ENERGYSOLUTIONS

FO-OP-PR-001

Shipping, Receiving, Handling, Usage and Storage of NUHIC, Radlok and Envirolene Polyethylene HICs

Revision 1

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1. PURPOSE AND SCOPE

1.1 Purpose

The Energy*Solutions* NUHIC, Radlok, and Envirolene series of High Integrity Containers (HICs) are designed to provide waste isolation from the surrounding environment for a period of 300 years. Various un-solidified wastes may be disposed of at Barnwell, S.C. However, if total specific activity of isotopes with half lives greater than five (5) years is 1 µCi/cc or greater, HICs approved by South Carolina Department of Health and Environmental Control shall be used. These containers may be allowed for use at an alternate disposal site which may implement additional requirements that must be met before use is granted. Contact the alternate disposal site for specific requirements.

1.2 Scope

This procedure controls the shipping, receiving, handling, usage and storing of polyethylene HICs manufactured by Energy*Solutions* and for the end user for radioactive waste disposal and other uses approved by Energy*Solutions*. This procedure applies to the NUHIC, Radlok, and Envirolene (EL) models of containers. Adherence to this procedure serves to protect the integrity of the container.

2. REFERENCES

2.1 DHEC-HIC-PL-004, Certificate of Compliance for Radlok®-55

2.2 DHEC-HIC-PL-005, Certificate of Compliance for Radlok®-100, Radlok®-179, Radlok®-195

2.3 DHEC-HIC-PL-007, Certificate of Compliance for Radlok®-200

2.4 DHEC-HIC-PL-014, Certificate of Compliance for Radlok®-500

2.5 DHEC-HIC-PL-010, Certificate of Compliance for NUHIC Containers

2.6 DHEC-HIC-PL-012, Certificate of Compliance for Envirolene Containers

2.7 ASME NQA-1, Quality Assurance Requirements for Nuclear Facility Applications

2.8 ASME B30.9, Slings

3. GENERAL

3.1 Definitions

None

3.2 Responsibilities

The receiving organization involved in shipping, receiving, and/or storage shall be responsible for compliance with the requirements of this procedure.

3.3 Precautions and Limitations

None

3.4 Records

Attachments 6.6 through 6.8 shall be maintained in accordance with the users QA Program requirements.

4. PREREQUISITES

Each user of Energy*Solutions* HICs shall possess the current revision of Certificate of Compliance, References 2.1 through 2.6 as appropriate, and this procedure.

5. DETAILED GUIDELINES

Note: If any discrepancies are noted, attach a "HOLD" tag to the HIC and place in a hold area. Contact Energy*Solutions* for disposition of any discrepancies.

Note: Descriptions of the Energy*Solutions* Series High Integrity Containers (see References 2.1 through 2.6, as applicable) are contained in the appropriate Certificate of Compliance.

5.1 Approved Contents

5.1.1 Energy*Solutions* containers are designed to safely contain nuclear wastes, including bead and powdered ion exchange resin, filter sludges, mechanical filters, stabilized incinerator ash, activated carbon, contaminated soil, dry active waste (DAW), and sandblasting grit. It should be noted that dewatering ion exchange resin that has been in contact with nitrates or other strong oxidizing agents can be hazardous due to exothermic reactions and should be avoided.

5.1.2 Procedures for loading metal filters, scrap and other non-compactable materials into a container, to ensure that protrusions and sharp edges do not damage the container, shall be developed by the user and submitted for approval by Energy*Solutions* prior to loading and shipment. The container shall not contain free-standing water greater than 1% of the container's waste volume. Energy*Solutions* standard dewatering procedures shall be used (or referenced if a plant procedure is used) for the waste type or container type, if applicable, being processed.

5.2 Compatible and Prohibited Contents

Note: The statements below are oriented towards those applications where tanks, manufactured using Schulink XL350S-01G, are used to store these chemicals in their pure form and not as contaminants in other materials.

5.2.1 The Chemical Resistance of Schulink XL350S-01G Rotational Molded Cross-Linked High Density Polyethylene (Attachment 6.1) lists those chemicals that are, under specified temperature limitations, compatible and incompatible with this material, which is used in manufacturing Energy*Solutions* HICs.

5.2.2 When using Energy*Solutions* NUHIC, Radlok, and Envirolene series containers, the chemicals noted as unsatisfactory or marginal in Attachment 6.1 are considered prohibited and shall not be disposed of in an Energy*Solutions* HIC. Chemicals listed elsewhere in the attachment are not prohibited when disposed of as incidental contaminants to radioactive wastes and provided the specified temperature limits are not exceeded.

5.3 Thermal Limitations

Note: The chemicals noted as satisfactory in Attachment 6.1 are acceptable below temperature limits specified here.

5.3.1 Energy*Solutions* containers are licensed with a temperature limitation of 170°F (180°F for NUHICs) for handling, lifting, and disposal operations. At no time is the container to be subjected to a temperature in excess of 200°F due to any process or its contents. When the containers include underdrain systems for processing waste, the maximum permitted temperature is reduced to 130°F because of the materials used in the underdrain assembly. It is expected that containers with dewatering internals installed will be maintained well below the 180°F limit.

5.3.2 These thermal limitations apply to containment of all anticipated waste forms including, where present, incidental chemical contamination.

5.4 Shipping Requirements

Shipping from HIC Fabricator and Designated Fabricator or Storage Location

5.4.1 All new HICs are to be shipped in accordance with Reference 2.7, Subpart 2.2, as a level C item.

5.4.2 HICs shall be inspected for cleanness immediately before packaging. Dirt, chips, dust, trash, or other forms of contamination shall be removed.

5.4.3 The appropriate HIC lid and hardware (if appropriate) shall be installed. NUHIC and Envirolene lids shall be hand tightened. Radlok HICs require that the manway lid be tightened by hand until a high degree of resistance is encountered. Screw the manway lid down firmly using a manway lid torque tool until the gap between the container dome and the bottom of the manway lid approaches the measurement marked by the HIC fabricator. Using gauge blocks or other measuring devices, check the gap between the lid bottom and the container dome. The gap measurement should be made where the mark on the container dome and the mark on the manway lid are aligned with each other. If, after aligning the marks, the gap is not met, continue to torque the lid until the correct gap is achieved when measured at the reference mark on the container dome. The maximum gap measurement shall not exceed ¾" for the Radlok®-200, Radlok®-500, and Radlok®-100 containers and ½" for the Radlok®-179 and Radlok®-195 containers. The Radlok®- 55 lid shall be flush with the top of the body lip. Screw fill port lid into container to a minimum of 150 ft-lbs. of torque. This torque can be readily applied by one person using a fill port torquing tool. Torque may be verified by (1) Applying a torque wrench to the torquing tool or (2) using the torque tool, verify fill port lid is tight and that the match marks on the fill port lid and manway lid match. The marks were applied at the manufacturer where the lid was torqued via calibrated torque wrench.

5.4.4. HICs shipping from the rotomolder to Energy*Solutions* facilities or to an internals installation vendor may be shipped in an enclosed van. The van floor shall be covered with cardboard to protect the bottoms of the HICs. Care shall be taken to insure HICs are not damaged if off loaded with a forklift.

5.4.5 HICs shipping from Energy*Solutions* facilities, Energy*Solutions* internals vendors or any other time that HICs are not being shipped in a cask shall be strapped to a pallet.

5.4.5.1 The pallet must extend beyond the perimeter of the HIC and have the following specifications:

5.4.5.2 The pallet shall allow for approximately 4" floor clearance for forklift tines.

5.4.5.3 The surface of the pallet shall provide uniform support for the HIC with at least 75% of the HIC supported.

5.4.5.4 The pallet shall have the capacity to support the fully loaded HIC.

5.4.5.5 If wooden pallets are used, they shall be assembled using wood screws or have a plywood top attached with counter-sunk wood screws and/or suitable adhesive. Nails that may vibrate loose during shipment and damage the HIC are not permitted.

5.4.5.6 Prior to use, the pallet shall be inspected to ensure there are no objects or parts of the pallet that could damage the container.

5.4.5.7 Strapping shall be ⅝" polyester properly tensioned and sealed with serrated seals. As an option, carbon steel strapping may be used. If carbon steel strapping is used, a protective pad (e.g. cardboard) shall be placed between the HIC and the strapping to protect from any damage.

5.4.6 The exterior surfaces of the HIC shall be completely wrapped with minimum 18" wide 80-gauge polyethylene stretch wrap or with a minimum 4-mil thickness black plastic sheet to provide protection from the weather, environment, and ultraviolet radiation.

5.4.7 HICs should be shipped in a closed carrier for adequate protection from the weather, environment, and ultraviolet radiation. If a closed carrier is not available, an open carrier may be used if the HIC is secured and completely covered with a waterproof tarpaulin that is installed in a manner to provide drainage.

5.5 Receiving Requirements at Designated Location (e.g. Internals Fabricator's Facility)

5.5.1 Obtain the bill of Lading and Certification Package from the driver. Note that the Certification Package may be forwarded separately to Energy*Solutions* QA. Verify the HIC serial numbers match.

5.5.2 Transfer the HICs to the receipt inspection area.

5.5.3 Inspect the HIC for any obvious damage such as scrapes, cuts, or punctures that may have occurred during shipment. Verify no damage to lifting devices such as damaged slings or shackles, bent lifting or grapple rings, and missing lifting components as necessary. Report any anomalies to Energy*Solutions* QA.

5.5.4 Transfer the HIC to an appropriate storage area.

5.5.5 Thread each HIC lid into place for a fit test. Lids that do not fit shall not be used and shall be brought to Energy*Solutions* attention.

5.6 Storage Conditions

5.6.1 Energy*Solutions* containers can be stored, under proper conditions, without adverse effects on the container. As a photosensitive material, the containers shall be kept out of direct sunlight, and away from any other sources of ultraviolet (UV) radiation. In total, NUHIC, Radlok, and Envirolene containers shall not be subjected to more than 365-days of exposure to UV light sources, primarily direct sunlight. Record any UV exposure on Attachment 6.6.

5.6.2 To minimize any chance of damage to a container with an underdrain system, the container should be stored in such a way that the bottom is flat and that no weight is located over the manway/fill port area. This is to ensure that no potential deformation of the manway/fill port area of the container or seal materials occur.

5.6.3 Each container shall be stored with its designated closure assemblies installed to prevent mismatching, and design of the facility must preclude the possibility of a wet or damp environment. Containers are shipped palletized for protection and handling convenience. The container should remain palletized until use to extend this protection.

5.6.4 Following filling and closure of the container, it may be stored on-site prior to shipment for burial. The design of the facility must preclude the possibility of a wet or damp environment and any prolonged exposure of the container to any source of ultraviolet light. Short exposures to ultraviolet light such as during placement or inspection are permitted.

5.6.5 Store HICs in an upright position with the lid in place hand tight. The storage surface shall be a flat, smooth, and supportive, and preferably not exposed to corrosive materials, solvents, or excessive ultraviolet radiation. Stone or gravel is unacceptable.

5.6.6 Do not permit contact of the HICs with any commonly used organic solvents such as benzene, toluene, xylene etc., since they may adversely react with the polyethylene. A chemical resistance chart of the HIC raw material is included in this procedure as Attachment 6.1.

5.6.7 Stacking of Empty HICs:

5.6.7.1 The NUHIC-80B, -90, -120, -136, and -205 may be stacked two (2) high empty indoors, out of any wind, and braced to prevent toppling.

5.6.7.2 The NUHIC-55 may be stacked up to three (3) high empty indoors out of any wind, and braced to prevent toppling.

5.6.7.3 The NUHIC-158 may be stacked up to three (3) high empty with Energy*Solutions* -approved stacking rings indoors out of any wind, and braced to prevent toppling.

5.6.7.4 The EL series of containers may be stacked two (2) high indoors out of any wind and must be braced to prevent toppling.

5.6.7.5 The Radlok® series of containers shall not be stacked.

5.6.8 Stacking of Loaded HICs:

5.6.8.1 Loaded NUHIC-55 containers may be stacked two (2) high but must have a Energy*Solutions* -approved stacking ring installed between the HICs.

5.6.8.2 Stacking of other loaded NUHIC, Envirolene, or Radlok HICs is prohibited.

5.7 Handling and Lifting Requirements

Caution: All lifting slings shall be used when lifting regardless of the content volume or content weight.

Note: Due to the nature of the container material, some bowing and deformation of the polyethylene may be evident during lifting. This is an anticipated condition and does not constitute an unsafe condition, if the maximum gross weight limit presented on the container stenciling is observed.

5.7.1 The Energy*Solutions* Radlok®-55 comes equipped with a lift band and may be lifted by either forklift tines under the edges of the lift band or by the use of a standard drum grappler. The Energy*Solutions* Radlok® -200, Radlok® -500, Radlok® -100, Radlok® -179, and Radlok® -195 containers come equipped with a lift band, lift lugs, and two sling assemblies or grapple with slings for lifting. The lift assembly for each container is designed to accommodate the respective weight when both slings are used (lift band or standard drum grappler for the Radlok®-55) and a 3g abrupt lift is applied. It is required that both slings (lift band or standard drum grappler for the Radlok®-55) be used when lifting the container in an empty condition.

5.7.2 Envirolene series containers are equipped with either lifting slings, lift ring assembly cables, or grapple ring assemblies for lifting when loaded. Additionally, the EL container can be handled with forklift when empty provided the container is on a suitable pallet.

5.7.3 NUHIC containers are designed to be handled only by the slings provided with each container when loaded. Empty NUHIC containers may be handled with forklift when the container is on a suitable pallet.

5.7.4 HICs containing underdrain assemblies shall be handled with reasonable care to prevent damage to the underdrain. An inspection of the underdrain shall be performed following rough handling to verify internals integrity (e.g. container dropped or struck against another object).

5.7.5 The polyethylene container has extraordinary resilience but can be damaged (scraped or gouged) by sharp objects with sufficient application force (e.g. fork lift tines, setting the container down on sharp objects or abrasive surfaces). Reasonable care during handling (and using the pallet provided) will prevent this type of damage.

5.7.6 Remote grapples are available for remote handling of a variety of containers. Use of these grapples allows for remote handling in inaccessible areas such as interim and long-term storage facilities. Reusable grapples (removed when the containers are loaded for shipment) and disposable grapples are also available for the Radlok® containers.

5.7.7 Inspect lift cables for the unacceptable conditions specified in Reference 2.8. Report any anomalies to Energy*Solutions* QA.

5.7.8 Transfer the HIC to the desired location. Document the transfer date, time, and location on the Attachment 6.6.

5.8 **Radlok Manway Use and Closure**

5.8.1 This section does not apply to the Energy*Solutions* Radlok® - 55.

5.8.2 The manway opening is used in the installation of any internals and will normally be sealed prior to arrival at the user's site. If, for various reasons, it is desirable to use the manway as a large diameter fill port, refer to Attachment 6.2.

5.9 **Radlok Fill Port Use and Closure**

The fill port is concentric with the manway opening (container opening for Radlok®-55) and is sealed with the fill port closure assembly. Two (2) seals are attached to the compression plug of the fill port closure assembly. The assembly is then lowered into the opening and screwed into position to a prescribed torque. For details of the closure procedure refer to Attachment 6.3.

5.10 **NUHIC Closure**

There are several different types of lids and sealing methods for NUHIC containers. Attachment 6.4 defines the steps necessary for proper closure on all NUHICs.

5.11 **Envirolene Closure**

The sealing method for Envirolene containers is described in Attachment 6.5. This attachment defines the steps necessary for proper closure on all Envirolene Containers.

5.12 **HIC Use**

5.12.1 All HICs shall be used solely within the limitations of References 2.1 through 2.6. Waste objects placed in the container shall not cause internal damage to the container nor shift about during transportation and handling. Do not exceed the maximum gross weight allowable for the HIC size as outlined in References 2.1 through 2.6.

5.12.2 Inspect each HIC before filling to insure that no foreign material is inside.

5.12.3 Ensure that the HIC certification package accompanies the container.

5.12.4 Inspect the HIC for any obvious physical damage such as scrapes, cuts, or punctures that may have occurred prior to use. Verify no damage to lifting devices such as damaged slings or shackles, bent lifting or grapple rings, and missing lifting components as necessary. Report any anomalies to Energy*Solutions* QA.

Note: Only the manufactured metal lifting device supplied with the HIC is acceptable. Contact Energy*Solutions* if the lifting device has been damaged or shows signs of deterioration prior to shipment. Other metal cables, chains, or wire ropes shall not be used unless specifically approved by Energy*Solutions*.

5.12.5 Filling shall be in accordance with approved radwaste operations procedures.

5.12.6 If a fill chute is used, it shall not impact the HIC in a manner that could result in damage. Compression of the HIC by fill-chute equipment is not permitted.

5.12.7 When filling the HIC, the contents shall be kept below the thread area so no interference with the lid thread engagement occurs.

5.12.8 At no time during the filling process shall the HIC be exposed to temperatures in excess of the limits specified in Section 5.3, either from HIC contents or surrounding equipment, machinery, etc.

5.12.9 Any vibration equipment used for compaction of contents shall be designed to protect against all possible container damage.

5.12.10 HICs shall be sealed prior to removal from the fill area. Lid installation and sealing shall be in accordance with Attachment 6.2 through Attachment 6.5 as appropriate.

5.12.11 Decontamination of HIC exterior surfaces shall be with a soap and water solution only. Water temperature shall be kept below 140°F.

5.12.12 Stacking of loaded containers (all except for the NUHIC-55) is prohibited.

5.12.13 Complete HIC User's Checklist (Attachment 6.6).

5.12.14 If the HIC is to be disposed of at the Barnwell, South Carolina, Low-Level Radioactive Waste Burial Facility, complete Certification Statement for Disposal of Polyethylene HICs (Attachment 6.7). This statement shall accompany the HIC to the Barnwell Disposal Facility.

5.12.15 Complete Polyethylene HIC Certification Statement (Attachment 6.8). This statement shall be forwarded to SCDHEC, Bureau of Land and Waste Management, Division of Waste Management, Infectious and Radioactive Waste Management Section.

6. ATTACHMENTS AND FORMS

6.1 Chemical Resistance of Schulink XL350S-01G Rotational Molded Cross-linked High Density Polyethylene

6.2 Radlok® Manway Assembly Closure and Sealing

6.3 Radlok® Fill Port Assembly Closure and Sealing

6.4 NUHIC Closure and Sealing

6.5 Envirolene HIC Closure and Sealing

6.6 HIC User's Checklist

6.7 Certification Statement for Disposal of Polyethylene High Integrity Containers

6.8 Polyethylene High Integrity Container Certification Statement

Attachment 6.1

Chemical Resistance of Schulink XL350S-01G Rotational Molded Cross-linked High Density Polyethylene

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Caution: It has been well documented over the years the types of chemicals that are compatible with polyethylene, either through tests or experience. It would be impossible to list all the chemicals that may be involved in use with polyethylene storage tanks. Therefore, the included table is only representative of typical chemicals.

Also, their rankings are specific to the application of chemical storage tanks and the superior properties of Schulink XL350S-01G. The following table is to be used only as a guide for establishing those uses that would give satisfactory services.

In many applications a knowledge of the chemical resistance of the raw material may be very useful. This chemical resistance chart was prepared based on a knowledge of the chemistry of the High Density Resins as well as chemical resistance tests in which molded specimens were immersed for prolonged periods of time at both 70°F (21°C) and 140°F (60°C). A classification of "unsatisfactory" under these circumstances does not mean that under certain conditions of use, such as intermittent and short time exposure, the part would fail.

The legend used denotes the following:

S – Satisfactory	This product has no effect on high density polyethylenes or ethylene copolymers.
M – Marginal	A loss of physical properties occurs. Part design and conditions of use will be the determining factors.
U – Unsatisfactory	A significant loss of strength, softening or embrittlement occurs. Resins are unsuitable for prolonged contact.
N – Not Known	

Some reagents are marked with an asterisk (*). Although high density cross linked polyethylene is chemically resistant to these agents, under certain conditions they may cause stress cracking.

Reagent	High Density Polyolefins	
	70°F (21°C)	140°F (60°C)
Acetic Acid* 1-10%	S	S
Acetic Acid* 10-60%	S	M
Acetic Acid* 80-100%	S	M
Acetone	M	U
Acrylic Emulsions*	S	S
Aluminum Chloride – dilute	S	S
Aluminum Chloride Conc.	S	S
Aluminum Fluoride Conc.	S	S
Ammonia 100% Dry Gas	S	S
Ammonium Carbonate	S	S
Ammonium Chloride Sat'd	S	S
Ammonium Fluoride 20%	S	S
Ammonium Hydroxide 0, 888 S.Q.	S	S
Ammonium Metaphosphate Sat'd	S	S
Ammonium Nitrate Sat'd	S	S

Chemical Resistance of Schulink XL350S-01G Rotational Molded Cross-linked High Density Polyethylene

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Reagent	High Density Polyolefins	
	70°F (21°C)	140°F (60°C)
Ammonium Persulfate Sat'd	S	S
Ammonium Sulfate Sat'd	S	S
Ammonium Sulfide Sat'd	S	S
Ammonium Thiocyanate Sat'd	S	S
Amyl Acetate	M	U
Amyl Alcohol* 100%	S	S
Amyl Chloride 100%	N	U
Aniline 100%	S	N
Antimony Chloride	S	S
Aqua Regia	U	U
Barium Carbonate Sat'd	S	S
Barium Chloride	S	S
Barium Hydroxide	S	S
Barium Sulfate Sat'd	S	S
Barium Sulfide Sat'd	S	S
Beer	S	S
Benzene	M	U
Benzene Sulfonic Acid*	S	S
Bismuth Carbonate Sat'd	S	S
Bleach Lye 10%	S	S
Black Liquor	S	S
Borax Cold Sat'd	S	S
Boric Acid Dilute	S	S
Boric Acid Conc.	S	S
Bromic Acid 10%	S	S
Bromine Liquid 100%	M	U
Butanediol* 10%	S	S
Butanediol* 60%	S	S
Butanediol* 100%	S	S
Butyl Alcohol* 100%	S	S
Calcium Bisulfide	S	S
Calcium Carbonate Sat'd	S	S
Calcium Chlorate Sat'd	S	S
Calcium Chloride Sat'd	S	S
Calcium Hydroxide	S	S
Calcium Hypochlorite Bleach Sol.	S	S
Calcium Nitrate 50%	S	S
Calcium Sulfate	S	S
Camphor Oil	N	U
Carbon Dioxide 100% Dry	S	S
Carbon Dioxide 100% Wet	S	S
Carbon Dioxide Cold Sat'd	S	S
Carbon Disulphide	N	U
Carbon Monoxide	S	S
Carbon Tetrachloride	M	U
Carbonic Acid	S	S
Castor Oil* Conc.	S	S
Chlorine Dry Gas 100%	S	M
Chlorine Moist Gas	M	U
Chlorine Liquid	M	U

Chemical Resistance of Schulink XL350S-01G Rotational Molded Cross-linked High Density Polyethylene

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Reagent	High Density Polyolefins	
	70°F (21°C)	140°F (60°C)
Chlorobenzene	M	U
Chloroform	M	U
Chlorosulfonic Acid 100%	M	U
Chrome Alum Sat'd	S	S
Chromic Acid 20%	S	S
Chromic Acid up to 50%	S	S
Chromic Acid and Sulfuric Acid	S	M
Cider*	S	S
Citric Acid* Sat'd	S	S
Coconut Oil Alcohols*	S	S
Cola Concentrates*	S	S
Copper Chloride Sat'd	S	S
Copper Cyanide Sat'd	S	S
Copper Fluoride 2%	S	S
Copper Nitrate Sat'd	S	S
Copper Sulfate Dilute	S	S
Copper Sulfate Sat'd	S	S
Cottonseed Oil*	S	S
Cuprous Chloride Sat'd	S	S
Cychohexanol*	S	S
Cyclohexanone	M	U
Detergents Synthetic*	S	S
Developers, Photographic	S	S
Dextrin Sat'd	S	S
Dextrose Sat'd	S	S
Dibutylphthalate	S	M
Disodium Phosphate	S	S
Diazo Salts	S	S
Diethylene Glycol*	S	S
Diglycolic Acid*	S	S
Dimethylamine	M	U
Emulsions, Photographic*	S	S
Ethyl Acetate 100%	M	U
Ethyl Alcohol* 100%	S	S
Ethyl Alcohol* 35%	S	S
Ethyl Butyrate	M	U
Ethyl Chloride	M	U
Ethyl Ether	U	U
Ethylene Chloride	U	U
Ethylene Chlorohydrin	U	U
Ethylene Dichloride	M	U
Ethylene Glycol*	S	S
Ferric Chloride Sat'd	S	S
Ferric Nitrate Sat'd	S	S
Ferrous Chloride Sat'd	S	S
Ferrous Sulphate	S	S
Fish Solubles*	S	S
Fluoboric Acid	S	S
Fluorine	S	U
Fluosilicic Acid 32%	S	S

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Reagent	High Density Polyolefins	
	70°F (21°C)	140°F (60°C)
Fluosilicic Acid Conc.	S	S
Formaldehyde* 40%	S	N
Formic Acid* 0-20%	S	S
Formic Acid* 20-50%	S	S
Formic Acid* 100%	S	S
Fructose Sat'd	S	S
Fruit Pulp	S	S
Fuel Oil	S	U
Furfural 100%	M	U
Furfuryl Alcohol	M	U
Gallic Acid* Sat'd	S	S
Gasolene	M	U
Gin	S	U
Glucose	S	S
Glycerine*	S	S
Glycol*	S	S
Glycolic Acid* 30%	S	S
Grape Sugar Sat'd Aq.	S	S
Hexanol, Tert.*	S	S
Hydrobromic Acid 50%	S	S
Hydrocyanic Acid Sat'd	S	S
Hydrochloric Acid 10%	S	S
Hydrochloric Acid 30%	S	S
Hydrochloric Acid 35%	S	S
Hydrochloric Acid Conc.	S	S
Hydrofluoric Acid 40%	S	S
Hydrofluoric Acid 60%	S	S
Hydrofluoric Acid 75%	S	S
Hydrogen 100%	S	S
Hydrogen Bromide 10%	S	S
Hydrogen Chloride Gas Dry	S	S
Hydrogen Peroxide 30%	S	S
Hydrogen Peroxide 90%	S	M
Hydrogen Phosphide 100%	S	S
Hydroquinone	S	S
Hydrogen Sulfide	S	S
Hypochlorus Acid Conc.	S	S
Inks*	S	S
Iodine (alc. Sol.) Conc.	S	U
Lactic Acid* 10%	S	S
Lactic Acid* 90%	S	S
Latex*	S	S
Lead Acetate Sat'd	S	S
Lube Oil	S	M
Magnesium Carbonate Sat'd	S	S
Magnesium Chloride Sat'd	S	S
Magnesium Hydroxide Sat'd	S	S
Magnesium Nitrate Sat'd	S	S
Megnesium Sulphate Sat'd	S	S
Mercuric Chloride Sat'd	S	S

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Reagent	High Density Polyolefins	
	70°F (21°C)	140°F (60°C)
Mercuric Cyanide Sat'd	S	S
Mercurous Nitrate Sat'd	S	S
Mercury	S	S
Methyl Alcohol* 100%	S	S
Methyl Bromide	M	U
Methyl Chloride	M	U
Methyl Ethyl Ketone 100%	M	U
Methylsulfuric Acid*	S	S
Methylene Chloride 100%	M	U
Milk	S	S
Mineral Oils	S	U
Molasses Comm.	S	S
Nickel Chloride Sat'd	S	S
Nickel Nitrate Conc.	S	S
Nickel Sulfate Sat'd	S	S
Nicotine* Dilute	S	S
Nicotinic Acid*	S	S
Nitric Acid 0-30%	S	S
Nitric Acid 30-50%	S	M
Nitric Acid 70%	S	M
Nitric Acid 95-98%	U	U
Nitrobenzene 100%	U	U
Octyl Cresol	S	U
Oils and Fats	S	U
Oleic Acid Conc.	S	U
Oleum Conc.	U	U
Orange Extract	S	S
Oxalic Acid* Dilute	S	S
Oxalic Acid* Sat'd	S	S
Ozone 100%	S	U
Perchloric Acid 10%	S	S
Petroleum Ether	U	U
Phenol 90%	U	U
Phosphoric Acid up to 30%	S	S
Phosphoric Acid Over 30%	S	S
Phosphoric Acid 90%	S	S
Phosphorous (Yellow) 100%	S	N
Phosphorus Pentoxide 100%	S	N
Photographic Solutions	S	S
Pickling Baths		
Sulfuric Acid*	S	S
Hydrochloric Acid*	S	S
Sulfuric-Nitric*	S	U
Plating Solutions		
Brass*	S	S
Cadmium*	S	S
Chromium*	N	N
Copper*	S	S
Gold*	S	S
Indium*	S	S

Chemical Resistance of Schulink XL350S-01G Rotational Molded Cross-linked High Density Polyethylene

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Reagent	High Density Polyolefins	
	70°F (21°C)	140°F (60°C)
Lead*	S	S
Nickel*	S	S
Rhodium*	S	S
Silver*	S	S
Tin*	S	S
Zinc*	S	S
Potassium Bicarbonate Sat'd	S	S
Potassium Borate 1%	S	S
Potassium Bromate 10%	S	S
Potassium Bromide Sat'd	S	S
Potassium Carbonate	S	S
Potassium Chlorate Sat'd	S	S
Potassium Chloride Sat'd	S	S
Potassium Chromate 40%	S	S
Potassium Cyanide Sat'd	S	S
Potassium Dichromate 40%	S	S
Potassium Ferri/Ferro Cyanide Sat'd	S	S
Potassium Fluoride	S	S
Potassium Hydroxide 20%	S	S
Potassium Hydroxide Conc.	S	S
Potassium Nitrate Sat'd	S	S
Potassium Perborate Sat'd	S	S
Potassium Perchlorate 10%	S	S
Potassium Sulfate Conc.	S	S
Potassium Sulfide Conc.	S	S
Potassium Sulfite Conc.	S	S
Potassium Persulphate Sat'd	S	S
Propargyl Alcohol*	S	S
Propyl Alcohol*	S	S
Propylene Dichloride 100%	U	U
Propylene Glycol*	S	S
Rayon Coagulating Bath*	S	S
Sea Water	S	S
Selenic Acid	S	S
Shortening*	S	S
Silicic Acid	S	S
Silver Nitrate Sol.	S	S
Soap Solution* Any Conc'n	S	S
Soldium Acetate Sat'd	S	S
Sodium Benzoate 35%	S	S
Sodium Bicarbonate Sat'd	S	S
Sodium Bisulfate Sat'd	S	S
Sodium Bisulfite Sat'd	S	S
Sodium Borate	S	S
Sodium Bromide Dilute Sol.	S	S
Sodium Carbonate Conc.	S	S
Sodium Carbonate	S	S
Sodium Chlorate Sat'd	S	S
Sodiujm Chloride Sat'd	S	S
Sodium Cyanide	S	S

Chemical Resistance of Schulink XL350S-01G Rotational Molded Cross-linked High Density Polyethylene

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Reagent	High Density Polyolefins	
	70°F (21°C)	140°F (60°C)
Sodium Dichromate Sat'd	S	S
Sodium Ferricyanide	S	S
Sodium Ferrocyanide	S	S
Sodium Fluoride Sat'd	S	S
Sodium Hydroxide Conc.	S	S
Sodium Hypochlorite	S	S
Sodium Nitrate	S	S
Sodium Sulfate	S	S
Sodium Sulfide 25%	S	S
Sodium Sulfide Sat'd Sol.	S	S
Sodium Sulfite Sat'd	S	S
Stannous Chloride Sat'd Sol.	S	S
Stannic Chloride Sat'd	S	S
Starch Solution* Sat'd	S	S
Stearic Acid* 100%	S	S
Sulfuric Acid 0-50%	S	S
Sulfuric Acid 70%	S	M
Sulfuric Acid 80%	S	U
Sulfuric Acid 96%	M	U
Sulfuric Acid 98%	M	U
Sulfuric Acid, Fuming	U	U
Sulfurous Acid	S	S
Tallow	S	M
Tannic Acid* 10%	S	S
Tanning Extracts* Comm.	S	S
Tartaric Acid Sat'd	N	N
Tetrahydrofurane	N	U
Titanium Tetrachloride Sat'd	N	U
Toluene	M	U
Transformer Oil	S	M
Trisodium Phosphate Sat'd	S	S
Trichloroethylene	U	U
Urea* Up to 30%	S	S
Urine	S	S
Vinegar Comm.	S	S
Vanilla Extract*	S	S
Wetting Agents*	S	S
Whiskey*	S	N
Wines	S	S
Xylene	M	U
Yeast	S	S
Zinc Chloride Sat'd	S	S
Zinc Sulfate Sat'd	S	S

Attachment 6.2
Radlok® Manway Assembly Closure and Sealing
(Page 1 of 2)

1. Manway Seal Installation

Note: Radloks® may be shipped with the manway lid completely installed and a security seal on the container. In these cases, removal and inspection of the manway and manway seals is not required or recommended.

Refer to the appropriate Radlok® user drawing for additional information.

1.1 Examine both seals for signs of significant gouges, splits, cracks, or brittleness that could affect the sealing integrity. Replace damaged seals.

1.2 Clean the seal seating surfaces on the container body and on the manway seal before installing the seals or filling the container.

Caution: When applying adhesive to a seal, care must be taken to avoid using excessive adhesive which could extrude out around the edges of the seal. Only enough adhesive to temporarily hold the seal in place is needed.

1.3 Follow Step 1.3.1 for Radlok®-55, Radlok®-200, Radlok®-500, and Radlok®-100; Step 1.3.2 for Radlok®-179 and Radlok®-195.

1.3.1 Apply silicone rubber adhesive on one side of the flat seal and place the seal on the manway seal plate seating surface, adhesive side down. A liquid adhesive such as 3M Scotch-Weld CA-40 Cyanoacrylate Adhesive may also be used. Ensure that the seal is seated at all points and in complete contact with the seating surface.

1.3.2 Apply silicone rubber adhesive on one side of the large square seal and place the seal on the underside of the manway seal plate seating surface, adhesive side down. A liquid adhesive such as 3M Scotch-Weld CA-40 Cyanoacrylate Adhesive may also be used. Ensure that the seal is seated at all points and in complete contact with the seating surface.

1.4 Slide the large vertical seal over the manway seal plate seating surface. This is the smaller diameter portion of the vertical sealing surface. Use a limited amount of adhesive, as in Step 1.3, to temporarily hold the large vertical seal in place if required.

Note: Caution must be exercised to ensure that any lubricant used does not contain any of the unsatisfactory or marginal chemicals listed in Attachment 6.1. Acceptable lubricants include Vaseline and other petroleum jelly products.

1.5 Apply a liberal coating of lubricant grease (approximately 2 ounces) to the exposed surfaces of the flat or large square seal and the large vertical seal. As an option, silicone spray lubricant can be used in place of the lubricant grease. The silicone spray should be applied in sufficient quantity to thoroughly wet the surface.

1.6 Check the seal seating surfaces on the container again to ensure that they are clean, then carefully place the manway seal inside the manway opening (small diameter face first) making sure not to disturb either seal.

Radlok® Manway Assembly Closure and Sealing

(Page 2 of 2)

2. Manway Lid Installation

2.1 Apply a liberal coating of lubricant grease or silicone spray, as detailed in Step 1.5, to the manway threads on the container or the threads on the manway lid.

2.2 Carefully place the manway lid over the opening, making sure that the manway seal is not disturbed in the process.

2.3 Screw down the manway lid by hand until a high degree of resistance is encountered.

Note: The maximum gap measurement shall not exceed ¾" for the Radlok®-200, Radlok®-500, and Radlok®-100 containers and ½" for the Radlok®-179 and Radlok®-195 containers. The Radlok®- 55 lid shall be flush with the top of the body lip.

2.4 Screw the manway lid down firmly using a manway lid torque tool until the gap between the container dome and the bottom of the manway lid approaches the measurement noted on the container dome. Using gauge blocks or other measuring devices, check the gap between the lid bottom and the container dome. The gap measurement should be made where the mark on the container dome and the mark on the manway lid are aligned with each other. If, after aligning the marks, the gap is not met, continue to torque the lid until the correct gap is achieved when measured at the reference mark on the container dome.

Note: Securing the manway lid need not be performed on containers to be shipped in Type A or Type B casks, or on containers to be shipped as strong-tight packages.

2.5 When the manway lid is properly screwed down, the manway lid may be secured with a security wire between the manway lid and the container lift lug. As an option for the Radlok®-179 and Radlok®-195 containers, the security wire may be secured between the manway lid and a ½" diameter washer tack welded in a flat position to the top of the lift ring. The washer is located so that the hole in the washer is located to the inside of the lift ring and is within 6" from a lifting lug.

Attachment 6.3
Radlok® Fill Port Assembly Closure and Sealing
(Page 1 of 2)

1. Safety Precautions

   1.1 Caution must be exercised to ensure that any lubricant used does not contain any of the chemicals listed in Attachment 6.1. Acceptable lubricants include Silicone, Vaseline, and other petroleum jelly products.

2. Compression Plug Preparation

   Notes: Refer to the appropriate Radlok® user drawing for additional information.

   Complete Section 2.1 for Radlok®-55, Radlok®-200, Radlok®-500, and Radlok®-100.

   Complete Section 2.2 for Radlok®-179 and Radlok®-195.

   2.1 Compression Plug Preparation for Radlok®-55, Radlok®-200, Radlok®-500, and Radlok®-100

      2.1.1 Examine the O-ring seal and small vertical seal for signs of significant gouges, splits, cracks, or brittleness that could affect the sealing integrity. Replace damaged seals.

      2.1.2 Clean the O-ring and vertical seal seats on compression plug and remove all foreign matter before installing the seals or filling the container.

      Caution: When applying adhesive to a seal seat, care must be taken to avoid using excessive adhesive which could extrude out around the edges of the seal. Only enough adhesive to temporarily hold the seal in place is needed.

      2.1.3 Apply silicone rubber adhesive on the O-ring seal seat on compression plug. Place O-ring seal in seat area. A liquid adhesive such as 3M Scotch-Weld CA-40 Cyanoacrylate Adhesive may also be used.

      2.1.4 Place vertical seal in its respective seat area.

   2.2. Compression Plug Preparation for Radlok®-179 and Radlok®-195

      2.2.1 Examine the O-ring seal and small vertical seal for signs of significant gouges, splits, cracks, or brittleness that could affect the sealing integrity. Replace damaged seals.

      2.2.2 Clean square seal and vertical seal seats on compression plug and remove all foreign matter.

      Caution: When applying adhesive to a seal seat, care must be taken to avoid using excessive adhesive which could extrude out around the edges of the seal. Only enough adhesive to temporarily hold the seal in place is needed.

Radlok® Fill Port Assembly Closure and Sealing
(Page 2 of 2)

2.2.3 Apply silicone rubber adhesive on square seal seat on compression plug. Place square seal on seal area. A liquid adhesive such as 3M Scotch-Weld CA-40 Cyanoacrylate Adhesive may also be used.

2.2.4 Place vertical seal in its respective seat are

3. Closure of Radlok® HIC Fill Port Closure Assembly

3.1 In sealing the container, the following steps are to be taken after the container is filled.

Note: As an option, silicone spray lubricant can be substituted for the lubricant grease used in Steps 3.2 and 3.3. The silicone spray should be applied in sufficient quantity to thoroughly wet the surfaces of the seals and lid threads.

3.2 Apply a liberal coating of lubricant grease on exposed surfaces of the seals.

3.3 Apply a liberal coating of lubricant grease to threads on the fill port lid.

3.4 Clean seal seating surfaces in fill port opening of the Radlok® container and remove all foreign materials.

Caution: Use as low as reasonably achievable (ALARA) when cleaning the seating surfaces and when placing the fill port closure assembly into fill port opening due to the possibility of high radiation levels in this area.

Note: On large Radloks® fitted with fill plates, orient compression plug so that the vent filter does not interfere with any of fill plate attachments.

3.5 Place fill port closure assembly into fill port opening.

3.6 Screw fill port lid into container to a minimum of 150 ft-lbs of torque.

Note: This torque can be readily applied by one person using an Energy*Solutions* fill port torquing tool. Torque may be verified by: (1) Applying a calibrated torque wrench to the torquing tool, or (2) Using the torque tool, verify fill port lid is tight and that the match marks on the fill port lid and manway lid match. The marks were applied at the manufacturer where the lid was torqued via calibrated torque wrench. This second method is recommended in most cases to keep personnel exposure ALARA.

Secure the fill port lid with a security wire between one ear of the fill port lid and top perimeter of the manway lid.

Note: Securing the fill port lid need not be performed on containers to be shipped in Type A or Type B casks, or on containers to be shipped as strong-tight packages.

Attachment 6.4

NUHIC Closure and Sealing

(Page 1 of 3)

The purpose of this attachment is to define the steps necessary to properly seal the NUHIC line of polyethylene high integrity containers (HICs) manufactured by Energy*Solutions*.

1. This guide is applicable for the following lid configurations:
   - 1.1 NUHIC-55 with RTV Silicone Rubber Sealant (RTV); Viton O-ring Seal (O-ring); or Cross-linked, Closed Cell, Polyethylene Foam Gasket (gasket);
   - 1.2 NUHIC-80B, -90, -136, -158 raised lid with RTV or gasket;
   - 1.3 NUHIC-80B, -90, -120, -136, -158, -205 recessed lid with gasket.
2. Precautions
   - 2.1 There are several different types of lids and sealing methods for NUHIC containers. Please verify which lid was supplied with the NUHIC container and which sealing method will be used prior to sealing.
   - 2.2 Verify that the shelf life for the RTV sealant has not expired.
   - 2.3 Verify that the gasket or O-ring is not damaged.
   - 2.4 Ensure the lid is not cocked during installation or cross threading may occur.
3. Prerequisites
   - 3.1 Verify that the HIC and lid have corresponding serial numbers.
4. Equipment Requirements
   - 4.1 Appropriate HIC lid installation tool
   - 4.2 Appropriate sealing kit:
     - 4.2.1 RTV – Dow Corning Silastic 732 RTV, General Electric GE RTV-103, or General Electric GE RTV-106; recommended sealant color is black to assure good visibility;
     - 4.2.2 O-ring provided by Energy*Solutions* (see Section 1.0); or
     - 4.2.3 Gasket provided by Energy*Solutions* (see Section 1.0) and Loctite Black Max 380 or equivalent (if needed).
5. Lid Sealing Steps
   - 5.1 Inspection
     - 5.1.1 All HIC lid openings and lids shall be inspected for debris, dirt, and damage prior to placing the lid into the opening for final closure. This inspection shall include all threaded areas and sealing surfaces. This inspection shall also include the gasket or O-ring, if applicable.
     - 5.1.2 If any damage is noted, contact Energy*Solutions* QA.
   - 5.2 Lid Installation
     - 5.2.1 NUHIC-55 Lid and NUHIC-80B, -90, -120, -136, and -158 Raised Lid with RTV Sealant

NUHIC Closure and Sealing
(Page 2 of 3)

5.2.1.1 Assure that the shelf life shown on the RTV container has not expired.

Caution: RTV will begin to cure within fifteen (15) minutes of initial application. Ensure that all components are ready for sealing before proceeding.

5.2.1.2 Apply a liberal amount of RTV to the flange and threaded portion of the lid. Work the RTV deep into the threads with sufficient excess to extrude outward and provide visible evidence when the lid is properly sealed.

5.2.1.3 Place the lid in the lid opening of the HIC and using the appropriate lid tool, rotate the lid in a counterclockwise direction until it drops down to engage the lead thread with the HIC thread.

5.2.1.4 After engaging the lid thread with the HIC thread, rotate the lid clockwise approximately one rotation until the lid flange contacts the HIC sealing surface.

5.2.1.5 If the lid flange cannot make contact with the HIC sealing surface, the gap between the lid flange and HIC sealing surface must be < ½".

5.2.1.6 Allow the RTV to cure in accordance with the manufacturer's recommendations.

5.2.2 NUHIC-55 Lid with O-Ring

5.2.2.1 Prior to installation of the O-ring, verify the lid flange sealing surface and the HIC sealing surface is clean and undamaged. If damage is noted, contact Energy*Solutions* QA for a resolution.

5.2.2.2 Inspect the O-ring for damage and verify the shelf life for the O-ring has not expired. If damage is noted or the shelf life has expired, contact Energy*Solutions* for a resolution.

5.2.2.3 Install O-ring on lid. Ensure the O-ring does not roll during installation.

5.2.2.4 Place the lid in the HIC lid opening and rotate the lid counterclockwise until it drops down to engage the lead thread with the HIC thread.

5.2.2.5 After engaging the lid thread with the HIC thread, rotate the lid clockwise until the O-ring engages the HIC sealing surface. Continue the clockwise rotation until the O-ring has been compressed approximately ⅛" to ¼" and the lid is tight.

5.2.2.6 Measure the gap between the lid flange and the HIC sealing surface. The gap between the lid flange and HIC sealing surface must be ½" or less in order to ensure the HIC is properly sealed.

5.2.3 NUHIC-55 Lid with Gasket

Note: If necessary, the gasket may be adhered to the HIC lid sealing surface with a minimal amount of adhesive (see Step 4.2.3) prior to placing the lid on the container.

NUHIC Closure and Sealing

(Page 3 of 3)

5.2.3.1 Installation method if sealing marks are visible:

5.2.3.1.1 Place the gasket over the HIC sealing surface.

5.2.3.1.2 Place the lid in the opening and rotate the lid counterclockwise until it drops down to engage the lead thread with the lead thread of the HIC.

5.2.3.1.3 After the lid is engaged, rotate the lid clockwise approximately one rotation until the lid seal mark is aligned with or has gone past the HIC seal mark.

5.2.3.2 Installation method if sealing marks are not visible:

5.2.3.2.1 Place the gasket over the HIC sealing surface.

5.2.3.2.2 Place the lid in the opening and rotate the lid counterclockwise until it drops down to engage the lead thread with the lead thread of the HIC.

5.2.3.2.3 After the lid is engaged, rotate the lid clockwise until the gap between the lid sealing flange and HIC sealing surface is $< {}^{3}/_{16}$". This $^{3}/_{16}$" gap assures that the gasket is compressed a minimum of 50%.

5.2.4 NUHIC-80B, -90, -120, -136, -158, and -205 Raised or Recessed Lid with Gasket

5.2.4.1 Ensure that the gasket is properly adhered to the sealing flange of the lid using a minimal amount of adhesive, as specified in Step 4.2.3.

5.2.4.2 Place the lid in the opening and rotate the lid counterclockwise until it drops down to engage the lead thread with the container thread.

5.2.4.3 After engaging the lid thread with the container thread, rotate the lid clockwise approximately one (1) rotation until the lid seal mark is aligned with or has gone past the container seal mark.

Attachment 6.5

Envirolene HIC Closure and Sealing

The purpose of this attachment is to define the steps necessary to properly seal the Envirolene line of polyethylene high integrity containers (HICs) manufactured by Energy*Solutions*.

1. This guide is applicable for all Envirolene HIC'S.
2. Precautions
   - 2.1 Verify that the shelf life for the RTV sealant has not expired.
   - 2.2 Verify that the gasket is not damaged.
   - 2.3 Ensure the lid is not cocked during installation or cross threading may occur.
3. Prerequisites
   - 3.1 Verify that the HIC and lid have corresponding serial numbers.
4. Equipment Requirements
   - 4.1 Appropriate HIC lid installation tool
   - 4.2 Appropriate sealing kit:
     - 4.2.1 RTV – Dow Corning Silastic 732 RTV, General Electric GE RTV-103, or General Electric GE RTV-106; recommended sealant color is black to assure good visibility;
     - 4.2.2 Gasket (provided by Energy*Solutions*)
5. Lid Sealing Steps
   - 5.1 Inspection
     - 5.1.1 All HIC lid openings and lids shall be inspected for debris, dirt, and damage prior to placing the lid into the opening for final closure. This inspection shall include all threaded areas and sealing surfaces. This inspection shall also include the gasket.
     - 5.1.2 If any damage is noted, contact Energy*Solutions* QA for a resolution.
   - 5.2 Lid Installation
     - 5.2.1 Ensure that the shelf life shown on the RTV container has not expired.

       Caution: RTV will begin to cure within fifteen (15) minutes of initial application. Ensure that all components are ready for sealing before proceeding.
     - 5.2.2 Apply a liberal amount of RTV to the underside of the container seal plate.
     - 5.2.3 Place the gasket on the fillplate ensuring sealant coverage of the gasket.
     - 5.2.4 Place the fill plate in the HIC opening (gasket down towards HIC sealing surface)
     - 5.2.5 Attach the HIC lid tool to the lid via the self tapping bolts.
     - 5.2.6 Place the HIC Lid on the HIC opening
     - 5.2.7 Rotate the lid in a counterclockwise direction until it drops down to engage the lead thread with the HIC thread.
     - 5.2.8 After engaging the lid thread with the HIC thread, rotate the lid clockwise to achieve a minimum torque of 50 ft-lbs.
     - 5.2.9 Allow the RTV to cure in accordance with the manufacturer's recommendations.

ATTACHMENT 6.6

HIC User's Checklist

(Page 1 of 3)

HIC ID No. _____ Initial: _____

Lid ID No. _____ Initial: _____

Date Received: _____ Initial: _____

Ultraviolet Radiation Exposure

From (Time)	To (Time)	Location	Initials	Date

Shipping

Step	Requirement	Acceptance	Initial	Date
5.4.2	Inspected for cleanness	☐ Yes ☐ No		
5.4.3	Lid Installed	☐ Yes ☐ No		
5.4.4	Strapped to Pallet	☐ Yes ☐ No		
5.4.4.1	Clearance for Forklift Tines	☐ Yes ☐ No		
5.4.4.2	Uniform Support for HIC	☐ Yes ☐ No		
5.4.4.4	Assembled with Screws (if wooden pallet)	☐ Yes ☐ No		
5.4.4.5	Inspect Pallet for Damaging Objects	☐ Yes ☐ No		
5.4.4.6	Polyester (or Carbon Steel) Strapping	☐ Yes ☐ No		
5.4.5	Stretch Wrap or Black Plastic Wrap	☐ Yes ☐ No		
5.4.6, 5.4.7	Closed Carrier or Waterproof Tarpaulin	☐ Yes ☐ No		

Receiving

Step	Requirement	Acceptance	Initial	Date
5.5.1	Certification Package	☐ Yes ☐ No		
5.5.3	No Shipping Damage	☐ Yes ☐ No		
5.5.5	Lid Fit Test	☐ Yes ☐ No		

HIC User's Checklist

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Storage

Step	Requirement	Acceptance	Initial	Date
5.3.1	Storage Protected from the Elements and Below 170°F (NUHIC - 180°F)	☐ Yes ☐ No		
5.6.1	Protected from Ultraviolet Exposure	☐ Yes ☐ No		
5.6.5	Stored Upright with Lid Hand Tight	☐ Yes ☐ No		
5.6.5	Storage Surface Acceptable, with no exposure to corrosives or solvents	☐ Yes ☐ No		
5.6.6	No Exposure to Adverse Chemicals	☐ Yes ☐ No		
5.6.7, 5.6.8	Stacking, as outlined	☐ Yes ☐ No		

Handling

Step	Requirement	Acceptance	Initial	Date
5.7	Transporting with Forklift	☐ Yes ☐ No		
5.7	Lifting and Tie Down Material	☐ Yes ☐ No		
5.7.8	HIC Transferred Date:_____ Time:_____ Location:_____			

Prior to Use

Step	Requirement	Acceptance	Initial	Date
5.12.3	Certification Package	☐ Yes ☐ No		
5.12.4	No Shipping Damage	☐ Yes ☐ No		
5.6.1	Storage Protected from the Elements and Prescribed Thermal Limits	☐ Yes ☐ No		
5.6.1	Protected from Ultraviolet Exposure	☐ Yes ☐ No		
5.12.1	No Exposure to Adverse Chemicals	☐ Yes ☐ No		
5.6.7, 5.6.8	Stacking, as outlined	☐ Yes ☐ No		
5.7	Lifting and Tie Down Material	☐ Yes ☐ No		
	HIC Transferred Date:_____ Time:_____ Location:_____			

HIC User's Checklist

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Use

Step	Requirement	Acceptance	Initial	Date
5.12.1	C of C Limitations	☐ Yes ☐ No		
5.12.4	Foreign Material/Physical Damage/Lifting Device	☐ Yes ☐ No		
5.12.5	Approved Radwaste Procedures	☐ Yes ☐ No		
5.12.6	No Compression of the HIC by Fill Chute	☐ Yes ☐ No		
5.12.7	Contents below Thread Area	☐ Yes ☐ No		
5.12.8	HIC Temperature Maintained Below Limits	☐ Yes ☐ No		
5.12.9	Vibration Equipment	☐ Yes ☐ No		
5.12.10	Lid Installation and HIC Sealing	☐ Yes ☐ No		
5.12.11	Decontamination of Exterior	☐ Yes ☐ No		

Comments_____

Attachment 6.7

Certification Statement for Disposal of Polyethylene High Integrity Containers

For the Polyethylene High Integrity Container (HIC) to be disposed of at the Barnwell, South Carolina, Low-Level Radioactive Waste Burial Facility and identified by serial numbers _____,

_____, hereby certifies that its use of HICs is in compliance with the following: (1) with the current applicable Certificate of Compliance issued by the South Carolina Department of Health and Environmental Control (DHEC), Bureau of Land and Waste Management, Division of Waste Management, Infectious and Radioactive Waste Management Section, DHEC-HIC-PL-_____, (2) the current sealing procedures as described in this procedure. The current revisions can be verified by contacting Energy*Solutions*, Document Control.

_____ _____
Signature Date

_____
Title

_____
Company

Attachment 6.8

Polyethylene High Integrity Container Certification Statement

_____(Company) hereby certifies that for each polyethylene High Integrity Container (HIC) purchased directly or indirectly from Energy*Solutions*, and for which disposal is proposed, attempted or completed at the Barnwell, South Carolina, Low-Level Radioactive Waste Burial Facility, or for which any use in connection with the collection, storage, processing or transportation of low-level radioactive waste is proposed, attempted or completed, it has read and will comply with the following: (1) the current applicable Certificate of Compliance issued by the South Carolina Department of Health and Environmental Control (DHEC), Bureau of Land and Waste Management, Division of Waste Management, Infectious and Radioactive Waste Management Section, DHEC-HIC-PL-_____; (2) the current sealing instructions as described in Energy*Solutions* procedure FO-OP-PR-001, "Shipping, Receiving, Handling, Usage, and Storage of NUHIC, Radlok, and Envirolene Polyethylene HICs", (3) the effective South Carolina Radioactive Materials License No. 097 (for current revision, contact CNS Barnwell Regulatory Affairs/Licensing). Company further certifies that it will not make any modifications or change in the HIC, materials, usage from the design, materials, and usage as described in the C of C without prior written approval from Energy*Solutions*. Company understands that the HIC purchased directly or indirectly from Energy*Solutions* will be maintained, stored, transported and used in accordance with the above requirements. When the HIC is disposed of at the Barnwell, South Carolina, Low-Level Radioactive Waste Burial Facility, Company will complete the Certification Statement for Disposal of Polyethylene High Integrity Containers (FO-OP-PR-001, Attachment 6.7) prior to such disposal.

_____ _____
Signature Date

_____
Title

_____
Company