

SEALANT PERFORMANCE TESTING

Using aluminium test rings confirming to porosity
Requirements of US MIL-I-17563C Section "4.5.5 Sealing Capability test"
18 September 1992

Date:

Sealant Manufacturer/Supplier:

Sealant Type: Anaerobic: Thermal Cure: Methacrylate:

Catalyst Type: Peroxide: AZBN: Other:

1. GC Trace: Yes: No:
2. Peroxide in sealant: Positive: Negative:
3. US MIL-Standard 17563C approval: Yes: No:
4. Sealant sample supplied: Without catalyst added:

5. PREPARE SEALANT SAMPLE:

a) Make up 500ml of sealant with % Catalyst. Name:

b) Viscosity: SG @ 25C: Gel time (90C):

c) Measure out 2x60ml of catalysed sealant into a 75ml capacity large opening screw top clear glass bottles:

Bottle 1 - Catalysed Sealant only.

Bottle 2 - Add: a) Scraps of swarf representative of production metals

b) 2% solution of contaminated component wash water.

d) Place bottles side by side in an air circulation oven having a constant temperature of 30C

6. DAILY CHECKS:

Check bottles for signs of polymerisation:.

- a) Swarf sticking together: 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30 days.
- b) Change of colour of sealant. 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30 days.
- c) Polymerisation at bottom of bottle. 1-2-3-4-5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30 days.

Terminate test after 30 days.

7. WEEKLY CHECKS:

- a) Viscosity: Bottle 1: Week 1: 2: 3: 4: 5: 6: 7: 8:
Bottle 2: Week 1: 2: 3: 4: 5: 6: 7: 8:
- b) Gel test: Bottle 1: Week 1: 2: 3: 4: 5: 6: 7: 8:
Bottle 2: Week 1: 2: 3: 4: 5: 6: 7: 8:

Terminate test after 8 weeks.

8. TEST RING IMPREGNATION

- a) Weigh Test Ring. g
- b) Place sufficient prepared sealant in vacuum chamber to cover test ring
(do not add test ring at this stage) and degass down to 10mb for 2 mins.
- c) Return chamber to atmospheric pressure and immerse Test Ring in sealant.
- d) Pump vacuum chamber down to 10mb for 10 mins and release.
- e) Remove Test Ring from sealant and gently wash in tepid water, dry and weigh: g
- f) Transfer Test Ring to hot water bath with a constant temperature of 90C
- g) Remove after 10 mins and allow to cool and weigh: g
- h) Surface condition of Test Ring: Exudation: Clean: Discoloured:
- i) If exudation, carefully remove without damaging the ring and weigh: g
- j) Place impregnated ring in test fixture and apply dry air @ 50psi.
- DO NOT IMMERGE IN WATER AT THIS STAGE.**
- k) Observe any liquid exuding from the surface of the Test Ring: Yes: No:
- l) Immerse Test Ring in tepid water and observe any leakage from the body.
- m) Leakage at the interface with the seal: None: Slight: Severe:

Note: Some sealants do not seal well up to the surface. If leak rate is severe, dry rub the ends of the test ring with wet & dry paper on a flat surface and retest: Yes: No:

- n) Check body leakage rate against Test Ring Chart and record - see: casting-impregnation.com

Leak Test Rate: 1: 2: 3: 4: 5:

Note: Up to leak rate 2 may be considered as acceptable in certain instances where exacting sealing is not required.

- o) Place Test Ring in air circulation oven with constant temperature of 150C for 24 hrs.

Leak Test Rate: 1: 2: 3: 4: 5: Weight: g

Total Weight Gain/Loss: g

9. CHEMICAL TESTING

Should the impregnation phase prove positive, produce a sufficient number of impregnated Test Rings to cover the range of chemicals required to be covered by the impregnated component.

E.G gasoline, engine oil, transmission fluids, brake fluids, antifreeze, diesel fuel etc.

For positive evaluation, each Test Ring must complete section 1 to 7 above and have a leak rate better than 3.

Add approx 30ml of appropriate test solution to each 75ml glass bottle together with the impregnated test ring and place in an air circulation oven for a temperature relative to the operating temperature of the components to be treated, plus and where appropriate, a safe margin as deemed necessary by the appropriate design authority.

Carry out this heat test cycle for a period of 30 days.

Remove Test Rings from liquid and carefully dry with clean tissue and pressure test/re-weigh and record.

It is very important to save these test solutions for Gas Chromatography/FI examination in order to identify traces of migrated sealant into the test solutions.

10. EQUIPMENT REQUIRED:

- 1 off Vacuum desiccator. Clear glass with large opening to take a 200ml beaker.
- 1 off Small gas ballast vacuum pump. Capable of 10mb vacuum.
- 1 off vacuum tubing, shut-off valve & bleed valve.
- 1 off Hot water bath with circulation for constant temperature.
- 1 off No 1 Zahn Cup.
- 1 pack Test Tubes: 16 x 100mm borosilicate glass.
- 1 off 2mm dia x 130mm tag wire – galvanised or stainless steel.
- 2 off Calibrated thermometers. 80-100C
- 1 off Oven hot air circulation set at 150C
- 1 off Incubator oven set at 35C
- 1x10 pack US Conformity Test rings
- 1 off Test fixture
- 1 pack 75ml clear large opening glass bottles with screw top.
- 1 off Laboratory scales 100g - 0.00 accuracy.
- 1 off Gas Chromatography/FI machine. Can be subcontracted to outside analytical laboratory.
- 1 Off sheet of wet & dry paper.

NOTES:

1. Have a sample of incoming uncatalysed sealant set aside for evaluation analysis using Gas Chromatography.
Important: This liquid sample is your master and needs to be kept and stored in a cool place for as long as the chosen sealant is approved for use.
2. Ensure that the impregnation plant is working normally. Do not make assumed adjustments as these could mask any real problems.
3. Place the ring through the plant at a time that could reflect a period of low performance - at the end of a shift?
4. Temperature has a major effect on impregnation. If the plant is working 24/7, record lowest atmospheric temperatures, incoming fresh water rinse, temperature of sealant, temperature of incoming work. *Adverse temperatures are often the root cause of poor impregnation performance.*
5. Ensure that the Test Ring remains with the batch of components until it is released from the impregnation department before testing commences.