

# MSC Guidelines for Review of Compressed Air Systems

Procedure Number: E1-4

Revision Date: 03/19/03

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## References

- a. Title 46 CFR Part 54 Pressure vessels (Subchapter F)
  - b. Title 46 CFR Part 56 Piping systems and appurtenances (Subchapter F)
  - c. Title 46 CFR 58.30 Fluid Power and Control Systems (Subchapter F)
  - d. Title 46 CFR 119.715 - 119.730 Piping systems (Subchapter K)
  - e. Title 46 CFR 182.715 - 182.730 Piping systems (Subchapter T)
  - f. Title 46 CFR 197.310 Air compressor system (Commercial diving operations)
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## Disclaimer

These guidelines were developed by the Marine Safety Center as an aid in the preparation and review of vessel plans and submissions. They were developed to supplement existing guidance. They are not intended to substitute or replace laws, regulations, or other official Coast Guard policy documents. The responsibility to demonstrate compliance with all applicable laws and regulations still rests with the plan submitter. The Coast Guard and the U. S. Department of Homeland Security expressly disclaim liability resulting from the use of this document.

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## Contact Information

If you have any questions or comments concerning this Guidance, please contact the Marine Safety Center by e-mail or phone. Please refer to Procedure Number: E1-4.

E-mail: [customerservicemsc@msc.uscg.mil](mailto:customerservicemsc@msc.uscg.mil)

Phone: (202) 366-6440

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## General Review Guidance

### ***Applicable to All Vessels***

- ❑ The design, construction, and testing of unfired pressure vessels, such as accumulators, shall meet the applicable requirements of 46 CFR 54.01-5 (c)(3), (c)(4), and (d) or the remaining requirements in 46 CFR Part 54. (Reference 46 CFR 58.30-25)
  - ❑ Fluid power cylinders may be required by 46 CFR 58.30(b) to be considered as pressure vessels. Fluid power cylinders shall have a bursting pressure of not less than 4 times the allowable working pressure. A certified burst report test report is acceptable. (Reference 46 CFR 58.30)
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- ❑ Air compressor systems installed onboard for commercial diving operations shall comply with 46 CFR 197.310.

## **Vessels Subject to Title 46 CFR Subchapter T**

- ❑ Piping subject to more than 1,034 kPa (150 psig) in a non-vital system shall be designed, constructed, and inspected in accordance with ANSI B31.1 or other industry standard acceptable to the Commandant. (Reference 46 CFR 119.715 and 182.715)
- ❑ Flexible nonmetallic hose shall meet SAE J-1942 and is subject to the limitations of 46 CFR 182.720(d)(1) through (d)(4). Unreinforced hoses are limited to a maximum service pressure of 50 psig, reinforced hoses are limited to a maximum service pressure of 150 psig. Hose fittings shall comply with SAE J1475. Nonmetallic piping materials onboard subchapter K vessels shall comply with 46 CFR 56.60-25. (Reference 46 CFR 119.720 and 182.720)
- ❑ Nonferrous materials may only be used in accordance with 46 CFR 119.730 or 182.730, as applicable.

## **Vessels Subject to Title 46 CFR Subchapter F**

- ❑ All fluid power and control systems listed in 46 CFR 58.30-1(a) shall comply with the requirements of 46 CFR 58.30-5 through 58.30-40:
  - ❑ Piping systems shall be designed, constructed, and inspected in accordance with ANSI B31.1, as limited, modified, or replaced in 46 CFR Part 56.
  - ❑ Materials used in the manufacture of tubing, pipes, valves, flanges, and fittings shall be selected from those specifications which appear in Table 56.60-1(a) or Table 56.60-2(a) of this subchapter; or they may be selected from the applicable material specifications of sections I, III, and VIII of the ASME Code. (Reference 46 CFR 58.30(b))
  - ❑ Flexible nonmetallic hose shall meet SAE J-1942 and may be used only where flexibility is required and in lengths not exceeding 30 inches. Hose fittings shall comply with SAE J1475. Unreinforced hoses are limited to a maximum service pressure of 50 psi, reinforced hoses are limited to a maximum pressure of 150 psi. (Reference 46 CFR 56.60(b))
  - ❑ The maximum allowable working pressure and minimum thickness shall be calculated as required by 46 CFR 56.07-10(e) when the outside diameter

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to wall thickness ratio is greater than 6. Where the ratio is less than 6, the wall thickness may be established on the basis of an applicable thick-wall cylinder equation acceptable to the Commandant using the allowable stress values specified in 46 CFR 56.07-10(e).

- ❑ Bolting shall meet the requirements of 46 CFR 56.25-20 except that regular hexagon bolts conforming to SAE J429, grades 2 through 8, or ASTM A-193 may be used in sizes not exceeding 1 ½ inches. (Reference 46 CFR 58.30-15(d))
- ❑ Nonferrous materials may only be used in accordance with 46 CFR 56.60-20.
- ❑ Pneumatic systems with a maximum allowable working pressure in excess of 150 psi shall be designed with a surge tank or other acceptable means of pulsation dampening. Reference 46 CFR 58.30-5(c)
- ❑ Each pneumatic system must minimize the entry of oil into the system and must drain the system of liquids.
- ❑ For offshore supply vessels (subchapter L), any non-standard hydraulic or pneumatic component (such as control valves, check valves, relief valves, and regulators) may be accepted by the cognizant OCMI or the Commanding Officer, Marine Safety Center, if the component is certified by the manufacturer as suitable for marine service and if the component meets each of the requirements for materials and pressure design of subparts 56.60 and 58.30 of this chapter and if its service is:
  - ❑ limited to the manufacturer's rated pressure; or
  - ❑ The service of the component is limited to 1/2 the manufacturer's recommended maximum allowable working pressure (MAWP) or 1/10 the component's burst pressure. Burst-pressure testing is described in ANSI B 31.1, Paragraph 104.7.A, and must be conducted to comply with Paragraph A-22, Section I, ASME Boiler and Pressure Vessel Code. Written certification of results of burst-pressure testing must be submitted with the plans required by 46 CFR 127.110(d). (Reference 46 CFR 128.240)
- ❑ Those systems not listed in 46 CFR 58.30-1(a) shall meet the requirements of 46 CFR 58.30-50(a)(1) through (a)(5):

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- The installed system must be tested in accordance with 46 CFR 58.30-35(c)(2).
- All pneumatic cylinders shall comply with 46 CFR 58.30-30.
- Where pipes are carried through bulkheads, decks, or tank tops, the integrity of the structure shall be maintained. (Reference 46 CFR 56.50-1)