404.1.2 Components Having Specific Pressure–Temperature Ratings. Within the metal temperature limits of −20°F (−30°C) to 250°F (120°C), pressure ratings for components shall conform to those stated for 100°F (40°C) in material standards listed in Table 403.2.1-1. The nonmetallic trim, packing, seals, and gaskets shall be made of materials that are not injuriously affected by the fluid in the piping system and shall be capable of withstanding the pressures and temperatures to which they will be subjected in service. Consideration should be given to possible conditions that may cause low temperatures on pipelines transporting liquids that become gases at or near atmospheric conditions.

404.5.1 General. Steel valves conforming to standards and specifications listed in Tables 423.1-1 and 426.1-1 may be used. These valves may contain certain cast, malleable, or wrought iron parts as provided for in API 6D. Cast iron valves conforming to standards and specifications listed in Tables 423.1-1 and 426.1-1 may be used for pressures not to exceed 250 psi (17 bar). Care shall be exercised to prevent excessive mechanical loading (see para. 404.4.8).

Working pressure ratings of the steel parts of steel valves are applicable with the temperature limitations of −20°F (−30°C) to 250°F (120°C) (see para. 401.2.2.4).

Where resilient, rubber-like, or plastic materials are used for sealing, they shall be capable of withstanding the fluid, pressure, and temperature specified for the piping system.

434.8.2 Welding Processes and Filler Metal
(a) Welding shall be performed by a manual, semiautomatic, or automatic process or combination of processes that have been demonstrated to produce sound welds.
(b) Unless otherwise specified by the operating company, welding electrodes and consumables shall comply with the following:
   (1) Filler metal and consumables shall be selected so that the strength of the completed weldment will equal or exceed the specified minimum tensile strength of the materials being joined.
   (2) If base metals of different tensile strengths are to be joined, the nominal tensile strength of the weld metal shall equal or exceed the tensile strength of the weaker of the two.
   (3) When filler metals of different strengths are used in a single weld, the proportions shall be such that the completed weldment equals the specified minimum tensile strength of the base metal.

437.4 Test Pressure
437.4.1 Hydrostatic Testing of Internal Pressure Piping

(a) Portions of piping systems to be operated at a hoop stress of more than 20% of the specified minimum yield strength of the pipe shall be subjected at any point to a hydrostatic proof test equivalent to not less than 1.25 times the internal design pressure at that point (see para. 401.2.2) for not less than 4 hr. When lines are tested at pressures that develop a hoop stress, based on nominal wall thickness, in excess of 90% of the specified minimum yield strength of the pipe, special care shall be used to prevent overstrain of the pipe.
Figure 402.1-1 in the 2009 edition is missing the following tables. (From Figure 419.6.4(c) of B31.4-2006)

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**Chart A**

- Flexibility factor for elbows $k = 1.65/h$
- Flexibility factor for miters $k = 1.52/h^{5/8}$
- Stress intensification factor $i = 0.9/h^{1/3}$

**Chart B**

- Corr factor $C_1$
  - 1 End flanged $C_1 = h^{1/6}$
  - 2 Ends flanged $C_1 = h^{1/3}$

**Fig. 419.6.4(c) Flexibility Factor $k$ and Stress Intensification Factor $i$ (Cont’d)**