Submittal Information for Spears® Manufacturing Company OceanTUFF® Marine Drainage System

MSOT-7-0325

Date: _____

Job Name: _____ **Location:** _____

Engineer: _____ **Contractor:** _____

Scope:
This submittal covers Spears® OceanTUFF® CPVC marine drainage system suitable for marine drainage applications and consists of Schedule 40 solid wall pipe, drain, waste and vent (DWV) pattern fittings and a one-step primerless solvent cement. This system is intended for use in intermittent, non-pressure applications with an operating temperature not to exceed 220°F (104°C) in non-essential marine applications.

Product Specification:
OceanTUFF® Marine Drainage System for sanitary and chemical waste marine applications shall be manufactured in the U.S.A. from CPVC Type IV, minimum ASTM Cell Classification 23447 per ASTM D1784 and available in sizes 1-1/2" – 12". System pipe and fittings shall be manufactured in accordance with ASTM F2618 and certified by NSF International. All fittings shall be CPVC drainage patterns meeting the applicable requirements of ASTM D3311 or the manufacturer's specifications. Joining method for pipe and fittings shall be solvent cement welding. Solvent cement shall be Spears® OT-5 "one-step" primerless CPVC cement, specially formulated and manufactured in accordance with ASTM F2618 and F493. All OceanTUFF® pipe shall be approved by the United States Coast Guard, meet the low flame spread requirements and smoke and toxicity requirements of the IMO 2010 FTP Code Annex 1, Parts 2 and 5, and may be installed in accommodation, service and control spaces without meeting the additional requirements of Title 46 CFR 56.60-25(a) (2) as manufactured by Spears® Manufacturing Company. OceanTUFF® Marine Drainage System shall be approved by the American Bureau of Shipping (ABS) meeting IMO 2010 FTP Code Annex 1, Parts 2 and 5 and Transport Canada Approval Sections 114 & 226. OceanTUFF® CPVC marine pipe and solvent cement shall be GREENGUARD GOLD certified by Underwriters Laboratories (UL). All pipe, fittings, and cement shall be supplied as a complete system with a Limited Lifetime Warranty, as Spears® OceanTUFF® CPVC Marine Drainage System manufactured by Spears® Manufacturing Company.

Product Marking:
All OceanTUFF® pipe shall be marked with a yellow stripe for identification as a CPVC Marine Drainage System. Pipe shall be marked with NSF® Listing, applicable ASTM standard, required ABS markings and U.S. Coast Guard Approval Number, testing laboratory file number. Pipe and solvent cement shall bear UL GREENGUARD GOLD marking. Fittings shall be engraved with NSF® listing and applicable ASTM Standard, bear a "USCG" mark for use in marine applications.

Installation:
OceanTUFF® is suitable for drainage use on marine vessels and accommodations in non-essential applications including black water, gray water, vacuum flush sanitary piping, vents and drains in services requiring no fire endurance testing or electrical conductivity testing. Piping to be used in non-hazardous areas only. NOTE: Spears® EverTUFF® sch80 pipe & fittings in sizes ½" through 1-1/4" can be used in combination with OceanTUFF®. OceanTUFF® may be installed in concealed spaces in accommodation, service, and control spaces without meeting the additional requirements of Title 46 CFR 56.60-25(a)(2). Installation shall comply with the current installation instructions provided by Spears® Manufacturing Company and all regulations applicable to the vessel such as Subchapter F of Title 46 of the Code of Federal Regulations. Solvent cemented joints shall be assembled using a "one-step" primerless type CPVC cement specially formulated and manufactured in accordance with ASTM F2618 and F493. Refer to technical guide for more information on installation and product weights & dimensions.
NOTE: Spears® thermoplastic piping systems are suitable for oil-free air handling to 25 psi, not for distribution of compressed air or gas.

Referenced Standards:
ASTM D1784 – Rigid Vinyl Compounds
ASTM D3311 – DWV Fitting Patterns
ASTM F493 - Cement for CPVC Pipe & Fittings
ASTM F2618 – Standard for CPVC Drainage System
IMO 2010 FTP Code - Fire Test Procedure
Title 46 CFR – Code of Federal Regulations

Approvals:
ABS – American Bureau of Shipping
USCG – US Coast Guard (#164.141/45/0)
NSF® – NSF International
Transport Canada
UL – GREENGUARD GOLD Certified

PROJECT APPROVAL

Approved: _____
PRINT

Sign: _____

Date: _____

OceanTUFF® Marine Drainage System

OceanTUFF® Schedule 40 CPVC Marinen Pipe Dimensions (Inch)								
Pipe Diameter	1-1/2	2	3	4	6	8	10	12
Avg. O.D.	**1.900**	**2.375**	**3.500**	**4.500**	**6.625**	**8.625**	**10.750**	**12.750**
Avg. I.D.	**1.592**	**2.049**	**3.042**	**3.998**	**6.031**	**7.943**	**9.976**	**11.889**
Min. Wall	**0.145**	**0.154**	**0.216**	**0.237**	**0.280**	**0.322**	**0.365**	**0.406**
Std. Length (feet)	10	10	10	10	10	10	10	10

Recommended Hanger Spacing (Feet)								
Pipe Diameter	1-1/2	2	3	4	6	8	10	12
Hanger Spacing	6	6	7	7-1/2	8	9	10	10-1/2

Thermal Expansion Table

Length of Run (L) in feet	Length Change in inches (ΔL) for Specified Change in Temperature (ΔT)								
	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F
10	.08	.12	.15	.19	.23	.27	.31	.35	.38
20	.15	.23	.31	.38	.46	.54	.61	.69	.77
40	.31	.46	.61	.77	.92	1.08	1.23	1.38	1.54
50	.38	.58	.77	.96	1.15	1.34	1.54	1.73	1.92
70	.54	.81	1.08	1.34	1.61	1.88	2.15	2.42	2.69
90	.69	1.04	1.38	1.73	2.07	2.42	2.76	3.11	3.46
120	.92	1.38	1.84	2.30	2.76	3.23	3.69	4.15	4.61

Expansion & Contraction

Spears® OceanTUFF® CPVC products, like all piping materials, expand and contract with changes in temperature. If the coefficient of linear expansion is 3.2 x 10^{-5} in./in. °F, a 25°F change in temperature will cause an expansion of 1 inch for a 100-foot straight length. For most operating and installation conditions, expansion and contraction can be accommodated at changes of direction, or simple expansion loops can be used.

Thermal expansion change in length is calculated from Length of Run in feet, expected Change in Temperature and given Coefficient of Linear Thermal Expansion of 3.2 x 10^{-5} in./in. °F for CPVC:

$\Delta L = 12eL (\Delta T)$

Where:
e = 3.2 x 10^{-5} in./in. °F
L = Length of Run in feet
ΔT = Temperature Change in °F

Example:
How much will a 50 ft. run Spears® **OceanTUFF®** pipe expand if the expected ambient temperature will range from 45°F to 85°F?
$\Delta L = 12eL (\Delta T)$
$\Delta L = 12 \times .000032 \times 50 \times 40$
$\Delta L = .768$ inches