



**Newport News
Shipbuilding**

A Division of Huntington Ingalls Industries

ROXTEC Resilient Mechanical Bulkhead Pipe Transits for Navy Applications

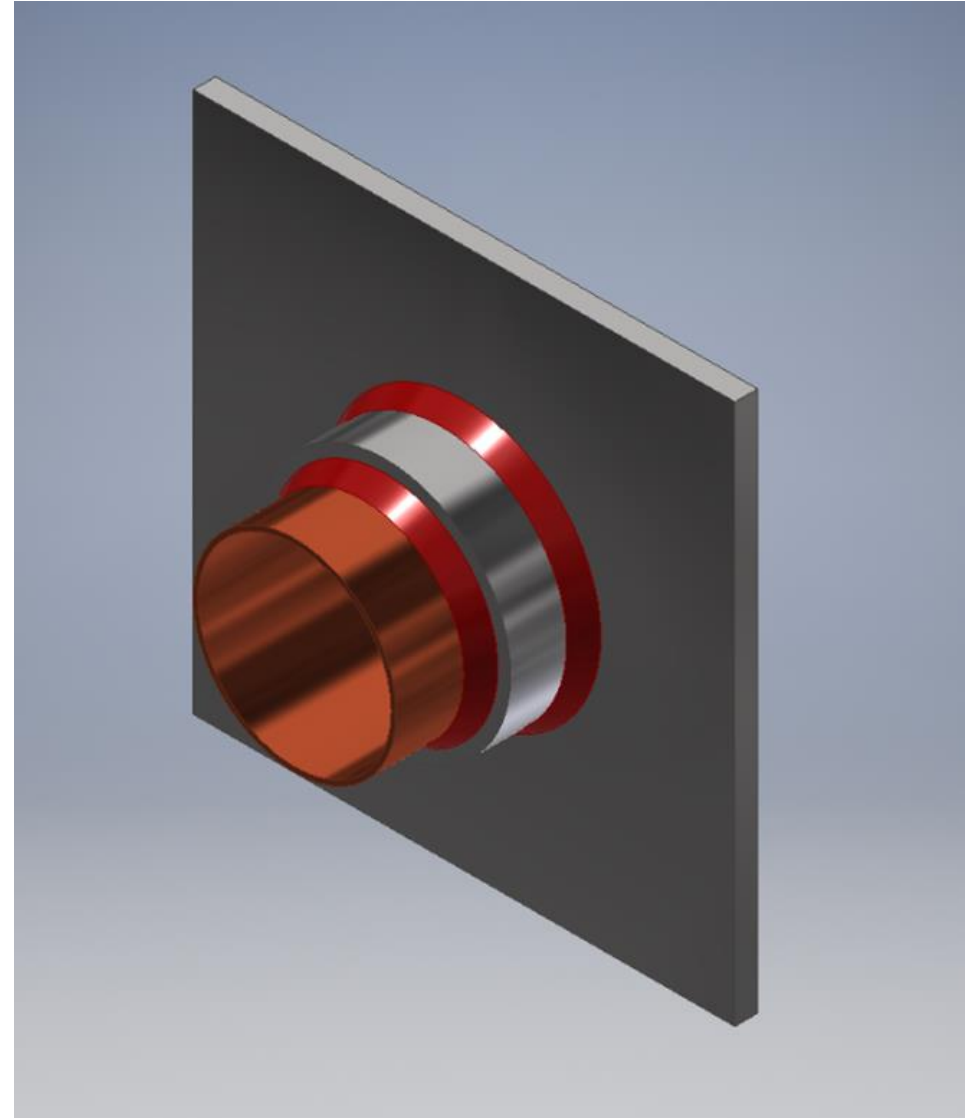
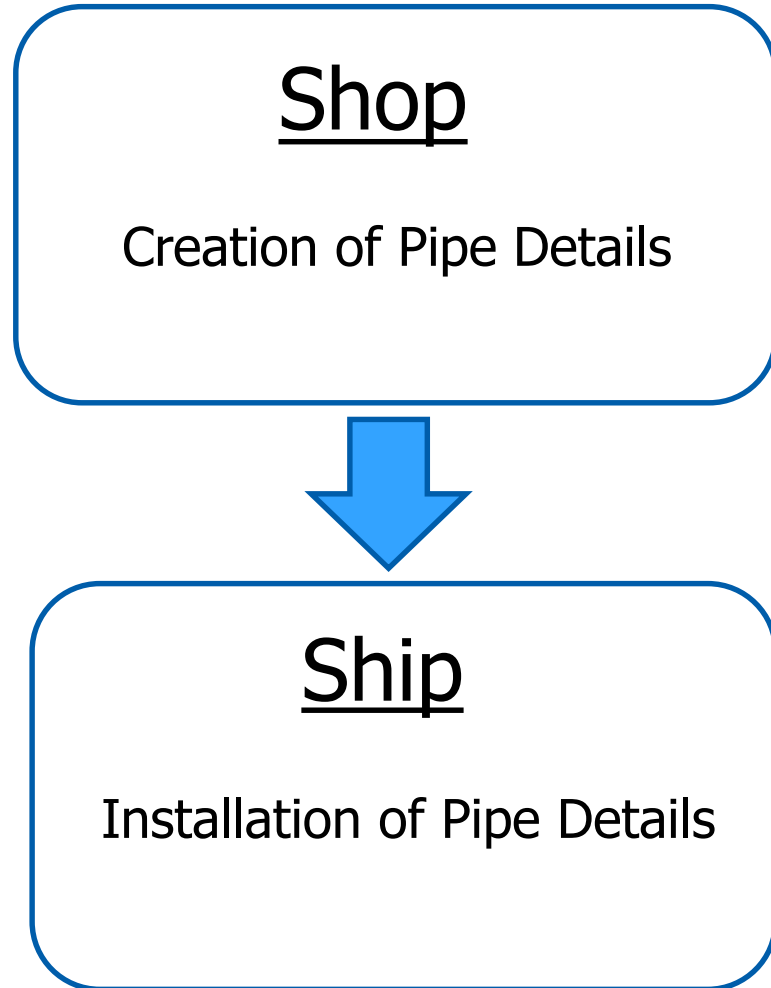
NSRP All-Panel Conference
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Goal: To establish whether commercially available resilient mechanical bulkhead pipe transits are suitable for US Navy applications and quantify the benefits for their use.



Photo taken with permission from Roxtec.com



Project Overview - Background



Photos taken with permission from Rextec.com



- Task 1 - Evaluate advantages and disadvantages for various product options over the life of a ship
- Task 2 - Demonstrate shipyard producibility
- Task 3 - Extend fire smoke and toxicity qualifications from wire-way multi-cable transits
- Task 4 – Summarize results of shock and vibration testing representative fittings in various applications
- Task 5 - Pressure test after shock tests
- Task 6 - Recommend implementation of best practices and consolidation of findings
- Task 7 - Publish a white paper of results and present white paper to NSRP Panel



Table 1.1: ROXTEC Models from 2016 ROXTEC Catalog

ROXTEC Model	Basic Description
RS Seal	Split seal for a single metal pipe
RS OMD Seal	Split seal for a single metal pipe
SPM Seal	Single piece seal for a single metal pipe
RS X Seal	Non-welding seal for single metal pipe
R X Seal	Non-welding seal for multiple metal pipes
R Frame	Circular frame with packing to seal multiple metal pipes
S Frame	Rectangular frame with packing to seal multiple metal pipes



Task 1 – Initial Evaluation

- Pressure Rated, fire rated, certified to American Bureau of Shipping Standards
- Structural Compensation
- Prevention of galvanic corrosion
- Thermal Insulation
- Life-cycle testing

Table 1.2: ROXTEC Model ABS Certified Pressure Ratings

ROXTEC Model	Gas Tightness (psi)	Water Tightness (psi)
RS Seal	58	87
RS OMD Seal	58	87
SPM Seal	14.5	21.75
RS X Seal	58	87
R X Seal	58	87
R Frame	58	87
S Frame	58	87

ROXTEC products have both positive and negative attributes that impact its use on the ship.



Task 1 – Initial Evaluation



RS Seal



RS OMD Seal

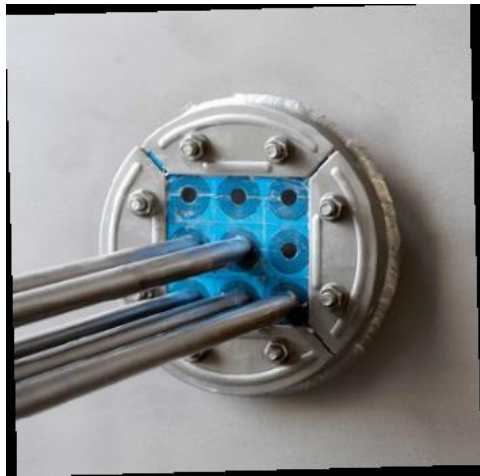


SPM Seal



RS X Seal





R Frame

R X Seal



S Frame



RS Seal



RS OMD Seal



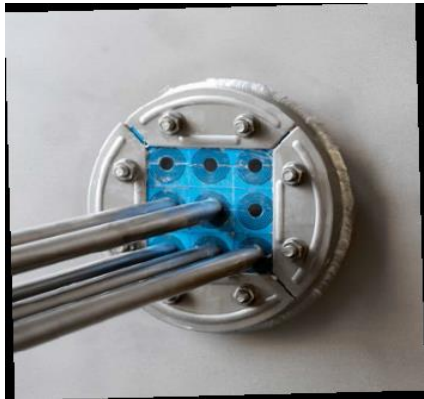
SPM Seal



RS X Seal



R X Seal



R Frame

This NSRP task will primarily focus on the RS, RS OMD, and SPM Seal.



S Frame



Task 2 – Demonstrate Shipyard Producibility





Table 2.1: Feasibility Test Time Records of RS and RS OMD Seals

ROXTEC Products	Steps 1-3 (minutes)	Step 4 (minutes)	Total time (minutes)
RS OMD: 1"NPS	9:30	10:25	19:55
RS: 6" NPS	5:09	9:05	14:14
RS: 3" NPS	1:33	8:04	9:37
RS: 1" NPS	2:50	7:57	10:47

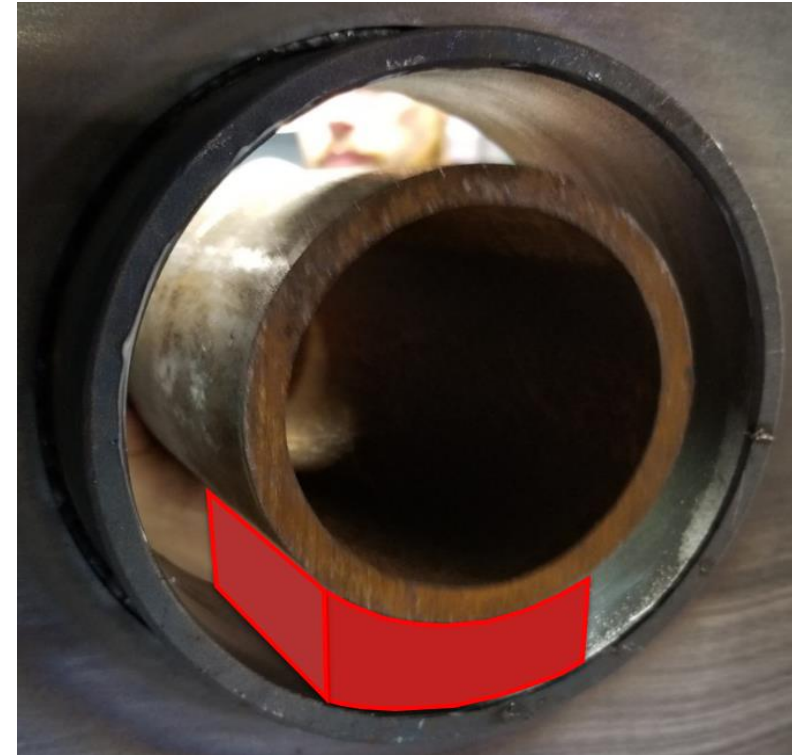
Steps 1-3 are to size the Roxtec seal, lubricate the sleeve and seal, and fit the seal onto the pipe.

Step 4 is for tightening of the bolts using an Allen wrench





Lubricant Container



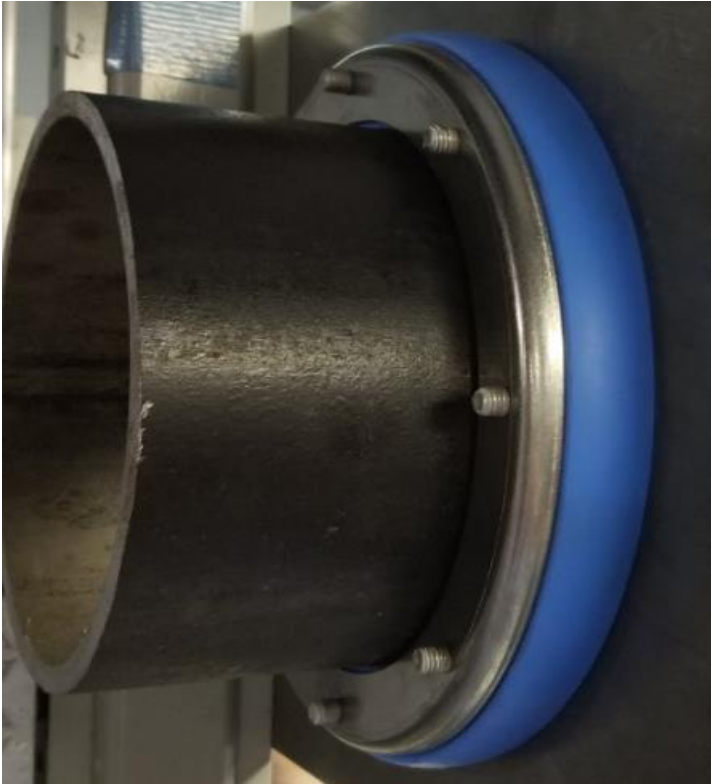
Sketch of Potential Utilization of Jig



Table 2.4: Feasibility Test Time Records of SPM Seals

ROXTEC Product	Total time (minutes)
SPM: 3" NPS	6:00
SPM: 6" NPS	11:14





Exposed SPM Seal Rubber



Tightening the SPM seal around the pipe before fixing the entire assembly to the bulkhead

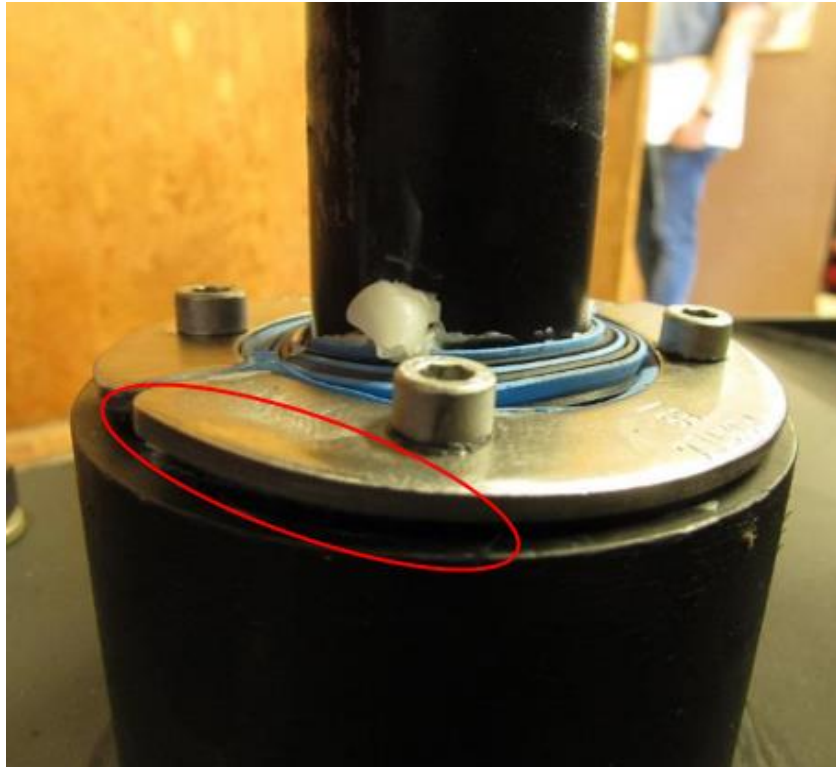
- MIL-DTL-24705B, “General Specification for Penetrators, Multiple Cable, Electric Cable”
- NSTM 505 extension to pipe transits
- RS and RS OMD pipe transits are equivalent to their cable transit counterparts
- Fire stop test performed for RS and RS OMD seals as cable transits
- SPM seals differ from the RS and RS OMD and have not been qualified.
- For any of the ROXTEC products to become qualified for use on Navy ships, a letter to request approval for use would have to be sent to NAVSEA.





Typical Apparatus of Confidence Test Specimen

*Flange Separation of RS 68, 0 lbs. added weight,
hammer dropped from 5ft*



*“Telescoping” of RS OMD, 10 lbs. added weight, hammer
dropped from 5ft*



RS 150 Test Results

RS 150, NPS 4 in		
Added Weight (lbs.)	Height of Drop (feet)	Slippage (inches)
30	5	8/32
40	5	4/32
60	5	5/32

RS OMD 150 Test Results

RS OMD 150, NPS 4 in		
Added Weight (lbs.)	Height of Drop (feet)	Slippage (inches)
30	5	3/32
40	5	5/32
60	5	0

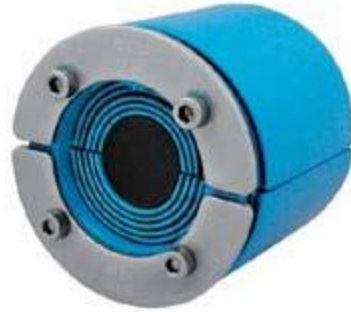


Task 6 – Final Evaluation and Recommendations



RS Seal

- Split design for easy installation/replacement
- Pipes must be centered during assembly
- Requires a Roxtec specific sleeve



RS OMD Seal

- Split design for easy installation/replacement
- Can be used with sleeves not manufactured by Roxtec
- Pipes must be centered during assembly



SPM Seal

- Complete no-weld solution
- Single piece design
- Installation limited to thickness of the bulkhead
- Requires further testing for fire stop test

NNS recommends the RS seal and the RS OMD seal as the best alternatives for Navy shipboard use.



Recommended Further Evaluation

- Shock and Vibration testing needs to be completed
- Service Life – need for life-cycle testing
- Structural concerns
- Thermal Insulation

NNS recommends further evaluation as well to understand all the possible uses of the Roxtec products.

