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Plant Condition / Component	Design and Normal	Upset	Emergency	Faulted
ASME Code Class 2 and 3 vessels	ASME Section VIII Division 1	$\sigma_m \leq 1.1S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 1.65S$	$\sigma_m \leq 1.5S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 1.80S$	$\sigma_m \leq 2.0S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 2.4S$
ASME Code Class 2 and 3 inactive pumps	ASME Section III NC-3400 or ND-3400	$\sigma_m \leq 1.1S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 1.65S$ $P_{max} \leq 1.1\ PD$	$\sigma_m \leq 1.5S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 1.80S$ $P_{max} \leq 1.2\ PD$	$\sigma_m \leq 2.0S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 2.4S$ $P_{max} \leq 1.5\ PD$
ASME Code Class 2 and 3 active pumps	ASME Section III NC-3400 or ND-3400	$\sigma_m \leq 1.0S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 1.5S$ $P_{max} \leq 1.1\ PD$	$\sigma_m \leq 1.1S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 1.65S$ $P_{max} \leq 1.2\ PD$	$\sigma_m \leq 1.2S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 1.8S$ $P_{max} \leq 1.5\ PD$
ASME Code Class 2 and 3 active and inactive valves (See notes 1 to 5)	Valve bodies shall conform to the requirements of ASME Section III NC-3500 or ND-3500	$\sigma_m \leq 1.1S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 1.65S$ $P_{max} \leq 1.1\ PD$ or rated pressure (see note 6)	$\sigma_m \leq 1.5S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 1.80S$ $P_{max} \leq 1.2\ PD$ or rated pressure (see note 6)	$\sigma_m \leq 2.0S$ $(\sigma_m \text{ or } \sigma_L) + \sigma_b \leq 2.4S$ $P_{max} \leq 1.5\ PD$ or rated pressure (see note 6)

Definitions

σ_m = general membrane stress. This stress is equal to the average stress across the solid section under consideration. It excludes discontinuities and concentrations and is produced only by mechanical loads.

σ_L = local membrane stress. This stress is the same as σ_m except that it includes the effect of discontinuities.

σ_b = bending stress. This stress is equal to the linearly varying portion of the stress across the solid section under consideration. It excludes discontinuities and concentrations and is caused by mechanical loads only.

S = allowable stress value given in Tables I-7.1, I-7.2 and I-7.3 of Appendix I of the Section III Code. The allowable stress shall correspond to the highest metal temperature at the section under consideration during the condition under consideration.

P_{max} = maximum pressure resulting from upset, emergency, or faulted conditions.

The term "stress" in above definitions means maximum normal stress.

Notes pertaining to ASME Code Class 2 and 3 valves (active and inactive):

1. Valve nozzle (piping load) stress analysis is not required when both of the following conditions are satisfied by calculation:

    a. Section modulus and area of a plane, normal to the flow, through the region of valve body crotch is at least 10% greater than the piping connected (or joined) to the valve body inlet and outlet nozzles.

    b. Code allowable stress, S, for valve body material is equal to or greater than the code allowable stress, S, of connected piping material.

    If the valve body material allowable stress is less than that of the connected piping, the valve section modulus and area as calculated in a. above shall be multiplied by the ratio of S_{pipe}/S_{valve}. If unable to comply with this requirement, the design by analysis procedure of NB-3545.2 is an acceptable alternate method.

2. Casting quality factor of 1.0 shall be used.

3. These stress limits are applicable to the pressure retaining boundary, and include the effects of loads transmitted by the extended structures, when applicable.

4. Design requirements listed in this table are not applicable to valve discs, stems, seat rings, or other parts of valves that are contained within the confines of the body and bonnet, or otherwise are not part of the pressure boundary.

5. These rules do not apply to Class 2 and 3 safety relief valves. Safety relief valves will be designed in accordance with ASME Section III requirements.

6. Maximum pressure should not exceed the rated pressure of valve at the applicable plant conditions.