



21 February 2012
EL&P-009-12

Mr. Pierre Saverot
Licensing Branch
Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

SUBJECT: Amendment Request for Certificate of Compliance No. 9168 for the
Model 8-120B Package - Supplemental Information
Docket No. 71-9204
TAC No. L24514

Dear Mr. Saverot:

EnergySolutions provides the attached Specification as a supplement to our previously provided application for amendment of the 8-120B CoC. As we discussed, the seal specification is provided for your review. It is referenced in the previously provided revised SAR.

Should you or members of your staff have any additional questions about the specification, please contact me at (803) 758-1898.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark Whittaker".

Mark Whittaker
Health Physicist, Radiological Services

Attachments:

- Specification ES-C-038

NM5501

Seal Specification for the 8-120B Cask

Revision 0

Authored By: *Michael Frassica* 2/17/12
Michael Frassica, Project Engineer Date

Reviewed By: *Phillip Thomas* 2/17/12
Phillip Thomas, Cask Operations Manager Date

Approved By: *Patrick L. Paquin* 2/17/12
Patrick L. Paquin, Director - Products Date

- New
- Title Change
- Revision
- Rewrite
- Cancellation

Effective Date 2/21/12

Electronic documents, once printed, are uncontrolled and may become outdated.
Refer to the Intranet or the Document Control authority for the correct revision.

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Seal Specification for the 8-120B Cask

1 SCOPE

1.1 Purpose

This document provides the technical specification and performance tests for elastomeric compounds used as containment boundary seals for the EnergySolutions licensed 8-120B transport cask.

1.2 Introduction

The intention of this specification is to provide consistent elastomeric criteria across several types of compounds. Example compounds that are well suited in sealing applications are (but not limited to) silicone, butyl (IIR), and ethylene propylene (EPDM). To demonstrate containment boundary elastomer(s) ability to perform under Hypothetical Accident Conditions (HAC) and Normal Conditions to Transport (NCT), selected compound(s) shall be subjected to and successfully demonstrate the ability to pass tests and inspections communicated herein.

1.3 General Overview

Elastomeric seal material is a general term which comprises a wide variety of polymers having elastic properties similar to natural rubber. Therefore selected elastomeric seal material for containment boundaries will be delineated by meeting the requirements of this specification. The helium permeability requirement (Section 4.1.3) only applies to seals used in packages subject to leak tight requirements.

2 REFERENCES

- 2.1 ASTM D2240, Standard Test Method for Rubber Property; Durometer Hardness
- 2.2 ASTM D2137, Standard Test Methods for Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics
- 2.3 Parker O-Ring Handbook, ORD 5700, Parker Seals, O-ring Division, 2007
- 2.4 Safety Analysis Report for Model 8-120B Type B Shipping Packaging (latest revision)
- 2.5 Fastener and Fitting Seals Catalog, CSS 5125, Parker Hannifin Corporation, Composite Sealing Systems Division
- 2.6 ASTM E1069-85, Standard Test Method for Testing Polymeric Seal Materials for Geothermal or High Temperature Service, or both, Under Sealing Stress

3 MATERIAL

3.1 Elastomeric Selection

Elastomeric compounds to be identified by EnergySolutions Q-Level I supplier on Approved Suppliers List (ASL) or by ASL laboratory utilizing fourier transform infrared spectrometry (FTIR).

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3.2 Restrictions

Seals fabricated from fluoropolymers shall be excluded for containment seals on the 8-120B cask.

4 Physical Properties

4.1 Mechanical Properties for Elastomeric Seals

4.1.1 Durometer; compounds shall have a hardness between 50 and 70 Shore A, Reference 2.1.

4.1.2 Low Temperature Compatibility; compounds shall pass the low temperature brittleness test, Method A at -40°F, Reference 2.2.

4.1.3 Permeability (For Leak Tight packaging only); compounds shall have a maximum permeability for helium gas of $100 \times 10^{-8} [\text{cm}^3 \cdot \text{cm} / \text{cm}^2 \cdot \text{sec} \cdot \text{bar}]$ at ambient temperature, Reference 2.3

4.2 Dimensional Conformance

4.2.1 Cross section of seal: O-rings' cross section as stated on the SAR bill of material. Manufactured seals (e.g. Parker Stat-O-Seal) shall conform to manufacturer literature.

4.2.2 Outside Diameter (Reference 2.4, Drawing C-110-E-0007):

Seal Position	BOM No.	Outside Dimension (in.)	Cross Sectional Diameter (in.)	Quality Level
Primary Inner O-ring	22	63" +/- 1/2"	0.285" +/- 0.010"	1
Primary Outer O-ring	23	65" +/- 1/2"	0.285" +/- 0.010"	3
Secondary Inner O-ring	24	30" +/- 1/2"	0.285" +/- 0.010"	1
Secondary Outer O-ring	25	32" +/- 1/2"	0.285" +/- 0.010"	3
Vent Bolt Seal	26	Reference 2.5	Reference 2.5	1

5 Conditional Testing

5.1 Temperature - Pressure Testing

5.1.1 Seal Test of Normal Condition of Transport (NCT)

Utilizing testing methods as outlined in Reference 2.6 with the noted alteration (§§5.1.1.1-5.1.1.3) to simulate the environment during the 8-120B NCT condition.

5.1.1.1 Test temperature shall be maximum allowable (-0, + 10%) from Table 3-1 of Ref. 2.4

5.1.1.2 Test pressure shall be MNOP (-0, + 10%) from Section 3.3.2 of Ref. 2.4

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5.1.1.3 Test duration shall be a minimum of 1000 hrs

5.1.2 Seal Test of Hypothetical Accident Condition (HAC)

Utilizing testing methods as outlined in Reference 2.6 with the noted alteration (§§5.1.2.1 -5.1.2.3) to reproduce 8-120B SAR HAC conditions

5.1.2.1 Test temperature shall be maximum allowable (-0, + 10%) from Table 3-2 of Ref. 2.4

5.1.2.2 Test pressure shall be maximum HAC pressure (-0, + 10%) from Section 3.4.3 of Ref. 2.4

5.1.2.3 Test duration shall be minimum of 70 hrs

5.2 Considerations for Irradiation of Elastomeric Seals

Elastomers experience some degradation in elasticity when exposed to radiation levels of 10^7 rad. Using conservative factors, calculation for the 8-120B cask show a maximum annual dose approaching 10^6 rad. At these levels, typical elastomers physical properties do not degrade significantly, Reference 2.3. Maximum installation time of all 8-120B seals is 365 days. Therefore selection of elastomeric compounds will not be limited by the effects of radiation during installation except as noted in §3.2.

6 QUALITY ASSURANCE

The procurement of seals shall comply with EnergySolutions Quality Assurance Program ES-QA-PG-001 latest revision.