



Class I

**S1125 ADHESIVE QUALITY
ASSURANCE SPECIFICATION**

RK-6619

Raychem S1125 Adhesive

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1. SCOPE

This Quality Assurance Specification establishes the quality standard for a two-part epoxy adhesive for bonding TE Connectivity's heat-shrinkable polymeric and elastomeric tubing, moulded components, and other suitable substrates.

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2. REQUIREMENTS

2.1. Composition, Appearance and Colour

The two components shall be homogeneous and free from large particles. One component shall be a grey viscous paste, the other a black viscous paste.

2.2. Test Requirements

The adhesive shall meet all the requirements in Table 2.

2.3. Shelf Life

When stored in the original unopened containers at temperatures not exceeding 23°C, the adhesive shall continue to comply with the requirements of Table 2 for a period of up to 18 months.

3. TEST METHODS

3.1. Lap Shear Strength

3.1.1 Aluminium to Aluminium Using Abraded Strips (Method A)

Method A features abraded strips and can be used for tests at ambient temperature only.

Ten test strips 1.5 ± 0.15 mm x 25 ± 1 mm x 115 ± 3 mm of a 2000-series aluminium alloy clad with 1000-series (min. 99% aluminium) Alclad to any of the specifications listed in Table 1 shall be degreased with Isopropanol or Acetone.

At least 25 mm length of one surface of one end of each strip shall be abraded with P320 grit silicon carbide abrasive paper, then wiped with a clean dry tissue to remove dust particles. Within 2 hours of this preparation, adhesive from the bi-packs contained in Kit 1 shall be thoroughly mixed in an uncontaminated dish and applied evenly to one surface of each of the treated end of the strips.

Within 60 ± 5 minutes of mixing, the strips shall be assembled, coated ends together, into five test joints, each separated by silicone paper (to prevent test specimens sticking together), with an overlap of between 12.5 and 14.3 mm. Where metal jigs are used the jigs and weights shall be preheated at the curing temperature for a minimum of 4 hours before the strips are placed in the jigs. The joints shall be cured for 60 ± 5 minutes at $85 \pm 2^\circ\text{C}$ under pressure of 35 kPa using a 1.1 kg weight, allowed to cool in the jig, then stored for a minimum of 72 hours at $23 \pm 2^\circ\text{C}$ and tested on a suitable tensile testing machine. Initial grip separation shall be 100 mm. Rate of grip separation shall be 50 mm/minute. The lap shear strength shall be reported as the mean value of the five breaking loads. The test shall be carried out at a temperature of $23 \pm 2^\circ\text{C}$.

3.1.2 Aluminium to Aluminium Using Etched Strips (Method B)

Method B features acid-etched strips and can be used for tests at any temperature.

Degrease ten test strips 1.5 ± 0.15 mm x 25 ± 1 mm x 115 ± 3 mm of a 2000-series aluminium alloy clad with 1000-series (min. 99% aluminium) Alclad to any of the specifications listed in

Table 1 in a solution of MacDermid Oxidite C-8 (10 g in 250 ml water) at 50°C for 15 minutes. Remove and allow to air dry. Prepare an etching solution comprising 50g sodium dichromate, 300ml sulphuric acid (specific gravity 1.84) and 700ml water. Heat the etching solution to $65 \pm 3^\circ\text{C}$ ($149 \pm 5^\circ\text{F}$) and immerse the test strips in the solution for 15 minutes. Rinse the strips in running water for 15 minutes and then final rinse in distilled water. Air dry at room temperature for 10 minutes then force dry for 15 minutes at $60 \pm 10^\circ\text{C}$ ($140 \pm 18^\circ\text{F}$) in a convection oven. Remove the test strips from the oven, cool to room temperature and use within 2 hours.

Adhesive from the bi-packs contained in Kit 1 shall be thoroughly mixed in an uncontaminated dish and applied evenly to one surface of each of the treated end of the strips. Within 60 ± 5 minutes of mixing, the strips shall be assembled, coated ends together, into five test joints, each separated by silicone paper (to prevent test specimens sticking together), with an overlap of between 12.5 and 14.3 mm. Where metal jigs are used the jigs and weights shall be preheated at the curing temperature for a minimum of 4 hours before the strips are placed in the jigs. The joints shall be cured for 60 ± 5 minutes at $85 \pm 2^\circ\text{C}$ under pressure of 35 kPa using a 1.1 kg weight, allowed to cool in the jig, then stored for a minimum of 72 hours at $23 \pm 2^\circ\text{C}$ and tested on a suitable tensile testing machine. Initial grip separation shall be 100 mm. Rate of grip separation shall be 50 mm/minute. The lap shear strength shall be reported as the mean value of the five breaking loads. The test shall be carried out at a temperature of $23 \pm 2^\circ\text{C}$.

3.1.3 DR-25 to DR-25

Ten test strips 25 ± 1 mm x 100 mm approximately shall be cut from TE's Raychem tubing DR-25-2-0 which has been fully recovered. At least 25 mm length of one surface of one end of each strip shall be degreased with Isopropanol or Acetone, abraded with P100 grit emery cloth, and then wiped with a dry tissue to remove abrasion dust and debris. Within 2 hours of this preparation, adhesive from bi-packs contained in Kit 1 shall be thoroughly mixed in an uncontaminated dish, and applied evenly to one surface of each of the treated end of the strips. Within 60 ± 5 minutes of mixing, the strips shall be assembled, coated ends together, into five test joints each separated by silicone paper (to prevent test specimens sticking together), with an overlap of between 25 and 28 mm. Where metal jigs are used the jigs and weights shall be preheated at the curing temperature for a minimum of 4 hours before the strips are placed in the jigs. The joints shall be cured for 60 ± 5 minutes at $85 \pm 2^\circ\text{C}$ under a pressure of 35 kPa using a 2.2 kg weight, allowed to cool in the jig, stored for at least 72 hours at $23 \pm 2^\circ\text{C}$ and tested on a suitable tensile testing machine. Initial grip separation shall be 100 mm. Rate of grip separation shall be 50 mm/min. The lap shear strength shall be reported as the mean value of the five breaking loads. The test shall be carried out at a temperature of $23 \pm 2^\circ\text{C}$.

3.1.4 -25 to -25

Test plaques approximately 2 mm thick shall be moulded using -25 moulding compound. Ten test strips 100 mm x 25 mm shall be cut from these plaques and shall be prepared and tested as described in Clause 3.1.3.

3.2. Peel Strength

Five cylindrical aluminium rolling drum peel strength mandrels 25 mm x 25 mm diameter shall be abraded with P100 grit emery cloth and degreased with Isopropanol or Acetone. A 15 mm wide strip of masking tape shall be placed axially along the surface of the aluminium mandrel.

The inside surface of 5 pieces of DR-25-1-1/2-0 expanded tubing approximately 40 mm in length shall be degrease with Isopropanol or Acetone, abraded with P320 grit silicon carbide abrasive paper, and wiped with a dry tissue to remove any dust created by abrasion. These pieces of prepared tubing shall be used within 2 hours of preparation.

Within 60 ± 5 minutes of mixing, a layer of adhesive shall be evenly applied to the outer surface of the prepared aluminium mandrels. The pieces of prepared DR-25 tubing shall be recovered onto the aluminium mandrels with a validated hot air gun then conditioned in an air circulating oven at $150 \pm 3^\circ\text{C}$ for 20 minutes (refer to Code of Practice ELE-3COP-551 for installation and recovery of heat shrinkable tubing). The tubing should be positioned in relation to the aluminium mandrel so that the tubing recovers over each side of the mandrel. The test specimens shall be stored for at least 72 hours at $23 \pm 2^\circ\text{C}$ before testing. The specimens shall then be trimmed so that the tubing which has recovered over the end of the aluminium mandrel is removed. The tubing on the test specimen shall then be slit axially at the edge of the masking tape and the flap of tubing over the tape peeled back. The test specimen shall be mounted onto a rolling drum peel strength jig in a suitable tensile testing machine and the flap gripped in the upper jaws. The sample shall be peeled at a rate of 50 mm/minute. The test shall be carried out at $23 \pm 2^\circ\text{C}$. The mean peel force for each specimen shall be recorded and the mean value of the five recorded measurements reported as the peel strength.

3.3. Temperature Resistance

Test specimens shall be prepared using the etching process, Method B, described in Clause 3.1.2. Five aluminium lap shear strength test specimens shall be prepared for each temperature described in Table 2. In all cases, each sample shall be stabilised in the test chamber for a period of 30 minutes minimum and tested for lap shear strength as specified in Clause 3.1.2.

3.4. Fluid Resistance

Lap shear strength specimens shall be prepared using the etching process, Method B, described in Clause 3.1.2. Five strips shall be prepared for each of the fluids listed in Table 2. These will be immersed in the fluid for the time and at the temperature specified in Table 2. The lap shear strength specimens shall then be removed, lightly wiped, air dried at $23 \pm 2^\circ\text{C}$ for 18 to 24 hours and tested for lap shear strength as specified in Clause 3.1.2.

4. RELATED STANDARDS

Title	Description
AMS4040	Aluminum Alloy, Sheet and Plate, Alclad 4.4Cu - 1.5Mg - 0.60Mn (2024-O with 1 ½% Alclad); Annealed Cladding: 1230
AMS4041	Aluminum Alloy, Sheet and Plate, Alclad 4.4Cu - 1.5Mg - 0.60Mn (2024, -T3 Sheet/-T351 Plate with 1-1/2% Alclad) Solution Heat Treated, Cold Worked and Naturally Aged Cladding: 1230
QQA250/5 T3	Aluminum Alloy Alclad 2024, Plate and Sheet Cladding: 1230
EN 2090	Aerospace series - Aluminium alloy AL-P2024-T3 - Clad sheet and strip 0,3 mm <a <6 mm Cladding: 1050A / 1145
EN 2703	Aerospace series - Aluminium alloy AL-P2024-T4 or T42 - Clad sheet and strip - 0,3 mm ≤a ≤6 mm Cladding: 1050A / 1145
BS L163* *By extension (different tempers) - BS L164, BS L165, BS L166, BS L167	Specification for Sheet and Strip of Aluminium-Coated Aluminium Copper-Magnesium-Silicon-Manganese Alloy (Solution Treated, Cold Worked for Flattening and Aged at Room Temperature) (Cu 4.4, Mg 0.5, Si 0.8, Mn 0.8) Cladding: 1050A
EN 2087	Aerospace series - Aluminium alloy AL-P2014A - T6 or T62 - Clad sheet and strip - 0,4 mm <or= a <or= 6 mm Cladding: 1050A / 1145
EN 2088	Aerospace series - Aluminium alloy AL-P2014A - T4 or T42 - Clad sheet and strip - 0,4 mm <or= a <or= 6 mm Cladding: 1050A / 1145
VG95343 Part 15* *RK-6619 is comparable to VG95343 Part 15.	Specification for the testing of 2-part adhesives

Table 1 – Related Standards

Subsequent amendments to, or revisions of, any of the above publications apply to this standard only when incorporated in it by updating or revision.

5. SAMPLING

Production routine tests consisting of Visual Examination, Peel Strength and Aluminium to Aluminium Lap Shear shall be carried out on every batch of resin and activating agent. Qualification test samples shall consist of not less than 60 grams of adhesive (6 bi-packs). Qualification tests shall be carried out to the requirements of the Design Authority.

6. PACKAGING

Packaging shall be in accordance with PS5142. Each package shall bear an identification label showing material quantity, description, batch number and “use before” date. Additional information shall be supplied as specified in the contract or order.

7. TEST REQUIREMENTS

Test	Test Method	Test Requirements
Visual Examination	-	As per Clause 2.1
Lap Shear Strength Aluminium to Aluminium DR-25 to DR-25 -25 to -25	Clause 3.1 Clause 3.1.1 (Method A) Clause 3.1.3 Clause 3.1.4	5.0 kN minimum 300 N minimum 300 N minimum
Peel Strength DR-25 to Aluminium	Clause 3.2	80 N/25mm minimum
Temperature Resistance Lap Shear Strength at: -40°C 50°C 70°C 100°C 120°C 150°C	Clause 3.1.2 (Method B)	5.0 kN minimum 3.5 kN minimum 2.5 kN minimum 1.5 kN minimum 1.3 kN minimum 1.0 kN minimum
Fluid Resistance 24 ± 2h immersion at 24 ± 2°C <ul style="list-style-type: none"> • ISO 1817 Test Liquid 103 • Water 24 ± 2h immersion at 70 ± 3°C <ul style="list-style-type: none"> • ISO 1817 Test Liquid F • ISO 1817 Test Liquid B • Hydraulic Fluid H-520 24 ± 2h immersion at 100 ± 4°C <ul style="list-style-type: none"> • ISO 1817 Test Liquid 101 Lap Shear Strength Aluminium to Aluminium	Clause 3.4	
	Clause 3.1.2 (Method B)	5.0 kN minimum

Table 2 – Test Requirements

8. REVISION HISTORY

Author	Date	Rev	Comments
Paul Dixon	May 2005	7	CR-05-DM-052
Paul Dixon	Jun 2010	8	CR-10-DM-008
Paul Dixon	3 Aug 2010	9	CR10-DM-009
Paul Dixon	6 Jun 2013	10	See DMTEC
Paul Dixon	Sep 2014	11	-
Pedro Vu	22 Aug 2017	12	RTS - 1332842 Standardised to match current test procedures
Phil Hammond	30 Apr 2019	13	RTS - 1448882 Added method B (Etching) for aluminium lap shear
Justin Chow	4 Jul 2022	14	Updated aluminium grades for lap shear plates

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