

MSC Guidelines for Design Verification of Machinery Systems – Towing Vessels

Procedure Number: E1-36

Revision Date: 26Mar2021


J. J. Min, CDR, Chief, Engineering Division

References:

- a. 46 CFR Subchapter M
 - b. Standards and Recommended Practices for Small Craft, American Boat and Yacht Council, Inc. (ABYC)
 1. H-2 Ventilation of Boats Using Gasoline
 2. H-22 Electric Bilge Pump Systems
 3. H-24 Gasoline Fuel Systems
 4. H-25 Portable Gasoline Fuel Systems
 5. H-32 Ventilation of Boats Using Diesel Fuel
 6. H-33 Diesel Fuel Systems
 7. P-1 Installation of Exhaust Systems for Propulsion and Auxiliary Engines
 8. P-4 Marine inboard engines and Transmissions
 - c. The International Convention for the Safety of Life at Sea (SOLAS) 1974
 - d. American Bureau of Shipping (ABS)
 1. Rules for Building and Classing Steel Vessels for Service on Rivers and Intracoastal Waterways, 2007
 2. Rules for Building and Classing Steel Vessels Under 90 Meters (295 Feet) in Length, 2006, including Supplement Part 1
 - e. National Fire Protection Association (NFPA)
 1. NFPA 302 Fire Protection Standard for Pleasure and Commercial Motor Craft
 2. NFPA 750 Standard on Water Mist Fire Protection Systems
 - f. Marine Safety Center Technical Note (MTN) No. 1-17, “Guidance On Design Verification for Subchapter M Towing Vessels”
-

Contact Information:

If you have any questions or comments concerning this document, please contact the Marine Safety Center by e-mail or phone, referring to Procedure Number: **E1-36**.

E-mail: MSC@uscg.mil
Phone: 202-795-6729
Website: <http://www.dco.uscg.mil/msc>

MSC Guidelines for Design Verification of Machinery Systems – Towing Vessels

Procedure Number: E1-36

Revision Date: 26Mar2021

Responsibilities

The submitter shall provide sufficient plans, drawings, schematics, calculations, and other documents including a complete bill of materials, component technical data sheets, and arrangement plans, to ensure the vessel complies with the standards used. Guidance on the design verification process can be found in reference (f), which should be reviewed by the submitter prior to beginning the design verification process.

The table in this document contains references to the regulations and standards listed in 46 CFR Subchapter M as applicable to each vessel system. The first column of each row identifies the machinery system to which the regulations in subsequent columns are applicable. The second column indicates the regulatory cite within Subchapter M that applies to the specific machinery system. The third column provides alternate standards incorporated by reference for that system. These requirements may include restrictions (i.e. vessel is less than 65 ft) which prevent them from being applied to all classes of vessel. The submitter must verify that the alternate standards apply to their vessel if they desire to use those standards. The fourth column contains the requirements from ABS Rules for Building and Classing Steel Vessels for Service on Rivers and Intracoastal Waterways, Part 4, Chapter 3, as incorporated by 46 CFR 143.540(b). The fifth column contains reference to the requirements from ABS Rules for Building and Classing Steel Vessels Under 90 Meters (295 Feet) in Length, Part 4, Chapter 4, as incorporated by 46 CFR 143.540(a). Vessels must meet all of the requirements in the second column and the requirements of either the fourth or fifth columns depending on the size and route of the vessel. The requirements that apply to all piping systems are listed in the next paragraph.

Existing Vessels

Design Verification

- ❑ Existing vessels built to class rules and classed are considered in compliance with the machinery requirements of Subchapter M. (143.215(a))
- ❑ Existing vessels built to class rules but not currently classed may be deemed by the OCMI or TPO to be in compliance with Subchapter M. (143.215(b))
- ❑ Contact OCMI to clarify review as existing vessels are required to complete design verification per the OCMI's judgment.

MSC Guidelines for Design Verification of Machinery Systems – Towing Vessels

Procedure Number: E1-36

Revision Date: 26Mar2021

New Vessels

Plans and Documents Required for Review:

- ❑ Drawings and data as required by 46 CFR 144.145(g) and;
 - ❑ Drawings and data sufficient to demonstrate compliance with reference (b)(1) through (b)(8) as applicable or;
 - ❑ Documents as required by 4-4-1/3 of reference (d)(2) or;
 - ❑ Documents as required by 4-3-1/3 of reference (d)(1).
-

All Piping Systems

- ❑ Piping and tanks exposed to weather must be made of metal. (143.270)
 - ❑ Pressure vessels over 5 ft³ and 15 psi MAWP must meet the requirements of 143.545.
 - ❑ Any hull penetrations below the waterline must be fitted with a valve and clearly labeled or color coded to identify its function. (143.250(d))
 - ❑ Closure devices, appropriate for the route of the vessel, must be provided for all deckhouse and hull penetrations, which open to the exterior of the vessel and which may allow water to enter the vessel. (144.320(b))
 - ❑ Each pipe containing fluids with a temperature exceeding 150°F must be insulated to prevent injury to crew members. (144.830)
 - ❑ Piping installation and materials requirements for ABYC standards are listed in the individual system standard. Vessels less than 65 feet in length, not pushing tank barges or hazmat may use this standard in lieu of the ABS Rules outlined below. (143.520(a))
-

MSC Guidelines for Design Verification of Machinery Systems – Towing Vessels

Procedure Number: E1-36

Revision Date: 26Mar2021

- ❑ Vessels not operating exclusively on rivers and intracoastal waterways, all pumps, piping, valves, and fittings must meet ABS Steel Vessel Rules Under 90 Meters (295 Feet), Part 4, Chapter 4. (143.540(a))
 - ❑ Installation of piping systems must meet 4-4-1/9.
 - ❑ Bulkhead, deck, and hull penetrations, and welding details, must comply with Chapter 4 of ABS Rules for Materials and Welding (Part 2). The method of penetration must maintain the watertight, fire-tight or smoke-tight integrity of the bulkhead, deck, or tanktop. (4-4-1/9.9)
 - ❑ Piping materials shall be selected and installed in accordance with 4-4-2.
 - ❑ Pipes piercing the collision bulkhead must be fitted with suitable valves operable from above the bulkhead deck and secured to the bulkhead. Cast iron valves may not be used. (4-4-1/9.11)
 - ❑ Flexible hose must be designed and constructed to a recognized National or International standard and outfitted with manufacturer fittings. Double hose clamps are not permitted unless there is a readily accessible shutoff valve. (4-4-1/9.19)
 - ❑ Pipe must be steel, either seamless, electric resistance welded, or furnace butt welded. (4-4-2/5.3) Nonmetallic piping may be used in machinery spaces and cargo pump rooms in accordance with 4-4-2/Table 2.
 - ❑ Shell penetrations shall be welded or bolted to the hull, and the pipe should be at least as thick as the hull plate. (4-4-2/19.3)
 - ❑ Valves at shell penetrations must be steel, or bronze (4-4-2/19.5), and of the positive closing type. (4-4-2/21.1) Each discharge must also be fitted with an automatic non-return valve. A non-return valve with positive means of closing is acceptable. (4-4-2/23.3.1)
- ❑ Vessels operating exclusively on rivers/intracoastal waterways may meet ABS Steel Vessel Rules for Service on Rivers and Intracoastal Waterways, Part 4, Chapter 3. (143.540(b))

MSC Guidelines for Design Verification of Machinery Systems – Towing Vessels

Procedure Number: E1-36

Revision Date: 26Mar2021

- ❑ Installation of piping systems must meet 4-3-1/7.
 - ❑ Piping materials shall be selected and installed in accordance with 4-3-2.
 - ❑ Bulkhead, deck, and hull penetrations, and welding details must comply with Chapter 4 of ABS Rules for Materials and Welding (Part 2). The method of penetration must maintain the watertight, fire-tight or smoke-tight integrity of the bulkhead, deck, or tanktop. (4-3-1/5.1, 4-3-1/7.9)
 - ❑ Pipes piercing the collision bulkhead must be fitted with suitable valves operable from above the bulkhead deck and secured to the bulkhead. (3-3-1/15.7) Incorporated by reference by 144.205(a).
 - ❑ If used, plastic piping must be confined to one watertight compartment, and the valve and shell connection must be metallic. (4-3-1/7.15)
 - ❑ Flexible hose must be suitable for the intended service. Double hose clamps are permitted in readily accessible locations. (4-3-1/7.21)
 - ❑ Pipe must be steel, either seamless, electric resistance welded, or furnace butt welded. (4-3-2/5.3) Nonmetallic piping may be used in machinery spaces and cargo pump rooms in accordance with 4-3-2/Table 2.
 - ❑ Shell penetrations shall be welded or bolted to the hull, and the pipe should be at least as thick as the hull plate. (4-3-2/19.1.1)
 - ❑ Valves at shell penetrations must be a material not readily rendered ineffective by heat, and of the positive closing type (4-3-2/19.1.3).
-

MSC Guidelines for Design Verification of Machinery Systems – Towing Vessels

Procedure Number: E1-36

Revision Date: 26Mar2021

System	46 CFR	Alternate Standards	ABS Rivers & ICW Rules	ABS <90 Meters Rules
Bilge and Ballast	143.275, 143.540	ABYC H-22	4-3-1/7.13 4-3-3/1.3, /1.5, /7 4-4-2/19.9, 23.3.4 (SOLAS only),	4-4-2/19.9, /23.3.4, 4-4-3/3.3, /5.3, /5.5, /5.9, /7.1, /7.3, /9
Cooling Water	143.520, 143.540	ABYC P-1 & P-4	4-3-2/21.1, /21.3, /21.5 4-3-5/1.1, /1.3, /1.5	4-2-1/11 4-4-2/25.1, /25.3, /25.5
Fixed Fire Suppression Systems (All Types)	76.15, 78.47-9, 78.47-11, 95.16, 97.37-9, 142.215, 142.315, 144.405, 144.605, NFPA 750	N/A	N/A	N/A
Exhaust	143.520, 143.540, 144.415	ABYC P-1 or NFPA 302	4-3-5/3	4-2-1/15
Fire Main	142.325, 143.540	N/A	Materials Req's only	Materials Req's only
Fuel Oil Piping	143.250(c), 143.255(a) and (c), 143.260(b) and (c), 143.265(b), (c), (d), and (e)	ABYC H-33, NFPA 302 Ch. 5, or 33 CFR Subchapter S	4-3-1/1.3 4-3-3/7.3, /7.5, /9.1, /9.3, /9.5, 4-3-4/1.1, /1.3, /1.7, /1.13 4-4-1/21 4-4-3/13.7	4-4-1/9.23 4-4-3/9.5, /9.7, /9.9.1, /13.1, /13.3, /13.5, /13.7 4-4-4/1.3, /1.5.2, /1.7, /3, /5, /7.1, /11

MSC Guidelines for Design Verification of Machinery Systems – Towing Vessels

Procedure Number: E1-36

Revision Date: 26Mar2021

System	46 CFR	Alternate Standards	ABS Rivers & ICW Rules	ABS <90 Meters Rules
Fluid Power Control Piping	136.110, 143.540, 143.545	N/A	4-3-1/1.3, /5, /7.21 4-3-2/5, /11, /13, /15 4-3-8/1.3.2, /1.7, /1.11, /1.15 4-6-7/3.5.5 (ABS SVR)	4-2-1/13, /13.3, /13.5, /13.7, 4-4-1/1.3
Lube Oil Piping	143.540	N/A	4-3-1/1.3 4-3-4/1.7.1, /1.7.2, /1.7.3, /3.1, /3.3, /3.5	4-1-1/17 4-2-1/9, /9.11 4-4-1/1.3 4-4-4/1.1.2, /1.3, /1.5, /3.7, /9.3, /9.5, /9.9, /9.11 4-6-3/3.3, /3.5, /3.15
Miscellaneous Piping	143.205(a), 143.250(d), 143.270, 143.540, 143.545(b), 144.320, 144.415, 144.830	System Dependent	System Dependent	System Dependent
Propulsion Shafting	143.205(c)(2), 143.515(a), 143.520(a)(8)	ABYC P-4	4-2-1	4-3-1
Potable Water	143.515(a), 143.545(b)	N/A	Materials Req's only	Materials Req's only

MSC Guidelines for Design Verification of Machinery Systems – Towing Vessels

Procedure Number: E1-36

Revision Date: 26Mar2021

System	46 CFR	Alternate Standards	ABS Rivers & ICW Rules	ABS <90 Meters Rules
Sewage Piping	143.515(a)	N/A	Materials Req's only	Materials Req's only
Steering Gear	143.550 For vessels moving tank barges carrying oil/HAZMAT: 143.585(l), 143.590(a), 143.590(c), 143.595(a), 143.595(b), 143.600	N/A For vessels moving tank barges carrying oil/HAZMAT: Sections 7-5 (class ABCU) and 3-5 (class R2) of ABS SVR <90 meters	4-2-3/1.3, /1.5, /1.7, /1.9, /1.11, /1.13, /1.15	4-3-3/1.5, /1.7, /1.11
Ventilation	143.520(a)(2) and (a)(5), 144.610	ABYC H-2, or H-32	System Specific	System Specific
Vents, Fills, & Sounds	143.540	N/A	System Specific	System Specific

Disclaimer

This guidance is not a substitute for applicable legal requirements, nor is it itself a rule. It is not intended to nor does it impose legally-binding requirements on any party. It represents the Coast Guard's current thinking on this topic and may assist industry, mariners, the general public, and the Coast Guard, as well as other federal and state regulators, in applying statutory and regulatory requirements. You can use an alternative approach for complying with these requirements if the approach satisfies the requirements of the applicable statutes and regulations. If you want to discuss an alternative, you may contact the Marine Safety Center, the unit responsible for implementing this guidance.