STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard for BASIC ENVIRONMENTAL TESTING PROCEDURES FOR ELECTROTECHNOLOGY

PART 3—BACKGROUND INFORMATION

SECTION 6. GUIDANCE ON TEST Q

This standard shall be read in conjunction with AS 1099.1, General, and AS 1099.2Q, Sealing.

6.1 SCOPE. This Section gives guidance on Tests Qc, Qd, Qk and Ql of AS 1099.2Q.

6.2 GUIDANCE FOR TEST Qc.

6.2.1 General. The information derived from this test is only of a semi-quantitative nature, indicating individual leakage paths and not the total leakage associated with the specimen.

When using the optimum test conditions, Method 1 can achieve a sensitivity of 10 Pa.cm^3/s, Method 2 of 100 Pa.cm^3/s, and Method 3 of 1 Pa.cm^3/s. Varying severities can be achieved with Methods 1 and 2, by utilizing differing levels of vacuum and test liquid temperature, respectively. However, it should be borne in mind that some components may be damaged by subjecting them to overpressure or underpressure.

With Method 1 a pressure differential of 100 kPa (1000 mb) can be achieved whereas Method 2 will produce a pressure differential in the range 12 kPa (120 mb) (55°C) to 36.5 kPa (365 mb) (125°C). Consequently, increasing the immersion time of Method 2 to 10 min should produce an approximate equivalence in severity with Method 1.

Specimens having seals on more than one surface require each surface to be tested separately. Consideration should be given to the possible need for recovery of the specimen prior to the testing of each surface, e.g. specimens having a small included gas-filled cavity could have this exhausted during the testing of one surface.

Observation should be made against a dull, non-reflective black background, under direct lighting adjusted to provide maximum visibility at the specimen position, through a 3 × magnifier or stereo-zoom microscope arranged for the observation of bubbles emanating from the specimens immersed in the liquid.

With certain types of specimens, engineering judgement will be required to distinguish between 'real' and 'virtual' leaks, because of the gas retention capability of the material. In most instances the rate of bubbles and/or growth of bubble issuing from a virtual leak will decrease as the source of gas is exhausted. It may also be suggested that a dummy specimen consisting of a solid block of the same material is used for comparison purposes.

Specimens should be as clean as possible and free from foreign material on the surface, including coatings and any markings if they may contribute in erroneous test results. Careful handling is also required to avoid contact of bare fingers with critical parts of the specimen.

Test liquids should be chosen so as to behave in a stable condition throughout the test.

6.2.2 Method 1. For Method 1, the test liquid shall have the following characteristics:

(a) Kinematic viscosity at 20°C: 25×10^{-6} m^2/s (25 cSt).

(b) Kinematic viscosity at 50°C: 9×10^{-6} m^2/s (9 cSt).

(c) Ambient vapour pressure: < 10 Pa.

A suitable liquid is oil. It should be degassed. Water with a wetting agent or any suitable liquid having a kinematic viscosity of not more than 25×10^{-6} m^2/s (25 cSt) at 20°C may be used, but in this case it must be considered that the sensitivity of the test will be impaired. The depression shall be limited by the risk of having the liquid boiling.

Since any initial frothing may mask bubbles due to leaks from the specimen sealing, it is essential that in Method 1, the reduced pressure be attained rapidly.

However, if the air space within the specimen is small or if the leak rate is large, the bubbles emerging through the sealing during the initial frothing may not be detected.

6.2.3 Method 2. Before selecting Method 2, assessment of the heating effect on the specimen should be considered, e.g. in view of the closing and/or opening of leakage paths.

For Method 2, water with a wetting agent may be used for test temperatures lower than 90°C. For higher test temperatures suitable liquids should have a kinematic viscosity of the order of 0.3×10^{-6} m^2/s (0.3 cSt) *at test temperature*. In the latter case, commonly used liquids are fluorocarbons, e.g. perfluorotributylamine or perfluoro(1-methyl-decaline) which are available under various trade names.

The volume of the bath shall be at least 10 times the volume of the specimen.