

38 kHz ADCP Installation on RV/IB *Nathaniel B. Palmer*

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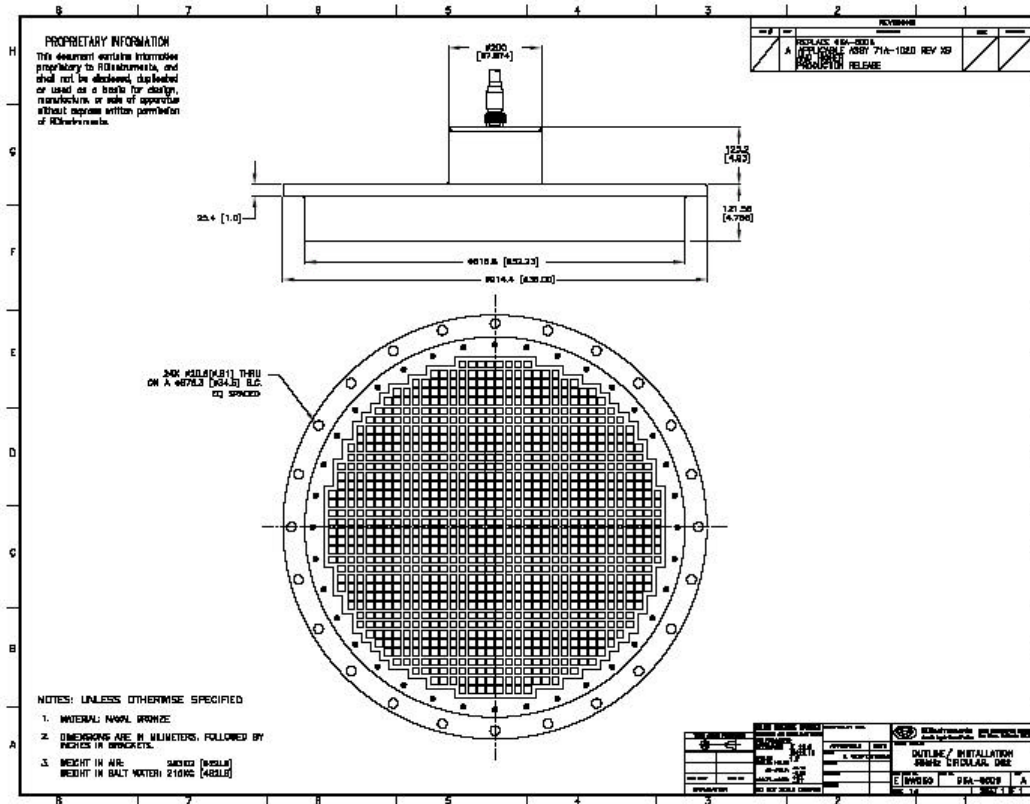
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RD Instruments 38 kHz Ocean Surveyor ADCP Transducer

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- Phased array transducer
- Weight: 622 lb
- Dia: approx 36"
- Height: approx 10"
- Note Beam 3 mark
- Transducer element face is recessed by 7 mm!
- Don't operate in air



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Zelux W Window Material

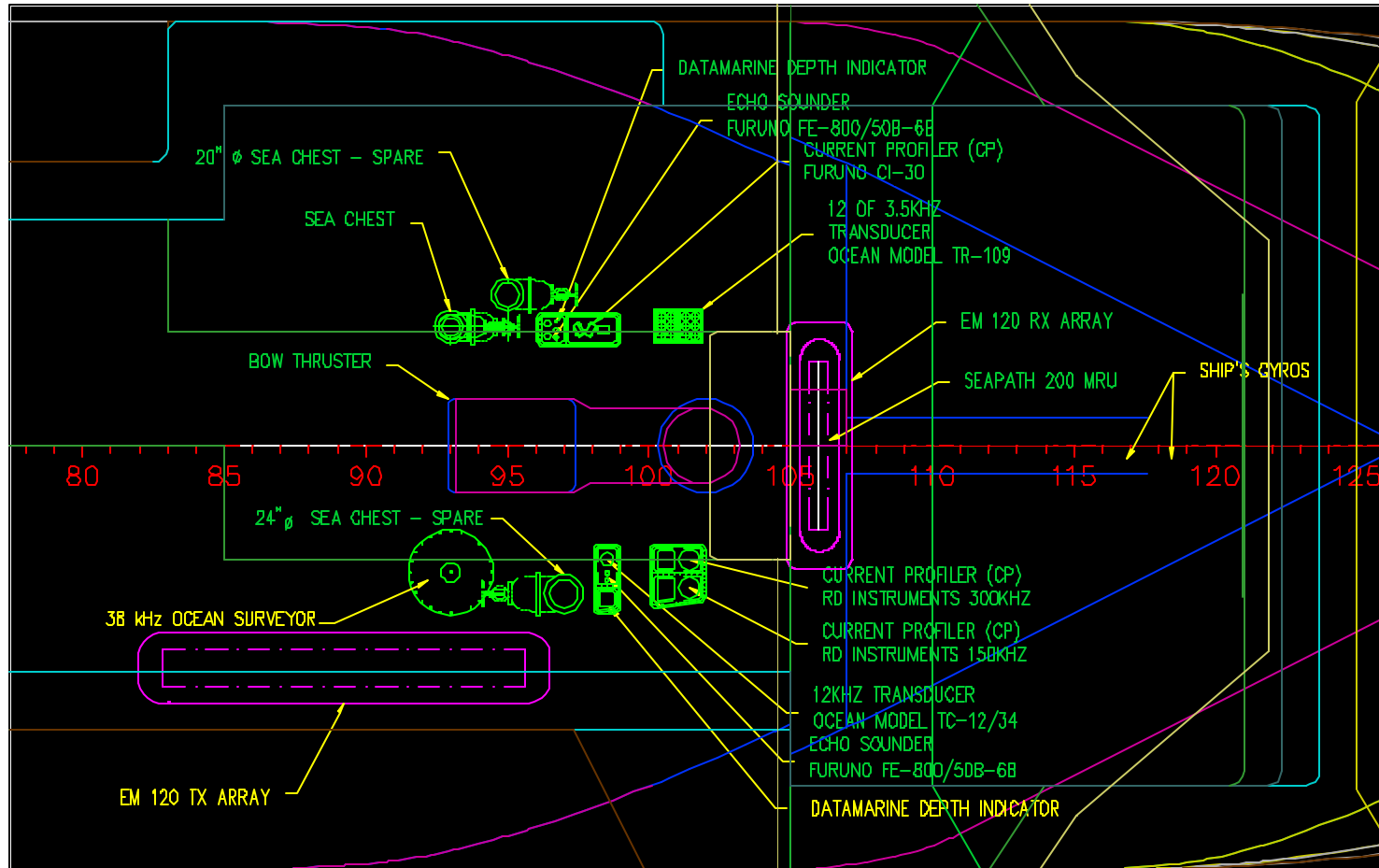


- ☞ Compression molded polycarbonate – “bulletproof glass” – Optically Clear
- ☞ Produced from many layers of material – pressed together under controlled temperature
- ☞ Chemical Resistance – test proposed chemicals prior to use. Acetone – instant destruction
 - ☞ Loctite and Ethylene Glycol – some crazing
- ☞ Machining must be conducted dry – **No oil allowed**
- ☞ Machines well – lathe turning operations preferred
- ☞ Tensile strength: 9000 psi @ break
- ☞ Specific gravity: 1.20
- ☞ Coefficient of Thermal Expansion: 3.8×10^{-5} in/in-°F
- ☞ Consult with RDI regarding thickness variations



Bow Thruster Room

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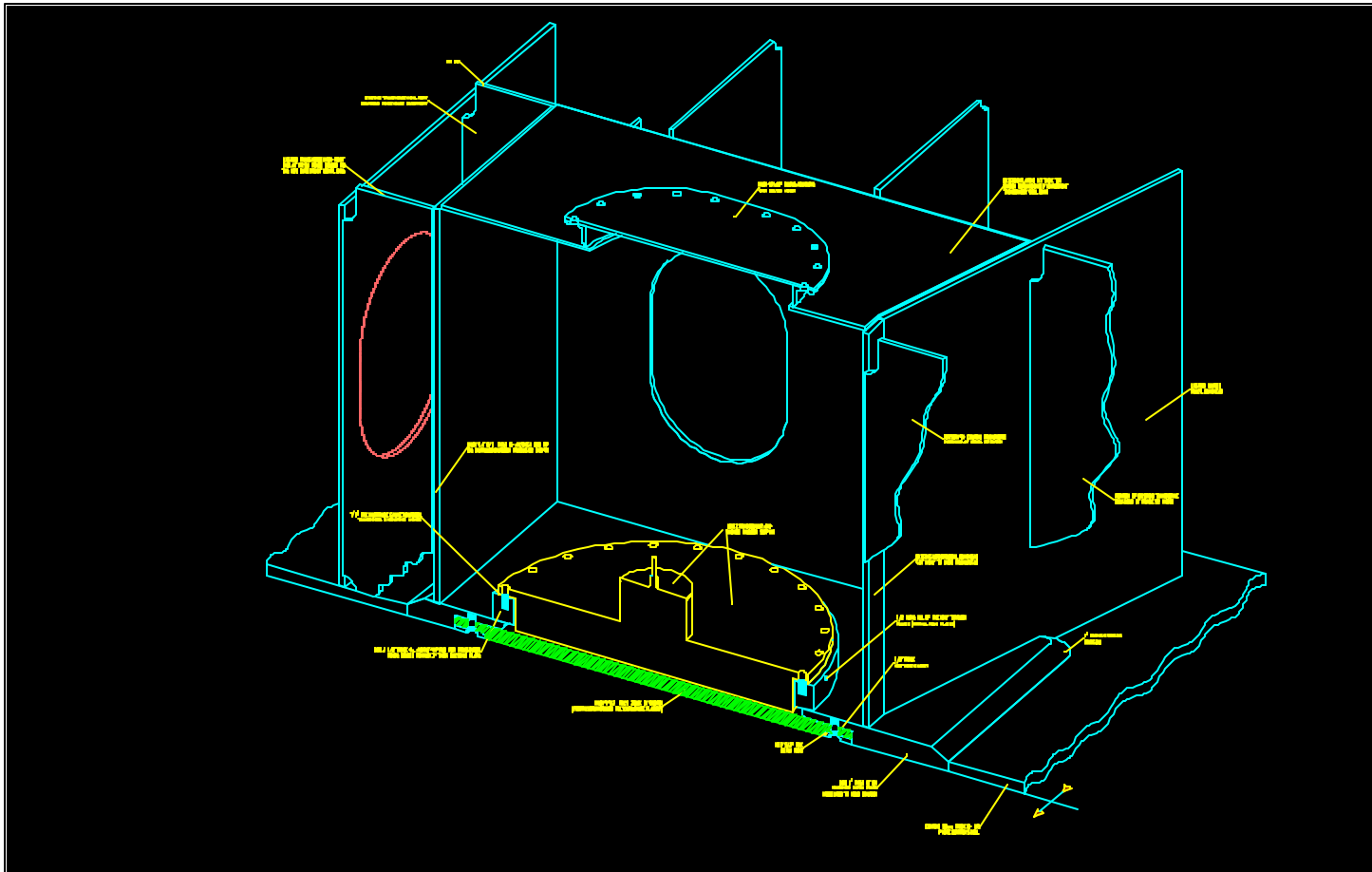
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Well Design Iso View

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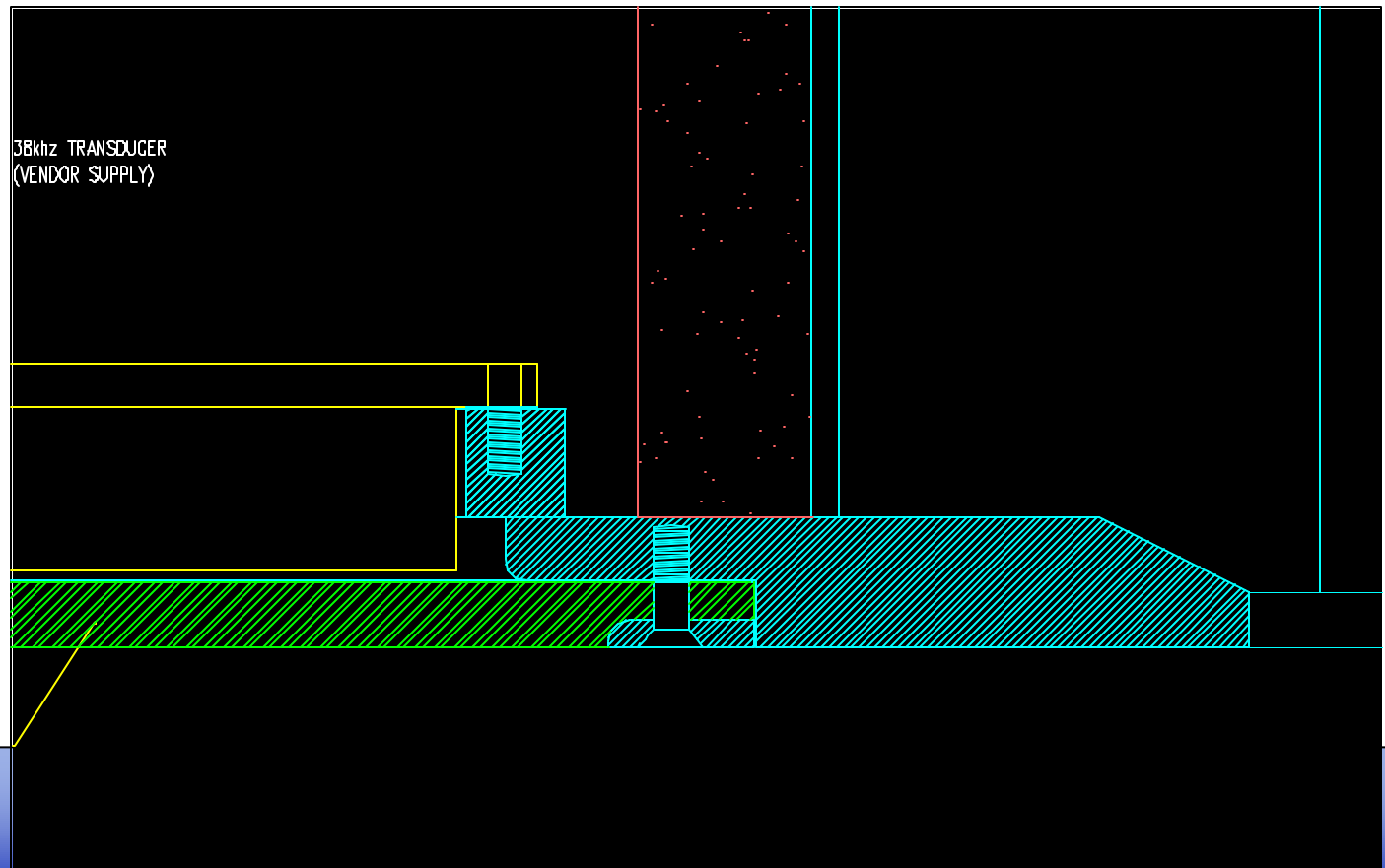
ABS considers the tank top to be the hull



Window Edge Detail

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- ☞ Observe window spacing (6.4 – 12.7 mm) and alignment (DNE 5°) – note recessed element face!
- ☞ Chamfer exposed edge and fair smooth with hull



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Major Installation Tasks



✎ Modify Hull

- ✎ Cut large hole
- ✎ Cable Conduit
- ✎ Head Tank Plumbing

✎ Fabricate Mounting Plate

- ✎ Polar Steel

✎ Fabricate Window

✎ Install Mounting Plate

- ✎ ABS Certification

✎ Install Window

- ✎ Test for leaks

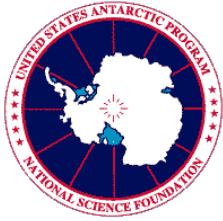
✎ Install Transducer

- ✎ Eliminate bubbles – not trivial

✎ Route Cable

✎ Install Deck Box

✎ Smoke Test!



Window Fabrication

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- ⌘ Lathe turning produces excellent results
- ⌘ Vertical mill – avoid small diameter end mills – use flycutter to avoid striping?
- ⌘ Polished surface out



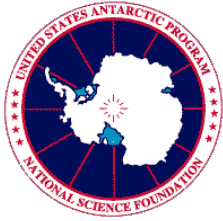
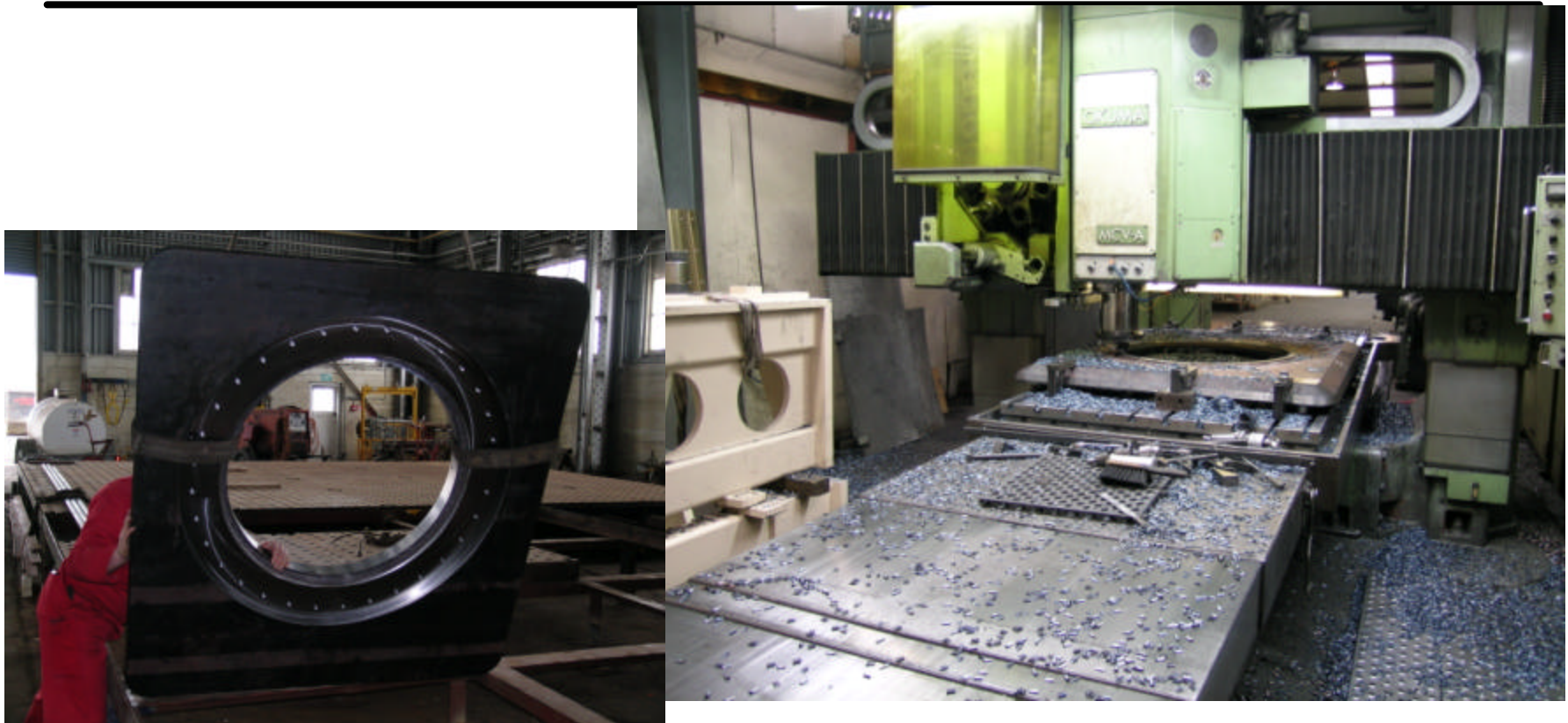


Plate Fabrication

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Plate Installation

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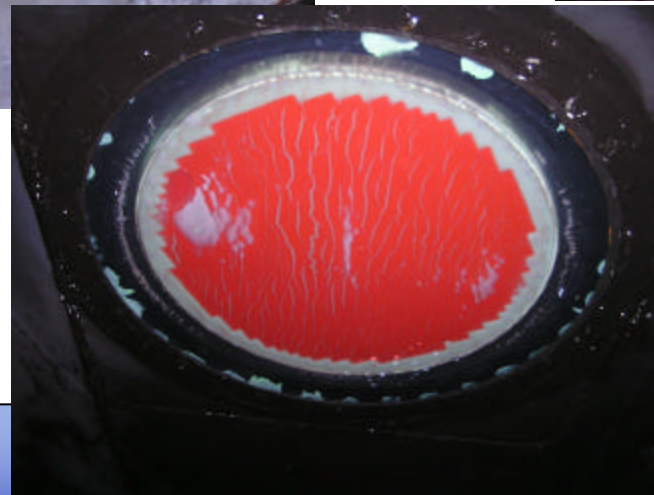
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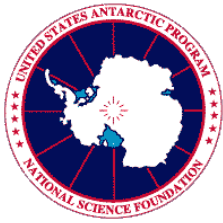


LMG Lessons

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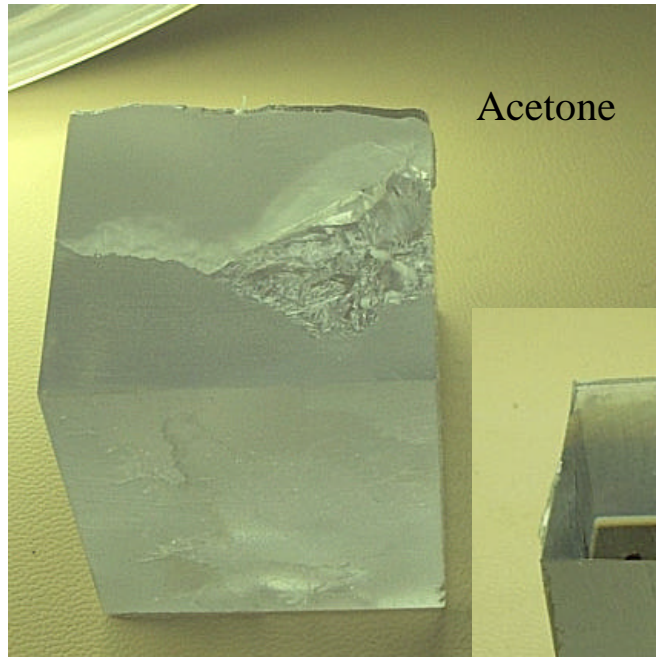


- ⚠ Watch the installation closely
- ⚠ Choose sealants with care
- ⚠ Clean the well before installing
- ⚠ Avoid bubbles

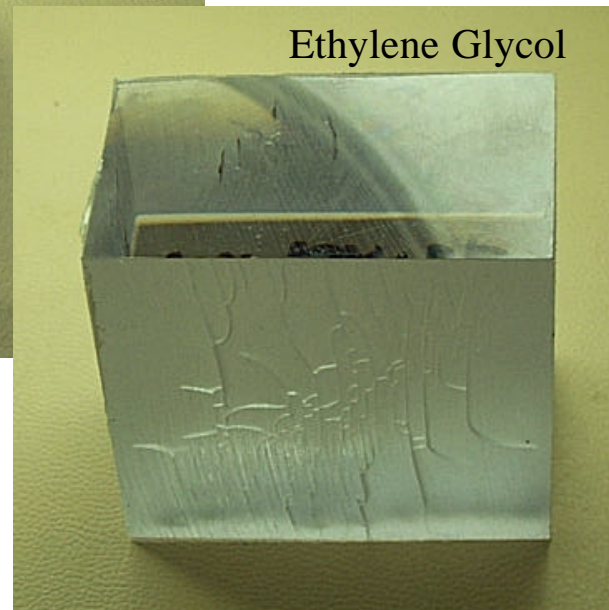


Zelux W Chemical Resistance Test

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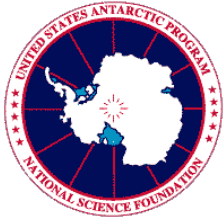
Acetone



Ethylene Glycol



Galley Coffee

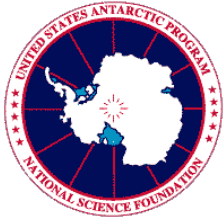


Head Tank Plumbing

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- ✍ Head Tank located in Engineer's workshop
- ✍ All sonar wells manifolded onto common head tank system
- ✍ Head level maintained approximately at design waterline
- ✍ Filled with 90% fresh water/10% Propylene Glycol
- ✍ Free surface – vented to atmosphere
- ✍ Ethylene vs Propylene Glycol – Toxicity – “Eth is Death”



Transmission Cable Conduit

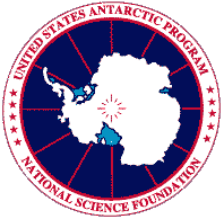
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- ☒ Conduit extends above waterline
- ☒ Rox-tec glands installed at top and bottom

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Acoustic Damping

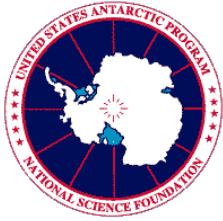
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- 4" thickness on walls
- 14" thickness on tank top
- Compressed by hydrostatic pressure



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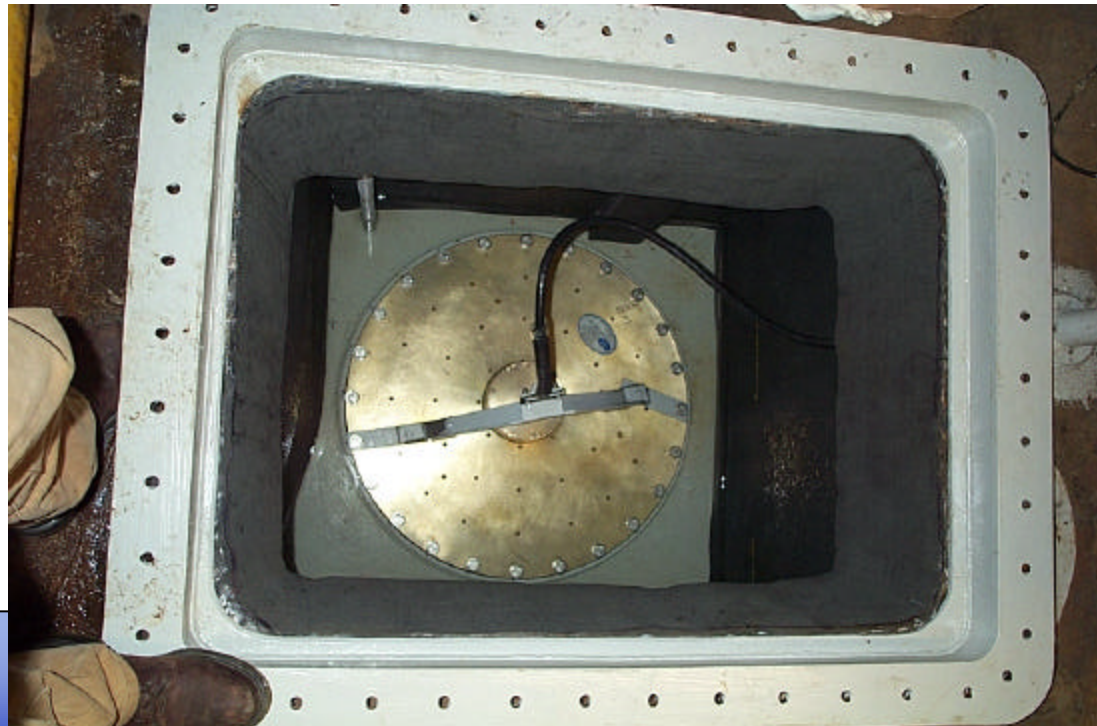
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Details, Details

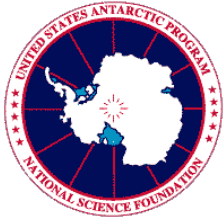
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- ☒ Checklists – Number Bolts – Torque Checklist - Loctite – Secure connector With Tape
- ☒ Verify connector o-rings – 2 people
- ☒ Food Dye – Use color different from Ethylene Glycol
- ☒ Cable Support
- ☒ Photo Documentation
- ☒ Beam 3 orientation 45° to STBD
- ☒ To paint or not to paint?
- ☒ Fairing
- ☒ Alignment
- ☒ Acoustic Isolation?
- ☒ CTE calculations
- ☒ Gaskets
- ☒ Obtain materials in advance



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Finished Installation

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