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Standard drawing of ASME B16.9 Straight Tee & Cross. The ASME B16.9 straight tee is a three-way fitting used to make perpendicular connections to a pipe. Its name comes from its resemblance to the letter T. The ASME B16.9 straight cross is a four-way fitting used to make double perpendicular connections to the pipe. It resembles a crossroad. Lines that connect to the main run of pipe are known as branches. The main run of pipe is often called the header. The word straight denotes that all three (or four) tees or flange (cross) outlets are the same pipe size. Dimensions NPS0.0 to NPS 48.0 are covered. Dimensions are in inches. NOTES: (1) Outlet dimension M for NPS 26 and larger is recommended but not required. (2) Dimensions applicable to crosses NPS 24 and smaller. Piping Tees are used either for dividing the main fluid flow into two streams or for combining flow from two streams. The term Tee for these types of pipe fittings most probably comes from the resemblance of the English letter Tee. The main run pipe has often termed a Header and the other as a branch. The branch size may be smaller or equal to the run pipe size but it cannot be larger. Tees having branch size equal to run size are called equal tees & others as unequal tees or reducing tees. Tees are normally designed based on ASME B16.9 or ASME B16.11. Tee is always normal or perpendicular to the pipe axis and is normally produced by forging. Piping tee connections are classified according to the branch size and end connection. Based on the branch size, there are two types of piping tee connections. They are Equal Tee, and Reducing Tee. When the branch size is equal to the run pipe it is called Equal Tee pipe fitting. In the case of reducing tee, the branch size is smaller than the run pipe size. There is a limitation to the branch size. It can not be sufficiently smaller. For example, Reducing Tee from 16 pipe is available up to 6 branch size. 16 x 4 piping tee is not manufactured. Usually reducing piping tee connections are manufactured till a branch pipe size of one size lower than 1/2 the parent pipe size. This rule is valid till 28 Fig. 1. Equal Tee vs Reducing Tee. Based on the pipe end connections, tees are classified as follows: Socket Welded Tees, Screwed-End Tees, Butt Welding Tees, Flanged Tees. These are usually forged and used up to 2 run size on services where socket welded connections are permitted. The applicable dimensional standard is ASME B16.11 and material standards including ratings are the same as those for socket-welded elbows. Normal industry practice is to use socket welded tees up to 1 1/2 run size. Their use including rating, dimensional, and material standards are the same as applicable to screwed elbows. The dimensional standard applicable for equal and unequal tees is ANSI B16.9. These are available from 1/2 through 48. Unequal butt welding tees are available having branches up to one size lower than half run size e.g. If the run size is 8, unequal tees are available in sizes 6, 5, 4, 3, 2, 1, and 1/2. Applicable Pressure temperature rating and material standards are the same as those for butt-welding elbows. Butt welding tees are usually used for size 2 and above and in smaller sizes for services where the use of socket weld joints is prohibited. Their use including pressure rating, and dimensional & material standards are the same as applicable to flanged elbows. In normal large-bore pressure piping most often butt-welded Tee connections are used. The ASME B31.3 (Appendix D) is used to provide a formula for calculating the SF value at tee connections which Caesar automatically calculates when Tee is defined. From the ASME B31.3-2002 onwards, Appendix D is deleted from the code. Now Stress Intensification and Flexibility factors are to be calculated using the ASME B31.3 code. The Tee connections are normally defined in Caesar as shown in the attached figure Fig. 2. Tee modeling in Caesar. If/or pipeline systems, a special type of tee is used, known as Barred Tee. Refer to the following table (Table 1) for the Tee dimension chart for equal pipe tee as per ASME B16.9 NPS (Inches) Outside Diameter at Bowl (D), mm/Center to End (C), mm/Center to Center (M), mm/1/2 (2), 3/4 (3), 1 (4), 1 1/4 (4.25), 1 1/2 (4.5), 1 3/4 (4.75), 2 (5), 2 1/4 (6), 2 1/2 (6.25), 2 3/4 (6.75), 3 (7.5), 3 1/4 (8.25), 3 1/2 (8.75), 3 3/4 (9.25), 4 (10), 4 1/4 (10.75), 4 1/2 (11.25), 4 3/4 (11.75), 5 (12.5), 5 1/4 (13.25), 5 1/2 (13.75), 5 3/4 (14.25), 6 (15), 6 1/4 (15.75), 6 1/2 (16.25), 6 3/4 (16.75), 7 (17.5), 7 1/4 (18.25), 7 1/2 (18.75), 7 3/4 (19.25), 8 (20), 8 1/4 (20.75), 8 1/2 (21.25), 8 3/4 (21.75), 9 (22.5), 9 1/4 (23.25), 9 1/2 (23.75), 9 3/4 (24.25), 10 (25), 10 1/4 (25.75), 10 1/2 (26.25), 10 3/4 (26.75), 11 (27.5), 11 1/4 (28.25), 11 1/2 (28.75), 11 3/4 (29.25), 12 (30), 12 1/4 (30.75), 12 1/2 (31.25), 12 3/4 (31.75), 13 (33.25), 13 1/4 (33.75), 13 1/2 (34.25), 13 3/4 (34.75), 14 (36.25), 14 1/4 (36.75), 14 1/2 (37.25), 14 3/4 (37.75), 15 (40), 15 1/4 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