z dimension method

Introduction

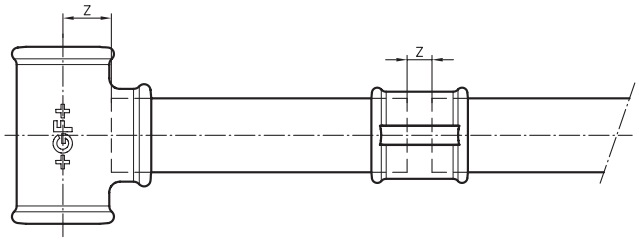
The z dimension installation method, developed by Georg Fischer in conjunction with experienced installers of domestic and industrial piping systems, has been proving its worth for years in practical applications. The method offers a basis for efficient planning, preparation for work and preliminary assembly and can result in savings in time and effort:

- staff use can be reliably planned
- administrative work more easily completed
- calculation and costing simplified
- optimised machine use
- reduced storage requirement of own fittings and pipes
- optimisation of transportation
- the pipeline layout can easily be recognized by the pipeline diagram.

z dimension

The z dimension - also called «laying length» is the middle distance between

- installed pipe end and the axis of the fitting or
- the ends of two installed pipes



The z dimensions are calculated from the overall lengths less the average length of engagement. z dimensions were introduced by Georg Fischer with a view to rational planning and preparation for work.

Requirements

The z dimension method relies on:

- knowledge of the pipeline layout
- knowledge of the space requirements of valves, appliances and their locations.
- co-ordination with architect, planner, works management and the other businesses who work may have an influence on the pipeline layout.
- use of fittings with consistant dimensional accuracy, such as **Georg Fischer's**.
- Pipe threads conforming to standards, implying combined exact adjustment of the threading machine.

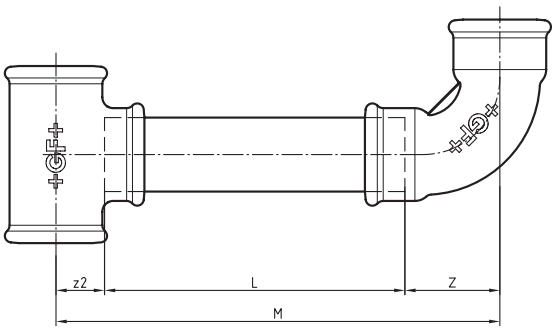
z dimension and measurement procedure

z dimension and uniform measuring procedure are the core of the Georg Fischer installation method.

The z dimension is the pipe installers «design dimension». With its help he can easily calculate the exact pipe length between fittings and/or valves. The principle of

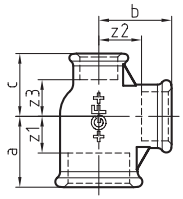
standardised measuring centre - centre = M

forms the basis for determining and using the z dimension



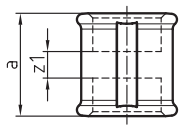
Pipe length L = M - (z2 + z)

The z dimension is calculated as the difference between «dimension face - middle» (a, b or c) and length of engagement of the pipe thread.

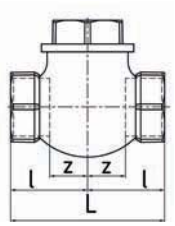


For fittings, e.g. tee no. 130, reduced branch and run:
z1 = a-length of engagement
z2 = b-length of engagement
z3 = c-length of engagement

The fitting‘s bead deliberately put on the Georg Fischer fittings can be used as a measuring aid.



Exception - socket no. 270, 271:
z1 = a-2 length of engagement



For valves:
z = l - length of engagement
If the total overall length is indicated by L,the following applies:

z = L/2 - length of engagement

Pipe threads

(see pages 69pp)

Another pre-condition for using the **Georg Fischer** z dimension method is that the pipes are cut with the correct standardised threads. This assures that all pipes with the connecting pieces can be screwed together equally far and the dimensions M taken as a base are also correct after installation.

The pipe thread must be cut clean and to EN 10226-1 standard (or ISO 7-1 with a taper of 1:16). The taper pipe thread also produces a strengthening of the pipe residual wall in the second half of the thread.
Unequal thread lengths influence the centre-centre dimension M and have a negative effect particularly for straight section with several branches.

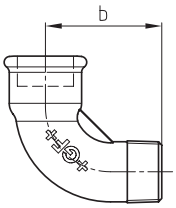
Note:
The centre-centre dimension (M) can show a permitted tolerance of ± 1/2 thread.

Length of engagement

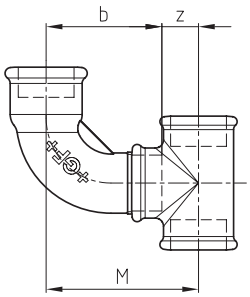
The nominal engagement length of the pipe external thread are (rounded values):

Joint size	Average length of engagement in mm
1/8	**7**
1/4	**10**
3/8	**10**
1/2	**13**
3/4	**15**
1	**17**
11/4	**19**
11/2	**19**
2	**24**
21/2	**27**
3	**30**
4	**36**

Examples of use

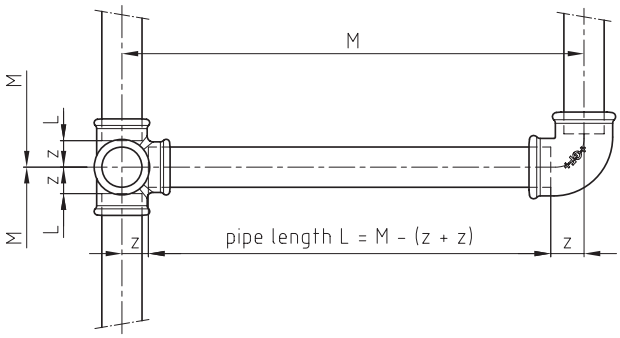


b is the distance of internal thread centre to face of the external thread.

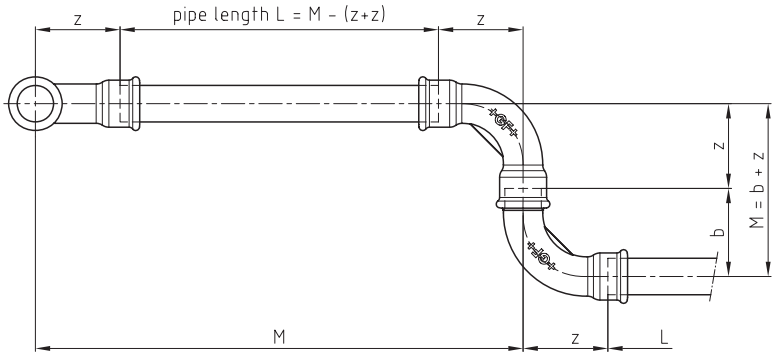


For fittings combinations with internal and external threads the sum of z + b produces the axial distance M:

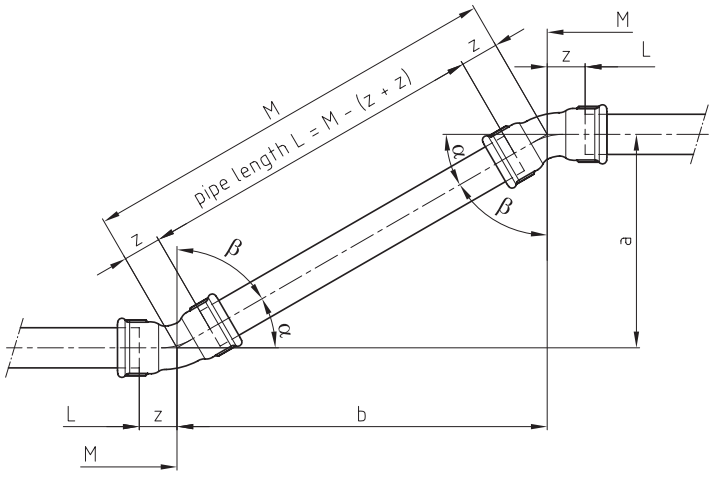
M = z + b



Principle of the z dimension installation method:
uniform measuring centre - centre = M



Exact pipe thread lengths produce exact M dimensions.



The M dimension for sloping pipeline parts is easily calculated with the factor or numerical table.

Calculation of the length of sloping pipelines

Parts of a pipeline diverging from the horizontal and verticals can only be accurately marked out in a few cases. Accurate results are obtained by rectangular measuring and determining the remaining (triangle) side lengths.

There are two possibilities for calculating the pipe lengths by means of the z dimensions:

1.Factor table

given:		a		b	
		Factor for		Factor for	
α	β	b	c = M	a	c = M
75°	15°	0,268	1,035	3,732	3,864
60°	30°	0,577	1,155	1,732	2,000
45°	45°	1,000	1,414	1,000	1,414
30°	60°	1,732	2,000	0,577	1,155
15°	75°	3,732	3,864	0,268	1,035

- α = given angle
- β = accompanying angle
- angle-dependent factors multiplied with the given dimension a or b = sought dimensions b and c or a and c.

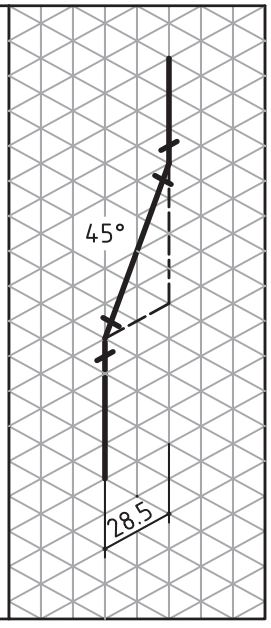
Example:

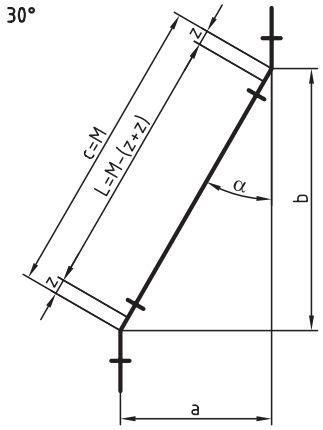
a = 28,5

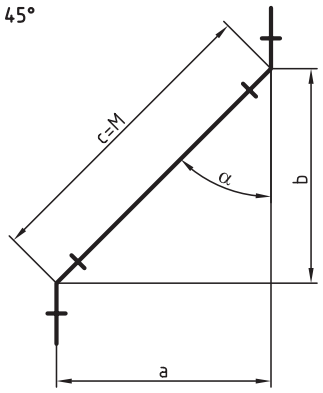
α = 45°

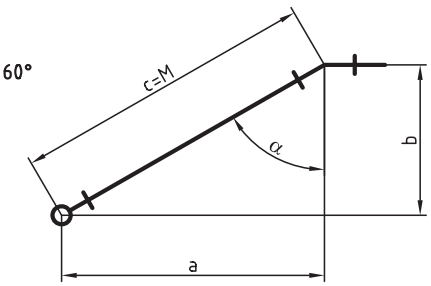
c = M = 28,5 x 1,414

= 40,3





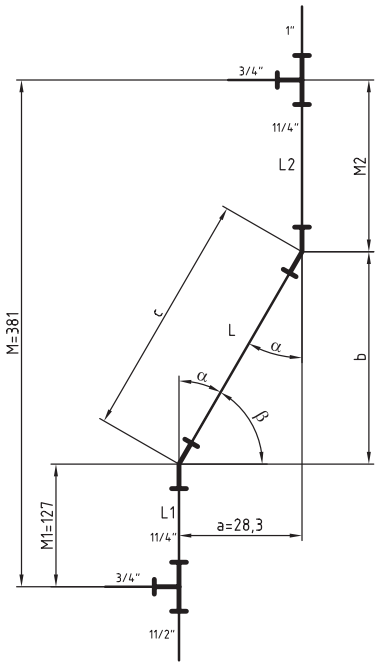




2. Numerical table

see table page 86.

Example:
Tier in a rising train of pipes. The dimensions M, M_1 and a are taken on the site, the remainder are to be determined from the table.



Planned fittings (from bottom to top):
1 tee no. 130 - 11/2 x 3/4 x 11/4
2 bends no. 51 - 11/4
1 tee no. 130 - 11/4 x 3/4 x 1

The projection a is 28.3 cm = 283 mm.
283 consists of 3 + 80 + 200. In columns b and c we find the partial values belonging to 3, 80 and 200 for the perpendiculars b and the slopes c.

In this case lengths b and c result from adding up the partial values α = 30°, β = 60°.

a (known)	b	c
3 mm	5,2 mm	6 mm
80 mm	138,6 mm	160 mm
200 mm	346,4 mm	400 mm
283 mm	**490,2 mm**	**566 mm**
or a=28,3 cm	b=49,0 cm	c= 56,6 cm

Pipe length L = c - (2 x z dimension of bend no. 51 - 11/4)
z dimension bend = 33 mm
L = 56.6 - (2 x 3.3) = 56.6 - 6.6 = 50 cm

Pipe length L_1 = M_1 - (sum of the z dimension of tee piece no. 130 - 11/2 x 3/4 x 11/4 and bend no 51 - 11/4)
z dimension tee no. 130 (on 11/4 exit) = 17 mm
z dimension bend = 33 mm
L_1 = 127 - (1.7 + 3.3) = 127 - 5 = 122 cm

M_2 = M - (M_1 + b), M_1 = 127, b = 49
M_2 = 381 - (127 + 49) = 381 - 176 = 205 cm

Pipe length L_2 = M_2 - (sum of the z dimensions of bend no. 51 - 11/4 and tee piece no. 130 - 11/4 x 3/4 x 1)
z dimension bend = 33 mm
z dimension tee no. 130 (on the 11/4 exit) = 17 mm
L_2 = 205 - (3.3 + 1.7) = 205 - 5 = 200 cm

Table to calculate the lengths of sloping pipes (see text pages 84-85)

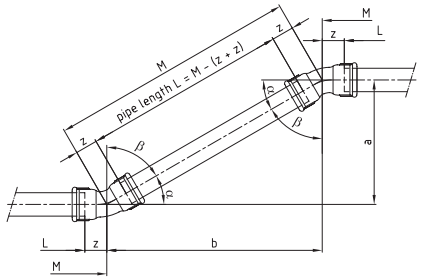
α	88,5°		87°		85°		80°		75°		70°		60°		45°		30°		15°		α
β	1,5°		3°		5°		10°		15°		20°		30°		45°		60°		75°		β
a	b	c	b	c	b	c	b	c	b	c	b	c	b	c	b	c	b	c	b	c	a
1	0,0	1,0	0,1	1,0	0,1	1,0	0,2	1,0	0,3	1,0	0,4	1,1	0,6	1,2	1	1,4	1,7	2	3,7	3,9	1
2	0,1	2,0	0,1	2,0	0,2	2,0	0,4	2,0	0,5	2,1	0,7	2,1	1,2	2,3	2	2,8	3,5	4	7,5	7,7	2
3	0,1	3,0	0,2	3,0	0,3	3,0	0,5	3,0	0,8	3,1	1,1	3,2	1,7	3,5	3	4,2	5,2	6	11,2	11,6	3
4	0,1	4,0	0,2	4,0	0,3	4,0	0,7	4,1	1,1	4,1	1,5	4,3	2,3	4,6	4	5,7	6,9	8	14,9	15,5	4
5	0,1	5,0	0,3	5,0	0,4	5,0	0,9	5,1	1,3	5,2	1,8	5,3	2,9	5,8	5	7,1	8,7	10	18,7	19,3	5
6	0,2	6,0	0,3	6,0	0,5	6,0	1,1	6,1	1,6	6,2	2,2	6,4	3,5	6,9	6	8,5	10,4	12	22,4	23,2	6
7	0,2	7,0	0,4	7,0	0,6	7,0	1,2	7,1	1,9	7,2	2,5	7,4	4,0	8,1	7	9,9	12,1	14	26,1	27,0	7
8	0,2	8,0	0,4	8,0	0,7	8,0	1,4	8,1	2,1	8,3	2,9	8,5	4,6	9,2	8	11,3	13,9	16	29,9	30,9	8
9	0,2	9,0	0,5	9,0	0,8	9,0	1,6	9,1	2,4	9,3	3,3	9,6	5,2	10,4	9	12,7	15,6	18	33,6	34,8	9
10	0,3	10,0	0,5	10,0	0,9	10,0	1,8	10,2	2,7	10,4	3,6	10,6	5,8	11,5	10	14,1	17,3	20	37,3	38,6	10
20	0,5	20,0	1,0	20,0	1,7	20,1	3,5	20,3	5,4	20,7	7,3	21,3	11,5	23,1	20	28,3	34,6	40	74,6	77,3	20
30	0,8	30,0	1,6	30,0	2,6	30,1	5,3	30,5	8,0	31,1	10,9	31,9	17,3	34,6	30	42,4	52,0	60	112,0	115,9	30
40	1,0	40,0	2,1	40,1	3,5	40,2	7,1	40,6	10,7	41,4	14,6	42,6	23,1	46,2	40	56,6	69,3	80	149,3	154,5	40
50	1,3	50,0	2,6	50,1	4,4	50,2	8,8	50,8	13,4	51,8	18,2	53,2	28,9	57,7	50	70,7	86,6	100	186,6	193,2	50
60	1,6	60,0	3,1	60,1	5,2	60,2	10,6	60,9	16,1	62,1	21,8	63,9	34,6	69,3	60	84,9	103,9	120	223,9	231,8	60
70	1,8	70,0	3,7	70,1	6,1	70,3	12,3	71,1	18,8	72,5	25,5	74,5	40,4	80,8	70	99,0	121,2	140	261,2	270,5	70
80	2,1	80,0	4,2	80,1	7,0	80,3	14,1	81,2	21,4	83,8	29,1	85,1	46,2	92,4	80	113,1	138,6	160	298,6	309,1	80
90	2,4	90,0	4,7	90,1	7,9	90,3	15,9	91,4	24,1	93,2	32,8	95,8	52,0	103,9	90	127,3	155,9	180	335,9	347,7	90
100	2,6	100,0	5,2	100,1	8,7	100,4	17,6	101,5	26,8	103,5	36,4	106,4	57,7	115,5	100	141,4	173,2	200	373,2	386,4	100
200	5,2	200,1	10,5	200,3	17,5	200,8	35,3	203,1	53,6	207,1	72,8	212,8	115,5	230,9	200	282,8	346,4	400	746,4	772,7	200
300	7,9	300,1	15,7	300,4	26,2	301,1	52,9	304,6	80,4	310,6	109,2	319,3	173,2	346,4	300	424,3	519,6	600	1.119,6	1.159,1	300
400	10,5	400,1	21,0	400,5	35,0	401,5	70,5	406,2	107,2	414,1	145,6	425,7	230,9	461,9	400	565,7	692,8	800	1.492,8	1.545,5	400
500	13,1	500,2	26,2	500,7	43,7	501,9	88,2	507,7	134,0	517,6	182,0	532,1	288,7	577,4	500	707,1	886,0	1.000	1.866,0	1.931,9	500
600	15,7	600,2	31,4	600,8	52,5	602,3	105,8	609,3	160,8	621,2	218,4	638,5	346,4	692,8	600	848,5	1.039,2	1.200	2.239,2	2.318,2	600
700	18,3	700,2	36,7	701,0	61,2	702,7	123,4	710,8	187,6	724,7	254,8	744,9	404,1	808,3	700	989,9	1.212,4	1.400	2.612,4	2.704,6	700
800	21,0	800,3	41,9	801,1	70,0	803,1	141,1	812,3	214,4	828,2	291,2	851,3	461,9	923,8	800	1.131,4	1.385,6	1.600	2.985,6	3.091,0	800
900	23,6	900,3	47,2	901,2	78,7	903,4	158,7	913,9	241,2	931,8	327,6	957,8	519,6	1.039,2	900	1.272,8	1.558,8	1.800	3.358,8	3.477,3	900
1.000	26,2	1.000,3	52,4	1.001,4	87,5	1.003,8	176,3	1.015,4	267,9	1.035,3	364,0	1.064,2	577,4	1.154,7	1.000	1.414,2	1.732,1	2.000	3.732,1	3.863,7	1.000
Example: the b and c belonging to a = 283 are the product of the b and c for 3.80 and 200															b and c for every other three figure number can be calculated in the same way.						
3	0,1	3,0	0,2	3,0	0,3	3,0	0,5	3,0	0,8	3,1	1,1	3,2	1,7	3,5	3	4,2	5,2	6	11,2	11,6	3
80	2,1	80,0	4,2	80,1	7,0	80,3	14,1	81,2	21,4	82,8	29,1	85,1	46,2	92,4	80	113,1	138,6	160,0	298,6	309,1	80
200	5,2	200,1	10,5	200,3	17,5	200,8	35,3	203,1	53,6	207,1	72,8	212,8	115,5	230,9	200	282,8	346,4	400,0	746,4	772,7	200
283	7,4	283,1	14,9	283,4	24,8	284,1	49,9	287,3	75,8	293,0	103,0	301,1	163,4	326,8	283	400,1	490,2	566,0	1.056,2	1.093,4	283

α = given angle

β = accompanying angle

a = given dimension

in the following boxes = the sought values b and c belonging to a, α and β



Clear outlining of the pipework

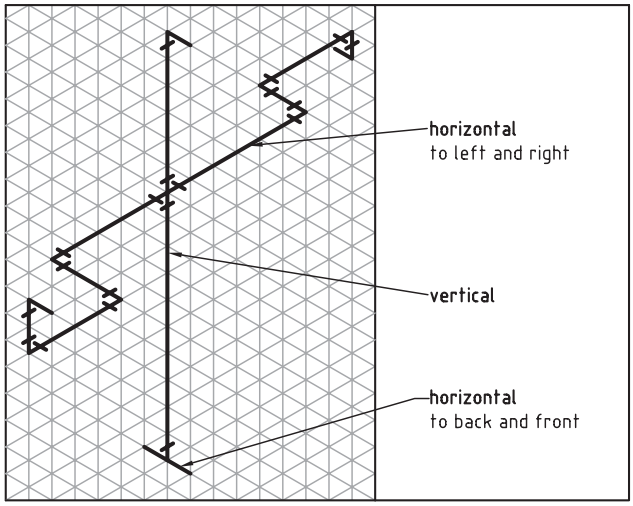
The isometric diagrams of pipes and horizontal projections are ideal for quick preparation when using the Georg Fischer installation method.

The drawing of the pipework should be given in a simple but effective way. The diagrams can be sketched by the installer himself on the spot.

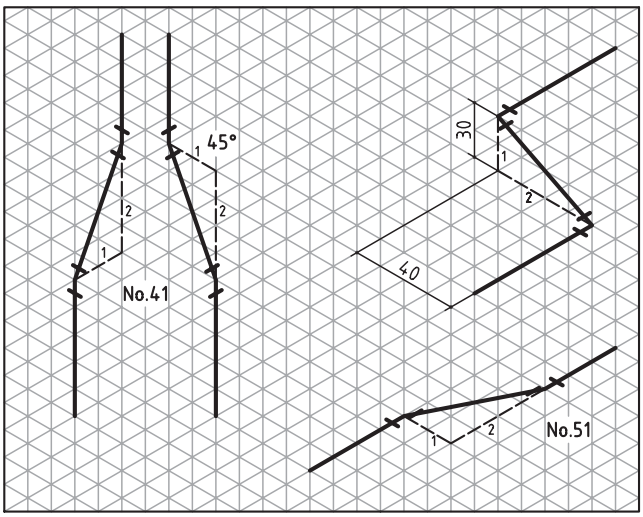
This type of representation enables quick outlining with no aids such as ruler, set square etc. either directly on the site of installation or according to a plan. The pipework system to be installed is always clearly recognisable with all necessary fittings, valves etc.

The 30° pipeline diagram (3D plan) is intentionally not drawn to scale, i.e. long pipe sections are made shorter, short pipe sections are to a large extent made somewhat longer. In this way even extensive pipe systems can be represented on an A4 sheet of paper.

Pipelines running at right angles to each other are drawn as shown below:

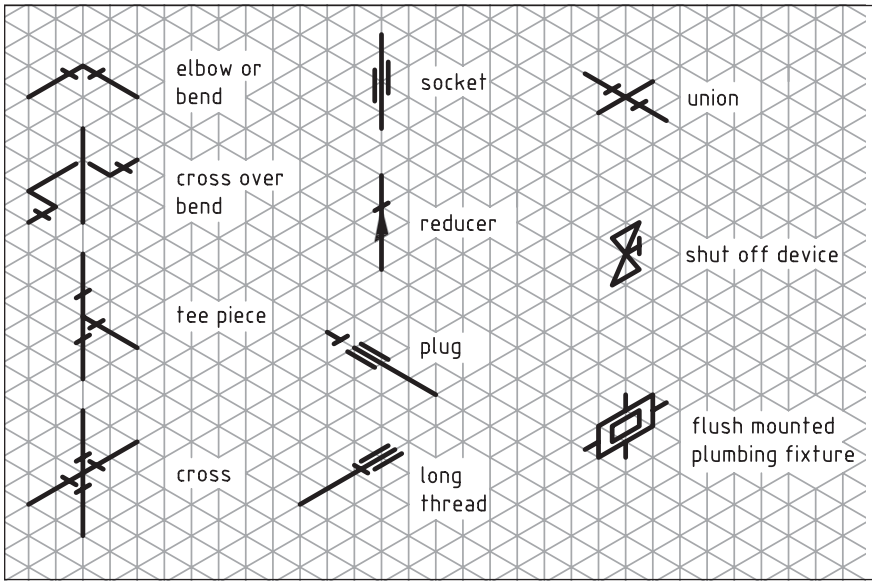


Pipelines sloping in relation to each other are drawn as shown in the example below:



Changes of direction are shown in the ratio of 2:1 or 1:2 irrespective of angles and dimensions. By drawing in the triangle as an aid the change of direction is set accurately. The divergence is established by giving the type of fitting (catalogue no. or angle) or by dimensioning.

Fittings and/or jointing points can be marked with a small dash, valves with the standardized symbols.



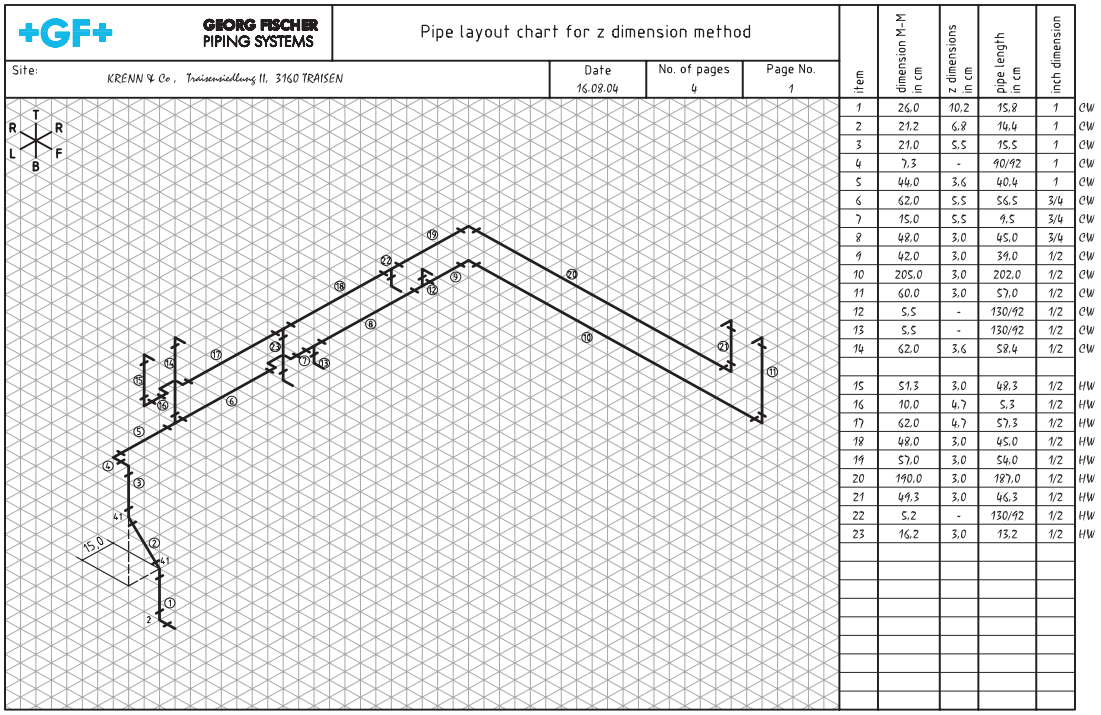
The most important symbols for drawing of pipe work on the **Georg Fischer** pipe layout chart

The Georg Fischer pipe layout chart

The 30° pipeline diagram can be drawn on the Georg Fischer pipe layout chart, for example. The oblong format selected is particularly suitable for use on the site. The area available for sketching, either allows sections of pipelines to be portrayed, or even more extensive part installations (e.g. cellar quantization, floor distributers) to be reproduced.

The advantages of the Georg Fischer pipe layout chart are obvious:

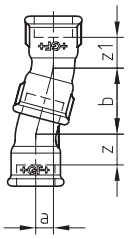
- division of the installation work
- quick drawing of the pipework diagram
- clear record of the centre - centre dimensions
- very simple pipe length calculation
- basis for a summary of pipe components
- costing document
- thus offering real rationalisation: measure, mark, cut into lengths and cut the thread for all pipes of the same diameter one after the other.
- If the project documents are saved, the pipe layout chart makes it possible to determine the pipeline layout exactly even years later. Extensions or repairs can be carried out considerably more easily.



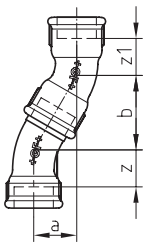
item	dimension M-M in cm	z dimensions in cm	pipe length in cm	inch dimension	
1	26.0	10.2	15.8	1	CW
2	21.2	6.8	14.4	1	CW
3	21.0	5.5	15.5	1	CW
4	7.3	-	90/92	1	CW
5	44.0	3.6	40.4	1	CW
6	62.0	5.5	56.5	3/4	CW
7	15.0	5.5	9.5	3/4	CW
8	48.0	3.0	45.0	3/4	CW
9	42.0	3.0	39.0	1/2	CW
10	205.0	3.0	202.0	1/2	CW
11	60.0	3.0	57.0	1/2	CW
12	5.5	-	130/92	1/2	CW
13	5.5	-	130/92	1/2	CW
14	62.0	3.6	58.4	1/2	CW
15	51.3	3.0	48.3	1/2	HW
16	10.0	4.7	5.3	1/2	HW
17	62.0	4.7	57.3	1/2	HW
18	48.0	3.0	45.0	1/2	HW
19	57.0	3.0	54.0	1/2	HW
20	190.0	3.0	187.0	1/2	HW
21	49.3	3.0	46.3	1/2	HW
22	5.2	-	130/92	1/2	HW
23	16.2	3.0	13.2	1/2	HW

Fittings combinations

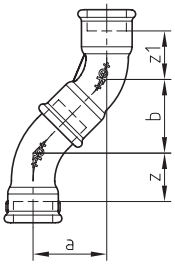
15°
53/54



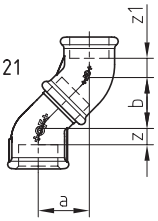
30°
50/51



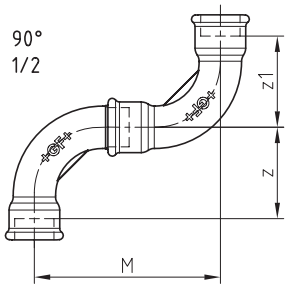
45°
40/41



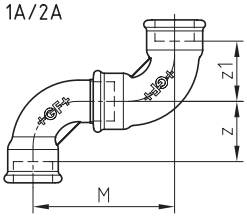
45°
120/121



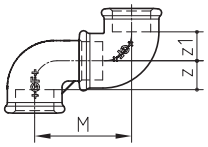
90°
1/2



90°
1A/2A

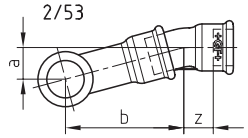


90°
90/92

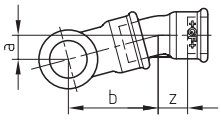


		15°	30°	45°			90°		
		53/54	50/51	40/41	120/121		1/2	1a/2a	90/92
3/8	**a**			**31**	**25**	**M**	**80**	**62**	**47**
	b			**31**	**25**	$z = z_1$	38	26	15
	z			20	10				
	z_1			20	10				
1/2	**a**	**9**	**21**	**37**	**26**	**M**	**90**	**77**	**52**
	b	**35**	**36**	**37**	**26**	$z = z_1$	42	32	15
	z	15	17	23	9				
	z_1	15	17	23	9				
3/4	**a**	**11**	**26**	**45**	**30**	**M**	**114**	**85**	**61**
	b	**42**	**44**	**45**	**30**	$z = z_1$	54	35	18
	z	18	21	28	10				
	z_1	18	21	28	10				
1	**a**	**13**	**32**	**54**	**34**	**M**	**143**	**109**	**73**
	b	**47**	**55**	**54**	**34**	$z = z_1$	68	46	21
	z	20	27	34	11				
	z_1	20	27	34	11				
11/4	**a**	**16**	**39**	**70**	**40**	**M**	**181**	**133**	**86**
	b	**58**	**67**	**70**	**40**	$z = z_1$	86	57	26
	z	24	33	45	14				
	z_1	26	33	45	14				
11/2	**a**	**16**	**42**	**76**	**45**	**M**	**202**	**151**	**96**
	b	**61**	**72**	**76**	**45**	$z = z_1$	97	66	31
	z	26	37	49	17				
	z_1	28	37	49	17				
2	**a**	**18**	**48**	**90**	**52**	**M**	**246**	**180**	**108**
	b	**66**	**83**	**90**	**52**	$z = z_1$	116	78	34
	z	27	42	57	19				
	z_1	27	42	57	19				
21/2	**a**			**112**	**53**	**M**	**314**	**203**	**130**
	b			**112**	**53**	$z = z_1$	149	88	42
	z			72	19				
	z_1			72	21				
3	**a**			**129**	**60**	**M**	**365**	**224**	**146**
	b			**129**	**60**	$z = z_1$	175	97	48
	z			83	22				
	z_1			83	24				
4	**a**			**166**		**M**	**469**	**294**	**178**
	b			**166**		$z = z_1$	224	129	60
	z			105					
	z_1			105					

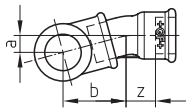
15°
2/53



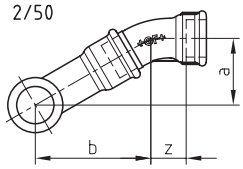
15°
2A/53



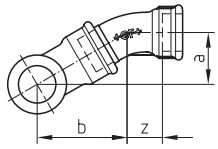
15°
90/53



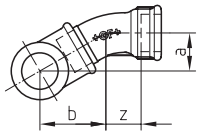
30°
2/50



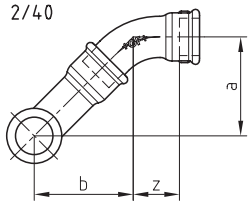
30°
2A/50



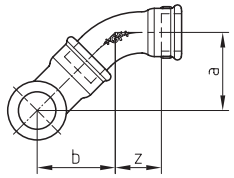
30°
90/50



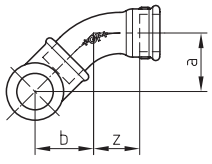
45°
2/40



45°
2A/40

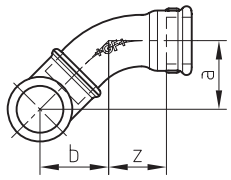


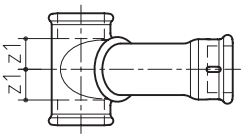
45°
90/40



		15°			30°			45°		
		2/53	**2a/53**	**90/53**	**2/50**	**2a/50**	**90/50**	**2/40**	**2a/40**	**90/40**
3/8	**a**							**44**	**35**	**28**
	b							**44**	**35**	**28**
	z							20	20	20
1/2	**a**	**16**	**14**	**9**	**33**	**28**	**20**	**51**	**44**	**32**
	b	**61**	**51**	**35**	**57**	**48**	**35**	**51**	**44**	**32**
	z	15	15	15	17	17	17	23	23	23
3/4	**a**	**20**	**15**	**11**	**42**	**33**	**24**	**64**	**50**	**38**
	b	**76**	**58**	**42**	**73**	**56**	**42**	**64**	**50**	**38**
	z	18	18	18	21	21	21	28	28	28
1	**a**	**25**	**19**	**13**	**52**	**41**	**29**	**78**	**62**	**45**
	b	**94**	**72**	**48**	**90**	**71**	**49**	**78**	**62**	**45**
	z	20	20	20	27	27	27	34	34	34
11/4	**a**	**31**	**24**	**16**	**65**	**51**	**35**	**99**	**78**	**57**
	b	**116**	**88**	**58**	**113**	**87**	**61**	**99**	**78**	**57**
	z	24	24	24	33	33	33	45	45	45
11/2	**a**	**34**	**26**	**17**	**72**	**56**	**39**	**110**	**88**	**63**
	b	**128**	**98**	**64**	**124**	**97**	**67**	**110**	**88**	**63**
	z	26	26	26	37	37	37	49	49	49
2	**a**	**41**	**31**	**19**	**85**	**66**	**44**	**132**	**105**	**74**
	b	**152**	**115**	**72**	**147**	**114**	**76**	**132**	**105**	**74**
	z	27	27	27	42	42	42	57	57	57
21/2	**a**	**52**	**36**	**24**	**108**	**77**	**54**	**166**	**123**	**91**
	b	**194**	**135**	**91**	**186**	**133**	**94**	**166**	**123**	**91**
	z	35	35	35	53	53	53	72	72	72
3	**a**				**126**	**87**	**63**	**194**	**139**	**105**
	b				**218**	**151**	**108**	**194**	**139**	**105**
	z				62	62	62	83	83	83
4	**a**				**162**	**115**	**80**	**250**	**183**	**134**
	b				**281**	**198**	**139**	**250**	**183**	**134**
	z				78	78	78	105	105	105

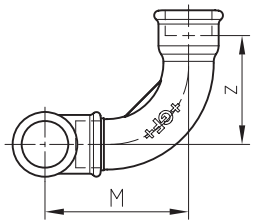
45°
130/40

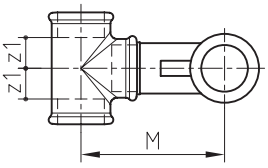




Equal run		Branch									
		3/8	1/2	3/4	1	11/4	11/2	2	21/2	3	4
3/8	**a=b**	**28**									
	z_1	15									
	z	20									
1/2	**a=b**	**28**	**32**								
	z_1	13	15								
	z	20	23								
3/4	**a=b**	**30**	**34**	**38**							
	z_1	13	15	18							
	z	20	23	28							
1	**a=b**	**33**	**36**	**40**	**45**						
	z_1	13	15	18	21						
	z	20	23	28	34						
11/4	**a=b**	**35**	**39**	**44**	**47**	**57**					
	z_1	13	15	17	21	26					
	z	20	23	28	34	45					
11/2	**a=b**	**37**	**42**	**46**	**50**	**59**	**63**				
	z_1	14	17	19	23	27	31				
	z	20	23	28	34	45	49				
2	**a=b**		**46**	**50**	**54**	**63**	**66**	**74**			
	z_1		14	16	20	24	28	34			
	z		23	28	34	45	49	57			
21/2	**a=b**		**52**	**57**	**60**	**69**	**72**	**79**	**91**		
	z_1		14	18	20	25	28	34	42		
	z		23	28	34	45	49	57	72		
3	**a=b**		**57**	**62**	**65**	**74**	**78**	**84**	**95**	**105**	
	z_1		15	18	21	25	28	34	42	48	
	z		23	28	34	45	49	57	72	93	
4	**a=b**				**74**		**87**	**93**	**105**	**115**	**134**
	z_1				20		28	34	41	48	60
	z				34		49	57	72	93	105

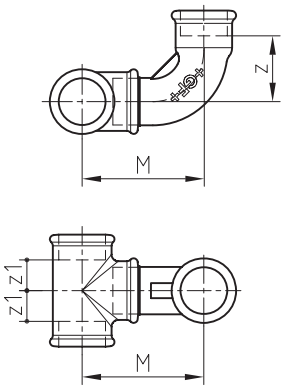
90°
130/1





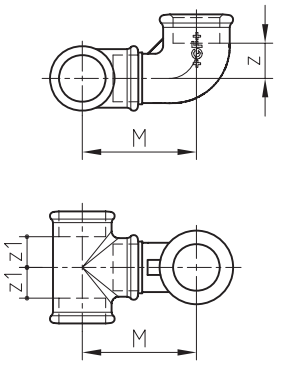
Equal run		Branch									
		3/8	1/2	3/4	1	11/4	11/2	2	21/2	3	4
3/8	**M**	**57**									
	z_1	15									
	z	38									
1/2	**M**	**58**	**63**								
	z_1	13	15								
	z	38	42								
3/4	**M**	**60**	**66**	**78**							
	z_1	13	15	18							
	z	38	42	54							
1	**M**	**64**	**69**	**81**	**96**						
	z_1	13	15	18	21						
	z	38	42	54	68						
11/4	**M**	**68**	**73**	**86**	**100**	**121**					
	z_1	13	15	17	21	26					
	z	38	42	54	68	86					
11/2	**M**	**70**	**77**	**89**	**104**	**124**	**136**				
	z_1	14	17	19	23	27	31				
	z	38	42	54	68	86	97				
2	**M**		**83**	**95**	**110**	**130**	**141**	**164**			
	z_1		14	16	20	24	28	34			
	z		42	54	68	86	97	116			
21/2	**M**		**91**	**104**	**118**	**138**	**149**	**172**	**207**		
	z_1		14	18	20	25	28	34	42		
	z		42	54	68	86	97	116	149		
3	**M**		**98**	**111**	**125**	**146**	**157**	**179**	**214**	**238**	
	z_1		15	18	21	25	28	34	42	48	
	z		42	54	68	86	97	116	149	175	
4	**M**				**138**		**170**	**192**	**227**	**252**	**305**
	z_1				20		28	34	41	48	60
	z				68		97	116	149	175	224

90°
130/1A



Equal run		Branch									
		3/8	1/2	3/4	1	11/4	11/2	2	21/2	3	4
3/8	**M**	**51**									
	z_1	15									
	z	26									
1/2	**M**	**52**	**60**								
	z_1	13	15								
	z	26	32								
3/4	**M**	**54**	**63**	**68**							
	z_1	13	15	18							
	z	26	32	35							
1	**M**	**58**	**66**	**71**	**84**						
	z_1	13	15	18	21						
	z	26	32	35	46						
11/4	**M**	**62**	**70**	**76**	**88**	**102**					
	z_1	13	15	17	21	26					
	z	26	32	35	46	57					
11/2	**M**	**64**	**74**	**79**	**92**	**105**	**116**				
	z_1	14	17	19	23	27	31				
	z	26	32	35	46	57	49				
2	**M**		**80**	**85**	**98**	**111**	**121**	**136**			
	z_1		14	16	20	24	28	34			
	z		32	35	46	57	49	78			
21/2	**M**		**88**	**94**	**106**	**119**	**129**	**144**	**157**		
	z_1		14	18	20	25	28	34	42		
	z		32	35	46	57	49	78	88		
3	**M**		**95**	**101**	**113**	**127**	**137**	**151**	**164**	**175**	
	z_1		15	18	21	25	28	34	42	48	
	z		32	35	46	57	49	78	88	97	
4	**M**				**126**		**150**	**164**	**177**	**189**	**225**
	z_1				20		28	34	41	48	60
	z				46		49	78	88	97	129

90°
130/92



Equal run		Branch									
		3/8	1/2	3/4	1	11/4	11/2	2	21/2	3	4
3/8	**M**	**47**									
	z_1	15									
	z	15									
1/2	**M**	**48**	**52**								
	z_1	13	15								
	z	15	15								
3/4	**M**	**50**	**55**	**61**							
	z_1	13	15	18							
	z	15	15	18							
1	**M**	**54**	**58**	**64**	**73**						
	z_1	13	15	18	21						
	z	15	15	18	21						
11/4	**M**	**58**	**62**	**69**	**77**	**86**					
	z_1	13	15	17	21	26					
	z	15	15	18	21	26					
11/2	**M**	**60**	**66**	**72**	**81**	**89**	**96**				
	z_1	14	17	19	23	27	31				
	z	15	15	18	21	26	31				
2	**M**		**72**	**78**	**87**	**95**	**101**	**108**			
	z_1		14	16	20	24	28	34			
	z		15	18	21	26	31	34			
21/2	**M**		**80**	**87**	**95**	**103**	**109**	**116**	**130**		
	z_1		14	18	20	25	28	34	42		
	z		15	18	21	26	31	34	42		
3	**M**		**87**	**94**	**102**	**111**	**117**	**123**	**137**	**146**	
	z_1		15	18	21	25	28	34	42	48	
	z		15	18	21	26	31	34	42	48	
4	**M**				**115**		**130**	**136**	**150**	**160**	**178**
	z_1				20		28	34	41	48	60
	z				21		31	34	42	48	60

Practical conclusions

The Georg Fischer z dimension installation method is the tried and tested basis for the skilled worker and industrial prefabrication of pipework installations.

Its objective is to bring together the same repetitive production sequences to achieve a trouble-free flow of materials and work, to avoid idle time, minimise setting up time and doing the same work twice and provide the optimal solutions.

This calls for:
- division of the pipework systems in installation sections.
- division of production in pre-assembly (in the workshop or on site) and installation. It is advantageous to prepare as large a number of the installations as possible in the workshop.
- summarised record of all important site dimensions, to be able to carry out in series prefabrication.

A main rule for this:
Gather as many pipework sections as possible from the planning documents.

However, where sections must be decided on the spot (offsetting of variations in the dimensions of the solidium) the following applies:

Always measure where pipelines are to be laid.

The Georg Fischer z dimension method enables:

- in series prefabrication
- rational use of material, skilled labour and machines
- reduction of installation times
- adaptability to building progress
- very large independence from building deadlines
- better preliminary conditions for carrying out non-local items
- better preliminary conditions for carrying out refurbishment work
- more accurate work with lower expenditure
- consistent quality

As a result of these advantages, installation planning, starting with the preliminary draft, should be included in the building plan. A prerequisiste of the rational running of building work is completed, co-ordinated planning of the implementation of work at its outset in its basic details.

Caution: pre-assembled pipework combinations must never be so unwieldy that they can not be transported or used on the installation site without problems.

Note: using the z dimension method is not synonymous with prefabrication; it is in principle suitable for use anywhere that pipes are installed with fittings.

z dimension method for different materials

The above text refers primarily to the installation of threaded pipes with malleable cast iron pipe fittings. The transportational stability of assembled sections of pipework and the later possibilities of correcting their running directions on the site of installation make this materials system suitable for prefabrication.

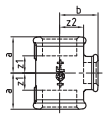
Bearing the features of other materials systems (e.g. copper pipes with soldered fittings, plastic pipes with clamped, welded or bonded fittings) the Georg Fischer z dimension method can be used in the same way.

Installation aids

z dimensions and face-centre dimensions of the most common Georg Fischer malleable cast iron fittings

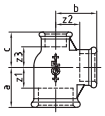
	Dimension	3/8		1/2		3/4		1		11/4		11/2		2		21/2		3		4	
	Nominal thread length	10		13		15		17		19		19		24		27		30		36	
	Catalogue No.	z	b	z	b	z	b	z	b	z	b	z	b	z	b	z	b	z	b	z	b
Equal Fittings	**1**	38	42	42	48	54	60	68	75	86	95	97	105	116	130	149	165	175	190	224	245
	2	38	-	42	-	54	-	68	-	86	-	97	-	116	-	149	-	175	-	224	-
	1a	26	36	32	45	35	50	46	63	57	76	66	85	78	102	88	115	97	127	129	165
	2a	26	-	32	-	35	-	46	-	57	-	66	-	78	-	88	-	97	-	129	-
	45° **40**	20	24	23	30	28	36	34	42	45	54	49	58	57	70	72	86	83	100	105	130
	45° **41**	20	-	23	-	28	-	34	-	45	-	49	-	57	-	72	-	83	-	105	-
	30° **50**	-	-	17	24	21	30	27	36	33	44	37	46	42	54	53	66	62	77	78	100
	30° **51**	-	-	17	-	21	-	27	-	33	-	37	-	42	-	-	-	-	-	-	-
	85	28	-	34	-	40	-	53	-	66	-	-	-	-	-	-	-	-	-	-	-
	90	15	-	15	-	18	-	21	-	26	-	31	-	34	-	42	-	48	-	60	-
	92	15	32	15	37	18	43	21	52	26	60	31	65	34	74	42	88	48	98	60	118
	45° **120**	10	-	9	-	10	-	11	-	14	-	17	-	19	-	21	-	24	-	-	-
	45° **121**	10	25	9	28	10	32	11	37	14	43	17	46	19	55	19	54	22	61	-	-
	130	15	-	15	-	18	-	21	-	26	-	31	-	34	-	42	-	48	-	60	-
	180	15	-	15	-	18	-	21	-	26	-	31	-	34	-	42	-	48	-	60	-
	270	10	-	10	-	9	-	11	-	12	-	17	-	17	-	20	-	20	-	22	-
	471	15	-	15	-	18	-	-	-	-	-		-	-	-	-	-	-	-	-	-
		a		a		a		a		a		a		a		a		a		a	
	280	38		44		47		53		57		59		68		75		83		95	

130, Branch reduced



Dimension	z_1	z_2
1/2 x 3/4	18	15
3/4 x 1/2	15	18
1 x 1/2	15	21
1 x 3/4	18	21
11/4 x 1/2	15	25
11/4 x 3/4	17	26
11/4 x 1	21	25
11/2 x 1/2	17	29
11/2 x 3/4	19	29
11/2 x 1	23	29
11/2 x 11/4	27	29

130, Branch and run reduced



Dimension	z_1	z_2	z_3
3/4 x 1/2 x 1/2	15	18	15
3/4 x 3/4 x 1/2	18	18	18
1 x 1/2 x 3/4	15	21	18
1 x 3/4 x 3/4	18	21	15
1 x 3/4 x 1/2	18	21	18
1 x 1 x 3/4	21	21	21
11/4 x 1/2 x 1	15	25	15
11/4 x 3/4 x 1	17	26	18
11/4 x 1 x 3/4	21	25	21
11/4 x 1 x 1	21	25	21
11/4 x 11/4 x 3/4	26	26	26

Dimension	z_1	z_2	z_3
11/4 x 11/4 x 1	26	26	25
11/2 x 3/4 x 11/4	19	29	17
11/2 x 1 x 11/4	23	29	21
11/2 x 11/4 x 1	27	29	25
11/2 x 11/4 x 11/4	27	29	26
11/2 x 11/2 x 11/4	31	31	29

a … dimension face - face (overall length)

b … dimension fitting axis - face external thread

z, z1, z2, z3 … z dimension

+GF+ GEORG FISCHER PIPING SYSTEMS

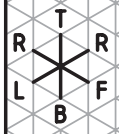
Pipe layout chart for z dimension method

Site:

Date

No. of pages

Page No.



item	dimension M-M in cm	z dimensions in cm	pipe length in cm	inch dimension