Proposal: As Errata, revise paras. 302.3.6(a), K302.3.2(b)(2), and K302.3.2(c)(2), as shown in the attachment.

Explanation: Table Y-3 (Section VIII, Division 3 Yield Strength Values $S_y$ for Ferrous and Nonferrous Materials) was deleted from Section II, Part D in the 2006 Addenda of the BPV Code. These materials and their yield strengths were incorporated into Table Y-1 (Yield Strength Values $S_y$ for Ferrous and Nonferrous Materials). It is therefore proposed that mention of Section II, Part D, Table Y-3 be deleted from paras. 302.3.6(a), K302.3.2(b)(2), and K302.3.2(c)(2) as Errata.
\[ r = \frac{S_i}{S_j} \]
\[ S_i = \text{any computed displacement stress range smaller than } S_j \]

(c) Weld Joint Strength Reduction Factor \( W \). At elevated temperatures, the long term strength of weld joints may be lower than the long term strength of the base material. For welded pipe (i.e., not seamless), the product of the allowable stress and the applicable weld quality factor \( SE \) shall be multiplied by the weld joint strength reduction factor \( W \) when determining the required wall thickness for internal pressure per para. 304. When evaluating longitudinal stresses for sustained loads per para. 302.3.5(c), at circumferential welds the allowable stress \( S_i \) shall be adjusted by multiplying it by \( W \). The weld joint strength reduction factor is not required when evaluating occasional loads such as wind and earthquake, or when evaluating permissible variations in accordance with para. 302.4. The pressure rating or allowable stress for the occasional load or variation condition is not required to be reduced by the weld joint strength reduction factor. It is also not required when calculating the allowable stress range for displacement stresses \( S_j \) in para. 302.3.5(d). The weld joint strength reduction factor only applies at weld locations.

The weld joint strength reduction factor is the ratio of the nominal stress to cause failure of the weld joint to that of the base material for the same duration. In the absence of more applicable data (e.g., creep testing), the factor shall be taken as 1.0 at temperatures of 510°C (950°F) and below, and 0.5 at 815°C (1500°F) for all materials. The strength reduction factor shall be linearly interpolated for intermediate temperatures. The designer is responsible for determining weld joint strength reduction factors for temperatures above 815°C (1500°F).

Creep testing of weld joints to determine weld joint strength reduction factors should be full thickness cross-weld specimens with test durations of at least 1000 hr. Full thickness tests shall be used unless the designer otherwise considers effects such as stress redistribution across the weld.

302.3.6 Limits of Calculated Stresses due to Occasional Loads

(a) Operation. The sum of the longitudinal stresses \( S_j \) due to sustained loads, such as pressure and weight, and of the stresses produced by occasional loads, such as wind or earthquake, may be as much as 1.33 times the basic allowable stress given in Appendix A.

At temperatures greater than 427°C (800°F), as an alternative to the use of 1.33 times the basic allowable stress provided in Table A-1, the allowable stress for occasional loads of short duration, such as surge, extreme wind or earthquake, may be taken as the strength reduction factor times 90% of the yield strength at temperature for materials other than cast or ductile iron and other materials with non-ductile behavior. This yield strength shall be as listed in the BPV Code, Section II, Part D, Table Y3-4-4-3-6 or determined in accordance with para. 302.3.2(f). The strength reduction factor represents the reduction in yield strength with long-term exposure of the material to elevated temperatures and, in the absence of more applicable data, shall be taken as 1.0 for austenitic stainless steel and 0.8 for other materials.

For castings, the basic allowable stress shall be multiplied by the casting quality factor \( E \). Where the allowable stress value exceeds two-thirds of the yield strength at temperature, the allowable stress value must be reduced as specified in para. 302.3.2(e). Wind and earthquake forces need not be considered as acting concurrently.

(b) Test. Stresses due to test conditions are not subject to the limitations in para. 302.3. It is not necessary to consider other occasional loads, such as wind and earthquake, as occurring concurrently with test loads.

302.4 Allowances

In determining the minimum required thickness of a piping component, allowances shall be included for corrosion, erosion, and thread depth or groove depth. See definition for \( c \) in para. 301.1(b).

302.4.1 Mechanical Strength. When necessary, the wall thickness shall be increased to prevent overstress, damage, collapse, or buckling due to superimposed loads from supports, ice formation, backfill, transportation, handling, or other causes. Where increasing the thickness would excessively increase local stresses or the risk of brittle fracture, or is otherwise impracticable, the required strength may be obtained through additional supports, braces, or other means without an increased wall thickness. Particular consideration should be given to the mechanical strength of small pipe connections to piping or equipment.

PART 2
PRESSURE DESIGN OF PIPING COMPONENTS

303 GENERAL

Components manufactured in accordance with standards listed in Table 326.1 shall be considered suitable for use at pressure-temperature ratings in accordance with para. 302.2.1 or para. 302.2.2, as applicable. The rules in para. 304 are intended for pressure design of components not covered in Table 326.1, but may be used for a special or more rigorous design of such components, or to satisfy requirements of para. 302.2.2. Designs shall be checked for adequacy of mechanical strength under applicable loadings enumerated in para. 301.
K302.3.3 \[\text{Casting Quality Factor}\] The casting quality factor \(E_p\) shall be 1.00 by conformance to all of the following requirements:
(a) All surfaces shall have a surface finish not rougher than 6.3 \(\mu m\), \(R_t\) (as-received).
(b) All surfaces shall be examined by either the liquid penetrant method in accordance with ASTM E 165, or the magnetic particle method in accordance with ASTM E 700. Acceptability of imperfections and weld repairs shall be judged in accordance with MSS SP-55, using ASTM E 125 as reference.
(c) Each casting shall be fully examined either ultrasonically in accordance with ASTM E 114, or radiographically in accordance with ASTM E 142. Cracks and hot tears (Category D and E discontinuities per the standards listed in Table K302.3.3.D) and imperfections whose depth exceeds 3% of nominal wall thickness are not permitted. Acceptable severity levels for radiographic examination of castings shall be in accordance with Table K302.3.3.D.

K302.3.4 \[\text{Weld Joint Quality Factor}\] Piping components containing welds shall have a weld joint quality factor \(E_i\), 1.00 (see Table K302.3.4 for requirements) except that the acceptance criteria for these welds shall be in accordance with para. K304.1.2. Spiral welds are not permitted.

K302.3.5 \[\text{Limits of Calculated Stresses Due to Sustained Loads and Displacement Stains}\]
(a) \[\text{Internal Pressure Stresses}\] Stresses due to internal pressure shall be considered safe when the wall thickness of the piping component, and its means of stiffening, meet the requirements of para. K304.
(b) \[\text{External Pressure Stresses}\] Stresses due to external pressure shall be considered safe when the wall thickness of the piping component, and its means of stiffening, meet the requirements of para. K304.
(c) \[\text{Longitudinal Stresses} \ S_L\] The sum of the longitudinal stresses \(S_L\) in any component of a piping system due to sustained loads, such as pressure and weight, shall not exceed \(S_p\) in (d) below. The thickness of pipe used in calculating \(S_p\) shall be the nominal thickness minus mechanical, corrosion, and erosion allowance \(e\).

\[S_{LS} = \frac{1}{1.25S_p - 0.25S_L}\] (32)

\text{where} \(S_L\) is computed displacement stress range \(S_p\) in a piping system due to sustained loads. The sum of the longitudinal stresses \(S_p\) in any component of a piping system due to sustained loads, such as pressure and weight, shall not exceed \(S_p\) in (d) below. The thickness of pipe used in calculating \(S_p\) shall be the nominal thickness minus mechanical, corrosion, and erosion allowance \(e\).