



# Marine Submittal for Spears® Manufacturing Company OceanTUFF™ Marine Drainage System



MSOT-7

Job Name: \_\_\_\_\_

Location: \_\_\_\_\_

Engineer: \_\_\_\_\_

Contractor: \_\_\_\_\_

## OceanTUFF™ CPVC Marine Drainage System

## OceanTUFF™ Marine Drainage Systems

### Scope:

This specification covers Spears® OceanTUFF™ CPVC marine drainage system suitable for marine sanitary and chemical waste 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 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 for use in corrosive waste drainage systems. 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 for resistance to standard drainage and corrosive chemicals 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 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 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) and meet IMO FTP Code Annex 1, Part 5 for Surface Flammability (IMO Resolution A.653 (16) for Low Flame Spread) 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 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, US Coast Guard Approval Number and testing laboratory File Number. Fittings shall be engraved with NSF® Listing and applicable ASTM Standard and bear a USCG mark for use in marine applications.

### Installation:

OceanTUFF™ is suitable for drainage use on ships, marine vessels and oil rig platforms in non-essential applications such as fresh water, sea water, potable water, drains and sanitary vents in services requiring no fire endurance testing. OceanTUFF™ may be installed in concealed spaces in accommodation, service, and control spaces without meeting the additional requirements of 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 for resistance to chemicals and manufactured in accordance with ASTM F2618 and F493. Refer to OT-4 technical guide for more information on installation and product weights & dimensions

**NOTICE:** Product is suitable for Oil-Free air handling. Not for distribution of compressed air or gas which can result in catastrophic failure and cause injury or death.

### 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 A.653 - Fire Test Procedure for Surface Flammability
- Title 46 CFR – Code of Federal Regulations

### Features:

- Lightweight
- Drainage Pattern Fittings per ASTM D3311
- Corrosion and Chemical Resistant
- Long Service Life

### Approvals:

- ABS – American Bureau of Shipping
- USCG – US Coast Guard
- NSF® – NSF International





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Schedule 40 CPVC 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  $3.2 \times 10^{-5}$  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  $3.2 \times 10^{-5}$  in./in. °F for CPVC:

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

Where:

$$e = 3.2 \times 10^{-5} \text{ in./in. } ^\circ\text{F}$$

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?

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

$$\Delta L = 12 \times .000032 \times 50 \times 40$$

$$\Delta L = .768 \text{ inches}$$