Pressure is imposed on a required backup stem seal such as packing. The bellows or diaphragms need not be constructed in accordance with the requirements of this Section.

**NB-3520  DESIGN CONSIDERATIONS**

**NB-3521  Design and Service Loadings**

The general design considerations of NB-3100 are applicable to valves. In case of conflict between NB-3100 and NB-3500, the requirements of NB-3500 shall apply.

**NB-3524  Earthquake**

The rules of this Subarticle consider that under earthquake loadings the piping system, not the valve, will be limiting and that the integrity of the valve pressure-retaining body is adequately considered under the piping requirements of NB-3550. Where valves are provided with operators having extended structures and these structures are essential to maintaining pressure integrity, an analysis, when required by the Design Specifications, may be performed based on static forces resulting from equivalent earthquake accelerations acting at the centers of gravity of the extended masses.

**NB-3525  Levels A and B Service Limits**

The design rules of NB-3512 and NB-3513 apply to loadings for which Level A or B Limits are designated except that when evaluating Level B Limits during operation of relief or safety valves (a) and (b) below shall be met.

(a) The service pressure may exceed the Design Pressures defined by the pressure-temperature ratings of ASME B16.34 by no more than 10%.

(b) The rules of NB-3540 apply using allowable stress intensity values of 110% of those listed in Section II, Part D, Subpart 1, Tables 2A and 2B.

**NB-3526  Level C Service Limits**

If the Design Specifications specify any loadings for which Level C Limits are designated, the rules used in evaluating these loadings shall be those of NB-3512 and NB-3513, except as modified by the following subparagraphs.

**NB-3526.1  Pressure–Temperature Ratings.** The pressure permissible for loadings for which Level C Limits are designated shall not exceed 120% of that permitted for Level A Limits.

**NB-3526.2  Pipe Reaction Stress.** Pipe reaction stresses shall be computed in accordance with the equations of NB-3545.2(b)(1), and the allowable value considered individually is 1.85 ε_m for the valve body material at 500°F (260°C). In performing these calculations, the value of S shall be taken as 1.2 times the yield strength at 500°F (260°C) of the material of the connected pipe, or 36.0 ksi (248 MPa) when the pipe material is not defined in the Design Specifications.

**NB-3526.3  Primary Stress and Secondary Stress.**

The equation of NB-3545.2 shall be satisfied using C_p equal to 1.5, D_2 computed in accordance with NB-3526.2, and D_2 equal to 0, and the calculated value shall be limited to 2.25 ε_m.

**NB-3526.4  Secondary and Peak Stresses.** The requirements of NB-3545 and NB-3550 need not be met.

**NB-3527  Level D Service Limits**

If the Design Specifications specify any loadings for which Level D Limits are designated, the guidelines of Appendix F may be used in evaluating those loadings independently of other loadings.

**NB-3530  GENERAL RULES**

**NB-3531  Pressure–Temperature Ratings and Hydrostatic Tests**

**NB-3531.1  Pressure–Temperature Ratings.** A valve designed in accordance with NB-3541 may be used in accordance with the pressure-temperature ratings in ASME B16.34, Tables 2-1.1A to 2-2.7A (Standard Class) for flanged end or welding end (including socket welding end) valves, and ASME B16.34, Tables 2-1.1B to 2-2.7B (Special Class) for welding end (including socket welding end) valves, provided the Design Pressure and Design Temperature are used. When a single valve has a flanged and a welding end, the flanged end requirements shall be used. The materials listed in ASME B16.34, Table 1, may be used if listed in Section II, Part D, Subpart 1, Tables 2A and 2B, subject to the temperature limitations therein, and as defined in NCA-1220.

**NB-3531.2  Hydrostatic Tests.**

(a) Valves designed in accordance with NB-3541 shall be subjected to the shell hydrostatic test pressures required by ASME B16.34 and in accordance with other appropriate rules of NB-6000. Valves with a primary pressure rating less than Class 150 shall be subjected to the required test pressure for Class 150 rated valves.

(b) The shell hydrostatic test shall be made with the valve in the partially open position. Stem leakage during this test is permissible. End closure seals for retaining fluid at test pressure in welding end valves may be positioned in the welding end transitions, as defined in NB-3544.8(b), in reasonable proximity to the end plane of the valve so as to ensure safe application of the test pressure.

(c) After the shell hydrostatic test, a valve closure test shall also be performed with the valve in the fully closed position with a test pressure across the valve disk no less than 110% of the 100°F (38°C) pressure rating. For valves that are designed for Service Conditions that have the pressure differential across the closure member limited to