

12 CUBIC FOOT DEMINERALIZER SPECIFICATION

- I. Demineralizer, disposable, pre-loaded pressure vessel:
 - A. Material: Carbon steel with Epoxy-coated liner.
 - B. Specifications: Designed and welded to ASME boiler Code Section VIII Division I, and bear a "U" stamp. Design pressure: 150 psig. Design temperature: 140 °F.
 - C. Quantity: Nine (9)
 - D. Size: Each demineralizer shall not exceed the dimensions of 24" diameter and 72" high (maximum height from bottom of pressure vessel pedestal to top of drip skirt) without additional written approval from Code 2380.8, Norfolk Naval Shipyard (NNSY). See attached drawing.
 - E. Usage: Disposal of Class "A" radioactive waste containing free liquid less than 0.5% by volume.
 - F. Requirements:
 - 1. Demineralizers shall include lifting lugs which meet specifications listed in Section II (Lifting Lug Specifications) below.
 - 2. Six (6) of the nine (9) demineralizers shall be loaded with 2 cu. ft. of HOH resin on the bottom to cover the retention elements, followed by 3 cu. ft. of activated charcoal, followed by 2 cu. ft. of HOH resin, followed by 3 cu. ft. of activated charcoal, and then followed by 2 cu. ft. of HOH resin.
 - 3. Three (3) of the nine (9) demineralizers shall be loaded with 5 cu. ft. of HOH resin on the bottom to cover the retention elements, followed by 2 cu. ft. of activated charcoal, and then followed by 5 cu. ft. of Purolite NRW5010 resin.
 - 4. For the nine (9) demineralizers, total quantity of HOH resin required is 51 cu. ft., total quantity of Purolite NRW5010 resin required is 15 cu. ft. and the total quantity of activated charcoal is 42 cu. ft. The resin media and activated charcoal shall be per the requirements of Paragraph G (Media Requirements) below.
 - 5. Inlet, outlet and vent connections to be 1" pipe, threaded 1" NPT schedule 40 with pipe caps. The inlet, outlet, and vent pipe stubs will at least be 5 inches from the top of the demineralizer to the top of the pipe stubs. The inlet pipe stub will be centered at the top of the demineralizer. Only top penetrations are allowed. See attached drawing.
 - 6. Size retention elements at a mesh of 200 or greater (74 micron or less openings).
 - 7. Vessel shall be capable of being de-watered to less than 0.5% by water volume using an air-driven double-diaphragm pump.

8. Vendor shall supply empty and loaded weight for each demineralizer and clearly mark weights on the side of the container with 1" or greater lettering.
9. Exposed surfaces of the demineralizer shall have a non-porous surface to provide for easy decontamination of all external exposed surfaces of the demineralizer. Wetted surfaces of carbon steel demineralizer vessels shall be coated with an epoxy like liner to prevent corrosion.
10. The demineralizer inlet distributor holes and outlet lateral holes shall be sized for a maximum flow of 25 gallons per minute.
11. Design maximum differential pressure drop of 5 psid at 25 gpm.
12. Install a 3/8" thick, 24" diameter carbon steel base plate on bottom of each demineralizer. See attached drawing.
13. Cleanliness level shall be Commercial grade. Demineralizer shall be free of grease, oil, flux and loose foreign material.
14. Demineralizers must have OSHA material safety warnings specified.
15. Demineralizer must be constructed to support the waste processing media as a fixed bed retained inside the demineralizer.
16. At least one copy of the vendors drawing shall be provided that specifies the manufacturing details of the demineralizer assembly, including all materials of construction prior to awarding contract for NNSY review and evaluation.

G. Media Requirements:

1. The mixed bed HOH resin (Class 3) and the Purolite NRW5010 resin shall conform to O-I-1279 (latest revision), FEDERAL SPECIFICATION ION EXCHANGE RESINS.
2. The activated charcoal (Class 1 or Class 2) shall conform to Military Specification MIL-C-24496 (latest revision), CHARCOAL, ACTIVATED, HIGH PURITY, or EQUIVALENT SPECIFICATION.

Acceptable equivalent Activated Charcoal (Class 1 or Class 2) shall meet the following criteria: PICA Chem W6 20x50 newly manufactured coconut shell based granular Activated Carbon, U.S. Sieve series 20x50 mesh, 0.6 average particle size. Apparent density (ASTM 2854) 30 lbs/ft³ average. Total ash content (ASTM 2866) 2% maximum. Carbon Tetrachloride Activity (ASTM 3467) 62% minimum. Ball hardness (ASTM 3802) 97 minimum. pH (ASTM 3838) 3.0 – 10.0. Iodine number (ASTM 4607) 1050 minimum. Surface area (B.E.T. Equation) 1100 – 1259 M²/G.

II. Lifting Lug Specifications:

A. Design Criteria:

1. The lifting lugs and attachment welds shall have a minimum safety factor of 10 to 1 based on the yield strength of the materials used in their construction.

B. Load Test Criteria:

1. The test load shall be applied in the same direction the container is lifted.
2. The load shall be a 150% +5%, -0% of the gross weight to be established for each lifting lug. Use 1,900 lbs as the gross weight of the pressure vessel (demineralizer).
3. The load test shall be held for a minimum of 10 minutes.
4. The load bearing member of the demineralizer shall meet the requirements of ANSI NI4.6-1993. (Only the 1993 revision is applicable. Note that this Spec has been withdrawn by ANSI.) This requires a drop weight test per ASTM E206 of a Charpy impact test per ASTM A370 as specified in paragraph 4.2.6 of ANSI NI4.6-1993. The Anticipated minimum service temperature for the lifting lugs is 20 degrees F. Therefore, the transition temperature shall be a minimum of -20 degrees F.

C. NDT Criteria: After load test, the lifting lugs, their attachment welds and the base metal within 1" of the weld area shall have non-destructive test (NDT) consisting of the following:

1. Magnetic Particle Test (MT) shall be per NAVSEA Technical Publication T9074-AS-GIB-010/271 (latest revision) with acceptance criteria to MIL-STD-2035 (latest revision), Class 3 for welds.
2. Padeyes and lugs shall be in good condition with no pits or irregularities and have a uniform weld and weld finish.

D. Approval:

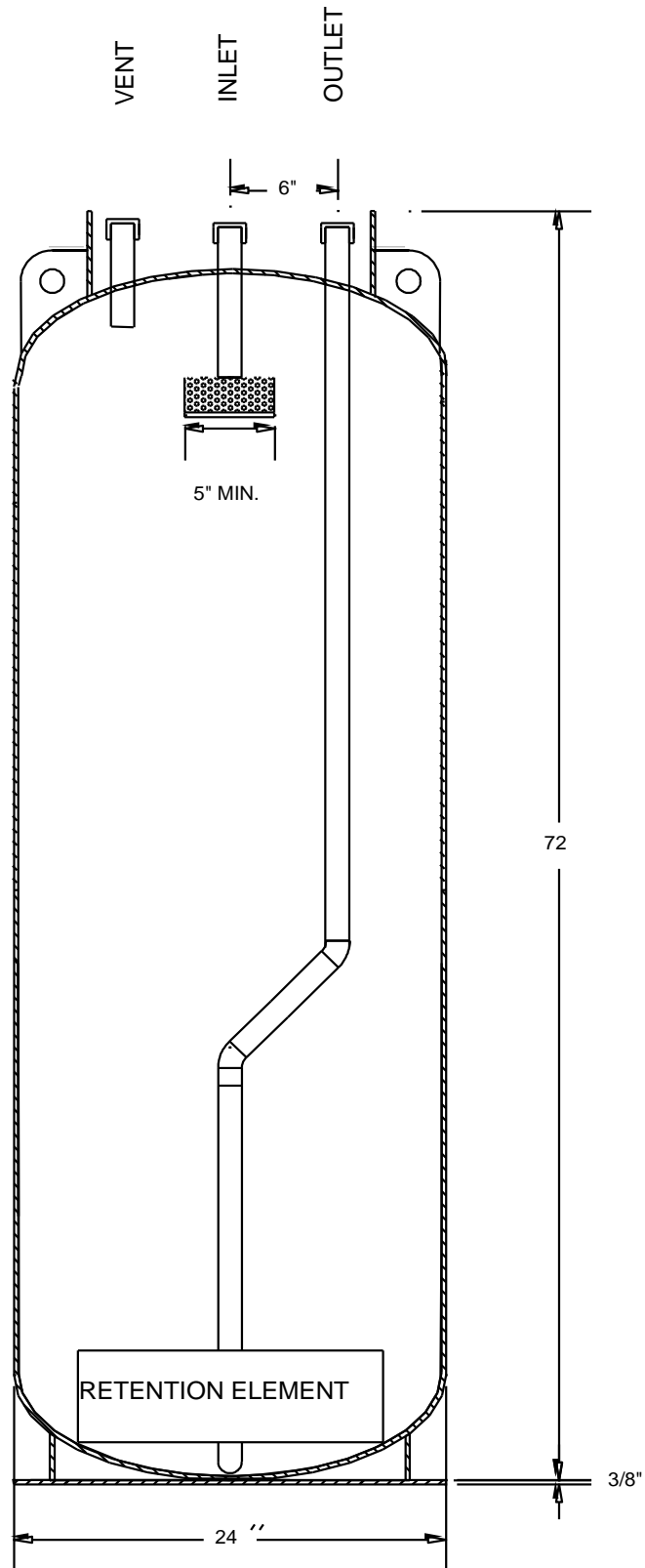
1. Vendor must provide padeye dimensions, material type and weld size for each demineralizer in accordance with Attachment (B).
2. A copy of all safety factor calculations for lifting lugs and attachment welds to ensure a minimum safety factor of 10 to 1 shall be provided in accordance with Attachment (B).
3. A copy of all load test certification papers must be provided for each padeye for each demineralizer in accordance with Attachment (B). Certification papers must include the demineralizer serial number.
4. A copy of all NDT reports must be provided for each padeye for each demineralizer in accordance with Attachment (B).
5. Certified records are required for each of the load bearing members listed in II.B.4 in accordance with Attachment (B).
6. Absence of the documents listed above shall be cause for rejection.

III. Hydrostatic Test Certification:

- A. A hydrostatic test shall be performed on each vessel to a minimum of 226 psig to verify the integrity of each demineralizer. Hydrostatic test pressure shall be held for a minimum of 30 minutes.
- B. Each demineralizer shall be blown down of free standing liquid after hydrostatic test and prior to shipment.
- C. Approval:
 - 1. A copy of hydrostatic test certification papers shall be provided for each demineralizer with the hydrostatic test pressure and documented proof of duration of test in accordance with Attachment (B).
 - 2. Absence of the documents listed above shall be cause for rejection.

DISPOSABLE DEMINERALIZER

Elevation View



DISPOSABLE DEMINERALIZER

Plan View

