause for rejection.
- 3.4.5 Heat Aging. When installed SEIDRS devices are subjected to 500 hours heat aging at the maximum rated temperature in accordance with 4.6.8, the SolderSleeve terminations shall meet the subsequent performance requirements of Table I. Discoloration of the SEIDRS device insulation shall not be cause for rejection.
- 3.4.6 Fluid Resistance. When installed SEIDRS devices are exposed to any of the six test fluids in accordance with 4.6.9, the SolderSleeve terminations shall meet the dielectric withstanding voltage requirements specified in 3.4.2.
- 3.4.7 Flammability. When installed, horizontally suspended SEIDRS devices are exposed to flame for 20 seconds in accordance with 4.6.11; the SEIDRS insulation shall be self-extinguishing within 5 seconds after removal from flame.
- 3.4.8 Altitude Immersion. When installed SEIDRS devices are subjected to three altitude immersion cycles between sea level and 70,000-foot altitude in accordance with 4.6.12, the insulation resistance shall be not less than 5000 megohms and the leakage current shall be not greater than 2.0 milliamperes.
- 3.4.9 Copper Mirror Corrosion. When SEIDRS devices are tested for 16 hours at 121°C in accordance with 4.6.13, copper removal shall not exceed 10 percent of the area of the mirror above the bottom 0.063 inch.
- 3.4.10 Slip Test. When installed, SEIDRS devices are tested in accordance with 4.6.4, the slip resistance of the SEIDRS shall not be less than the minimum specified in Table II. Breakage of wire shall not be cause for rejection.

TABLE II

C-Wrap	Slip resistance minimum (lbs)
D-150-C-11	2
D-150-C-12	4
D-150-C-13	6
D-150-C-14	8

3.5 Product Identification.

Marking of SEIDRS devices shall be in accordance with the applicable specification control drawing.

3.6 Workmanship.

SEIDRS devices shall be uniform in quality and shall be free from defects detrimental to life, serviceability, or performance.

4.0 Quality Assurance Provisions

4.1 Responsibility for Inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for performing the inspection tests specified herein. The supplier may utilize his own facilities or any suitable testing facility. Inspection records of the tests shall be kept complete and available to the buyer as specified in the contract or order.

4.1.1 Inspection Equipment and Facilities. Test and measuring equipment and inspection facilities of sufficient accuracy, quality, and quantity to permit performance of the required inspection shall be established and maintained by the supplier. A calibration system to control the accuracy of the measuring and test equipment shall be maintained in accordance with NCSL-Z540.1.

4.2 Classification of Inspections. The examination and testing of SolderSleeve devices covered by this specification shall be classified as follows:

- a Qualification inspection (See Paragraph 4.3)
- b Quality conformance inspection (See Paragraph 4.4)

4.3 Qualification

SEIDRS devices furnished under this specification shall be products which are qualified to this specification by test or by similarity of design and materials.

4.4 Qualification Inspection.

Qualification inspection shall consist of the tests in Table I in the order shown. All sample units shall be subjected to the inspection of Group A. The samples shall then be divided into Groups B through G, as shown in Table I, and subjected to the inspection for the particular groups.

4.4.1 Test Samples for Qualification Inspection. Test samples submitted for qualification inspection shall be produced using equipment and procedures normally used in production. Test samples shall be of the types listed in Table I.

4.4.2 Failures. One or more failures of the tests listed in Table I shall be cause for failure of qualification of the parts under test, with the exception of visual examination, where occurrence of one major defect or two minor defects shall be cause for failure of qualification. Major and minor defects shall be as defined in ANSI/ASQC Z1.4-1993.

- 4.4.3 Qualification Report. Qualification shall be documented in a report which shall be available to buyers.
 - 4.4.4 Retention of Qualification. Qualification may remain in effect as long as the component design and manufacturing procedures remain essentially unchanged, and components meet quality conformance requirements.
 - 4.4.5 Applicability of Routine Testing. Testing performed on production parts may be cited in support of continued qualification.
 - 4.4.6 Applicability of Usage Experience. In-service performance of components and documented testing performed on components by users may be cited in support of continued qualification.
- 4.5 Quality Conformance Inspection.
- 4.5.1 Component Materials Inspection. Component materials inspection shall consist of verification that the component materials are in accordance with applicable specifications and requirements.
 - 4.5.2 Inspection of Product for Delivery. Inspection of product for delivery shall consist of visual and dimensional examination in accordance with Paragraph 4.6.2. In-process examination may be used for quality conformance inspection. Statistical process control (SPC) may be substituted for lot acceptance inspection.
 - 4.5.2.1 Inspection Lot. An inspection lot, as far as practicable, shall consist of all SEIDRS devices of a single class, size, and composition, manufactured under essentially the same conditions and offered for inspection at one time.
 - 4.5.2.2 Sampling Plan. Quality conformance sampling shall be in accordance with MIL-STD-1916 for normal inspection. The inspection level shall be level I, and the acceptable quality level (AQL) shall be 4.0 for all defects.
 - 4.5.2.3 Nonconforming Lots. Disposition of nonconforming lots shall be in accordance with ANSI/ASQC Z1.4-1993.

TABLE I. QUALIFICATION INSPECTION

	REQUIREMENT PARAGRAPH	METHOD PARAGRAPH
Group A (23 uninstalled devices)		
Visual and dimensional exam. as supplied	3.1, 3.4, 3.5	4.6.2.1
Group B (4 installed devices)		
Insulation resistance	3.4.1	4.6.10
Thermal shock	3.4.4	4.6.7
Insulation resistance	3.4.1	4.6.10
Slip resistance	3.4.10	4.6.4
Group C (4 installed devices)		
Insulation resistance	3.4.1	4.6.10
Vibration	3.4.3	4.6.6
Insulation resistance	3.4.1	4.6.10
Dielectric withstanding voltage	3.4.2	4.6.5
Slip resistance	3.4.10	4.6.4
Group D (4 installed devices)		
Insulation resistance	3.4.1	4.6.10
Altitude Immersion	3.4.8	4.6.12
Insulation resistance	3.4.1	4.6.10
Immersion	-	4.6.14
Insulation resistance	3.4.1	4.6.10
Moisture resistance	-	4.6.15
Insulation resistance	3.4.1	4.6.10
Heat Aging	3.4.5	4.6.8
Insulation resistance	3.4.1	4.6.10
Dielectric Withstanding Voltage	3.4.2	4.6.5
Slip resistance	3.4.10	4.6.4
Group E (6 installed devices)		
Insulation resistance	3.4.1	4.6.10
Fluid Resistance	3.4.6	4.6.9
Dielectric Withstanding Voltage	3.4.2	4.6.5
Group F (3 installed devices)		
Flammability	3.4.7	4.6.11
Group G (2 uninstalled devices)		
Copper mirror corrosion	3.4.9	4.6.13

4.6 Test Procedures.

4.6.1 **Test Conditions.** Unless otherwise specified herein, all inspection shall be made at ambient temperature, pressure, and humidity as specified in general requirements of MIL-STD-202.

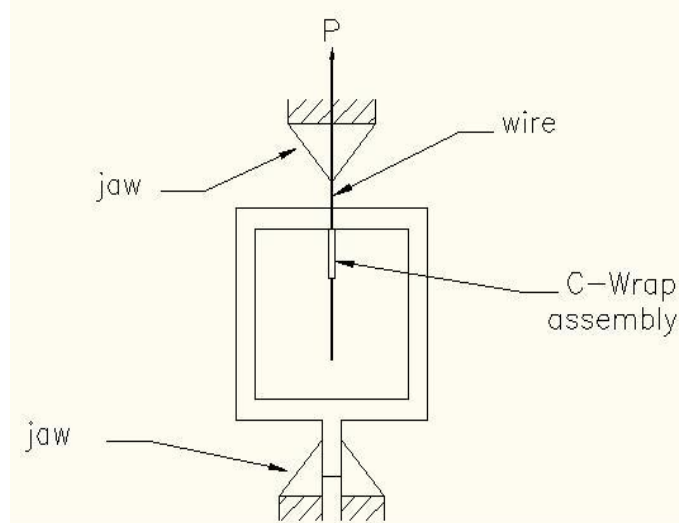
4.6.1.1 **Specimen Assembly.** When installed SEIDRS devices are specified for testing, the devices shall be installed in the mode of their primary function as specified on the applicable Raychem specification control drawing (e.g: shield termination, coaxial cable termination, or primary conductor splice).

4.6.2 Visual and Dimensional Examination.

4.6.2.1 **Visual and Dimensional Examination As Supplied (see 3.1, 3.4, 3.5).** Devices shall be visually examined, and the as-supplied dimensions shall be measured in accordance with the applicable Raychem specification control drawing

4.6.3 **Water bath:** Unless otherwise specified in the applicable test method, a water bath containing 0.5% of an anionic wetting agent (P-D-410C) and 5.0% sodium chloride shall be used whenever immersion is specified. Free ends of leads shall be a minimum of 2 inches from top surface of water

4.6.4 **Slip resistance (see 3.4.10).** Installed SEIDRS device shall be placed in a standard tensile testing machine with the specimen being pulled thru a holding fixture that prevents the SEIDRS assembly from passing thru the fixture hole. Specimen shall be gripped by the jaws at one end of the SEIDRS assembly device and the other end should be free. Sufficient force shall be applied to cause slip failure. The travel speed of the head shall be 1 inch per minute. The clamping surfaces of the jaws may be serrated to provide sufficient gripping force.



- 4.6.5 Dielectric Withstanding Voltage (see 3.4.2). Installed SEIDRS device shall be tested in accordance with Method 301 of MIL-STD-202. The following details shall apply:
- Condition of specimens: Specimens shall be immersed as specified (see 4.6.3)
 - Magnitude and nature of potential: 2,500 volts (RMS)
 - Points of measurement: Between specimens leads and water bath.
- 4.6.6 Vibration (see 3.4.3). Specimens with installed SEIDRS device shall have terminal lugs conforming to SAE-AS7928 attached to all conductors. The conductors leading from one end of the SEIDRS device shall be rigidly mounted to a test fixture 1 inch in height and securely fastened to the vibrating platform. The conductors leading from the opposite end of the devices shall be secured to a stationary support so that the center of the specimen is 6 inches from the vibrating platform and the tension on the wire allows between 1/8 and 1/4 inch of movement perpendicular to the axis of the specimen. The specimens shall be vibrated in accordance with MIL-STD-202, Method 204, test condition B. One axis shall be parallel to the specimen axis. After conditioning, slip resistance shall be performed in accordance with 4.6.4.
- 4.6.7 Thermal Shock (see 3.4.4). Installed SEIDRS device shall be conditioned in accordance with MIL-STD-202, Method 107, and test condition F, except that the maximum temperature extreme shall be the maximum continuous operating temperature of the SEIDRS device or wire, whichever is lower. After conditioning, the insulation resistance and slip resistance shall be measured in accordance with 3.4.1 and 3.4.10.
- 4.6.8 Heat Aging (see 3.4.5). Installed SEIDRS device shall be conditioned in an oven at the maximum operating temperature of the SEIDRS device or wire, whichever is lower. The duration of the test shall be 500 hours. Specimens shall be placed in the oven horizontally. After conditioning, insulation resistance, dielectric withstanding voltage, and slip resistance testing shall be performed in accordance with 3.4.1, 3.4.2, and 3.4.10.
- 4.6.9 Fluid Resistance (see 3.4.6). Installed SEIDRS devices shall be immersed in test fluids as specified in Table III. A separate specimen shall be immersed in each fluid. After the fluid immersion, dielectric withstanding voltage testing shall be performed in accordance with 3.4.2.

- 4.6.10 Insulation Resistance (see 3.4.1). Installed SEIDRS device shall be tested in accordance with Method 302 of MIL- STD-202. The following details shall apply:
- Test condition: A
 - Condition of SEIDRS assembly: specimens shall be immersed as specified for at least 1 hour
 - Points of measurement: Between specimens lead and water bath.
 - Electrification time: 1 minute
- 4.6.11 Flammability (see 3.4.7). Installed SEIDRS device shall be suspended horizontally in a draft-free enclosure. A Bunsen burner with a 3/8 inch bore, 1/4 inch inlet and 4 inch length shall be connected to a natural gas source and adjusted to produce a 2 inch high flame with a 3/4 inch inner cone. The top of this inner cone shall be applied to the center of the SEIDRS device under test. After 20 seconds, the flame shall be removed, and the length of time required for the flame to extinguish shall be recorded.
- 4.6.12 Altitude Immersion (see 3.4.8). Installed SEIDRS device shall be immersed in a water bath containing 0.5 percent of an anionic wetting agent so that the free ends of the leads are a minimum of 2 inches above the top surface of the water. After immersion for at least 30 minutes, insulation resistance shall be measured between the conductor lead and the water bath in accordance with MIL-STD- 202, Method 302, test condition A, with 1 minute electrification time.
- Following the insulation resistance measurement, the immersed specimens shall be placed in a vacuum chamber. The vacuum chamber shall be evacuated to a pressure of 1 inch of mercury, maintained at this pressure for 30 minutes, and returned to ambient pressure. This shall constitute one cycle. A total of three cycles shall be performed. After the third cycle and while the specimen is still immersed, insulation resistance shall be measured as described above, and the immersed specimen shall be subjected to dielectric withstanding voltage testing in accordance with 4.5.5, using the water bath as the outer electrode.
- 4.6.13 Copper Mirror Corrosion (see 3.4.9). SolderSleeve devices shall be tested in accordance with MIL-S-83519.
- 4.6.14 Immersion: The Installed SEIDRS device shall be tested in accordance with Method 104, test condition C, of MIL-STD-202.
- 4.6.15 Moisture Resistance: The Installed SEIDRS device shall be tested in accordance with Method 106 of MIL-STD-202 except sub cycle 7b shall not be required.

TABLE III. FLUID IMMERSION

SPECIMEN NUMBER	TEST FLUID SPECIFICATION	TEST CONDITION
1 2	MIL-PRF-7808 MIL-PRF-23699F	a) Immerse for 5 minutes at $120 \pm 3^{\circ}\text{C}$ or at the maximum operating temperature of the Solder Sleeve device or wire, whichever is lower. b) Remove and allow to drain for 1 hour at $23 \pm 5^{\circ}\text{C}$ c) Place in oven at rated temperature of device or wire, whichever is lower, for 22 hours, d) Repeat a, b, and c for 7 cycles
3	MIL-PRF-5606	Same as MIL-PRF-7808, except $85 \pm 3^{\circ}\text{C}$ for step (a) and $104 \pm 3^{\circ}\text{C}$ for step (c).
4 5	SAE-AMS1424 MIL-C-87937 pH 10-12	Same as MIL-PRF-7808, except $65 \pm 3^{\circ}\text{C}$ for step (a).
6	MIL-DTL-5624 JP-5	(a) Immerse at $23 \pm 5^{\circ}\text{C}$ for 20 hours. (b) Remove and allow to drain for 4 hours at $23 \pm 5^{\circ}\text{C}$

5.0 Preparation for Delivery

- 5.1 Packaging and Packing. SolderSleeve devices shall be packaged and packed in accordance with standard commercial practice.
- 5.2 Marking. Unless otherwise specified in the procurement document, marking shall be in accordance with commercial practice.

6.0 Notes

- 6.1 Intended Use. The SEIDRS devices described in this specification are intended for use in repairing a damage primary wire that is either chaffed or has a radial crack on the insulation. They are suitable for usage within the limitations set forth in this document and in the applicable TECD.

- 6.2 Ordering Data

Procurement documents should specify the following:

- (a) SEIDRS part number;
- (b) Quantity;
- (c) Any special marking or packaging requirements.

- 6.3 Design Modification.

Raychem reserves the right to make minor design modifications (which do not affect the form, fit or primary function of the product) without notification.

- 6.4 Storage Recommendations.

Raychem SEIDRS devices may be stored up to 5 years after the date of manufacture indicated on the label, provided that the following conditions are satisfied:

- The products are kept unopened in their original packages.
- The storage temperature does not exceed +50°C or fall below +5°C, and the relative humidity does not exceed 80 percent.

If storage exceeds 5 years, or storage conditions are not as described above, the user should carry out tests on installed products to ensure that solder joints have acceptable mechanical and electrical characteristics.