

NUCLEAR ENVIRONMENTAL QUALIFICATION

NEQ-320

SUMMARY

The environmental qualification testing of NEQ-320 Heat Shrinkable Tubing was conducted by RCM Technologies, Engineering Services Canada and is fully reported in documents 09070-FTR-Rev.00, March 1995; 11020-QTR Rev.00, February 1997; 11020-AD1 Rev.00, February 1997 and 14370-QTR Rev.00, FEBRUARY 2000. The elements of the testing with a brief outline of each are: 09070-FTR Rev.00, March 1995; 11020-QTR Rev.00, February 1997 and 11020-AD1 Rev.00, February 1997:

- 1) **Pre-test Inspection**
 - dimensional verification and photographic record
- 2) **Baseline Functional Test**
 - dielectric strength testing per CSA C22.2 No. 0.3 paragraph 4.28.1.1.2 (b)
 - acceptance criteria - leakage current less than 1 mA at 3600 VAC
 - insulation resistance per CSA C22.2 No. 0.3 paragraph 4.28.2.1.1
 - acceptance criteria - maintain 90% of unaged specimens resistance at 500 VDC
- 3) **Radiation Exposure**
 - 60.25 Mrads at a dose rate of approx. 276 Krads/hr
- 4) **Post Radiation Function Tests**
 - per baseline tests
- 5) **Thermal Aging**
 - accelerated aging to simulate a 75°C - 40 yr. life
- 6) **Mandrel Flexing Test #1**
 - splice bent around mandrel 20 times cable diameter
- 7) **Post Thermal Aging Functional Test**
 - per baseline test

8) Accident Simulation

- the temperature and pressure bounding limits were designed to encompass both a Loss of Coolant Accident (LOCA) and a Main Steam Line Break (MSLB) events. The test profiles of temperature and pressure are shown below. During the accident simulation the splices carried a 300V 5A load and were exposed to a chemical spray of pH10 for a period of 60 minutes, 20 minutes after the start of the test.

9) Mandrel Test

- splice bent around mandrel approximately 40 times splice diameter

10) Post-Accident Function Tests

- per baseline functional tests

11) Post-test Inspection

- the specimens were visually inspected and a photographic record made

FOR 14370-QTR Rev.00, February 2000:

- 1) **Pre-test Inspection**
 - dimensional verification and photographic record
- 2) **Baseline Functional Test**
 - dielectric strength acceptance criteria - leakage current less than 0.5 mA at 300VAC
 - insulation resistance acceptance criteria – more than 10MΩ at 500VDC
- 3) **Accident Simulation:**
 - The harsh environment service conditions that envelop MSLB and LOCA are:
 - temperature 171°C
 - pressure 13.8 psig
 - relative humidity 100% saturated steam
- 4) **Post-Accident Function Tests**
 - per baseline functional tests
- 5) **Post-test Inspection**
 - the specimens were visually inspected and a photographic record made

**QUALIFICATION OF 3M CANADA COMPANY
NEQ-320 HEAT SHRINKABLE CABLE SPLICE ASSEMBLY
TEST REPORT DOCUMENTS
09070-FTR-REV.00, MARCH 1995
11020-QTR REV.00, FEBRUARY 1997
11020-AD1 REV.00, FEBRUARY 1997
14370-QTR REV.00, FEBRUARY 2000**