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United States Coast Guard

Marine Safety Center Technical Note

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MARINE SAFETY CENTER TECHNICAL NOTE (MTN) NO. 02-10

Subj: MATERIAL SELECTION FOR VITAL PIPING SYSTEMS

Ref: (a) Title 46 CFR Subchapter F, Subpart 56.60, Materials
(b) Title 46 CFR Subchapter K, Subpart G, Piping Systems
(c) Title 46 CFR Subchapter L, Subpart B, Materials and Pressure Design
(d) Title 46 CFR Subchapter T, Subpart G, Piping Systems
(e) ASTM F1155-98, Standard Practice for Selection and Application of Piping System Materials

1. Purpose: This Marine Technical Note (MTN) provides additional guidance for industry and Authorized Classification Societies for selection of piping materials for vital piping systems subject to review by the Marine Safety Center (MSC). Additionally, this MTN formally recognizes reference (e) as an acceptable alternate standard from which to select materials for vital piping systems. Materials selected in accordance with this MTN will be considered as providing a level of safety equivalent to that intended by the regulations.

2. Background: The regulatory requirements of 46 CFR 56.60-20(a) prohibit the use of heat sensitive metallic piping materials in systems that convey flammable, combustible or other dangerous fluids, or for vital systems. However, the prevalence of piping components, especially valves, that are made of heat sensitive materials is such that additional consideration regarding the application of heat sensitive metallic piping materials is warranted.

3. Discussion: The selection of acceptable materials provided by 46 CFR Table 56.60-1(a) has not undergone a notable revision since 1969. Reference (e), which is reviewed and updated periodically by a panel of industry experts, provides a selection of materials in addition to those specified by the regulations. Most notably, reference (e) permits the use of ASTM B61 and B62 bronze valves in most systems that do not contain flammable, combustible or dangerous fluids.

a. **Regulatory Requirements**: Generally, piping material specifications selected from Table 56.60-(1)(a) or section II of the ASME Boiler and Pressure Vessel Code are acceptable for use in vital and non-vital systems within the materials limitations defined in 46 CFR 56.60-2 through 56.60-25. Metallic piping material requirements are outlined in each subchapter as follows:

i. Vessels certificated under Subchapters I, I-A, O, D and H: Piping materials must be in accordance with paragraph 3(a). Heat sensitive metallic piping materials are prohibited

in systems which convey flammable, combustible, or dangerous fluids, or for vital systems.

ii. Vessels certificated under Subchapter L: Class 1 vital system piping materials must be in accordance with paragraph 3(a). Class II vital system piping materials not listed in Subpart 56.60 or the ASME Code may be accepted by the cognizant OCMI or MSC if documentation is provided to indicate the materials provide a level of safety equivalent to those materials in Subpart 56.60.

iii. Vessels certificated under Subchapter K: Vital system piping materials shall be in accordance with paragraph 3(a). Nonferrous metallic piping materials are acceptable for the following vital systems on aluminum, fiberglass and wood hulled vessels:

- Aluminum fuel piping having a thickness not less than schedule 80
- Aluminum bilge, ballast, and fire main piping
- Other systems deemed acceptable by the OCMI

iv. Vessels certificated under Subchapter T: Vital system piping materials shall be in accordance with 46 CFR 182.710. Ferrous materials are acceptable. Nonferrous metallic materials are acceptable for the following vital systems on aluminum hulled vessels; this allowance is extended to fiberglass and wood hulled vessels:

- Aluminum fuel piping having a thickness not less than schedule 80
- Aluminum bilge, ballast, and fire main piping
- Other systems deemed acceptable by the OCMI

b. **Alternative Piping Material Selection Criteria:** Reference (e) is intended as a guide to shipbuilders, ship-owners and designers for use in the preparation of piping system material schedules for commercial ship design and construction. The guide is organized by system type and lists acceptable material specifications and design standards for pipe, takedown joints, bolting, fittings and valves. Materials selected in accordance with reference (e) are acceptable regardless of conflicts with section 3(a) of this MTN.

i. Metallic nonferrous valves are listed for use in vital systems; however, the use of heat sensitive materials in fuel, lube oil and cargo oil systems is not acceptable. Ball valves, though not explicitly listed in Tables (2) through (27) of reference (e), may be used interchangeably with gate, globe, butterfly or angle valves where throttling conditions are not warranted.

ii. Socket welded, flanged, brazed and threaded connections, as listed under the "Type/Style" column of Tables (2) through (27) of reference (e), may be used interchangeably as limited by section 3 of reference (e).

Subj: MATERIAL SELECTION FOR VITAL PIPING SYSTEMS

4. Applicability: This MTN applies to plans containing vital piping systems for all vessels to which the marine engineering requirements of 46 CFR Subchapters T, K, H, I, I-A, O, D, and L apply. This MTN may also be used to select materials for non-vital systems.

5. Definitions:

a. **Heat Sensitive Material**: Materials that have a melting point of 1700°F or less are considered heat-sensitive in accordance with 46 CFR 56.50-1(a). For those materials with a melting range, the melting point is considered the solidus temperature. The solidus temperature is the highest temperature at which the material can exist in fully solid form.

b. **Vital System**: Vital systems are defined by 46 CFR 56.07-5(f) as a system that is essential to the safety of the vessel, its passengers and crew. Vital systems include the following:

- Fuel system
- Fire main
- Fixed fire suppression systems
- Bilge and ballast system
- Steering system
- Propulsion system and necessary auxiliaries
- Ship's service and emergency electrical generation and necessary auxiliaries
- A marine engineering system identified by the cognizant OCMI as being crucial to the survival of the vessel or to the protection of the personnel on board

6. Action: Vital piping system plans submitted to the Marine Safety Center for approval will be reviewed for compliance with the applicable regulations, this MTN and any specific requirements established by the OCMI or MSC. The plans must provide sufficient details to permit a complete review of the piping system.

7. Disclaimer: While the guidance contained in this document may assist the industry, the public, the Coast Guard, and other Federal and State agencies in applying statutory and regulatory requirements, this guidance is not a substitute for the applicable legal requirements, nor is it in itself a regulation. It is not intended to, nor does it impose legally binding requirements on any party, including the Coast Guard, other Federal agencies, the States, or the regulated community.

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