I'm not a bot

The standard fittings have straight tangent lengths on the ends. If you cut a 45 in the middle to make 2 x 22.5, you won't have a tangent at the cut location. The "2" in that table is the pipe size, not the radius. The radius is given for the A value of the 90 degree elbow. I don't see where 1.5 comes from. Tan(theta/2) = the straight end distance / radius of the bend at the center of the elbow.The formula given was because the elbows are not in the table by radius; only by setback. So if all you know is setback, then you need to divide by the tangent(theta/2) to get the original radius. ASME B16.9 section 6.2.4 implies that dimension B is different if you cut the elbow. SO if you get one made use that formula, but if you cut a 45 elbow you won't get the same dimension. At least that's my reading of it... Remember - More details = better answersAlso: If you get a response it's polite to respond to it. Hi3DDave, I have given an example of a Long radius 45 Deg elbow. For a LR elbow r=1.5 D. for a 2" 45 Deg LR elbow As per ASME B16.9 Section 6.2.4, the "B" dimension for segmented elbow is given by Bs= A x Tan(/2) where is A is the dimension A for the 90 Deg elbow from which the segmenting is being done A) With this lets says we are cutting a 45 Deg C elbow from a 2" 90 Deg LR elbow A for 2" LR 90 Deg elbow = 76 mm Theta = 45 Deg Therefore Bs = 76 * Tan(45/2) = 76 * 0.4142 = 31.48 mm. Per the table below the B dimension for 45 Deg elbow is 35mm. That was my question. B) Lets say I want to cut a 2" elbow with 24.76 Deg C angle what would be the "B" dimension?. is it Bs = 76* Tan(24.76/2) = 16.68 mm ? Thanks and Regards,Pavan Kumar Probably best to not post copyrighted material. 6.2 4 is not easy to interpret but at the start it says "factory made segments.." Now I read that to means that the B dimension is somehow an odd dimension. B16.9 provides 45 and 90 factory made elbow dimensions. It doesn't say that you can cut either and get the same thing. So in your B this would be the dimension if you forged a 25 elbow , NOT if you cut it out of a 45 elbow. At least that's my interpretation. Remember - More details = better answersAlso: If you get a response it's polite to respond to it. I would talk to a shop that does pipe bending, and get them to make the custom bend, cut the ends to whatever it is they can cut them to, and weld that section of pipe in. Alternatively do a double 90 or 90 & 45 offset if you can take the elevation/dimensional change in your assembly. This may a bit of subject, but cutting, say, a 45 bend from a 90 may give problems since the 90 may not be round in the middle. The butt weld to the cut 45 would then be misaligned. Hi 3DDave , LittleInch ,TBP ,KevinNZ , I am modeling an existing pipe from a distillation tower overhead to the overhead condenser in CAE Pipe software to do the Pipe Stress Analysis. I have to enter the dimensions in this model. I need the "B" dimension for a bend that has an elbow angle of 22.8 deg to input the value in the model. I need the correct way to calculate this "B' dimension. I was using a 45 deg elbow as an example to verify the formula given in B16.9. An accurate input would help me model correctly. This is an existing bend. I am NOT fabricating new one now. I downloaded a free copy of B16.9 from internet. I will avoid posting it next time. Thanks and Regards,Pavan Kumar The standard radius for that 45 degree fitting is 84.5 mm; for the 90 degree fitting the radius is 76 mm. It seems like the off-standard fitting could be either one of those or some other radius. If it is a highly stressed area you may have to either make an accurate measurement from the installation or to try likely limits on different runs of the analysis. When I apply that given:B, find:radius, formula to the 3D version of the 45 degree 2 inch fitting, I get the same radius as the 90 fitting (152 mm); I don't know why the standard for smaller radii don't have consistent radii. Do you want (need) a uniform bent elbow, or one with a variable inlet and outlet tangent (straight) length? Are you placing the specialized pipe bend as a macro (assembly) with an original at the workpoint on the bend's centerline arc, at the inlet CL, or on the point of rotation? For the analysis I would just use whatever figure ASME B 16.9 calculates. If this is going to impact your results by 3mm on a 2" elbow I think you've got other problems. Sometimes there is no perfect answer, so you need to state your assumption (following the calculation in B16.9), stick the dimension in and then run the analysis. Remember - More details = better answersAlso: If you get a response it's polite to respond to it. Hi All, I got the problem solved by measuring the "B' dimension of the bend and inputting in the model. Thanks and Regards,Pavan Kumar Hi All, I found the 45 Deg and 90 Deg elbows in my piping model are actually Mitre Bends. Now I need to get the standard dimensions for 45 and 90 Deg Mitre bends. I mainly want the values of the standard radius of bend by pipe size. It would be helpful if anyone can point me to a reliable source. Thanks and Regards,Pavan Kumar How to Make 90 and 45 Miter Cut Elbow with formula90 3 4 45 2 3 How to Make a 90 Degree Miter Cut Elbow Formula 3 cuts and 4 pieces or as many cuts as you wantHow to Make a 45 Degree Miter Cut Elbow Formula In 2 cuts and 3 pieces or as many cuts as you want 90 degree elbow 3 cut 4 piece90 degree 3 = 30 degreeRadius calculation formula1080 25.4 = 42.5 38.1 = 1620 Formula for Calculating Miter Cut Elbow Middle Piece and Side Piece90 degree 3 = 30 degreeMiter cut degree 30 2 = 15Elbow radius 1600 2 = 3200Sin(15) 3200 = 828 Middle Piece828 2 = 414 mm Side Piece 16 How to mark 16 center line on top of pipe 0 16 After marking 0 degree middle piece above the pipe, do ground marking on both sides as far as the dimension of middle piece isAnd after that 16 center line marking has to be doneAnd above all the center line, write the degree as it is written Miter cut back formulaMiter cut degree 30 2 = 15tan(15) pipe OD 1080 = 289 2 = 144.590 144.5 mm - 90 degree position cutback is 144.5 mmAnd for marking on the rest of the center line, we will calculate with different degrees through sine theta.Sin(22.2) 144.5 = 55.2 22.5 center line positionSin(45) 144.5 = 102 45 center line positionSin(67.5) 144.5 = 133 67.5 center line positionSin(90) 144.5 = 144.5 90 center line position In this way, the formula is to be used no matter what degree of miter band is to be made and no matter how much cut is to be made in90 60 45 degree miter cut elbow 45 degree miter elbow formula 2 cut 3 piece45 2 = 22.5 2 = 11.25 degreeElbow radius 1600 use same 90 degree radiusRadius 1600 2 = 3200sin(11.25) 3200 = 624 mm middle piece624 2 = 312 mm side pieceMiter cut back formula 45 degree 2 cut45 2 = 22.5 degreePipe OD 1080 mmtan (22.5) 1080 = 447 2 = 223.6 mm cut back marking To understand the basic knowledge of an elbow, the determination of an elbow must know the diameter, radius, and angle of the elbow, and some have a straight section. According to the angle, there are 45 degree pipe elbow, 90 and 180 , which are the most commonly used, and other abnormal angle bends, such as 60, are also included according to the engineering needs. The angle of the elbow needs to be measured with a tool, and only 180 degrees, 90 degrees, and 45 degrees can be seen.Jianzhi offers a wide selection of pipe fittings, including the 3/4 street 90, short radius elbow, 90 degree elbow pipe, 90 degree elbow conduit, 1 2 90, and 6 inch 90 degree elbow. These high-quality fittings are essential for creating precise angles and bends in piping systems, ensuring efficient flow and easy installation. Whether you need a tight short radius elbow for space-constrained applications or a larger 6 inch 90 degree elbow for industrial systems, Jianzhi provides reliable and durable solutions to meet the specific requirements of any project. Jianzhi offers a comprehensive selection of 90 fittings, designed to facilitate seamless changes in direction within piping systems. These fittings are crafted from high-quality malleable iron and undergo a rigorous manufacturing process to ensure durability and reliability. Ideal for both residential and industrial applications, Jianzhi 90 fittings provide optimal flow characteristics and are easy to install, making them a practical choice for any plumbing or heating project. With a commitment to quality and customer satisfaction, Jianzhi continues to be a trusted supplier for all your fitting needs.Formula for calculating the size of the elbow:1. 5 times the center height of the elbow = path * 1.524, in fact, is the path * multiple, the number after the decimal point of the resulting result is round to the nearest integer, such as the path of 219 is 200. The center height is 200 1.524 304.8, take 305; if the path of 114 is 100, the center height is 100 1.524 152.4, take 152.(suitable for DN100 and above elbow curvature radius algorithm for convenient and fast calculation). Stamp height = center height + radius of elbow, such as 1.5 times diameter 219 elbow height = 305 x 219 2 305 109.5 414.5. The outer arc length = (center height + radius) * 3.14 2 360 * degrees, that is, (stamp height) * 3.14 2 360 * degrees, from which the outer arc length of 90 degree fitting elbow can be calculated = poke height * 3.14 2. Inner arc length = (center height-radius) * 3.14 2 360 * degrees. The blanking length of the elbow = the height of the center of the elbow * 3.14 2 * the outer diameter of the elbow / pipe diameter + (pipe wall thickness * 3) + machining allowance, such as using 180 8 pipe blanking, pushing 273 elbow, the above formula can be calculated:The blanking length is 381 1.57 273 / 180 / 24 / 931.22 mm + processing allowance.The calculation method for the short pipe in the middle of two 45 degree bends is as follows: short connection length = height difference x 1.4142 0.8284R, R = bending radius of elbow (that is, the length of a 90 elbow fitting bending head). First of all, calculate the center height. Then the central length minus the height of the elbow on both sides is the short pipe length in the middle.The elbow requires the radius of curvature to be controlled. For example, if the radius length is 1.5D, the curvature radius must be within the required tolerance range. Because most of these pipe fittings are used for welding, in order to improve the welding quality, the end of the car must be inserted into a groove, leaving a certain angle, with a certain edge. This requirement is also relatively strict, depending on how thick the edge is, how much angle and deviation range are specified, and the geometric of the pipe fittings.Formula for calculating center to end distance of such elbows is as follows:For standard degrees of pipe elbows such as 45 and 90, elbow center to end dimensions are available in standard pipe charts. But many times, custom elbow angles are required at site which should be cut from standard 45 or 90 elbows.The center to end dimension for 90 Long Radius elbows, as listed in ASME B16.9 dimension tables, is equal to the elbows radius. Tan(90/2) i.e. Tan 45 is 1, which is why.Typically, 90 degree standard elbows are used to cut custom elbow angles between 45 and 90 degrees. However, elbows with custom angles less than 45 degrees are typically cut from the 45 degree standard elbow. To find the elbow radius for a conventional 45-degree elbow, divide the center-to-end measurement given in the dimension tables by Tan (22.5). The elbow angle for custom degrees can then be obtained using the aforementioned formula.Same procedure applies to 3D elbows.Technical specifications needed to make elbows:Controlling the radius of curvature is necessary. For instance, the radius of curvature needs to fall within the necessary tolerance if the radius is 1.5D. Since the majority of these fittings are used for welding, the ends are car-grooved to leave a specific angle and edge. This requirement is more stringent since the edge must be thick, the angle must be determined, and the deviation range must be observed. Certain provisions have far larger geometric measurements than fittings. The elbows mechanical characteristics and surface quality are essentially the same as those of the tubes. The pipe that needs to be joined has the same steel material for ease of welding.For example, if the elbow dimensions are 10 inches by 90 degrees, the path D is 250 and the center height is 250 * 1.524 = 381. The algorithm for calculating the radius of curvature of DN100 and above is quick and simple to use. 1.1.5 times the center of the elbow height A = diameter * 1.524; in fact, the path diameter D * multiples. The decimal number of the result will be rounded to the nearest integer number.2.Poke height is equal to the center height plus the elbows radius; for example, a 10-inch, 90-degree elbow with a 273-diameter would have 305+273/2=441.5 in Poke height.3.The outer arc length of the 90 degree elbow can be computed as follows: stamp High *3.14/2. The outside arc length of the elbow is equal to (center height + radius) * 3.14 * 2/360 * degrees, or (poke height) * 3.14 * 2/360 * degrees.4.(Central height radius) * 3.14 * 2/360 * degrees is the length of the inner arc.Weight of elbow = (outer diameter-wall thickness) * wall thickness * 0.02466 * length.1) The outer diameter is not equal to the nominal diameter, equal to the outer diameter at the groove of series 2.2) length = 2 R * angle / 360, the calculated weight length of the elbow is the arc length corresponding to the angle of the elbow in the circumference of R as the radius.3) R is the bending radius of the elbow.AUTHORSJianzhi pipe fittingSpecialist Malleable Iron Fittings Manufacturer Jianzhi pipe fittingsgalvanized pipe fittings catalogblack pipe fittings catalog 3 2 90 45 The formula for marking in Miter Band Elbow 3 cut and 2 cut is givenFormula for making 90 degree miter band elbow and 45 degree miter band elbow 90 3 4 90 degree 8 1.5 D 304.8 mm elbow radius dimension 304.8 mm90 degree elbow marking formula in 3 cuts 4 pieces90 degree 8 inch elbow is 1.5 D elbow radius 304.8 mm elbow radius 304.8 2 = 609.690 3 cut = 30 degree30 2 = 15 degreeSin(15) 609.6 = 157.7 mm middle piece157.7 2 = 78.8 mm Side piece90 C 90 Degree Miter Band Cut Back Formula C Dimension8 inch Pipe OD 219 mmtan(15) 219 = 58 2 = 29 mm C 90 90 degree miter band pipe length198 + 198 + 99 + 99 = 594 pipe length45 2 3 90 45 elbow radius dimension 304.8 mmFormula for marking 45 degree elbow in 2 cuts 3 piecesThe formula that is used to make 90 degree miter band, the same formula will be used to make 45 degree elbow45 degree 8 inch elbow is 1.5 D elbow radius 304.8 mmelbow radius 304.8 2 = 609.6 45 2 = 22.5 degree22.5 2 = 11.25 degreeSin(11.25) 609.6 = 118.9 mm middle piece118.9 2 = 59.4 mm Side piece45 C 45 Degree Miter Band Cut Back Formula C Dimension8 inch Pipe OD 219 mm45 2 = 22.5 degreetan(22.5) 219 = 90.7 2 = 45.3 mm C In Piping design, sometimes you may have to trim the standard elbow into nonstandard trimmed elbow. This will result additional work and cost to the project.Normally Piping Designers will avoid and should avoid this situation. But if it is unavoidable or the designer thinks that to make the orthographic angle it may require more standard elbows, then he choose to to trim the elbow to the desired angle. Trimming the Elbow means, trimming the 90 degree or 45 degree elbow to reduced angle elbow by cutting the elbow and grinding it and performing end preparation.Note that you want to make 50 degree elbow, then you have only one option to trim the 90 degree standard elbow. Whereas your desired elbow angle is 30 degree, you will have two options. One is to cut the 90 degree elbow to 30 degree. Second option is to cut the 45 degree elbow in to 30 degree elbow. If the desired angle is less than 45 degree it is economical to cut the 45 degree elbow. After trimming the elbow it is difficult to measure the angle for the pipe fitter, especially if it is very odd figure. So if the designer can provide the detail in the piping isometric then it will be very useful.For designers it is difficult to do the manual calculations. So we are providing Excel sheet solution for elbow calculations. You can download it from the below link.I hope it will be useful and expecting your comments. You can share this page to your fellow piper by clicking the sharing buttons at the end of this page.Download 90 45 degree Elbow Trimming Excel sheet Subscribe to get the latest posts sent to your email. Standard drawing of ASME B16.9 3D radius elbow.According to ASME B16.9-2018, the standard 3D radius elbow may be furnished in 45 or 90. Compared to the long radius elbow, its center-to-end dimension is much larger, which is double the length of a corresponding L/R elbow. The center-to-end dimension can be calculated as 3 x NPS in inch unit. Thus, it provides much smoother flow characteristics.Dimensions NPSO.DmminchAmminchBmminch 3/426.71.05572.25240.94 133.41.32763.00311.25 1-1/442.21.66953.75391.56 1-1/248.31.901144.50471.88 260.32.381526.00632.50 2-1/273.02.881907.50793.12 388.93.502299.00953.75 3-1/2101.64.0026710.501114.38 4114.34.5030512.001275.00 5141.35.5638115.001576.19 6168.36.6245718.001897.44 8219.18.6261024.002529.94 10273.010.7576230.0031612.44 12323.812.7591436.0037814.88 14355.614.00106742.0044117.38 16406.416.00121948.0050519.88 18457.018.00137254.0056822.38 20508.020.00152460.0063224.88 22559.022.00167666.0069427.31 24610.024.00182972.0075729.81 26660.026.00198178.0082132.31 28711.028.00213484.0088334.75 30762.030.00228690.0094637.25 32813.032.00243896.00101039.75 34864.034.002591102.00107342.25 36914.036.002743108.00113544.69 38965.038.002896114.00120047.25 401016.040.003048120.00126449.75 421067.042.003200126.00132652.19 441118.044.003353132.00138954.69 461168.046.003505138.00145357.19 481219.048.003658144.00151659.69 *NPS: Nominal Pipe Size; O.D: Outside Diameter at Bevel; A: Center-to- End, 90-deg Elbows; B: Center-to- End, 45-deg Elbows. *Click to view dimensions of other ASME B16.9 standard fittings.Standard drawing of ASME B16.9 3D radius elbow.According to ASME B16.9-2018, the standard 3D radius elbow may be furnished in 45 or 90. Compared to the long radius elbow, its center-to-end dimension is much larger, which is double the length of a corresponding L/R elbow. The center-to-end dimension can be calculated as 3 x NPS in inch unit. 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But many times, custom elbow angles are required at site which should be cut from standard 45 or 90 elbows.Formula for calculating center to end distance of such elbows is as follows:Elbow length in mm = Tan(Elbow Angle/2) X Elbow Radius in mmWhere:For 90 Long Radius elbows, center to end dimension given in dimension tables of ASME B16.9 is same as radius of elbow. This is because Tan(90/2) i.e. Tan 45 is 1.Normally custom elbow angles from 45 degree to 90 are cut from 90 degree standard elbow. But for custom elbow angles smaller than 45 degree, elbow is normally cut from existing standard 45 degree elbow. Center to end dimension given in dimension tables for 45 degree elbow must be divided by Tan(22.5) to get elbow radius for standard 45 degree elbow. Then we can use above formula to get elbow angle for custom degrees.Same procedure applies to 3D elbows.Example 1:Calculate elbow center to end dimension for 4 inch nominal pipe diameter elbow at 60 degree angle, cut from 90 degree LR elbow.From ASME B16.9, center to elbow dimension for 4 in elbow is 152 mm.Length = Tan (60/2) X152Length =0.57735027 X 152Length = 87.757 i.e. 88 mm Approx.Example 2:Calculate elbow center to end dimension for 2inch nominal pipe diameter elbow at 30 degree angle, cut from 45degree LR elbow.From ASME B16.9, center to elbow dimension for 2inch 45 degree elbow is 35mm.Radius of elbow = 35/Tan(22.5)Radius of elbow = 35/0.4142 = 84.5 mmLength = 0.26795 X84.5Length = 22.64i.e. 23mm Approx. Mitered cut elbow 45 with PDF cut 2 cut 3 cut 4 cut 5 cutPipe miter cut bend fabrication with PDF chartMiter cut pipe bend cutting with PDF chartMiter cut pipe bend 45 cut back chart 2 3 4 6 8 10Miter cut Elbow 2D Radius L R 2 cut 3 piece Miter pipe bend 45 degree3 cut 4 piece Miter pipe bend 45 degree4 cut 5 piece Miter pipe bend 45 degree5 cut 6 piece Miter pipe bend 45 degrePDF - What dimensions have been taken to make miter cut pipe band through PDF chartAnd how many schedules of pipe have been takenPipe thickens stranded sizeElbow 45 degreeElbow Radius L R 2 D2D radius elbow center calculation formulaDegree 90 2 = 45tan(45) 2 25.4 = 50.8Any degree miter cut bend use sem formula 2D radius8 center line16 center linePipe size 2 3 4 6 8 10 PDF Elbow 45 degreePipe size. 2 3 4 6 8 10(1) C = number of center line 8 and 16(2) 2 cut 3 piece 1 middle piece 2 side piece(3) 3 cut 4 piece 2 middle piece 2 side piece(4) 4 cut 5 piece 3 middle piece 2 side piece(5) 5 cut 6 piece 4 middle piece 2 side piecemiter cut elbow demo middle piece side piece45 miter cut elbow pdf 2 to 10 45 Deg Elbow is a type of elbow used to connect two pipes to change the direction of fluid flow in the pipeline. The denotation of Deg is the abbreviation for degrees therefore the 45 Deg means an ASME B16.9 elbow 45 degree fitting. 45 Deg Elbow Dimensions vary according to the standards. There are diameters ranging from inches all the way up to 60 inches in two standards. The 45 Deg Elbow Weight depends on the length, material make, diameter and the radius of the elbow. Piping elbow center formula 1D 1.5D 2D 3D 4D 5D 6D any degree any degree elbow Centre calculation formula Long radius elbow Centre formula short radius elbow Centre formula 1D radius elbow Centre formula 1.5D radius elbow Centre formula 2D radius elbow Centre formula 3D radius elbow Centre formula 4D radius elbow Centre formula 5D radius elbow Centre formula 6D radius elbow Centre formula how to find elbow Centre any radius 10 to 90 long radius and short radius elbow center formula how to check pipe elbow 1D 1.5D 2D 3D 4D 5D 6D 600 mm 800mm 1000 mm D If the center of an elbow is 600mm 800mm 1000mm then how will we find out which D it is 90 10 = This formula is given for elbow center from 90 degrees to 10 degreesThis formula contains both long radius elbow andshort radius elbow formulaInches formula has to be done = elbow center will come out elbow Degree short radius long radius90 25.4 38.185 23.27 34.980 21.31 31.975 19.49 29.2370 17.78 26.265 16.18 24.2760 14.66 21.955 13.22 19.850 11.84 17.745 10.52 15.740 9.13 13.835 8.00 12.0130 6.80 10.225 5.63 8.420 4.47 6.715 3.34 5.0110 2.22 3.3 How to use this formula long radiusExamplepipe inch 38.1 = LR elbow center 90 Degree4 pipe 4 38.1 = 152.4 mm elbow center LR 90 DegreeHow to use this formula short radius 90 degreeExample4 pipe 4 25. 4 = 101.6 mm elbow center SR 90 DegreeHow to use this formula short radius 45 degreeExample4 pipe 4 10.52= 42 mm elbow center SR 45 Degree>> D how to find pipe elbow radius 1D 1.5D 2D 3D 4D 5D 6Dhow to find piping elbow 3.9 D elbow radiushow to find piping elbow 3.9 D elbow radius90 Long radius elbow center 90 short radius elbow centerExample 600 mm D If the center of an elbow dimension is 600 mm, then how do we know which D it is?Elbow size 6 inchElbow center dimension 600 mm6 25.4 = 152.2 mm600 152.2 = 3.9 D elbow 800 mm D If the center of an elbow is 800 mm, then how do we know which D it is?Elbow size 6 inchElbow center dimensions 800 mm6 25.4 = 152.2 mm800 152.2 = 5.2 D elbow 1000 mm D If the center of an elbow is 1000 mm, then how do we know which D it is?Elbow size 6 inchElbow center dimension 1000 mm6 25.4 = 152.2 mm1000 152.2 = 6.5 D elbow - - D The same size album is shown by doing different calculations at three placesThis way D can have different radius

45 degree elbow center formula in mm. 45 degree elbow offset formula. 45 degree elbow center formula calculator. Elbow centre 45 degree elbow center formula. 45 degree elbow dimensions formula. 45 degree elbow formula calculator. Pipe fitting formula for 45 degree elbow. 45 degree elbow take off formula. 45 degree elbow formula in mm. 45 degree elbow radius formula. 45 degree elbow center formula. 45 degree elbow formula pdf.