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(ii) Subjecting a representative model to a proof test or experimental stress analysis described in paragraph A–22 of section I the ASME Boiler and Pressure Vessel Code (incorporated by reference; see 46 CFR 56.01–2); or

(iii) Other means specifically accepted by the Marine Safety Center.

(3) Valves must be tested in accordance with §56.97–5 of this part.

(4) If welded, valves must be welded in accordance with subpart 56.70 of this part and part 57 of this chapter or by other processes specifically approved by the Marine Safety Center.

(d) Where liquid trapped in any closed valve can be heated and an uncontrollable rise in pressure can result, means must be provided in the design, installation, and operation of the valve to ensure that the pressure in the valve does not exceed that allowed by this part for the attained temperature. (For example, if a flexible wedge gate valve with the stem installed horizontally is closed, liquid from testing, cleaning, or condensation can be trapped in the bonnet section of the closed valve.) Any resulting penetration of the pressure wall of the valve must meet the requirements of this part and those for threaded and welded auxiliary connections in ASME B16.34 (incorporated by reference; see 46 CFR 56.01–2).

§ 56.20–9 Valve construction.

(a) Each valve must close with a right-hand (clockwise) motion of the handwheel or operating lever as seen by one facing the end of the valve stem. Each gate, globe, and angle valve must generally be of the rising-stem type, preferably with the stem threads external to the valve body. Where operating conditions will not permit such installations, the use of a nonrising-stem valve will be acceptable. Each nonrising-stem valve, lever-operated valve, or other valve where, because of design, the position of the disc or closure mechanism is not obvious must be fitted with an indicator to show whether the valve is opened or closed, except as provided for in §56.50–1(g)(2)(iii) of this part. No such indicator is required for any valve located in a tank or similar inaccessible space when indicators are available at accessible sites. The operating levers of each quarter-turn (rotary) valve must be parallel to the fluid flow when open and perpendicular to the fluid flow when closed.

(b) Valves of Class I piping systems (for restrictions in other classes refer to sections on low temperature service), having diameters exceeding 2 inches must have bolted, pressure seal, or breech lock bonnets and flanged or welding ends, except that socket type welding ends shall not be used where prohibited by §56.30–5(c) of this part, §56.30–10(b)(4) of this part for the same pressure class, or elsewhere in this part. For diameters not exceeding 2 inches, screwed union bonnet or bolted bonnet, or bonnetless valves of a type which will positively prevent the stem from screwing out of the body may be employed. Outside screw and yoke design must be used for valves 3 inches and larger for pressures above 600 pounds per square inch gage. Cast iron valves with screwed-in or screwed-over bonnets are prohibited. Union bonnet type cast iron valves must have the bonnet ring made of steel, bronze, or malleable iron.

(c) Valves must be designed for the maximum pressure to which they may be subjected, but in no case shall the design pressure be less than 50 pounds per square inch gage. The use of wafer type resilient seated valves is not permitted for shell connections unless
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they are so arranged that the piping
immediately inboard of the valve can
be removed without affecting the wa-
tertight integrity of the shell connec-
tion. Refer also to §56.20–15(b)(2)(iii)
of this part. Large fabricated ballast
manifold connecting lines exceeding 8
inches nominal pipe size must be de-
sign for a pressure of not less than 25
pounds per square inch gage.

(d) Disks or disk faces, seats, stems
and other wearing parts of valves shall
be made of material possessing corro-
sion and heat-resisting qualities suit-
able for the service conditions to which
they may be subjected.

(e) Plug cocks shall be constructed
with satisfactory and positive means of
preventing the plug from becoming
loosened or removed from the body
when the plug is operated. Cocks hav-
ing plug locking arrangements depend-
ing on cotter pins are prohibited.

(f) cocks shall be marked in a
straight line with the body to indicate
whether they are open or closed.

(g) Materials forming a portion of the
pressure barrier shall comply with the
applicable provisions of this part.

§56.20–15 Valves employing resilient
material.

(a) A valve in which the closure is ac-
complished by resilient nonmetallic
material instead of a metal to metal
seat shall comply with the design, ma-
terial, construction and testing for
valves specified in this part.

(b) Valves employing resilient mate-
rial shall be divided into three cat-
egories. Positive shutoff, Category A,
and Category B, and shall be tested and
used as follows:

(1) Positive shutoff valves. The closed
valve must pass less than 10 ml/hr (0.34
fluid oz/hr) of liquid or less than 3 l/hr
(0.11 cubic ft/hr) of gas per inch nomi-
nal pipe size through the line after re-
moval of all resilient seat-
ing material and testing at full rated
pressure; as represented by the for-

\[
\text{Formula: } 15\% \div \sqrt{\text{(NPS)}} \times \text{(Fully open
flow rate)}
\]

category A valves may be
used in any location except where posi-
tive shutoff valves are required by
§56.50–60(d). Category A valves are re-
quired in the following locations:

(i) Valves at vital piping system
manifolds;

(ii) Isolation valves in cross-connects
between two piping systems, at least
one of which is a vital system, where
failure of the valve in a fire would pre-
vent the vital system(s) from func-
tioning as designed.

(iii) Valves providing closure for any
opening in the shell of the vessel.

(3) Category B valves. The closed valve
will not provide effective closure of the
line or will permit appreciable leakage
from the valve after the resilient mate-
rial is damaged or destroyed. Category
B valves are not required to be tested
and may be used in any location except
where a Category A or positive shutoff
valve is required.

(c) If a valve designer elects to use ei-
ther a calculation or actual fire testing
instead of material removal and pres-
sure testing, the calculation must em-

ploy ISA–S75.02 (incorporated by ref-

erence; see 46 CFR 56.01–2) to determine
the flow coefficient \(C_v\), or the fire
testing must be conducted in accord-
ance with API 607 (incorporated by ref-
ERENCE; see 46 CFR 56.01–2).

§56.20–20 Valve bypasses.

(a) Sizes of bypasses shall be in ac-
cordance with MSS SP–45 (incor-
porated by reference; see 46 CFR 56.01–
2).