

Best Practices Guidelines:

Bladder Tank Above Ground Temporary Fuel Storage Systems – Arctic Regions

Arctic King Fuel Tanks meet the Environment Canada TECHNICAL REQUIREMENTS FOR COLLAPSIBLE FABRIC STORAGE TANKS (BLADDERS) - December 17, 2009

1. Fuel Bladders

- a. The fuel bladder should be manufactured from a polymer fabric that consists of substrate (scrim) and topcoat (polyester) or (polyether) based polyurethane. The top coating must be compatible with the fuel being stored and the climate at the installation site. The substrate (scrim) is typically polyester or nylon woven base material.
- b. Material shall be suitable for environmental conditions found in Arctic operations:
 - i. Fabric should have strength characteristics equal to or exceed Mil-T-52983E.
 - ii. Fabric should have double off-set urethane coating facing the fuel.
 - iii. Fabric shall have passed low temperature bend per ASTM D-2136.
- c. All seams shall be radio frequency (RF) welded, complete with top and bottom cap strips, and body panels should be segregated. The welded seam strength shall be equal to or greater than the base material strength.
- d. Exposed substrate along top and bottom cap strips should be sealed inside and outside of the bladder.
- e. Tank capacity should be engineered to ensure the tank dimensions are correct for the intended volume with min 5% over capacity for volume expansion due to temperature changes. Static loading on base fabric and seams shall be less than one fifth the tensile strength of the base fabric.
- f. Corners should be designed according to acceptable engineering practices. Square corners should be protected from abrasion.
- g. Tanks shall be leak-tested at place of manufacturing and certified by the manufacturer to be free from leaks. Furthermore, tanks should include a vent and any interconnecting piping shall be pressure tested for leaks.
- h. Tanks shall include test strips for nine years of annual integrity testing.
- i. The bladders shall include design criteria and drawings that are stamped by a professional engineer.
- j. Bladders are designed for static storage only.
- k. Bladders should not exceed 125,000 litres in capacity.




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2. Secondary Containment Above Ground Berms

- a. Secondary containment above ground berms should be constructed from a material impervious to petroleum products and be suitable for the environment they are being used in.
- b. Above ground berm wall supports should be made from aluminum metal and be able to hold the entire berm while full of liquid.
- c. Metal frame-supported above ground berms with single or double horizontal wall supports and vertical wall supports at every 5' (1.5 m) intervals should be used for bladder tanks.
- d. Each above ground berm should be engineered specifically for the supplied fuel bladder or installation to ensure the berm is able to accommodate 110% of the maximum bladder volume in the event of spillage including catastrophic failure.
- e. Above ground berms to be used with fuel bladder storage tanks should be supplied with stamped professional engineered drawings and engineering approval check list.
- f. Above ground berms should include corner drains with plugs installed in four corners of the berm.
- g. Above ground berm fabric should be fire resistant to ULC ORD C58.9.



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3. Secondary Containment Berm Liners

- a. Secondary containment berm liners should be constructed as per ULC-ORD-C58.9-1997.
- b. The material shall be impervious to petroleum products and be suitable for the environment they are being used in.
- c. 6” (15 cm) of clean sand should be placed on top of the berm liner.
- d. Each berm liner should be engineered specifically for the supplied fuel bladder or installation to ensure the berm is able to accommodate 110% of the maximum bladder volume in the event of spillage including catastrophic failure.
- e. Each berm liner should include a sump to collect rain water/snow melt and include a provision for an oil/water separator.
 - i. **Note:** Decommissioning of secondary containment berm liner systems must include on/off site soil reclamation that should be specified by a soil scientist. Consult local regulations for further information.

4. Oil/Water Separator

- a. An oil water separator shall be used to treat precipitation collected in the bermed secondary containment prior to discharge.
- b. The oil water separator must be designed to produce a discharge of water that will not contain more than 15 mg/L of free oil and grease.
- c. The oil/water separator must be designed to withstand freezing of liquid inside the system.



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5. Installation

- a. All fuel bladders should be installed as a system that includes a secondary containment system, as listed above, with an oil/water separator
- b. Systems should be installed on level ground.
- c. The installation of fuel bladder systems should be under the direction of a trained field service representative. Upon completion, as-built drawings and an installation report should be provided to the operator.
- d. The operator should be trained on the proper use and maintenance procedures for fuel bladder systems and shall be provided operator manuals.
- e. As per *Environment Canada Regulations* bladders shall be installed and maintained to have a minimum distance between the secondary containment and buildings based on the size of the secondary containment and construction or use of the building.

The distance between the secondary containment and buildings of ordinary or combustible construction having extensive window areas or associated combustible yard storage shall be two times the secondary containment diameter (if round) or diagonal (if not).

The distance between the secondary containment and buildings containing hazardous materials shall be two times the secondary containment diameter or diagonal. The distance between the secondary containment and buildings of unknown construction or varying or unknown storage and yard storage shall be two times the secondary containment diameter or diagonal.

The distance between the secondary containment and buildings of ordinary or combustible construction not having extensive window areas, hazardous materials storage or associated combustible yard storage shall be one times the secondary containment diameter or diagonal.

The distance between the secondary containment and buildings of fire-resistive or non-combustible construction not having extensive window areas, hazardous materials storage or associated combustible yard storage shall be .5 times the secondary containment diameter or diagonal.

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6. Maintenance and Inspection

- a. Regular monthly maintenance inspections shall be conducted for fuel bladders, secondary containment and oil/water separator systems and records should be kept.
- b. Fuel bladders are equipped with nine (9) integrity strips. A strip is cut from the bladder after the second year of use and annually after year two. The test strips are sent to the manufacturer where they are tested for integrity. Reports are returned to operators for inspection purposes. Wet date and fuel type should be recorded once the bladder is installed.
- c. Operators shall provide provisions for fuel inventory reconciliation at timed intervals.
- d. Operators should ensure that snow loads do not exceed manufacturer's specifications.
- e. Operators should keep the surface of the tank clean, removing any sand or dirt that has fallen on it.
- f. Operators should clean out dirt or sand and make sure the vent is working properly.
- g. Operators should ensure that secondary containment berms are drained of water. This can be accomplished by an oil/water separator.

7. Other

- a. A spill prevention plan should be developed for each site in accordance with local regulations.
- b. A spill kit should be provided at site.
- c. Fire suppression equipment should be provided at site.
- d. No smoking signs should be provided at site.
- e. Secondary containment should be placed around all fuel transfer areas and equipment.
- f. The site must be clearly marked and access restricted to trained personnel.
- g. Addition requirements should be reviewed with local regulation and legislation and must be adhered to.

8. Website

www.sei-ind.com

9. Comments

Please forward comments to:

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