GF Piping Systems

Technical Catalogue 2015

Malleable cast iron fittings

The advantages of a proven solution

+ Concept
Standardized components such as malleable cast iron fittings for long-lasting piping concepts were invented; not like for individual systems, where new systems continously replace the previous. Availability of spare parts is practically unlimited and piping amendments can be done on a long-term basis.

+ Product and Features
Choose from the largest range. Our product features include hot-dip galvanizing suitable for drinking water, corrosion-resistant solid designs, high-grade materials, special ranges for high pressures, and much more.

+ Quality
A sophisticated third-party monitored quality management system and certified products provide safety. CPR, RoHS, PED – we are at the cutting edge of new regulations and offer assistance and customer support for proof of conformity.

+ Reliability
Reliable logistics from the European central warehouse and leading stock trade partners to ensure availability in each market for our end users. Our business is characterised by long-term partnerships with our customers.

+ Support
We support customers with CAD geometry for piping design, EAN bar-coding on the packaging, EDI-ordering service and advice in each of our markets for jointing technology and application issues.

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The technical data given in this publication are for general information purposes only.
They imply no warranty of whatever kind. Please consult our General Terms and Conditions of Supply.

General Information

Product standards

The international malleable cast iron pipe fittings standard ISO 49 and the European malleable cast iron pipe fittings standard EN 10242 apply. Both standards are almost equal. The European fittings standard (EN 10242) has been adopted by most European countries as a national version (DIN EN 10242, ÖNORM EN 10242, SN EN 10242, etc.), whilst the former national standards have been withdrawn (e.g. DIN 2950). The British Standard is an exception. BS 143 & 1256 has merely been partially superseded by BS EN 10242. Parts of BS 143 & 1256 remain valid as on the one hand also fittings made of copper based materials are covered and on the other hand some types/shapes of malleable cast iron fittings are included, which are not covered by BS EN 10242.

In EN 10242 (and ISO 49) the different combinations of malleable cast iron grades and types of jointing threads, offered by the different manufacturers are grouped into so called «Design Symbols». These «Design Symbols» have been introduced to facilitate the specification/designation of the fittings execution for tendering or ordering process. They are not intended to be used for marking of the fitting or packaging.

Georg Fischer malleable cast iron fittings are exclusively manufactured from decarburised annealed (white) malleable cast iron type EN-GJMW-400-5 and with Rp and R jointing threads. Thus they comply with Design Symbol A.

Elements of the standard designation

For vendor independent public tenders, inquiries, etc. EN 10242 and ISO 49 provide a syntax for product designation. To indicate the Design Symbol is imperative within this syntax in order to define material and thread type properly.

As an example the designation for an equal elbow with 2 internal threads, fitting size ½, galvanised, Design Symbol A is:

Elbow EN 10242 – A1 – ½ – Zn – A

①	②	③	④	⑤	⑥

The standard designation is structured as follows:

Designation	Explanation
① Type of fitting	Kind of fitting shape
② Product standard	EN 10242 (ISO 49)
③ Symbol	see Product Range, „ISO / EN ... “ above the tables
④ Fitting size(s)	given in inch (see column “Dimension” of Product Range)
⑤ Surface	Fe = black Zn = galvanised
⑥ Design Symbol	A, B, C or D see explanation in tab. 1

tab. 2 Explanation of standard designation

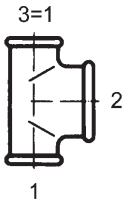
Design Symbol	Type of material acc. to EN 1562	Tensile strength in N/mm²	Elongation in %	Jointing thread
A	EN-GJMW-400-5	400	5	parallel internal thread Rp and taper external thread R acc. to EN 10226-1/ISO 7-1
	EN-GJMB-350-10	350	10	
B	EN-GJMW-350-4	350	4	
	EN-GJMB-300-6	300	6	
*C**	*EN-GJMW-400-5*	*400*	*5*	*taper internal thread Rc* and taper external thread R acc. to EN 10226-2/ISO 7-1*
	EN-GJMB-350-10	*350*	*10*	
*D**	*EN-GJMW-350-4*	*350*	*4*	
	EN-GJMB-300-6	*300*	*6*	

*** Not used at Continental Europe, respectively partially prohibited by national regulations.**

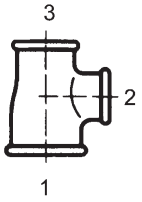
tab. 1 Design Symbols for malleable cast iron fittings

Size designation

The designation of types of fittings starts from the simplest possible basic types such as bend, elbow, tee, cross etc.; basic features are also indicated.



illustr. 1/A



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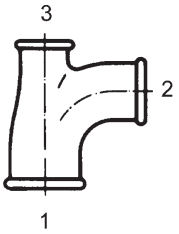

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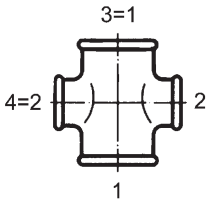


illustr. 1/D

The following rules apply for the sequence of connection sizes:

- for **equal fittings** giving the individual connection size once is sufficient.
- for **reducing fittings with 2 connections of different sizes the connection size** of the larger is given first, than the one of the smaller connection. **Exception:** Elbow A4 internal/ external thread (catalogue no. 92) - first the connection size of the internal thread.
- for fittings **with 3 or more connections** (illustr. 1/A and 1/D) in case of equal connections on the run it is sufficient to give the size of the run first, followed by the size of the branch.
- for **3 different connections sizes or fittings reduced in run** the sequence for the designation of connections according to illustr. 1/B and 1/C applies.

Example T with internal threads 1 ¼ on the run and ¾ at the branch, black, Design Symbol A:
Tee EN 10242 – B1 – 1 ¼ x ¾ – Fe – A

Example Pitcher-T with internal threads 2 and ½ on the run and 1 ¼ at the branch, galvanised, Design Symbol A:
Pitcher-Tee EN 10242 – E1 – 2 x 1 ¼ x ½ – Zn – A

Elements of the Georg Fischer designation

For inquiries and orders Georg Fischer introduced a simple product designation. It consist of:

Designation	Explanation
Type of fitting	catalogue number (see Product Range)
Fitting size(s)	given in inch (see column “Dimension” of Product Range)
Surface	B = black G = galvanised

tab. 3 Explanation of Georg Fischer designation

To avoid errors during specification, the 9 digit Georg Fischer code, given in the following chapter Product Range can be used as well.

In both cases the Design Symbol must not be indicated, since Georg Fischer exclusively produces fittings according to Design Symbol A.

Example of designation for an Equal elbow with 2 internal threads, fitting size ½, galvanized, Design Symbol A:
90 - ½ G or 770 090 204

Surface finish

Georg Fischer malleable cast iron fittings are supplied in black or hot dip galvanised finish, covered with a preservative coating for temporary prevention of a rust film.
Exceptions are fittings marked with "**ST**" which are made of steel, and if a galvanised finish is required, are electroplated for technical reasons instead of hot dip galvanising.

Due to the lower corrosion protection electroplated zinc surfaces are not suitable for drinking water application.

According to the European and International standard malleable cast iron pipe fittings must be free from polycyclic aromatic hydrocarbons.

Corporate Policy

The success of our corporation is secured only if we fulfil the requirements of our customers regarding product performance, quantities, on time delivery, price and service and all needs of our company environment are respected. Our aim is to improve customer satisfaction, delivery service as well as environmental and health and safety performance by continuous enhancement of product and process quality. We base this process on our Integrated Management System, which we improve continuously and rely on our competent employees, which we lead with targets and support in their personal development.
We consequently aim to implement and “live” the Georg Fischer Values.

Our Integrated Management System is certified according to EN ISO 9001, EN ISO 14001 und BS OHSAS 18001.
Actual certificates can be order at **www.fittings.at/contactform**

Quality testing

Georg Fischer malleable cast iron fittings are individually tested within the framework of the existing standard. The testing of pressure carrying unions is carried out on their piece parts.

Measurements

The measurements given in this catalogue represent the status at the time of printing – mistakes and printing errors excluded. For important cases of application the measurements should be ensured by queries.

Product presentation at chapter "Product Range"

This document shows all malleable cast iron fittings and piece parts of Georg Fischer Fittings GmbH. Products without position or code number are shown for information purposes only and are not part of the delivery program.
The individual fittings are displayed by using **symbolic pictures** and **drawings** with all essential measurements for the application. International standardized types of fittings are headed by the **ISO/EN symbol**.

Symbols

EN ... the first column "EN" indicates the fittings standardised in European Standard EN 10242:
- ● ... standardised
- **-** ... not standardised

B/G ... B = balck
G = galvanised

ST ... these types of fittings are made from steel (galvanised finish = electroplated) and are not suitable for drinking water installations.

Code ... Georg Fischer part number

ISO/EN ... symbol to ISO 49/EN 10242

R ... taper external thread, for connections to EN 10226-1 and/or ISO 7-1 sealing on the threads.

Rp ... parallel internal jointing thread for connections to EN 10226-1 and/or ISO 7-1 sealing on the threads.

G ... parallel internal fastening thread for connections to EN ISO 228-1 not sealing on the thread.

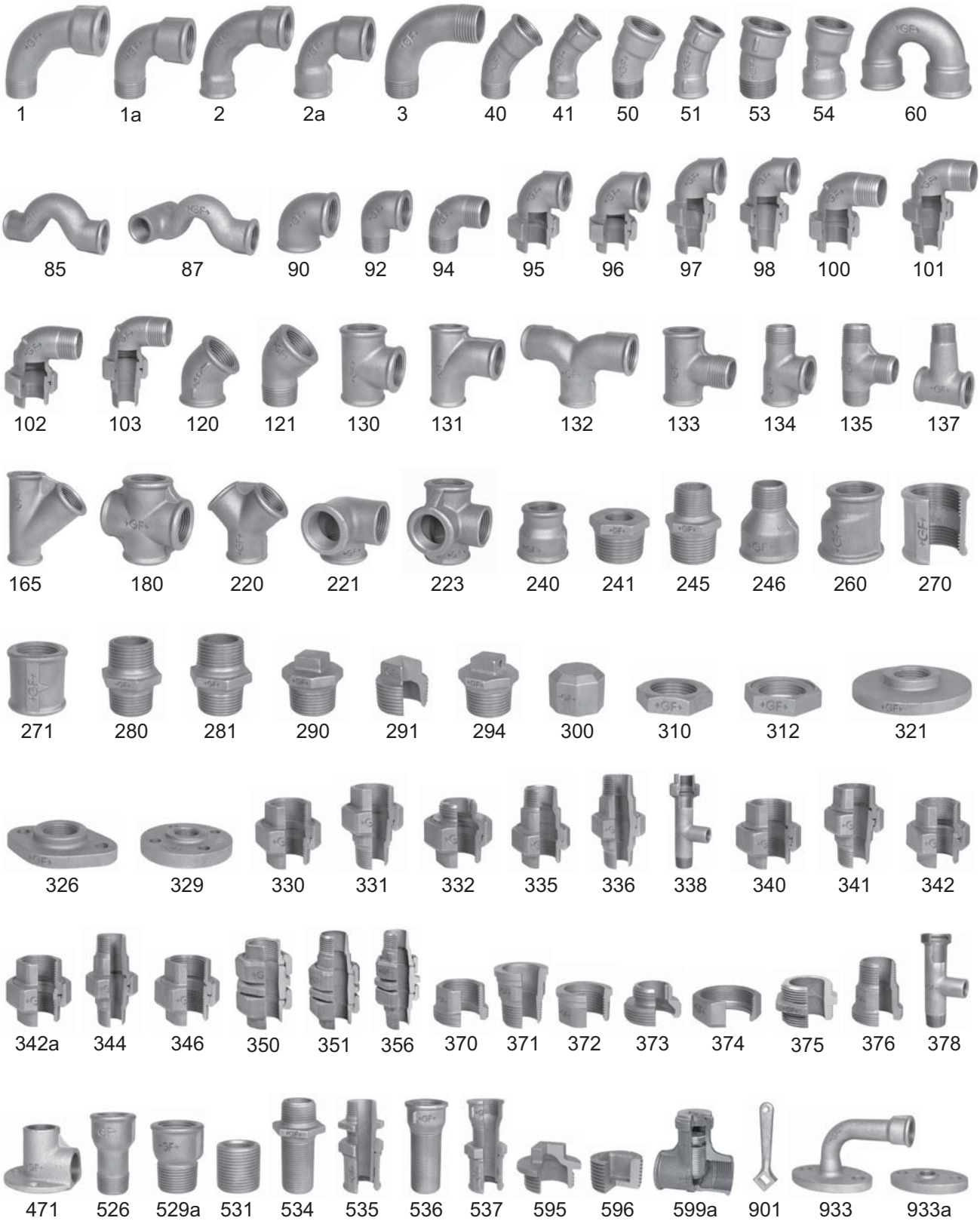
G ... B ... parallel external fastening thread, tolerance class B for connections to EN ISO 228-1 not sealing on the threads.

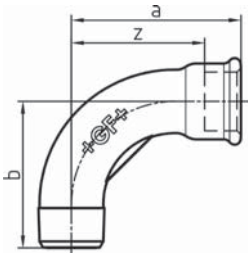
ET ... piece part

s ... width across flat
The given measurement states the size of the screw-wrench that is to be used.

***** ... notes

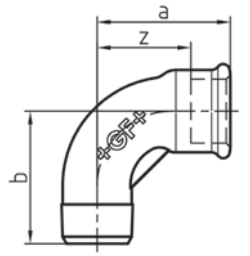
Malleable cast iron fittings - Assortment overview





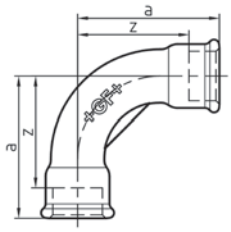
1
Long sweep bend 90°, ISO/EN G4

EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	z [mm]
•	B	⅛	**770 001 101**	35	32	28
•	G	⅛	**770 001 201**	35	32	28
•	B	¼	**770 001 102**	40	36	30
•	G	¼	**770 001 202**	40	36	30
•	B	⅜	**770 001 103**	48	42	38
•	G	⅜	**770 001 203**	48	42	38
•	B	½	**770 001 104**	55	48	42
•	G	½	**770 001 204**	55	48	42
•	B	¾	**770 001 105**	69	60	54
•	G	¾	**770 001 205**	69	60	54
•	B	1	**770 001 106**	85	75	68
•	G	1	**770 001 206**	85	75	68
•	B	1 ¼	**770 001 107**	105	95	86
•	G	1 ¼	**770 001 207**	105	95	86
•	B	1 ½	**770 001 108**	116	105	97
•	G	1 ½	**770 001 208**	116	105	97
•	B	2	**770 001 109**	140	130	116
•	G	2	**770 001 209**	140	130	116
•	B	2 ½	**770 001 110**	176	165	149
•	G	2 ½	**770 001 210**	176	165	149
•	B	3	**770 001 111**	205	190	175
•	G	3	**770 001 211**	205	190	175
•	B	4	**770 001 112**	260	245	224
•	G	4	**770 001 212**	260	245	224



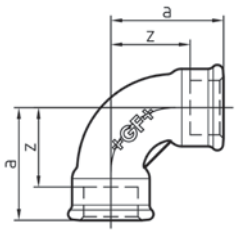
1a
Short bend 90°, ISO/EN D4

EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	z [mm]
•	B	¼	**770 011 102**	30	30	20
•	G	¼	**770 011 202**	30	30	20
•	B	⅜	**770 011 103**	36	36	26
•	G	⅜	**770 011 203**	36	36	26
•	B	½	**770 011 104**	45	45	32
•	G	½	**770 011 204**	45	45	32
•	B	¾	**770 011 105**	50	50	35
•	G	¾	**770 011 205**	50	50	35
•	B	1	**770 011 106**	63	63	46
•	G	1	**770 011 206**	63	63	46
•	B	1 ¼	**770 011 107**	76	76	57
•	G	1 ¼	**770 011 207**	76	76	57
•	B	1 ½	**770 011 108**	85	85	66
•	G	1 ½	**770 011 208**	85	85	66
•	B	2	**770 011 109**	102	102	78
•	G	2	**770 011 209**	102	102	78
-	B	2 ½	**770 011 110**	115	115	88
-	G	2 ½	**770 011 210**	115	115	88
-	B	3	**770 011 111**	127	127	97
-	G	3	**770 011 211**	127	127	97
-	B	4	**770 011 112**	165	165	129
-	G	4	**770 011 212**	165	165	129



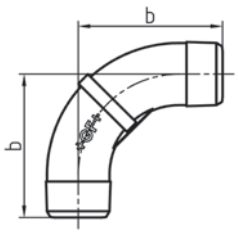
2
Long sweep bend 90°, ISO/EN G1

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	¼	**770 002 102**	40	30
•	G	¼	**770 002 202**	40	30
•	B	⅜	**770 002 103**	48	38
•	G	⅜	**770 002 203**	48	38
•	B	½	**770 002 104**	55	42
•	G	½	**770 002 204**	55	42
•	B	¾	**770 002 105**	69	54
•	G	¾	**770 002 205**	69	54
•	B	1	**770 002 106**	85	68
•	G	1	**770 002 206**	85	68
•	B	1 ¼	**770 002 107**	105	86
•	G	1 ¼	**770 002 207**	105	86
•	B	1 ½	**770 002 108**	116	97
•	G	1 ½	**770 002 208**	116	97
•	B	2	**770 002 109**	140	116
•	G	2	**770 002 209**	140	116
•	B	2 ½	**770 002 110**	176	149
•	G	2 ½	**770 002 210**	176	149
•	B	3	**770 002 111**	205	175
•	G	3	**770 002 211**	205	175
•	B	4	**770 002 112**	260	224
•	G	4	**770 002 212**	260	224



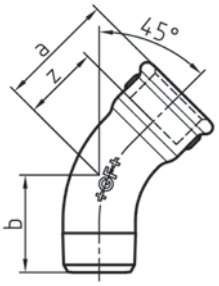
2a
Short bend 90°, ISO/EN D1

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	¼	**770 012 102**	30	20
•	G	¼	**770 012 202**	30	20
•	B	⅜	**770 012 103**	36	26
•	G	⅜	**770 012 203**	36	26
•	B	½	**770 012 104**	45	32
•	G	½	**770 012 204**	45	32
•	B	¾	**770 012 105**	50	35
•	G	¾	**770 012 205**	50	35
•	B	1	**770 012 106**	63	46
•	G	1	**770 012 206**	63	46
•	B	1 ¼	**770 012 107**	76	57
•	G	1 ¼	**770 012 207**	76	57
•	B	1 ½	**770 012 108**	85	66
•	G	1 ½	**770 012 208**	85	66
•	B	2	**770 012 109**	102	78
•	G	2	**770 012 209**	102	78
-	B	2 ½	**770 012 110**	115	88
-	G	2 ½	**770 012 210**	115	88
-	B	3	**770 012 111**	127	97
-	G	3	**770 012 211**	127	97
-	B	4	**770 012 112**	165	129
-	G	4	**770 012 212**	165	129



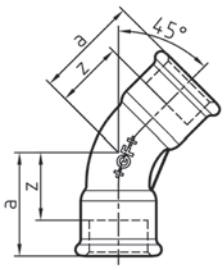
3
Long sweep bend 90°, ISO/EN G8

EN	B/G	Dim. [inch]	Code	b [mm]
-	B	¼	**770 003 102**	33
-	G	¼	**770 003 202**	33
•	B	⅜	**770 003 103**	42
•	G	⅜	**770 003 203**	42
•	B	½	**770 003 104**	48
•	G	½	**770 003 204**	48
•	B	¾	**770 003 105**	60
•	G	¾	**770 003 205**	60
•	B	1	**770 003 106**	75
•	G	1	**770 003 206**	75
•	B	1 ¼	**770 003 107**	95
•	G	1 ¼	**770 003 207**	95
•	B	1 ½	**770 003 108**	105
•	G	1 ½	**770 003 208**	105
•	B	2	**770 003 109**	130
•	G	2	**770 003 209**	130
-	G	2 ½	**770 003 210**	165



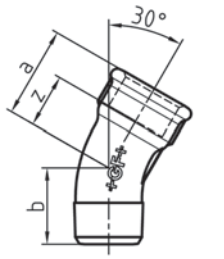
40
Long sweep bend 45°, ISO/EN G4/45°

EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	z [mm]
•	B	¼	**770 040 102**	26	21	16
•	G	¼	**770 040 202**	26	21	16
•	B	⅜	**770 040 103**	30	24	20
•	G	⅜	**770 040 203**	30	24	20
•	B	½	**770 040 104**	36	30	23
•	G	½	**770 040 204**	36	30	23
•	B	¾	**770 040 105**	43	36	28
•	G	¾	**770 040 205**	43	36	28
•	B	1	**770 040 106**	51	42	34
•	G	1	**770 040 206**	51	42	34
•	B	1 ¼	**770 040 107**	64	54	45
•	G	1 ¼	**770 040 207**	64	54	45
•	B	1 ½	**770 040 108**	68	58	49
•	G	1 ½	**770 040 208**	68	58	49
•	B	2	**770 040 109**	81	70	57
•	G	2	**770 040 209**	81	70	57
•	B	2 ½	**770 040 110**	99	86	72
•	G	2 ½	**770 040 210**	99	86	72
•	B	3	**770 040 111**	113	100	83
•	G	3	**770 040 211**	113	100	83
-	B	4	**770 040 112**	141	130	105
-	G	4	**770 040 212**	141	130	105



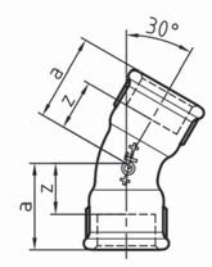
41
Long sweep bend 45°, ISO/EN G1/45°

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	⅜	**770 041 103**	30	20
•	G	⅜	**770 041 203**	30	20
•	B	½	**770 041 104**	36	23
•	G	½	**770 041 204**	36	23
•	B	¾	**770 041 105**	43	28
•	G	¾	**770 041 205**	43	28
•	B	1	**770 041 106**	51	34
•	G	1	**770 041 206**	51	34
•	B	1 ¼	**770 041 107**	64	45
•	G	1 ¼	**770 041 207**	64	45
•	B	1 ½	**770 041 108**	68	49
•	G	1 ½	**770 041 208**	68	49
•	B	2	**770 041 109**	81	57
•	G	2	**770 041 209**	81	57
•	B	2 ½	**770 041 110**	99	72
•	G	2 ½	**770 041 210**	99	72
•	B	3	**770 041 111**	113	83
•	G	3	**770 041 211**	113	83
-	G	4	**770 041 212**	141	105



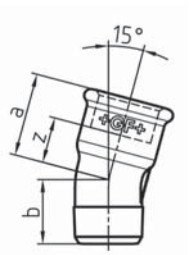
50
Bend 30°

EN	B/G	Code	Dim. [inch]	a [mm]	b [mm]	z [mm]
-	G	**770 050 204**	½	30	24	17
-	G	**770 050 205**	¾	36	30	21
-	G	**770 050 206**	1	44	36	27
-	G	**770 050 207**	1 ¼	52	44	33
-	G	**770 050 208**	1 ½	56	46	37
-	G	**770 050 209**	2	66	54	42
-	G	**770 050 210**	2 ½	80	66	53
-	G	**770 050 211**	3	92	77	62
-	G	**770 050 212**	4	114	100	78



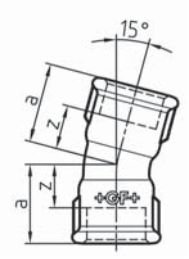
51
Bend 30°

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
-	G	½	**770 051 204**	30	17
-	G	¾	**770 051 205**	36	21
-	G	1	**770 051 206**	44	27
-	G	1 ¼	**770 051 207**	52	33
-	G	1 ½	**770 051 208**	56	37
-	G	2	**770 051 209**	66	42



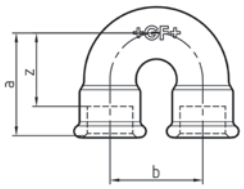
53
Bend 15°

EN	B/G	Code	Dim. [inch]	a [mm]	b [mm]	z [mm]
-	G	**770 053 204**	½	28	21	15
-	G	**770 053 205**	¾	33	25	18
-	G	**770 053 206**	1	37	29	20
-	G	**770 053 207**	1 ¼	43	34	24
-	G	**770 053 208**	1 ½	45	35	26
-	G	**770 053 209**	2	51	41	27
-	G	**770 053 210**	2 ½	62	52	35



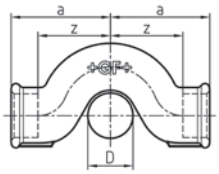
54
Bend 15°

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
-	G	½	**770 054 204**	28	15
-	G	¾	**770 054 205**	33	18
-	G	1	**770 054 206**	37	20
-	G	1 ¼	**770 054 207**	45	26
-	G	1 ½	**770 054 208**	47	28
-	G	2	**770 054 209**	51	27



60
Return bend

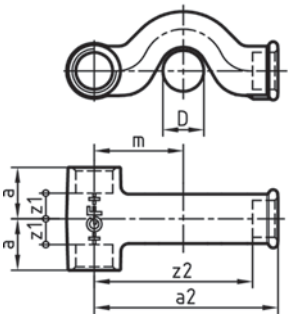
EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	z [mm]
-	B	½	**770 060 104**	45	38	32
-	G	½	**770 060 204**	45	38	32
-	B	¾	**770 060 105**	52	50	37
-	G	¾	**770 060 205**	52	50	37
-	B	1	**770 060 106**	64	64	47
-	G	1	**770 060 206**	64	64	47
-	B	1 ¼	**770 060 107**	73	76	54
-	G	1 ¼	**770 060 207**	73	76	54
-	B	1 ½	**770 060 108**	80	89	61
-	G	1 ½	**770 060 208**	80	89	61
-	B	2	**770 060 109**	90	102	66
-	G	2	**770 060 209**	90	102	66



85
Crossover

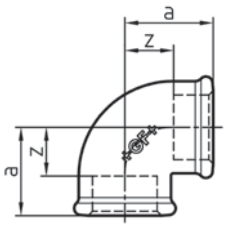
- * D=¾

EN	B/G	Dim. [inch]	Code	a [mm]	D [inch]	z [mm]
-	B	⅜	**770 085 103**	38	⅜	28
-	G	⅜	**770 085 203**	38	⅜	28
-	B	½	**770 085 104**	47	½	34
-	G	½	**770 085 204**	47	½	34
* -	B	½	**770 085 115**	49	¾	36
* -	G	½	**770 085 215**	49	¾	36
-	B	¾	**770 085 105**	55	¾	40
-	G	¾	**770 085 205**	55	¾	40
-	B	1	**770 085 106**	70	1	53
-	G	1	**770 085 206**	70	1	53
-	B	1 ¼	**770 085 107**	85	1 ¼	66
-	G	1 ¼	**770 085 207**	85	1 ¼	66



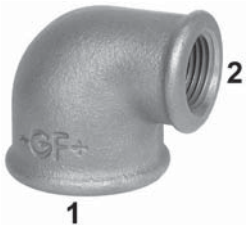
87
Tee with crossover branch

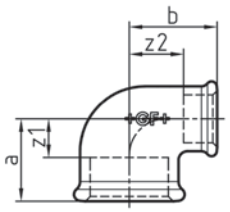
EN	B/G	Dim. [inch]	Code	a [mm]	a2 [mm]	z1 [mm]	z2 [mm]	D [inch]	m [mm]
-	G	½	**770 087 204**	26	93	13	80	½	45



90
Elbow 90°, equal, ISO/EN A1

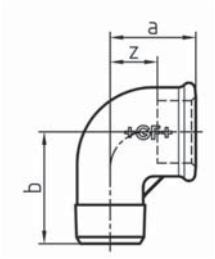
EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	⅛	**770 090 101**	19	12
•	G	⅛	**770 090 201**	19	12
•	B	¼	**770 090 102**	21	11
•	G	¼	**770 090 202**	21	11
•	B	⅜	**770 090 103**	25	15
•	G	⅜	**770 090 203**	25	15
•	B	½	**770 090 104**	28	15
•	G	½	**770 090 204**	28	15
•	B	¾	**770 090 105**	33	18
•	G	¾	**770 090 205**	33	18
•	B	1	**770 090 106**	38	21
•	G	1	**770 090 206**	38	21
•	B	1 ¼	**770 090 107**	45	26
•	G	1 ¼	**770 090 207**	45	26
•	B	1 ½	**770 090 108**	50	31
•	G	1 ½	**770 090 208**	50	31
•	B	2	**770 090 109**	58	34
•	G	2	**770 090 209**	58	34
•	B	2 ½	**770 090 110**	69	42
•	G	2 ½	**770 090 210**	69	42
•	B	3	**770 090 111**	78	48
•	G	3	**770 090 211**	78	48
•	B	4	**770 090 112**	96	60
•	G	4	**770 090 212**	96	60





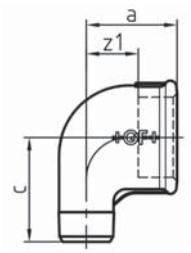
90
Elbow 90°, reducing, ISO/EN A1

EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	b [mm]	z1 [mm]	z2 [mm]
-	B	¼ - ⅛	**770 090 115**	20	20	10	13
-	G	¼ - ⅛	**770 090 215**	20	20	10	13
•	B	⅜ - ¼	**770 090 116**	23	23	13	13
•	G	⅜ - ¼	**770 090 216**	23	23	13	13
-	B	½ - ¼	**770 090 117**	24	24	11	14
-	G	½ - ¼	**770 090 217**	24	24	11	14
•	B	½ - ⅜	**770 090 118**	26	26	13	16
•	G	½ - ⅜	**770 090 218**	26	26	13	16
•	B	¾ - ½	**770 090 120**	30	31	15	18
•	G	¾ - ½	**770 090 220**	30	31	15	18
-	B	1 - ⅜	**770 090 145**	32	34	15	24
-	G	1 - ⅜	**770 090 245**	32	34	15	24
•	B	1 - ½	**770 090 121**	32	34	15	21
•	G	1 - ½	**770 090 221**	32	34	15	21
•	B	1 - ¾	**770 090 122**	35	36	18	21
•	G	1 - ¾	**770 090 222**	35	36	18	21
-	B	1 ¼ - ½	**770 090 132**	35	38	16	25
-	G	1 ¼ - ½	**770 090 232**	35	38	16	25
•	B	1 ¼ - ¾	**770 090 123**	36	41	17	26
•	G	1 ¼ - ¾	**770 090 223**	36	41	17	26
•	B	1 ¼ - 1	**770 090 124**	40	42	21	25
•	G	1 ¼ - 1	**770 090 224**	40	42	21	25
-	B	1 ½ - ¾	**770 090 125**	38	44	19	29
-	G	1 ½ - ¾	**770 090 225**	38	44	19	29
•	B	1 ½ - 1	**770 090 126**	42	46	23	29
•	G	1 ½ - 1	**770 090 226**	42	46	23	29
•	B	1 ½ - 1 ¼	**770 090 127**	46	48	27	29
•	G	1 ½ - 1 ¼	**770 090 227**	46	48	27	29
-	B	2 - 1	**770 090 128**	44	52	20	35
-	G	2 - 1	**770 090 228**	44	52	20	35
-	B	2 - 1 ¼	**770 090 129**	48	54	24	35
-	G	2 - 1 ¼	**770 090 229**	48	54	24	35
•	B	2 - 1 ½	**770 090 130**	52	55	28	36
•	G	2 - 1 ½	**770 090 230**	52	55	28	36
•	G	2 ½ - 2	**770 090 231**	61	66	34	42



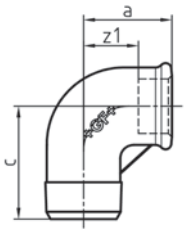
92
Elbow 90°, equal, ISO/EN A4

EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	z [mm]
•	B	⅛	**770 092 101**	19	25	12
•	G	⅛	**770 092 201**	19	25	12
•	B	¼	**770 092 102**	21	28	11
•	G	¼	**770 092 202**	21	28	11
•	B	⅜	**770 092 103**	25	32	15
•	G	⅜	**770 092 203**	25	32	15
•	B	½	**770 092 104**	28	37	15
•	G	½	**770 092 204**	28	37	15
•	B	¾	**770 092 105**	33	43	18
•	G	¾	**770 092 205**	33	43	18
•	B	1	**770 092 106**	38	52	21
•	G	1	**770 092 206**	38	52	21
•	B	1 ¼	**770 092 107**	45	60	26
•	G	1 ¼	**770 092 207**	45	60	26
•	B	1 ½	**770 092 108**	50	65	31
•	G	1 ½	**770 092 208**	50	65	31
•	B	2	**770 092 109**	58	74	34
•	G	2	**770 092 209**	58	74	34
•	B	2 ½	**770 092 110**	69	88	42
•	G	2 ½	**770 092 210**	69	88	42
•	B	3	**770 092 111**	78	98	48
•	G	3	**770 092 211**	78	98	48
•	B	4	**770 092 112**	96	118	60
•	G	4	**770 092 212**	96	118	60



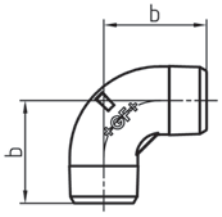
92
Elbow 90°, male thread reduced, ISO/EN A4

EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	c [mm]	z1 [mm]
•	B	½ - ⅜	**770 092 116**	26	33	13
•	G	½ - ⅜	**770 092 216**	26	33	13
•	B	¾ - ½	**770 092 117**	30	40	15
•	G	¾ - ½	**770 092 217**	30	40	15
•	B	1 - ½	**770 092 130**	32	46	15
•	G	1 - ½	**770 092 230**	32	46	15
•	B	1 - ¾	**770 092 118**	35	46	18
•	G	1 - ¾	**770 092 218**	35	46	18
-	G	1 ¼ - ¾	**770 092 219**	44	51	17
•	B	1 ¼ - 1	**770 092 120**	40	56	21
•	G	1 ¼ - 1	**770 092 220**	40	56	21
-	B	1 ½ - 1	**770 092 121**	47	62	28
-	G	1 ½ - 1	**770 092 221**	47	62	28
-	B	1 ½ - 1 ¼	**770 092 122**	52	64	33
-	G	1 ½ - 1 ¼	**770 092 222**	52	64	33



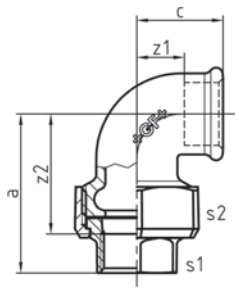
92
Elbow 90°, female thread reduced, ISO/EN A4

EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	c [mm]	z1 [mm]
-	B	⅜ - ½	**770 092 124**	28	37	18
-	G	⅜ - ½	**770 092 224**	28	37	18
-	B	½ - ¾	**770 092 125**	34	42	21
-	G	½ - ¾	**770 092 225**	34	42	21
-	B	¾ - 1	**770 092 126**	39	50	24
-	G	¾ - 1	**770 092 226**	39	50	24
-	B	1 - 1 ¼	**770 092 127**	44	59	27
-	G	1 - 1 ¼	**770 092 227**	44	59	27



94
Elbow 90°

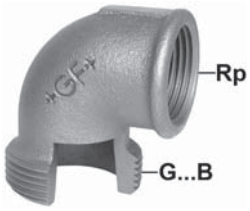
EN	B/G	Dim. [inch]	Code	b [mm]
-	B	⅜	**770 094 103**	29
-	G	⅜	**770 094 203**	29
-	B	½	**770 094 104**	37
-	G	½	**770 094 204**	37
-	B	¾	**770 094 105**	40
-	G	¾	**770 094 205**	40
-	B	1	**770 094 106**	47
-	G	1	**770 094 206**	47
-	B	1 ¼	**770 094 107**	56
-	G	1 ¼	**770 094 207**	56
-	B	1 ½	**770 094 108**	59
-	G	1 ½	**770 094 208**	59
-	B	2	**770 094 109**	68
-	G	2	**770 094 209**	68

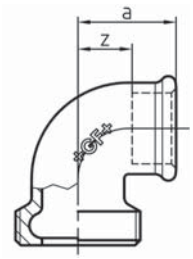


95
Union elbow, flat seat, ISO/EN UA1

- Supplied without sealing gaskets; a and z2 include the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.
- * Inside hexagon

EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	c [mm]	z1 [mm]	z2 [mm]	s1 [mm]	s2 [mm]
•	B	⅜	¾	**770 095 103**	52	25	15	42	*12	32
•	G	⅜	¾	**770 095 203**	52	25	15	42	*12	32
•	B	½	1	**770 095 104**	58	28	15	45	26	41
•	G	½	1	**770 095 204**	58	28	15	45	26	41
•	B	¾	1 ¼	**770 095 105**	62	33	18	47	31	48
•	G	¾	1 ¼	**770 095 205**	62	33	18	47	31	48
•	B	1	1 ½	**770 095 106**	72	38	21	55	38	55
•	G	1	1 ½	**770 095 206**	72	38	21	55	38	55
•	B	1 ¼	2	**770 095 107**	82	45	26	63	48	67
•	G	1 ¼	2	**770 095 207**	82	45	26	63	48	67
•	B	1 ½	2 ¼	**770 095 108**	90	50	31	71	54	74
•	G	1 ½	2 ¼	**770 095 208**	90	50	31	71	54	74
•	B	2	2 ¾	**770 095 109**	100	58	34	76	67	90
•	G	2	2 ¾	**770 095 209**	100	58	34	76	67	90

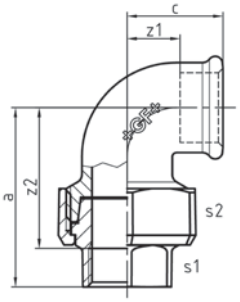




95 ET
Union bush to fig. 95

- * Is usually not supplied as a separate piece.

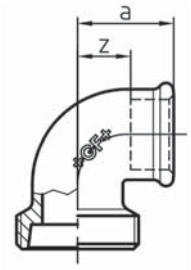
EN	B/G	Dim. Rp [inch]	G...B [inch]	Code	a [mm]	z [mm]
* -	B	⅜	¾		25	15
* -	G	⅜	¾		25	15
-	B	½	1	**770 695 104**	28	15
-	G	½	1	**770 695 204**	28	15
-	B	¾	1 ¼	**770 695 105**	33	18
-	G	¾	1 ¼	**770 695 205**	33	18
-	B	1	1 ½	**770 695 106**	38	21
-	G	1	1 ½	**770 695 206**	38	21
-	B	1 ¼	2	**770 695 107**	45	26
-	G	1 ¼	2	**770 695 207**	45	26
-	B	1 ½	2 ¼	**770 695 108**	50	31
-	G	1 ½	2 ¼	**770 695 208**	50	31
-	B	2	2 ¾	**770 695 109**	58	34
-	G	2	2 ¾	**770 695 209**	58	34



96
Union elbow, taper seat, ISO/EN UA11

- Torque and notes for installation please find in "Technical Product Notes".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.
- * Inside hexagon

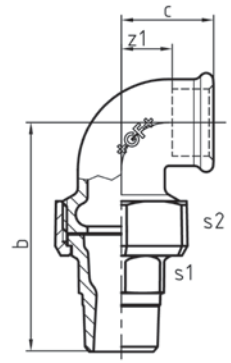
EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	c [mm]	z1 [mm]	z2 [mm]	s1 [mm]	s2 [mm]
•	B	¼	⅝	**770 096 102**	48	21	11	38	*10	28
•	G	¼	⅝	**770 096 202**	48	21	11	38	*10	28
•	B	⅜	¾	**770 096 103**	52	25	15	42	*12	32
•	G	⅜	¾	**770 096 203**	52	25	15	42	*12	32
•	B	½	1	**770 096 104**	58	28	15	45	25	41
•	G	½	1	**770 096 204**	58	28	15	45	25	41
•	B	¾	1 ¼	**770 096 105**	62	33	18	47	32	48
•	G	¾	1 ¼	**770 096 205**	62	33	18	47	32	48
•	B	1	1 ½	**770 096 106**	72	38	21	55	38	55
•	G	1	1 ½	**770 096 206**	72	38	21	55	38	55
•	B	1 ¼	2	**770 096 107**	82	45	26	63	48	67
•	G	1 ¼	2	**770 096 207**	82	45	26	63	48	67
•	B	1 ½	2 ¼	**770 096 108**	90	50	31	71	54	74
•	G	1 ½	2 ¼	**770 096 208**	90	50	31	71	54	74
•	B	2	2 ¾	**770 096 109**	100	58	34	76	66	90
•	G	2	2 ¾	**770 096 209**	100	58	34	76	66	90
-	B	2 ½	3 ½	**770 096 110**	130	72	45	103	85	111
-	G	2 ½	3 ½	**770 096 210**	130	72	45	103	85	111
-	B	3	4	**770 096 111**	134	79	49	104	96	131
-	G	3	4	**770 096 211**	134	79	49	104	96	131



96 ET
Union bush to fig. 96

- Is usually not supplied as a separate piece.

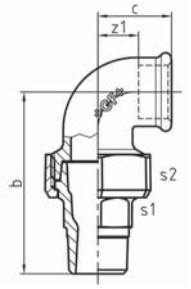
EN	B/G	Dim. Rp [inch]	G...B [inch]	Code	a [mm]	z [mm]
-	B	¼	⅝		21	11
-	G	¼	⅝		21	11
-	B	⅜	¾		25	15
-	G	⅜	¾		25	15
-	B	½	1		28	15
-	G	½	1		28	15
-	B	¾	1 ¼		33	18
-	G	¾	1 ¼		33	18
-	B	1	1 ½		38	21
-	G	1	1 ½		38	21
-	B	1 ¼	2		45	26
-	G	1 ¼	2		45	26
-	B	1 ½	2 ¼		50	31
-	G	1 ½	2 ¼		50	31
-	B	2	2 ¾		58	34
-	G	2	2 ¾		58	34
-	B	2 ½	3 ½		72	45
-	G	2 ½	3 ½		72	45
-	B	3	4		79	49
-	G	3	4		79	49



97
Union elbow, flat seat, ISO/EN UA2

- Supplied without sealing gaskets; b includes the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

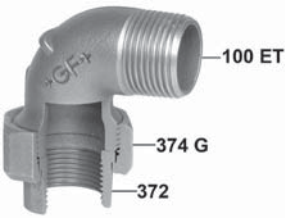
EN	B/G	Dim. [inch]	374 G [inch]	Code	b [mm]	c [mm]	z1 [mm]	s1 [mm]	s2 [mm]
•	B	⅜	¾	**770 097 103**	65	25	15	19	32
•	G	⅜	¾	**770 097 203**	65	25	15	19	32
•	B	½	1	**770 097 104**	79	28	15	23	41
•	G	½	1	**770 097 204**	79	28	15	23	41
•	B	¾	1 ¼	**770 097 105**	82	33	18	30	48
•	G	¾	1 ¼	**770 097 205**	82	33	18	30	48
•	B	1	1 ½	**770 097 106**	93	38	21	36	55
•	G	1	1 ½	**770 097 206**	93	38	21	36	55
•	B	1 ¼	2	**770 097 107**	107	45	26	48	67
•	G	1 ¼	2	**770 097 207**	107	45	26	48	67
•	B	1 ½	2 ¼	**770 097 108**	115	50	31	54	74
•	G	1 ½	2 ¼	**770 097 208**	115	50	31	54	74
•	B	2	2 ¾	**770 097 109**	128	58	34	66	90
•	G	2	2 ¾	**770 097 209**	128	58	34	66	90

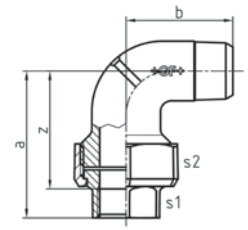


98
Union elbow, taper seat, ISO/EN UA12

- Torque and notes for installation please find in "Technical Product Notes".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	b [mm]	c [mm]	z1 [mm]	s1 [mm]	s2 [mm]
•	B	¼	⅝	**770 098 102**	61	21	11	15	28
•	G	¼	⅝	**770 098 202**	61	21	11	15	28
•	B	⅜	¾	**770 098 103**	65	25	15	20	32
•	G	⅜	¾	**770 098 203**	65	25	15	20	32
•	B	½	1	**770 098 104**	76	28	15	25	41
•	G	½	1	**770 098 204**	76	28	15	25	41
•	B	¾	1 ¼	**770 098 105**	82	33	18	32	48
•	G	¾	1 ¼	**770 098 205**	82	33	18	32	48
•	B	1	1 ½	**770 098 106**	94	38	21	38	55
•	G	1	1 ½	**770 098 206**	94	38	21	38	55
•	B	1 ¼	2	**770 098 107**	107	45	26	48	67
•	G	1 ¼	2	**770 098 207**	107	45	26	48	67
•	B	1 ½	2 ¼	**770 098 108**	115	50	31	54	74
•	G	1 ½	2 ¼	**770 098 208**	115	50	31	54	74
•	B	2	2 ¾	**770 098 109**	128	58	34	67	90
•	G	2	2 ¾	**770 098 209**	128	58	34	67	90
-	B	2 ½	3 ½	**770 098 110**	164	72	45	85	111
-	G	2 ½	3 ½	**770 098 210**	164	72	45	85	111
-	B	3	4	**770 098 111**	167	79	49	95	131
-	G	3	4	**770 098 211**	167	79	49	95	131

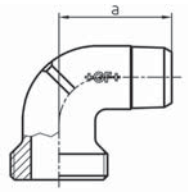




100
Union elbow, flat seat

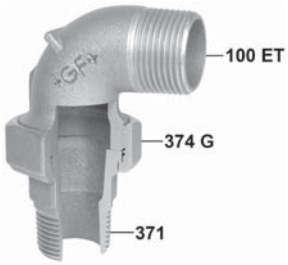
- Supplied without sealing gaskets; a and z include the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

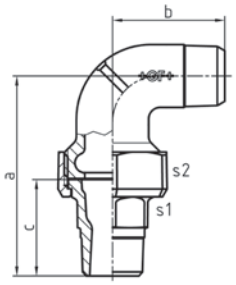
EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	b [mm]	z [mm]	s1 [mm]	s2 [mm]
-	B	½	1	**770 100 104**	58	39	45	26	41
-	G	½	1	**770 100 204**	58	39	45	26	41
-	B	¾	1 ¼	**770 100 105**	61	43	46	31	48
-	G	¾	1 ¼	**770 100 205**	61	43	46	31	48
-	B	1	1 ½	**770 100 106**	71	52	55	38	55
-	G	1	1 ½	**770 100 206**	71	52	55	38	55



100 ET
Union bush to fig. 100/101

EN	B/G	Dim. R [inch]	G...B [inch]	Code	a [mm]
-	B	½	1	**770 600 104**	39
-	G	½	1	**770 600 204**	39
-	B	¾	1 ¼	**770 600 105**	43
-	G	¾	1 ¼	**770 600 205**	43
-	B	1	1 ½	**770 600 106**	52
-	G	1	1 ½	**770 600 206**	52

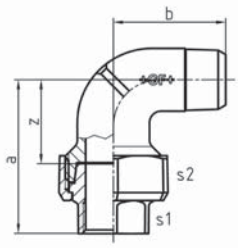




101
Union elbow, flat seat

- Supplied without sealing gaskets; a includes the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

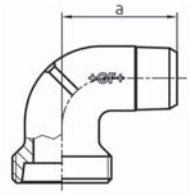
EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	b [mm]	c [mm]	s1 [mm]	s2 [mm]
-	B	½	1	**770 101 104**	77	39	40	23	41
-	G	½	1	**770 101 204**	77	39	40	23	41
-	B	¾	1 ¼	**770 101 105**	81	43	42	30	48
-	G	¾	1 ¼	**770 101 205**	81	43	42	30	48
-	B	1	1 ½	**770 101 106**	93	52	47	36	55
-	G	1	1 ½	**770 101 206**	93	52	47	36	55



102
Union elbow, taper seat

- Torque and notes for installation please find in "Technical Product Notes".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

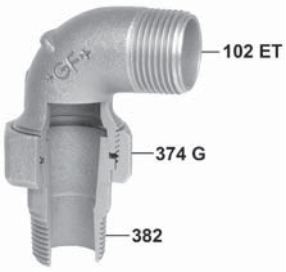
EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	b [mm]	z [mm]	s1 [mm]	s2 [mm]
-	B	½	1	**770 102 104**	59	39	46	25	41
-	G	½	1	**770 102 204**	59	39	46	25	41
-	B	¾	1 ¼	**770 102 105**	61	43	46	32	48
-	G	¾	1 ¼	**770 102 205**	61	43	46	32	48
-	B	1	1 ½	**770 102 106**	71	52	54	38	55
-	G	1	1 ½	**770 102 206**	71	52	54	38	55

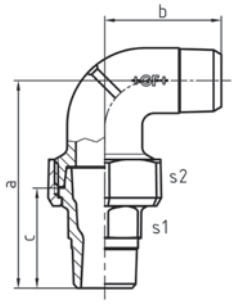


102 ET
Union bush to Fig. 102/103

- Is usually not supplied as a separate piece.

EN	B/G	Dim. R [inch]	G...B [inch]	Code	a [mm]
-	B	½	1		39
-	G	½	1		39
-	B	¾	1 ¼		43
-	G	¾	1 ¼		43
-	B	1	1 ½		52
-	G	1	1 ½		52

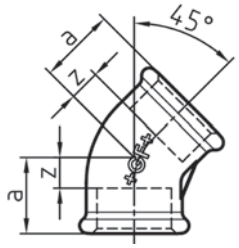




103
Union elbow, taper seat

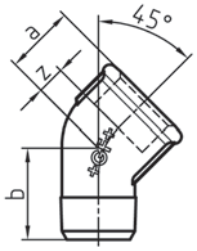
- Torque and notes for installation please find in "Technical Product Notes".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	b [mm]	c [mm]	s1 [mm]	s2 [mm]
-	B	½	1	**770 103 104**	76	39	40.5	25	39
-	G	½	1	**770 103 204**	76	39	40.5	25	39
-	B	¾	1 ¼	**770 103 105**	81	43	42.5	32	48
-	G	¾	1 ¼	**770 103 205**	81	43	42.5	32	48
-	B	1	1 ½	**770 103 106**	93	52	47.5	38	55
-	G	1	1 ½	**770 103 206**	93	52	47.5	38	55



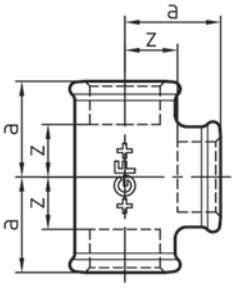
120
Elbow 45°, ISO/EN A1/45°

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	⅜	**770 120 103**	20	10
•	G	⅜	**770 120 203**	20	10
•	B	½	**770 120 104**	22	9
•	G	½	**770 120 204**	22	9
•	B	¾	**770 120 105**	25	10
•	G	¾	**770 120 205**	25	10
•	B	1	**770 120 106**	28	11
•	G	1	**770 120 206**	28	11
•	B	1 ¼	**770 120 107**	33	14
•	G	1 ¼	**770 120 207**	33	14
•	B	1 ½	**770 120 108**	36	17
•	G	1 ½	**770 120 208**	36	17
•	B	2	**770 120 109**	43	19
•	G	2	**770 120 209**	43	19
-	B	2 ½	**770 120 110**	48	21
-	G	2 ½	**770 120 210**	48	21
-	B	3	**770 120 111**	54	24
-	G	3	**770 120 211**	54	24



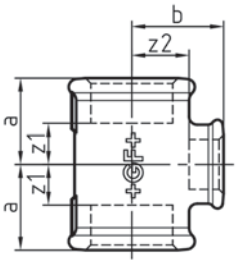
121
Elbow 45°, ISO/EN A4/45°

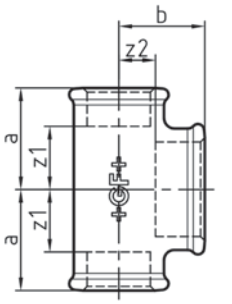
EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	z [mm]
•	B	⅜	**770 121 103**	20	26	10
•	G	⅜	**770 121 203**	20	26	10
•	B	½	**770 121 104**	22	28	9
•	G	½	**770 121 204**	22	28	9
•	B	¾	**770 121 105**	25	32	10
•	G	¾	**770 121 205**	25	32	10
•	B	1	**770 121 106**	28	39	11
•	G	1	**770 121 206**	28	39	11
•	B	1 ¼	**770 121 107**	33	43	14
•	G	1 ¼	**770 121 207**	33	43	14
•	B	1 ½	**770 121 108**	36	46	17
•	G	1 ½	**770 121 208**	36	46	17
•	B	2	**770 121 109**	43	55	19
•	G	2	**770 121 209**	43	55	19
-	B	2 ½	**770 121 110**	46	54	19
-	G	2 ½	**770 121 210**	46	54	19
-	B	3	**770 121 111**	52	61	22
-	G	3	**770 121 211**	52	61	22



130
Tee, equal, ISO/EN B1

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	⅛	**770 130 101**	19	12
•	G	⅛	**770 130 201**	19	12
•	B	¼	**770 130 102**	21	11
•	G	¼	**770 130 202**	21	11
•	B	⅜	**770 130 103**	25	15
•	G	⅜	**770 130 203**	25	15
•	B	½	**770 130 104**	28	15
•	G	½	**770 130 204**	28	15
•	B	¾	**770 130 105**	33	18
•	G	¾	**770 130 205**	33	18
•	B	1	**770 130 106**	38	21
•	G	1	**770 130 206**	38	21
•	B	1 ¼	**770 130 107**	45	26
•	G	1 ¼	**770 130 207**	45	26
•	B	1 ½	**770 130 108**	50	31
•	G	1 ½	**770 130 208**	50	31
•	B	2	**770 130 109**	58	34
•	G	2	**770 130 209**	58	34
•	B	2 ½	**770 130 110**	69	42
•	G	2 ½	**770 130 210**	69	42
•	B	3	**770 130 111**	78	48
•	G	3	**770 130 211**	78	48
•	B	4	**770 130 112**	96	60
•	G	4	**770 130 212**	96	60





130
Tee, reducing or increasing on the branch, ISO/EN B1

EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	b [mm]	z1 [mm]	z2 [mm]
•	B	⅜ - ¼	**770 130 115**	23	23	13	13
•	G	⅜ - ¼	**770 130 215**	23	23	13	13
•	B	⅜ - ½	**770 130 116**	26	26	16	13
•	G	⅜ - ½	**770 130 216**	26	26	16	13
•	B	½ - ¼	**770 130 117**	24	24	11	14
•	G	½ - ¼	**770 130 217**	24	24	11	14
•	B	½ - ⅜	**770 130 119**	26	26	13	16
•	G	½ - ⅜	**770 130 219**	26	26	13	16
•	B	½ - ¾	**770 130 121**	31	30	18	15
•	G	½ - ¾	**770 130 221**	31	30	18	15
•	B	½ - 1	**770 130 130**	34	32	21	15
•	G	½ - 1	**770 130 230**	34	32	21	15
•	B	¾ - ¼	**770 130 122**	26	27	11	17
•	G	¾ - ¼	**770 130 222**	26	27	11	17
•	B	¾ - ⅜	**770 130 124**	28	28	13	18
•	G	¾ - ⅜	**770 130 224**	28	28	13	18
•	B	¾ - ½	**770 130 127**	30	31	15	18
•	G	¾ - ½	**770 130 227**	30	31	15	18
•	B	¾ - 1	**770 130 132**	36	35	21	18
•	G	¾ - 1	**770 130 232**	36	35	21	18
•	B	1 - ¼	**770 130 133**	28	31	11	21
•	G	1 - ¼	**770 130 233**	28	31	11	21
•	B	1 - ⅜	**770 130 134**	30	32	13	22
•	G	1 - ⅜	**770 130 234**	30	32	13	22
•	B	1 - ½	**770 130 137**	32	34	15	21
•	G	1 - ½	**770 130 237**	32	34	15	21
•	B	1 - ¾	**770 130 140**	35	36	18	21
•	G	1 - ¾	**770 130 240**	35	36	18	21
•	B	1 - 1 ¼	**770 130 145**	42	40	25	21
•	G	1 - 1 ¼	**770 130 245**	42	40	25	21
•	B	1 - 1 ½	**770 130 159**	46	42	29	23
•	G	1 - 1 ½	**770 130 259**	46	42	29	23
•	B	1 ¼ - ⅜	**770 130 146**	32	36	13	26
•	G	1 ¼ - ⅜	**770 130 246**	32	36	13	26
•	B	1 ¼ - ½	**770 130 148**	34	38	15	25
•	G	1 ¼ - ½	**770 130 248**	34	38	15	25
•	B	1 ¼ - ¾	**770 130 151**	36	41	17	26
•	G	1 ¼ - ¾	**770 130 251**	36	41	17	26
•	B	1 ¼ - 1	**770 130 155**	40	42	21	25
•	G	1 ¼ - 1	**770 130 255**	40	42	21	25
•	B	1 ¼ - 1 ½	**770 130 161**	48	46	29	27
•	G	1 ¼ - 1 ½	**770 130 261**	48	46	29	27
•	B	1 ¼ - 2	**770 130 177**	54	48	35	24
•	G	1 ¼ - 2	**770 130 277**	54	48	35	24
-	B	1 ½ - ⅜	**770 130 162**	33	38	14	28
-	G	1 ½ - ⅜	**770 130 262**	33	38	14	28
•	B	1 ½ - ½	**770 130 164**	36	42	17	29
•	G	1 ½ - ½	**770 130 264**	36	42	17	29
•	B	1 ½ - ¾	**770 130 166**	38	44	19	29
•	G	1 ½ - ¾	**770 130 266**	38	44	19	29
•	B	1 ½ - 1	**770 130 169**	42	46	23	29
•	G	1 ½ - 1	**770 130 269**	42	46	23	29
•	B	1 ½ - 1 ¼	**770 130 172**	46	48	27	29
•	G	1 ½ - 1 ¼	**770 130 272**	46	48	27	29
•	B	1 ½ - 2	**770 130 179**	55	52	36	28
•	G	1 ½ - 2	**770 130 279**	55	52	36	28
•	B	2 - ½	**770 130 181**	38	48	14	35
•	G	2 - ½	**770 130 281**	38	48	14	35
•	B	2 - ¾	**770 130 183**	40	50	16	35
•	G	2 - ¾	**770 130 283**	40	50	16	35
•	B	2 - 1	**770 130 185**	44	52	20	35
•	G	2 - 1	**770 130 285**	44	52	20	35
•	B	2 - 1 ¼	**770 130 188**	48	54	24	35
•	G	2 - 1 ¼	**770 130 288**	48	54	24	35

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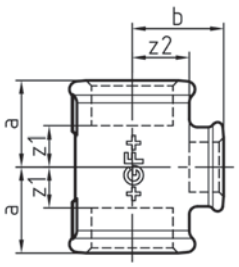
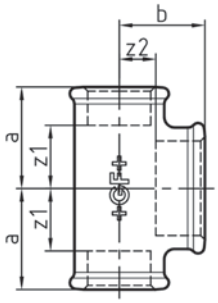
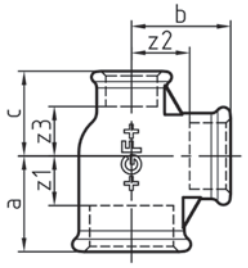




EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	b [mm]	z1 [mm]	z2 [mm]
•	B	2 - 1 ½	**770 130 191**	52	55	28	36
•	G	2 - 1 ½	**770 130 291**	52	55	28	36
-	B	2 - 2 ½	**770 130 197**	66	61	42	34
-	G	2 - 2 ½	**770 130 297**	66	61	42	34
-	B	2 ½ - ½	**770 130 198**	41	56	14	43
-	G	2 ½ - ½	**770 130 298**	41	56	14	43
-	B	2 ½ - ¾	**770 130 199**	45	59	18	44
-	G	2 ½ - ¾	**770 130 299**	45	59	18	44
•	B	2 ½ - 1	**770 129 115**	47	60	20	43
•	G	2 ½ - 1	**770 129 215**	47	60	20	43
•	B	2 ½ - 1 ¼	**770 129 116**	52	62	25	43
•	G	2 ½ - 1 ¼	**770 129 216**	52	62	25	43
•	B	2 ½ - 1 ½	**770 129 118**	55	63	28	44
•	G	2 ½ - 1 ½	**770 129 218**	55	63	28	44
•	B	2 ½ - 2	**770 129 120**	61	66	34	42
•	G	2 ½ - 2	**770 129 220**	61	66	34	42
-	B	3 - ½	**770 129 124**	46	63	15	50
-	G	3 - ½	**770 129 224**	46	63	15	50
-	B	3 - ¾	**770 129 125**	48	66	18	51
-	G	3 - ¾	**770 129 225**	48	66	18	51
•	B	3 - 1	**770 129 126**	51	67	21	50
•	G	3 - 1	**770 129 226**	51	67	21	50
•	B	3 - 1 ¼	**770 129 127**	55	70	25	51
•	G	3 - 1 ¼	**770 129 227**	55	70	25	51
•	B	3 - 1 ½	**770 129 128**	58	71	28	52
•	G	3 - 1 ½	**770 129 228**	58	71	28	52
•	B	3 - 2	**770 129 130**	64	73	34	49
•	G	3 - 2	**770 129 230**	64	73	34	49
•	B	3 - 2 ½	**770 129 131**	72	76	42	49
•	G	3 - 2 ½	**770 129 231**	72	76	42	49
-	B	4 - 1	**770 129 133**	56	80	20	63
-	G	4 - 1	**770 129 233**	56	80	20	63
-	B	4 - 1 ½	**770 129 135**	61	84	28	65
-	G	4 - 1 ½	**770 129 235**	64	84	28	65
•	B	4 - 2	**770 129 136**	70	86	34	62
•	G	4 - 2	**770 129 236**	70	86	34	62
-	G	4 - 2 ½	**770 129 237**	77	89	41	62
•	B	4 - 3	**770 129 138**	84	92	48	62
•	G	4 - 3	**770 129 238**	84	92	48	62



130
Tee, reducing or increasing on the branch, reducing on the run, ISO/EN B1

EN	B/G	Dim. (1-2-3) [inch]	Code	a [mm]	b [mm]	c [mm]	z1 [mm]	z2 [mm]	z3 [mm]
•	B	½ - ⅜ - ⅜	**770 130 118**	26	26	25	13	16	15
•	G	½ - ⅜ - ⅜	**770 130 218**	26	26	25	13	16	15
•	B	½ - ½ - ⅜	**770 130 120**	28	28	26	15	15	16
•	G	½ - ½ - ⅜	**770 130 220**	28	28	26	15	15	16
•	B	¾ - ⅜ - ½	**770 130 123**	28	28	26	13	18	13
•	G	¾ - ⅜ - ½	**770 130 223**	28	28	26	13	18	13
•	B	¾ - ½ - ⅜	**770 130 125**	30	31	26	15	18	16
•	G	¾ - ½ - ⅜	**770 130 225**	30	31	26	15	18	16
•	B	¾ - ½ - ½	**770 130 126**	30	31	28	15	18	15
•	G	¾ - ½ - ½	**770 130 226**	30	31	28	15	18	15
•	B	¾ - ¾ - ⅜	**770 130 128**	33	33	28	18	18	18
•	G	¾ - ¾ - ⅜	**770 130 228**	33	33	28	18	18	18
•	B	¾ - ¾ - ½	**770 130 129**	33	33	31	18	18	18
•	G	¾ - ¾ - ½	**770 130 229**	33	33	31	18	18	18
-	B	¾ - 1 - ½	**770 130 131**	36	35	34	21	18	21
-	G	¾ - 1 - ½	**770 130 231**	36	35	34	21	18	21
•	B	1 - ½ - ½	**770 130 135**	32	34	28	15	21	15
•	G	1 - ½ - ½	**770 130 235**	32	34	28	15	21	15
•	B	1 - ½ - ¾	**770 130 136**	32	34	30	15	21	15
•	G	1 - ½ - ¾	**770 130 236**	32	34	30	15	21	15
•	B	1 - ¾ - ½	**770 130 138**	35	36	31	18	21	18
•	G	1 - ¾ - ½	**770 130 238**	35	36	31	18	21	18
•	B	1 - ¾ - ¾	**770 130 139**	35	36	33	18	21	18
•	G	1 - ¾ - ¾	**770 130 239**	35	36	33	18	21	18
•	B	1 - 1 - ⅜	**770 130 141**	38	38	32	21	21	22
•	G	1 - 1 - ⅜	**770 130 241**	38	38	32	21	21	22
•	B	1 - 1 - ½	**770 130 142**	38	38	34	21	21	21
•	G	1 - 1 - ½	**770 130 242**	38	38	34	21	21	21
•	B	1 - 1 - ¾	**770 130 143**	38	38	36	21	21	21
•	G	1 - 1 - ¾	**770 130 243**	38	38	36	21	21	21
-	B	1 - 1 ¼ - ¾	**770 130 144**	42	40	41	25	21	26
-	G	1 - 1 ¼ - ¾	**770 130 244**	42	40	41	25	21	26
•	B	1 ¼ - ½ - 1	**770 130 147**	34	38	32	15	25	15
•	G	1 ¼ - ½ - 1	**770 130 247**	34	38	32	15	25	15
•	B	1 ¼ - ¾ - ¾	**770 130 149**	36	41	33	17	26	18
•	G	1 ¼ - ¾ - ¾	**770 130 249**	36	41	33	17	26	18
•	B	1 ¼ - ¾ - 1	**770 130 150**	36	41	35	17	26	18
•	G	1 ¼ - ¾ - 1	**770 130 250**	36	41	35	17	26	18
•	B	1 ¼ - 1 - ¾	**770 130 153**	40	42	36	21	25	21
•	G	1 ¼ - 1 - ¾	**770 130 253**	40	42	36	21	25	21
•	B	1 ¼ - 1 - 1	**770 130 154**	40	42	38	21	25	21
•	G	1 ¼ - 1 - 1	**770 130 254**	40	42	38	21	25	21
•	B	1 ¼ - 1 ¼ - ½	**770 130 156**	45	45	38	26	26	25
•	G	1 ¼ - 1 ¼ - ½	**770 130 256**	45	45	38	26	26	25
•	B	1 ¼ - 1 ¼ - ¾	**770 130 157**	45	45	41	26	26	26
•	G	1 ¼ - 1 ¼ - ¾	**770 130 257**	45	45	41	26	26	26
•	B	1 ¼ - 1 ¼ - 1	**770 130 158**	45	45	42	26	26	25
•	G	1 ¼ - 1 ¼ - 1	**770 130 258**	45	45	42	26	26	25
-	B	1 ¼ - 1 ½ - 1	**770 130 160**	48	46	46	29	27	29
-	G	1 ¼ - 1 ½ - 1	**770 130 260**	48	46	46	29	27	29
•	B	1 ½ - ½ - 1 ¼	**770 130 163**	36	42	34	17	29	15
•	G	1 ½ - ½ - 1 ¼	**770 130 263**	36	42	34	17	29	15
•	B	1 ½ - ¾ - 1 ¼	**770 130 165**	38	44	36	19	29	17
•	G	1 ½ - ¾ - 1 ¼	**770 130 265**	38	44	36	19	29	17
•	B	1 ½ - 1 - 1	**770 130 167**	42	46	38	23	29	21
•	G	1 ½ - 1 - 1	**770 130 267**	42	46	38	23	29	21
•	B	1 ½ - 1 - 1 ¼	**770 130 168**	42	46	38	23	29	21
•	G	1 ½ - 1 - 1 ¼	**770 130 268**	42	46	38	23	29	21
•	B	1 ½ - 1 ¼ - 1	**770 130 170**	46	48	42	27	29	25
•	G	1 ½ - 1 ¼ - 1	**770 130 270**	46	48	42	27	29	25
•	B	1 ½ - 1 ¼ - 1 ¼	**770 130 171**	46	48	45	27	29	26
•	G	1 ½ - 1 ¼ - 1 ¼	**770 130 271**	46	48	45	27	29	26
•	B	1 ½ - 1 ½ - ½	**770 130 173**	50	50	42	31	31	29

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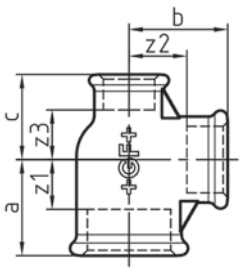
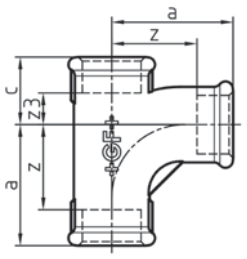
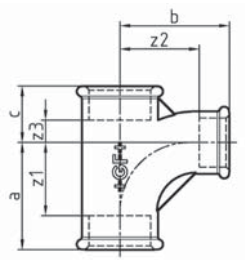


EN	B/G	Dim. (1-2-3) [inch]	Code	a [mm]	b [mm]	c [mm]	z1 [mm]	z2 [mm]	z3 [mm]
•	G	1 ½ - 1 ½ - ½	**770 130 273**	50	50	42	31	31	29
•	B	1 ½ - 1 ½ - ¾	**770 130 174**	50	50	44	31	31	29
•	G	1 ½ - 1 ½ - ¾	**770 130 274**	50	50	44	31	31	29
•	B	1 ½ - 1 ½ - 1	**770 130 175**	50	50	46	31	31	29
•	G	1 ½ - 1 ½ - 1	**770 130 275**	50	50	46	31	31	29
•	B	1 ½ - 1 ½ - 1 ¼	**770 130 176**	50	50	48	31	31	29
•	G	1 ½ - 1 ½ - 1 ¼	**770 130 276**	50	50	48	31	31	29
-	B	1 ½ - 2 - 1 ¼	**770 130 178**	56	54	56	37	30	37
-	G	1 ½ - 2 - 1 ¼	**770 130 278**	56	54	56	37	30	37
-	B	2 - ½ - 1 ½	**770 130 180**	38	48	38	14	35	19
-	G	2 - ½ - 1 ½	**770 130 280**	38	48	38	14	35	19
•	B	2 - ¾ - 1 ½	**770 130 182**	40	50	38	16	35	19
•	G	2 - ¾ - 1 ½	**770 130 282**	40	50	38	16	35	19
•	B	2 - 1 - 1 ½	**770 130 184**	44	52	42	20	35	23
•	G	2 - 1 - 1 ½	**770 130 284**	44	52	42	20	35	23
•	B	2 - 1 ¼ - 1 ¼	**770 130 186**	48	54	45	24	35	26
•	G	2 - 1 ¼ - 1 ¼	**770 130 286**	48	54	45	24	35	26
•	B	2 - 1 ¼ - 1 ½	**770 130 187**	48	54	46	24	35	27
•	G	2 - 1 ¼ - 1 ½	**770 130 287**	48	54	46	24	35	27
•	B	2 - 1 ½ - 1 ½	**770 130 190**	52	55	50	28	36	31
•	G	2 - 1 ½ - 1 ½	**770 130 290**	52	55	50	28	36	31
-	B	2 - 2 - ½	**770 130 192**	58	58	48	34	34	35
-	G	2 - 2 - ½	**770 130 292**	58	58	48	34	34	35
•	B	2 - 2 - ¾	**770 130 193**	58	58	50	34	34	35
•	G	2 - 2 - ¾	**770 130 293**	58	58	50	34	34	35
•	B	2 - 2 - 1	**770 130 194**	58	58	52	34	34	35
•	G	2 - 2 - 1	**770 130 294**	58	58	52	34	34	35
•	B	2 - 2 - 1 ¼	**770 130 195**	58	58	54	34	34	35
•	G	2 - 2 - 1 ¼	**770 130 295**	58	58	54	34	34	35
•	B	2 - 2 - 1 ½	**770 130 196**	58	58	55	34	34	36
•	G	2 - 2 - 1 ½	**770 130 296**	58	58	55	34	34	36
-	B	2 ½ - 2 - 2	**770 129 119**	67	72	62	40	48	38
-	G	2 ½ - 2 - 2	**770 129 219**	67	72	62	40	48	38
-	G	2 ½ - 2 ½ - 1	**770 129 221**	71	71	71	44	44	54
-	B	2 ½ - 2 ½ - 1 ½	**770 129 122**	69	69	64	42	42	45
-	G	2 ½ - 2 ½ - 1 ½	**770 129 222**	69	69	64	42	42	45
-	B	2 ½ - 2 ½ - 2	**770 129 123**	73	73	68	46	46	34
-	G	2 ½ - 2 ½ - 2	**770 129 223**	73	73	68	46	46	34
-	G	3 - 2 - 2	**770 129 229**	64	73	60	34	49	36
-	G	3 - 3 - 2	**770 129 232**	78	79	72	48	49	48



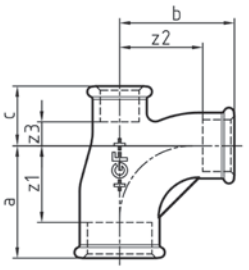
131
Pitcher tee, equal, ISO/EN E1

EN	B/G	Dim. [inch]	Code	a [mm]	c [mm]	z [mm]	z3 [mm]
•	B	½	**770 131 104**	45	24	32	11
•	G	½	**770 131 204**	45	24	32	11
•	B	¾	**770 131 105**	50	28	35	13
•	G	¾	**770 131 205**	50	28	35	13
•	B	1	**770 131 106**	63	33	46	16
•	G	1	**770 131 206**	63	33	46	16
•	B	1 ¼	**770 131 107**	76	40	57	21
•	G	1 ¼	**770 131 207**	76	40	57	21
•	B	1 ½	**770 131 108**	85	43	66	24
•	G	1 ½	**770 131 208**	85	43	66	24
•	B	2	**770 131 109**	102	53	78	29
•	G	2	**770 131 209**	102	53	78	29
-	B	2 ½	**770 131 110**	115	62	88	35
-	G	2 ½	**770 131 210**	115	62	88	35
-	B	3	**770 131 111**	127	70	97	40
-	G	3	**770 131 211**	127	70	97	40
-	B	4	**770 131 112**	165	87	129	51
-	G	4	**770 131 212**	165	87	129	51



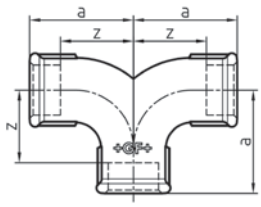
131
Pitcher tee, reducing on the branch, ISO/EN E1

EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	b [mm]	c [mm]	z1 [mm]	z2 [mm]	z3 [mm]
•	B	¾ - ½	**770 131 116**	47	48	25	32	35	10
•	G	¾ - ½	**770 131 216**	47	48	25	32	35	10
•	B	1 - ½	**770 131 119**	49	51	28	32	38	11
•	G	1 - ½	**770 131 219**	49	51	28	32	38	11
•	B	1 - ¾	**770 131 121**	53	54	30	36	39	13
•	G	1 - ¾	**770 131 221**	53	54	30	36	39	13
•	B	1 ¼ - ½	**770 131 122**	51	56	30	32	43	11
•	G	1 ¼ - ½	**770 131 222**	51	56	30	32	43	11
•	B	1 ¼ - ¾	**770 131 123**	55	58	33	36	43	14
•	G	1 ¼ - ¾	**770 131 223**	55	58	33	36	43	14
•	B	1 ¼ - 1	**770 131 125**	66	68	36	47	51	17
•	G	1 ¼ - 1	**770 131 225**	66	68	36	47	51	17
-	B	1 ½ - ½	**770 131 140**	52	58	29	33	45	10
-	G	1 ½ - ½	**770 131 240**	52	58	29	33	45	10
•	B	1 ½ - ¾	**770 131 126**	55	61	33	36	46	14
•	G	1 ½ - ¾	**770 131 226**	55	61	33	36	46	14
•	B	1 ½ - 1	**770 131 127**	66	71	36	47	54	17
•	G	1 ½ - 1	**770 131 227**	66	71	36	47	54	17
•	B	1 ½ - 1 ¼	**770 131 128**	77	79	41	58	60	22
•	G	1 ½ - 1 ¼	**770 131 228**	77	79	41	58	60	22
-	B	2 - ½	**770 131 137**	54	64	32	30	51	8
-	B	2 - ¾	**770 131 129**	69	75	39	45	60	15
-	G	2 - ¾	**770 131 229**	69	75	39	45	60	15
•	B	2 - 1	**770 131 130**	70	77	40	46	60	16
•	G	2 - 1	**770 131 230**	70	77	40	46	60	16
•	B	2 - 1 ¼	**770 131 131**	80	85	45	56	66	21
•	G	2 - 1 ¼	**770 131 231**	80	85	45	56	66	21
•	B	2 - 1 ½	**770 131 132**	91	94	48	67	75	24
•	G	2 - 1 ½	**770 131 232**	91	94	48	67	75	24
-	G	2 ½ - 1 ¼	**770 131 233**	103	108	58	76	89	31
-	B	3 - 2	**770 131 135**	138	143	69	108	119	39
-	G	3 - 2	**770 131 235**	138	143	69	108	119	39



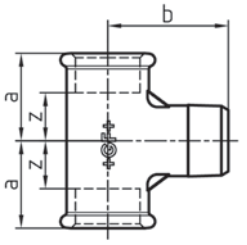
131
Pitcher tee, equal or reducing on the branch and run, ISO/EN E1

EN	B/G	Dim. (1-2-3) [inch]	Code	a [mm]	b [mm]	c [mm]	z1 [mm]	z2 [mm]	z3 [mm]
•	B	¾ - ½ - ½	**770 131 115**	47	48	24	31	34	11
•	G	¾ - ½ - ½	**770 131 215**	47	48	24	31	34	11
•	B	¾ - ¾ - ½	**770 131 117**	49	49	27	34	34	14
•	G	¾ - ¾ - ½	**770 131 217**	49	49	27	34	34	14
-	B	1 - ½ - ¾	**770 131 118**	49	51	25	32	38	10
-	G	1 - ½ - ¾	**770 131 218**	49	51	25	32	38	10
•	B	1 - ¾ - ¾	**770 131 120**	53	54	28	36	39	13
•	G	1 - ¾ - ¾	**770 131 220**	53	54	28	36	39	13



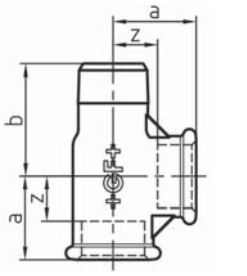
132
Twin elbow, equal, ISO/EN E2

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	½	**770 132 104**	45	32
•	G	½	**770 132 204**	45	32
•	B	¾	**770 132 105**	50	35
•	G	¾	**770 132 205**	50	35
•	B	1	**770 132 106**	63	46
•	G	1	**770 132 206**	63	46
•	B	1 ¼	**770 132 107**	76	57
•	G	1 ¼	**770 132 207**	76	57
•	B	1 ½	**770 132 108**	85	66
•	G	1 ½	**770 132 208**	85	66
•	B	2	**770 132 109**	102	78
•	G	2	**770 132 209**	102	78



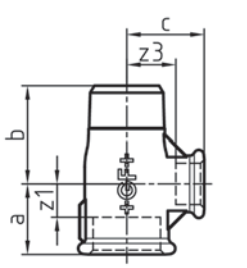
133
Tee, equal

EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	z [mm]
-	B	⅜	**770 133 103**	22	31	12
-	G	⅜	**770 133 203**	22	31	12
-	B	½	**770 133 104**	25	38	12
-	G	½	**770 133 204**	25	38	12
-	B	¾	**770 133 105**	33	45	18
-	G	¾	**770 133 205**	33	45	18
-	B	1	**770 133 106**	39	53	22
-	G	1	**770 133 206**	39	53	22



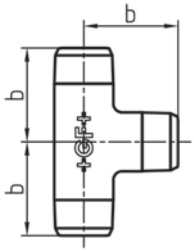
134
Tee, equal

EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	z [mm]
-	B	¼	**770 134 102**	22	28	12
-	G	¼	**770 134 202**	22	28	12
-	B	⅜	**770 134 103**	24	32	14
-	G	⅜	**770 134 203**	24	32	14
-	B	½	**770 134 104**	27	37	14
-	G	½	**770 134 204**	27	37	14
-	B	¾	**770 134 105**	33	43	17
-	G	¾	**770 134 205**	33	43	17
-	B	1	**770 134 106**	37	50	20
-	G	1	**770 134 206**	37	50	20
-	B	1 ¼	**770 134 107**	45	58	26
-	G	1 ¼	**770 134 207**	45	58	26
-	B	1 ½	**770 134 108**	50	65	31
-	G	1 ½	**770 134 208**	50	65	31
-	B	2	**770 134 109**	59	69	35
-	G	2	**770 134 209**	59	69	35



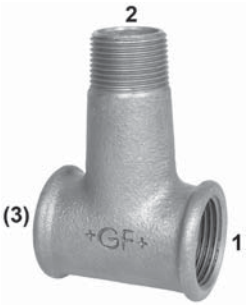
134
Tee, reducing on branch

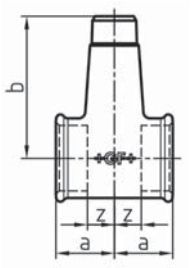
EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	b [mm]	c [mm]	z1 [mm]	z3 [mm]
-	B	½ - ¼	**770 134 116**	24	34	24	11	14
-	G	½ - ¼	**770 134 216**	24	34	24	11	14
-	B	¾ - ½	**770 134 118**	30	40	30	15	17
-	G	¾ - ½	**770 134 218**	30	40	30	15	17
-	B	1 - ½	**770 134 119**	32	44	35	15	22
-	G	1 - ½	**770 134 219**	32	44	35	15	22



135
Tee, equal

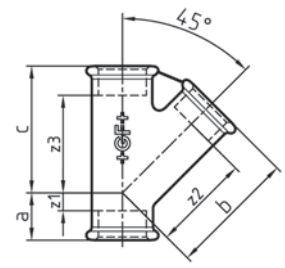
EN	B/G	Dim. [inch]	Code	b [mm]
-	B	½	**770 135 104**	37
-	G	½	**770 135 204**	37
-	B	¾	**770 135 105**	43
-	G	¾	**770 135 205**	43
-	B	1	**770 135 106**	48
-	G	1	**770 135 206**	48





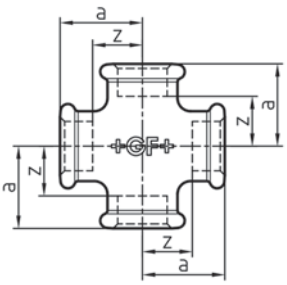
137
Distribution Tee reducing on branch

EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	b [mm]	z [mm]
-	G	1 ¼ - ¾	**770 137 216**	35	85	16
-	G	1 ¼ - 1	**770 137 217**	35	75	16
-	G	1 ½ - 1	**770 137 219**	40	86	21



165
Tee 45°, equal

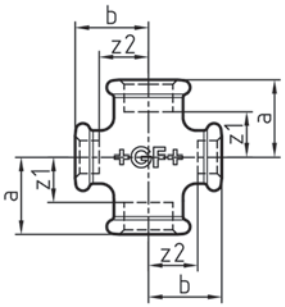
EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	c [mm]	z1 [mm]	z2 [mm]	z3 [mm]
-	B	⅜	**770 165 103**	16	46	46	6	36	36
-	B	½	**770 165 104**	23	54	54	10	41	41
-	G	½	**770 165 204**	23	54	54	10	41	41
-	B	¾	**770 165 105**	24	64	64	9	49	49
-	G	¾	**770 165 205**	24	64	64	9	49	49
-	B	1	**770 165 106**	28	77	77	11	60	60
-	G	1	**770 165 206**	28	77	77	11	60	60
-	B	1 ¼	**770 165 107**	34	91	91	14	72	72
-	G	1 ¼	**770 165 207**	34	91	91	14	72	72
-	B	1 ½	**770 165 108**	34	98	98	15	79	79
-	G	1 ½	**770 165 208**	34	98	98	15	79	79
-	B	2	**770 165 109**	39	115	115	15	91	91
-	G	2	**770 165 209**	39	115	115	15	91	91



180
Cross, equal, ISO/EN C1

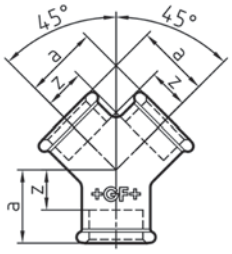
- * Available as long as our stock will last

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	¼	**770 180 102**	21	11
•	G	¼	**770 180 202**	21	11
•	B	⅜	**770 180 103**	25	15
•	G	⅜	**770 180 203**	25	15
•	B	½	**770 180 104**	28	15
•	G	½	**770 180 204**	28	15
•	B	¾	**770 180 105**	33	18
•	G	¾	**770 180 205**	33	18
•	B	1	**770 180 106**	38	21
•	G	1	**770 180 206**	38	21
•	B	1 ¼	**770 180 107**	45	26
•	G	1 ¼	**770 180 207**	45	26
•	B	1 ½	**770 180 108**	50	31
•	G	1 ½	**770 180 208**	50	31
•	B	2	**770 180 109**	58	34
•	G	2	**770 180 209**	58	34
•	B	2 ½	**770 180 110**	69	42
•	G	2 ½	**770 180 210**	69	42
•	B	3	**770 180 111**	78	48
•	G	3	**770 180 211**	78	48
* •	B	4	**770 180 112**	96	60
•	G	4	**770 180 212**	96	60



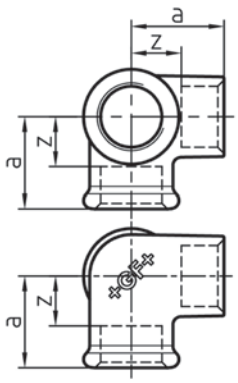
180
Cross, reducing, ISO/EN C1

EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	b [mm]	z1 [mm]	z2 [mm]
•	B	¾ - ½	**770 180 115**	30	31	15	18
•	G	¾ - ½	**770 180 215**	30	31	15	18
•	B	1 - ½	**770 180 116**	32	34	15	21
•	G	1 - ½	**770 180 216**	32	34	15	21
•	B	1 - ¾	**770 180 117**	35	36	18	21
•	G	1 - ¾	**770 180 217**	35	36	18	21
•	B	1 ¼ - 1	**770 180 118**	40	42	21	25
•	G	1 ¼ - 1	**770 180 218**	40	42	21	25
•	B	1 ½ - 1	**770 180 120**	42	46	23	29
•	G	1 ½ - 1	**770 180 220**	42	46	23	29
-	B	2 - 1	**770 180 121**	44	52	20	35
-	G	2 - 1	**770 180 221**	44	52	20	35



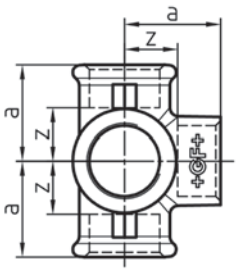
220
Y-piece

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
-	B	⅜	**770 220 103**	24	14
-	G	⅜	**770 220 203**	24	14
-	B	½	**770 220 104**	27	14
-	G	½	**770 220 204**	27	14
-	B	¾	**770 220 105**	33	18
-	G	¾	**770 220 205**	33	18
-	B	1	**770 220 106**	40	23
-	G	1	**770 220 206**	40	23



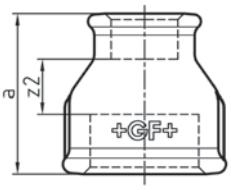
221
Side outlet elbow, ISO/EN Za1

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	⅜	**770 221 103**	25	15
•	G	⅜	**770 221 203**	25	15
•	B	½	**770 221 104**	28	15
•	G	½	**770 221 204**	28	15
•	B	¾	**770 221 105**	33	18
•	G	¾	**770 221 205**	33	18
•	B	1	**770 221 106**	38	21
•	G	1	**770 221 206**	38	21
-	B	1 ¼	**770 221 107**	45	26
-	G	1 ¼	**770 221 207**	45	26
-	B	1 ½	**770 221 108**	50	31
-	G	1 ½	**770 221 208**	50	31
-	B	2	**770 221 109**	58	34
-	G	2	**770 221 209**	58	34



223
Side outlet tee, ISO/EN Za2

EN	B/G	Dim. [inch]	Code	a [mm]	z [mm]
•	B	½	**770 223 104**	28	15
•	G	½	**770 223 204**	28	15
•	B	¾	**770 223 105**	33	18
•	G	¾	**770 223 205**	33	18
•	B	1	**770 223 106**	38	21
•	G	1	**770 223 206**	38	21

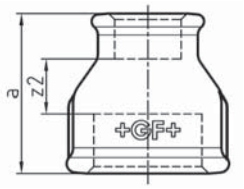


240
Socket, reducing, ISO/EN M2

- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations. Steel parts are hexagonal instead of beaded at the end no. 1.

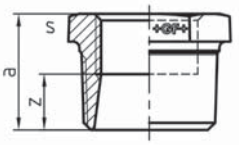
EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	s [mm]	z2 [mm]
ST •	B	¼ - ⅛	**770 240 115**	27	17	10
ST •	G	¼ - ⅛	**770 240 215**	27	17	10
ST •	B	⅜ - ⅛	**770 240 116**	30	22	13
ST •	G	⅜ - ⅛	**770 240 216**	30	22	13
ST •	B	⅜ - ¼	**770 240 117**	30	22	10
ST •	G	⅜ - ¼	**770 240 217**	30	22	10
•	B	½ - ¼	**770 240 118**	36		13
•	G	½ - ¼	**770 240 218**	36		13
•	B	½ - ⅜	**770 240 119**	36		13
•	G	½ - ⅜	**770 240 219**	36		13
•	B	¾ - ¼	**770 240 120**	39		14
•	G	¾ - ¼	**770 240 220**	39		14
•	B	¾ - ⅜	**770 240 121**	39		14
•	G	¾ - ⅜	**770 240 221**	39		14
•	B	¾ - ½	**770 240 122**	39		11
•	G	¾ - ½	**770 240 222**	39		11
•	B	1 - ⅜	**770 240 123**	45		18
•	G	1 - ⅜	**770 240 223**	45		18
•	B	1 - ½	**770 240 124**	45		15
•	G	1 - ½	**770 240 224**	45		15
•	B	1 - ¾	**770 240 125**	45		13
•	G	1 - ¾	**770 240 225**	45		13
-	B	1 ¼ - ⅜	**770 240 126**	50		21
-	G	1 ¼ - ⅜	**770 240 226**	50		21
•	B	1 ¼ - ½	**770 240 127**	50		18
•	G	1 ¼ - ½	**770 240 227**	50		18
•	B	1 ¼ - ¾	**770 240 128**	50		16
•	G	1 ¼ - ¾	**770 240 228**	50		16
•	B	1 ¼ - 1	**770 240 129**	50		14
•	G	1 ¼ - 1	**770 240 229**	50		14
•	B	1 ½ - ½	**770 240 130**	55		23
•	G	1 ½ - ½	**770 240 230**	55		23
•	B	1 ½ - ¾	**770 240 131**	55		21
•	G	1 ½ - ¾	**770 240 231**	55		21
•	B	1 ½ - 1	**770 240 132**	55		19
•	G	1 ½ - 1	**770 240 232**	55		19
•	B	1 ½ - 1 ¼	**770 240 133**	55		17
•	G	1 ½ - 1 ¼	**770 240 233**	55		17
•	B	2 - ½	**770 240 134**	65		28
•	G	2 - ½	**770 240 234**	65		28
•	B	2 - ¾	**770 240 135**	65		26
•	G	2 - ¾	**770 240 235**	65		26
•	B	2 - 1	**770 240 136**	65		24
•	G	2 - 1	**770 240 236**	65		24
•	B	2 - 1 ¼	**770 240 137**	65		22
•	G	2 - 1 ¼	**770 240 237**	65		22
•	B	2 - 1 ½	**770 240 138**	65		22
•	G	2 - 1 ½	**770 240 238**	65		22
-	B	2 ½ - 1	**770 240 139**	74		30
-	G	2 ½ - 1	**770 240 239**	74		30
•	B	2 ½ - 1 ½	**770 240 141**	74		28
•	G	2 ½ - 1 ½	**770 240 241**	74		28
•	B	2 ½ - 2	**770 240 142**	74		23
•	G	2 ½ - 2	**770 240 242**	74		23
-	B	3 - 1 ½	**770 240 143**	80		31
-	G	3 - 1 ½	**770 240 243**	80		31
•	B	3 - 2	**770 240 144**	80		26
•	G	3 - 2	**770 240 244**	80		26
•	B	3 - 2 ½	**770 240 145**	80		23
•	G	3 - 2 ½	**770 240 245**	80		23

table continued next page

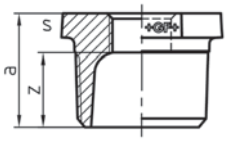


EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	s [mm]	z2 [mm]
•	B	4 - 2	**770 240 146**	94		34
•	G	4 - 2	**770 240 246**	94		34
•	B	4 - 2 ½	**770 240 147**	94		31
•	G	4 - 2 ½	**770 240 247**	94		31
•	B	4 - 3	**770 240 148**	94		28
•	G	4 - 3	**770 240 248**	94		28

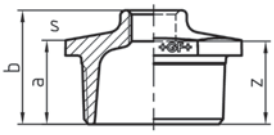
Form I



Form II



Form III



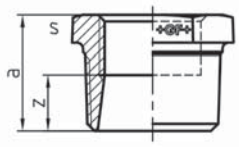
241
Reducing bush, ISO/EN N4

- Forms I, II, III are available only as marked under column "Form", Form I can also be supplied with continuous internal thread (=241D).
- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations.

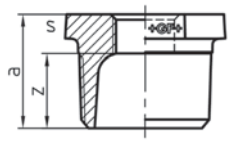
EN	B/G	Dim. (1-2) [inch]	Form	Code	a [mm]	b [mm]	z [mm]	s [mm]
ST •	B	¼ - ⅛	I	**770 241 115**	20		13	17
ST •	G	¼ - ⅛	I	**770 241 215**	20		13	17
ST •	B	⅜ - ⅛	I	**770 241 116**	20		13	19
ST •	G	⅜ - ⅛	I	**770 241 216**	20		13	19
ST •	B	⅜ - ¼	I	**770 241 117**	20		10	19
ST •	G	⅜ - ¼	I	**770 241 217**	20		10	19
•	B	½ - ⅛	II	**770 241 118**	24		17	23
•	G	½ - ⅛	II	**770 241 218**	24		17	23
•	B	½ - ¼	II	**770 241 119**	24		14	23
•	G	½ - ¼	II	**770 241 219**	24		14	23
•	B	½ - ⅜	I	**770 241 120**	24		14	23
•	G	½ - ⅜	I	**770 241 220**	24		14	23
•	B	¾ - ¼	II	**770 241 121**	26		16	30
•	G	¾ - ¼	II	**770 241 221**	26		16	30
•	B	¾ - ⅜	II	**770 241 122**	27		16	30
•	G	¾ - ⅜	II	**770 241 222**	27		16	30
•	B	¾ - ½	I	**770 241 123**	26		13	30
•	G	¾ - ½	I	**770 241 223**	26		13	30
•	B	1 - ¼	II	**770 241 124**	29		19	36
•	G	1 - ¼	II	**770 241 224**	29		19	36
•	B	1 - ⅜	II	**770 241 125**	29		19	36
•	G	1 - ⅜	II	**770 241 225**	29		19	36
•	B	1 - ½	II	**770 241 126**	29		16	36
•	G	1 - ½	II	**770 241 226**	29		16	36
•	B	1 - ¾	I	**770 241 127**	29		14	36
•	G	1 - ¾	I	**770 241 227**	29		14	36
•	B	1 ¼ - ⅜	II	**770 241 128**	31		21	46
•	G	1 ¼ - ⅜	II	**770 241 228**	31		21	46
•	B	1 ¼ - ½	II	**770 241 129**	31		18	46
•	G	1 ¼ - ½	II	**770 241 229**	31		18	46
•	B	1 ¼ - ¾	II	**770 241 130**	31		16	46
•	G	1 ¼ - ¾	II	**770 241 230**	31		16	46
•	B	1 ¼ - 1	II	**770 241 131**	31		14	46
•	G	1 ¼ - 1	II	**770 241 231**	31		14	46
•	B	1 ½ - ⅜	II	**770 241 132**	31		21	50
•	G	1 ½ - ⅜	II	**770 241 232**	31		21	50
•	B	1 ½ - ½	II	**770 241 133**	31		18	50
•	G	1 ½ - ½	II	**770 241 233**	31		18	50
•	B	1 ½ - ¾	II	**770 241 134**	31		16	50
•	G	1 ½ - ¾	II	**770 241 234**	31		16	50
•	B	1 ½ - 1	II	**770 241 135**	31		14	50
•	G	1 ½ - 1	II	**770 241 235**	31		14	50
•	B	1 ½ - 1 ¼	I	**770 241 136**	33		12	50
•	G	1 ½ - 1 ¼	I	**770 241 236**	33		12	50
•	B	2 - ½	III	**770 241 137**	35	48	35	65
•	G	2 - ½	III	**770 241 237**	35	48	35	65
•	B	2 - ¾	III	**770 241 138**	35	48	33	65
•	G	2 - ¾	III	**770 241 238**	35	48	33	65
•	B	2 - 1	II	**770 241 139**	37		20	65
•	G	2 - 1	II	**770 241 239**	37		20	65
•	B	2 - 1 ¼	II	**770 241 140**	37		18	65
•	G	2 - 1 ¼	II	**770 241 240**	37		18	65
•	B	2 - 1 ½	II	**770 241 141**	37		18	65
•	G	2 - 1 ½	II	**770 241 241**	37		18	65
•	B	2 ½ - 1	III	**770 241 142**	44	54	37	80
•	G	2 ½ - 1	III	**770 241 242**	44	54	37	80
•	B	2 ½ - 1 ¼	III	**770 241 143**	40	54	37	80
•	G	2 ½ - 1 ¼	III	**770 241 243**	40	54	37	80
•	B	2 ½ - 1 ½	II	**770 241 144**	40		21	80

table continued next page

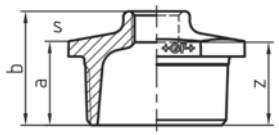
Form I



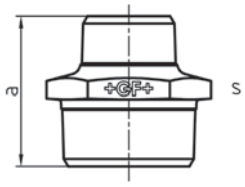
Form II



Form III



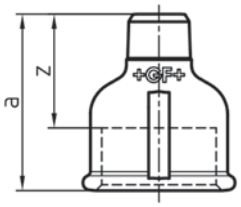
EN	B/G	Dim. (1-2) [inch]	Form	Code	a [mm]	b [mm]	z [mm]	s [mm]
•	G	2 ½ - 1 ½	II	**770 241 244**	40		21	80
•	B	2 ½ - 2	II	**770 241 145**	40		16	80
•	G	2 ½ - 2	II	**770 241 245**	40		16	80
•	B	3 - 1	III	**770 241 146**	44	59	42	95
•	G	3 - 1	III	**770 241 246**	44	59	42	95
•	B	3 - 1 ¼	III	**770 241 147**	44	59	40	95
•	G	3 - 1 ¼	III	**770 241 247**	44	59	40	95
•	B	3 - 1 ½	III	**770 241 148**	44	59	40	95
•	G	3 - 1 ½	III	**770 241 248**	44	59	40	95
•	B	3 - 2	II	**770 241 149**	44		20	95
•	G	3 - 2	II	**770 241 249**	44		20	95
•	B	3 - 2 ½	II	**770 241 150**	44		17	96
•	G	3 - 2 ½	II	**770 241 250**	44		17	96
•	B	4 - 2	III	**770 241 151**	51	69	45	120
•	G	4 - 2	III	**770 241 251**	51	69	45	120
•	B	4 - 2 ½	III	**770 241 152**	51	69	42	120
•	G	4 - 2 ½	III	**770 241 252**	51	69	42	120
•	B	4 - 3	II	**770 241 153**	53		23	120
•	G	4 - 3	II	**770 241 253**	53		23	120



245
Hexagon nipple, reducing, ISO/EN N8

- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations.

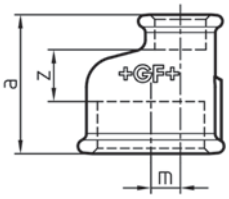
EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	s [mm]
ST -	B	¼ - ⅛	**770 245 115**	35	17
ST -	G	¼ - ⅛	**770 245 215**	35	17
ST -	B	⅜ - ⅛	**770 245 116**	34	19
ST -	G	⅜ - ⅛	**770 245 216**	34	19
ST •	B	⅜ - ¼	**770 245 117**	38	19
ST •	G	⅜ - ¼	**770 245 217**	38	19
•	B	½ - ¼	**770 245 118**	44	27
•	G	½ - ¼	**770 245 218**	44	27
•	B	½ - ⅜	**770 245 119**	44	22
•	G	½ - ⅜	**770 245 219**	44	22
-	B	¾ - ¼	**770 245 120**	43	30
-	G	¾ - ¼	**770 245 220**	43	30
•	B	¾ - ⅜	**770 245 121**	47	30
•	G	¾ - ⅜	**770 245 221**	47	30
•	B	¾ - ½	**770 245 122**	47	31
•	G	¾ - ½	**770 245 222**	47	31
•	B	1 - ½	**770 245 123**	53	36
•	G	1 - ½	**770 245 223**	53	36
•	B	1 - ¾	**770 245 124**	53	36
•	G	1 - ¾	**770 245 224**	53	36
•	B	1 ¼ - ½	**770 245 125**	57	46
•	G	1 ¼ - ½	**770 245 225**	57	46
•	B	1 ¼ - ¾	**770 245 126**	57	46
•	G	1 ¼ - ¾	**770 245 226**	57	46
•	B	1 ¼ - 1	**770 245 127**	57	46
•	G	1 ¼ - 1	**770 245 227**	57	46
•	B	1 ½ - ¾	**770 245 128**	59	50
•	G	1 ½ - ¾	**770 245 228**	59	50
•	B	1 ½ - 1	**770 245 129**	59	50
•	G	1 ½ - 1	**770 245 229**	59	50
•	B	1 ½ - 1 ¼	**770 245 130**	59	50
•	G	1 ½ - 1 ¼	**770 245 230**	59	50
•	B	2 - 1	**770 245 131**	68	65
•	G	2 - 1	**770 245 231**	68	65
•	B	2 - 1 ¼	**770 245 132**	68	65
•	G	2 - 1 ¼	**770 245 232**	68	65
•	B	2 - 1 ½	**770 245 133**	68	65
•	G	2 - 1 ½	**770 245 233**	68	65
-	B	2 ½ - 1 ½	**770 245 134**	75	80
-	G	2 ½ - 1 ½	**770 245 234**	75	80
•	B	2 ½ - 2	**770 245 135**	75	80
•	G	2 ½ - 2	**770 245 235**	75	80
•	B	3 - 2	**770 245 136**	83	95
•	G	3 - 2	**770 245 236**	83	95
•	B	3 - 2 ½	**770 245 137**	83	95
•	G	3 - 2 ½	**770 245 237**	83	95
-	B	4 - 3	**770 245 138**	96	120
-	G	4 - 3	**770 245 238**	96	120



246
Socket, reducing, ISO/EN M4

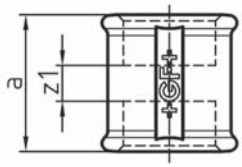
- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations. Steel parts are hexagonal instead of beaded at the end no. 1.

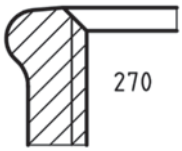
EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	s [mm]	z [mm]
ST -	B	¼ - ⅛	**770 246 115**	32	17	22
ST -	G	¼ - ⅛	**770 246 215**	32	17	22
ST •	B	⅜ - ¼	**770 246 116**	35	22	25
ST •	G	⅜ - ¼	**770 246 216**	35	22	25
•	B	½ - ¼	**770 246 117**	43		30
•	G	½ - ¼	**770 246 217**	43		30
•	B	½ - ⅜	**770 246 118**	43		30
•	G	½ - ⅜	**770 246 218**	43		30
•	B	¾ - ⅜	**770 246 119**	48		33
•	G	¾ - ⅜	**770 246 219**	48		33
•	B	¾ - ½	**770 246 120**	48		33
•	G	¾ - ½	**770 246 220**	48		33
•	B	1 - ½	**770 246 121**	55		38
•	G	1 - ½	**770 246 221**	55		38
•	B	1 - ¾	**770 246 122**	55		38
•	G	1 - ¾	**770 246 222**	55		38
-	B	1 ¼ - ½	**770 246 123**	60		41
-	G	1 ¼ - ½	**770 246 223**	60		41
•	B	1 ¼ - ¾	**770 246 124**	60		41
•	G	1 ¼ - ¾	**770 246 224**	60		41
•	B	1 ¼ - 1	**770 246 125**	60		41
•	G	1 ¼ - 1	**770 246 225**	60		41
-	B	1 ½ - ¾	**770 246 126**	60		41
-	G	1 ½ - ¾	**770 246 226**	60		41
•	B	1 ½ - 1	**770 246 127**	63		44
•	G	1 ½ - 1	**770 246 227**	63		44
•	B	1 ½ - 1 ¼	**770 246 128**	63		44
•	G	1 ½ - 1 ¼	**770 246 228**	63		44
-	B	2 - 1	**770 246 129**	70		46
-	G	2 - 1	**770 246 229**	70		46
•	B	2 - 1 ¼	**770 246 130**	70		46
•	G	2 - 1 ¼	**770 246 230**	70		46
•	B	2 - 1 ½	**770 246 131**	70		46
•	G	2 - 1 ½	**770 246 231**	70		46
-	B	2 ½ - 1 ½	**770 246 132**	83		56
-	G	2 ½ - 1 ½	**770 246 232**	83		56
-	B	2 ½ - 2	**770 246 133**	80		53
-	G	2 ½ - 2	**770 246 233**	80		53
-	B	3 - 2	**770 246 134**	87		57
-	G	3 - 2	**770 246 234**	87		57
-	B	3 - 2 ½	**770 246 135**	91		61
-	G	3 - 2 ½	**770 246 235**	91		61



260
Socket eccentric, reducing

EN	B/G	Dim. (1-2) [inch]	Code	a [mm]	z [mm]	m [mm]
-	B	¾ - ½	**770 260 122**	41	13	3.0
-	G	¾ - ½	**770 260 222**	41	13	3.0
-	B	1 - ½	**770 260 115**	45	15	6.0
-	G	1 - ½	**770 260 215**	45	15	6.0
-	B	1 - ¾	**770 260 116**	45	13	3.5
-	G	1 - ¾	**770 260 216**	45	13	3.5
-	B	1 ¼ - ½	**770 260 117**	50	18	11.0
-	G	1 ¼ - ½	**770 260 217**	50	18	11.0
-	B	1 ¼ - ¾	**770 260 118**	50	16	8.0
-	G	1 ¼ - ¾	**770 260 218**	50	16	8.0
-	B	1 ¼ - 1	**770 260 119**	50	14	5.0
-	G	1 ¼ - 1	**770 260 219**	50	14	5.0
-	B	1 ½ - ½	**770 260 120**	56	24	14.0
-	G	1 ½ - ½	**770 260 220**	56	24	14.0
-	B	1 ½ - ¾	**770 260 123**	56	22	11.0
-	G	1 ½ - ¾	**770 260 223**	56	22	11.0
-	B	1 ½ - 1	**770 260 121**	56	20	8.0
-	G	1 ½ - 1	**770 260 221**	56	20	8.0
-	B	1 ½ - 1 ¼	**770 260 124**	56	18	3.0
-	G	1 ½ - 1 ¼	**770 260 224**	56	18	3.0
-	B	2 - ½	**770 260 125**	65	28	20.0
-	G	2 - ½	**770 260 225**	65	28	20.0
-	B	2 - ¾	**770 260 126**	65	26	17.0
-	G	2 - ¾	**770 260 226**	65	26	17.0
-	B	2 - 1	**770 260 127**	65	24	14.0
-	G	2 - 1	**770 260 227**	65	24	14.0
-	B	2 - 1 ¼	**770 260 128**	65	22	10.0
-	G	2 - 1 ¼	**770 260 228**	65	22	10.0
-	B	2 - 1 ½	**770 260 129**	65	22	7.0
-	G	2 - 1 ½	**770 260 229**	65	22	7.0
-	B	2 ½ - 2	**770 260 130**	74	23	8.0
-	G	2 ½ - 2	**770 260 230**	74	23	8.0

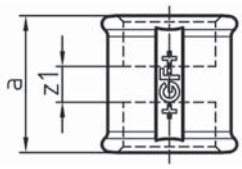


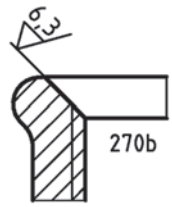


270
Socket, ISO/EN M2

- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations. Steel parts are hexagonal instead of beaded.

EN	B/G	Dim. [inch]	Code	a [mm]	s [mm]	z1 [mm]
ST •	B	⅛	**770 270 101**	25	17	11
ST •	G	⅛	**770 270 201**	25	17	11
ST •	B	¼	**770 270 102**	27	19	7
ST •	G	¼	**770 270 202**	27	19	7
•	B	⅜	**770 270 103**	30		10
•	G	⅜	**770 270 203**	30		10
•	B	½	**770 270 104**	36		10
•	G	½	**770 270 204**	36		10
•	B	¾	**770 270 105**	39		9
•	G	¾	**770 270 205**	39		9
•	B	1	**770 270 106**	45		11
•	G	1	**770 270 206**	45		11
•	B	1 ¼	**770 270 107**	50		12
•	G	1 ¼	**770 270 207**	50		12
•	B	1 ½	**770 270 108**	55		17
•	G	1 ½	**770 270 208**	55		17
•	B	2	**770 270 109**	65		17
•	G	2	**770 270 209**	65		17
•	B	2 ½	**770 270 110**	74		20
•	G	2 ½	**770 270 210**	74		20
•	B	3	**770 270 111**	80		20
•	G	3	**770 270 211**	80		20
•	B	4	**770 270 112**	94		22
•	G	4	**770 270 212**	94		22

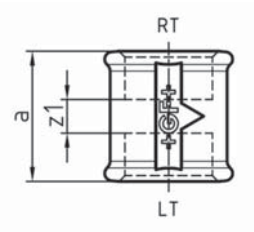




270b
Socket, equal

- Is usually not supplied as a separate piece.
- One side with larger chamfer, thread = fastening thread to ISO 228.

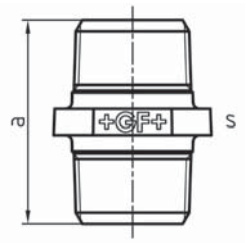
EN	B/G	Dim. [inch]	Code	a [mm]	z1 [mm]
-	G	½		36	10
-	G	¾		39	9
-	G	1		45	11
-	G	1 ¼		50	12
-	G	1 ½		55	17
-	G	2		65	17



271
Socket, right and left hand thread, ISO/EN M2 R-L

- RT ... right hand thread, LT ... left hand thread

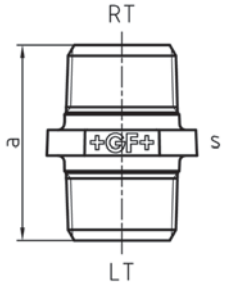
EN	B/G	Dim. [inch]	Code	a [mm]	z1 [mm]
•	B	⅜	**770 271 103**	30	10
•	G	⅜	**770 271 203**	30	10
•	B	½	**770 271 104**	36	10
•	G	½	**770 271 204**	36	10
•	B	¾	**770 271 105**	39	9
•	G	¾	**770 271 205**	39	9
•	B	1	**770 271 106**	45	11
•	G	1	**770 271 206**	45	11
•	B	1 ¼	**770 271 107**	50	12
•	G	1 ¼	**770 271 207**	50	12
•	B	1 ½	**770 271 108**	55	17
•	G	1 ½	**770 271 208**	55	17
-	B	2	**770 271 109**	65	17
-	G	2	**770 271 209**	65	17



280
Hexagon nipple, ISO/EN N8

- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations.

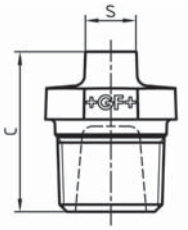
EN	B/G	Dim. [inch]	Code	a [mm]	s [mm]
ST •	B	⅛	**770 280 101**	29	17
ST •	G	⅛	**770 280 201**	29	17
ST •	B	¼	**770 280 102**	36	19
ST •	G	¼	**770 280 202**	36	19
•	B	⅜	**770 280 103**	38	22
•	G	⅜	**770 280 203**	38	22
•	B	½	**770 280 104**	44	28
•	G	½	**770 280 204**	44	28
•	B	¾	**770 280 105**	47	33
•	G	¾	**770 280 205**	47	33
•	B	1	**770 280 106**	53	42
•	G	1	**770 280 206**	53	42
•	B	1 ¼	**770 280 107**	57	50
•	G	1 ¼	**770 280 207**	57	50
•	B	1 ½	**770 280 108**	59	55
•	G	1 ½	**770 280 208**	59	55
•	B	2	**770 280 109**	68	70
•	G	2	**770 280 209**	68	70
•	B	2 ½	**770 280 110**	75	85
•	G	2 ½	**770 280 210**	75	85
•	B	3	**770 280 111**	83	100
•	G	3	**770 280 211**	83	100
•	B	4	**770 280 112**	95	131
•	G	4	**770 280 212**	95	131



281
Hexagon nipple, right and left hand thread, ISO/EN N8 R-L

- RT ... right hand thread, LT ... left hand thread

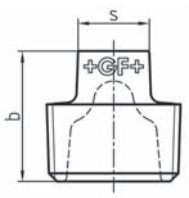
EN	B/G	Dim. [inch]	Code	a [mm]	s [mm]
-	G	⅜	**770 281 203**	38	22
•	B	½	**770 281 104**	44	28
•	G	½	**770 281 204**	44	28
•	B	¾	**770 281 105**	47	33
•	G	¾	**770 281 205**	47	33
•	B	1	**770 281 106**	53	42
•	G	1	**770 281 206**	53	42
-	B	1 ¼	**770 281 107**	57	50
-	G	1 ¼	**770 281 207**	57	50
-	B	1 ½	**770 281 108**	59	55
-	G	1 ½	**770 281 208**	59	55
-	B	2	**770 281 109**	68	70
-	G	2	**770 281 209**	68	70



290
Plug, beaded, ISO/EN T9

- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations.
- * Solid

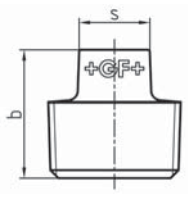
EN	B/G	Dim. [inch]	Code	c [mm]	s [mm]
*ST •	B	⅛	**770 290 101**	20	7
*ST •	G	⅛	**770 290 201**	20	7
*ST •	B	¼	**770 290 102**	24	8
*ST •	G	¼	**770 290 202**	24	8
•	B	⅜	**770 290 103**	28	10
•	G	⅜	**770 290 203**	28	10
•	B	½	**770 290 104**	32	11
•	G	½	**770 290 204**	32	11
•	B	¾	**770 290 105**	37	17
•	G	¾	**770 290 205**	37	17
•	B	1	**770 290 106**	41	19
•	G	1	**770 290 206**	41	19
•	B	1 ¼	**770 290 107**	47	22
•	G	1 ¼	**770 290 207**	47	22
•	B	1 ½	**770 290 108**	47	22
•	G	1 ½	**770 290 208**	47	22
•	B	2	**770 290 109**	54	27
•	G	2	**770 290 209**	54	27
•	B	2 ½	**770 290 110**	64	32
•	G	2 ½	**770 290 210**	64	32
•	B	3	**770 290 111**	71	36
•	G	3	**770 290 211**	71	36
•	B	4	**770 290 112**	81	41
•	G	4	**770 290 212**	81	41



291
Plug, plain, ISO/EN T8

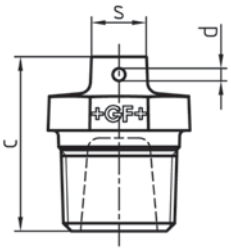
- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations. Steel parts are made solid.

EN	B/G	Dim. [inch]	Code	b [mm]	s [mm]
ST •	B	⅛	**770 291 101**	16	7
ST •	G	⅛	**770 291 201**	16	7
ST •	B	¼	**770 291 102**	18	8
ST •	G	¼	**770 291 202**	18	8
ST •	B	⅜	**770 291 103**	20	10
ST •	G	⅜	**770 291 203**	20	10
•	B	½	**770 291 104**	24	11
•	G	½	**770 291 204**	24	11
•	B	¾	**770 291 105**	26	17
•	G	¾	**770 291 205**	26	17
•	B	1	**770 291 106**	33	19
•	G	1	**770 291 206**	33	19
•	B	1 ¼	**770 291 107**	36	22
•	G	1 ¼	**770 291 207**	36	22
•	B	1 ½	**770 291 108**	37	22
•	G	1 ½	**770 291 208**	37	22
•	B	2	**770 291 109**	44	27
•	G	2	**770 291 209**	44	27
•	B	2 ½	**770 291 110**	52	32
•	G	2 ½	**770 291 210**	52	32
•	B	3	**770 291 111**	59	36
•	G	3	**770 291 211**	59	36
•	B	4	**770 291 112**	66	41
•	G	4	**770 291 212**	66	41



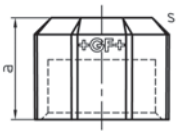
291a
Plug, plain, solid

EN	B/G	Dim. [inch]	Code	b [mm]	s [mm]
-	B	¾	**770 292 105**	28	17
-	G	¾	**770 292 205**	28	17
-	B	1	**770 292 106**	33	19
-	G	1	**770 292 206**	33	19
-	B	1 ¼	**770 292 107**	36	22
-	G	1 ¼	**770 292 207**	36	22
-	B	1 ½	**770 292 108**	38	23
-	G	1 ½	**770 292 208**	38	23
-	B	2	**770 292 109**	44	27
-	G	2	**770 292 209**	44	27



294
Plug, with hole in square head

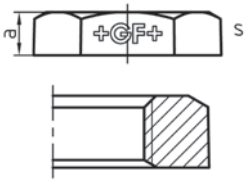
EN	B/G	Dim. [inch]	Code	c [mm]	s [mm]	d [mm]
-	B	½	**770 294 104**	32	11	4
-	G	½	**770 294 204**	32	11	4
-	B	¾	**770 294 105**	37	17	4
-	G	¾	**770 294 205**	37	17	4
-	B	1	**770 294 106**	41	19	5
-	G	1	**770 294 206**	41	19	5
-	B	1 ¼	**770 294 107**	47	22	5
-	G	1 ¼	**770 294 207**	47	22	5
-	B	1 ½	**770 294 108**	47	22	5
-	G	1 ½	**770 294 208**	47	22	5
-	B	2	**770 294 109**	54	27	5
-	G	2	**770 294 209**	54	27	5



300
Cap, ISO/EN T1

- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations.

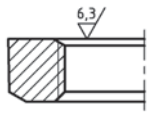
EN	B/G	Dim. [inch]	Code	a [mm]	s [mm]	Shape
ST •	B	⅛	**770 300 101**	14	14	hexagon
ST •	G	⅛	**770 300 201**	14	14	hexagon
ST •	B	¼	**770 300 102**	17	17	hexagon
ST •	G	¼	**770 300 202**	17	17	hexagon
ST •	B	⅜	**770 300 103**	18	22	hexagon
ST •	G	⅜	**770 300 203**	18	22	hexagon
•	B	½	**770 300 104**	24	26	hexagon
•	G	½	**770 300 204**	24	26	hexagon
•	B	¾	**770 300 105**	26	32	hexagon
•	G	¾	**770 300 205**	26	32	hexagon
•	B	1	**770 300 106**	29	38	octagon
•	G	1	**770 300 206**	29	38	octagon
•	B	1 ¼	**770 300 107**	34	47	octagon
•	G	1 ¼	**770 300 207**	34	47	octagon
•	B	1 ½	**770 300 108**	34	53	octagon
•	G	1 ½	**770 300 208**	34	53	octagon
•	B	2	**770 300 109**	39	68	octagon
•	G	2	**770 300 209**	39	68	octagon
•	B	2 ½	**770 300 110**	44	86	octagon
•	G	2 ½	**770 300 210**	44	86	octagon
•	B	3	**770 300 111**	50	96	octagon
•	G	3	**770 300 211**	50	96	octagon
•	B	4	**770 300 112**	54	128	octagon
•	G	4	**770 300 212**	54	128	octagon



310
Backnut, ISO/EN P4

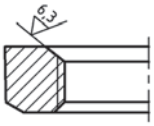
• ST ... these types of fittings are made from steel (galvanised finish = electroplated).

EN	B/G	G...B [inch]	Code	a [mm]	s [mm]
ST •	B	⅛	**770 310 101**	7.0	19
ST •	G	⅛	**770 310 201**	7.0	19
ST •	B	¼	**770 310 102**	7.5	22
ST •	G	¼	**770 310 202**	7.5	22
ST •	B	⅜	**770 310 103**	8.0	27
ST •	G	⅜	**770 310 203**	8.0	27
•	B	½	**770 310 104**	9.0	32
•	G	½	**770 310 204**	9.0	32
•	B	¾	**770 310 105**	10.0	36
•	G	¾	**770 310 205**	10.0	36
•	B	1	**770 310 106**	11.5	46
•	G	1	**770 310 206**	11.5	46
•	B	1 ¼	**770 310 107**	13.0	56
•	G	1 ¼	**770 310 207**	13.0	56
•	B	1 ½	**770 310 108**	14.0	60
•	G	1 ½	**770 310 208**	14.0	60
•	B	2	**770 310 109**	16.0	73
•	G	2	**770 310 209**	16.0	73
•	B	2 ½	**770 310 110**	19.0	95
•	G	2 ½	**770 310 210**	19.0	95
•	B	3	**770 310 111**	22.0	105
•	G	3	**770 310 211**	22.0	105



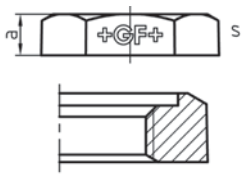
310a
Backnut, with one machined face, ISO/EN P4

EN	B/G	G...B [inch]	Code	a [mm]	s [mm]
•	B	½	**770 309 104**	8.5	32
•	G	½	**770 309 204**	8.5	32
•	B	¾	**770 309 105**	9.5	36
•	G	¾	**770 309 205**	9.5	36
•	B	1	**770 309 106**	11.5	46
•	G	1	**770 309 206**	11.5	46
•	B	1 ¼	**770 309 107**	12.5	56
•	G	1 ¼	**770 309 207**	12.5	56
•	B	1 ½	**770 309 108**	13.5	60
•	G	1 ½	**770 309 208**	13.5	60
•	B	2	**770 309 109**	15.5	73
•	G	2	**770 309 209**	15.5	73



310b
Backnut, strongly faced on one end, ISO/EN P4

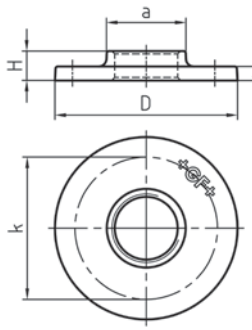
EN	B/G	G...B [inch]	Code	a [mm]	s [mm]
•	G	½	**770 308 204**	9.0	32
•	G	¾	**770 308 205**	10.0	36
•	G	1	**770 308 206**	11.5	46
•	G	1 ¼	**770 308 207**	13.0	56
•	G	1 ½	**770 308 208**	14.0	60
•	G	2	**770 308 209**	16.0	73



312
Backnut, recessed, ISO/EN P4

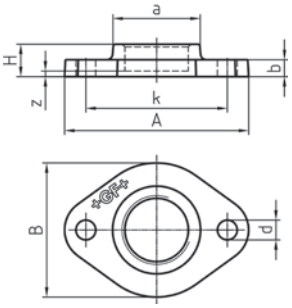
• ST ... these types of fittings are made from steel (galvanised finish = electroplated).

EN	B/G	G...B [inch]	Code	a [mm]	s [mm]
ST •	B	¼	**770 312 102**	7.5	22
ST •	G	¼	**770 312 202**	7.5	22
ST •	B	⅜	**770 312 103**	8.0	27
ST •	G	⅜	**770 312 203**	8.0	27
•	B	½	**770 312 104**	9.0	32
•	G	½	**770 312 204**	9.0	32
•	B	¾	**770 312 105**	10.0	37
•	G	¾	**770 312 205**	10.0	37
•	B	1	**770 312 106**	12.0	46
•	G	1	**770 312 206**	12.0	46
•	B	1 ¼	**770 312 107**	13.0	55
•	G	1 ¼	**770 312 207**	13.0	55
•	B	1 ½	**770 312 108**	14.0	60
•	G	1 ½	**770 312 208**	14.0	60
•	B	2	**770 312 109**	16.0	73
•	G	2	**770 312 209**	16.0	73



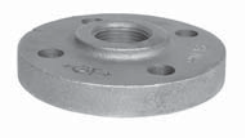
321
Screwed flange, undrilled

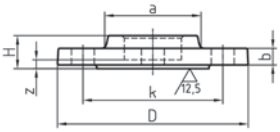
EN	B/G	Dim. [inch]	PN	Code	a [mm]	b [mm]	k [mm]	H [mm]	D [mm]
-	B	½	PN 1	**770 320 104**	28	5	55	13	80
-	G	½	PN 1	**770 320 204**	28	5	55	13	80
-	B	¾	PN 1	**770 320 105**	38	6	65	14	90
-	G	¾	PN 1	**770 320 205**	38	6	65	14	90
-	B	1	PN 1	**770 320 106**	47	9	75	17	100
-	G	1	PN 1	**770 320 206**	47	9	75	17	100
-	B	1 ¼	PN 1	**770 320 107**	51	10	90	21	120
-	G	1 ¼	PN 1	**770 320 207**	51	10	90	21	120
-	B	1 ½	PN 1	**770 320 108**	56	10	100	21	130
-	G	1 ½	PN 1	**770 320 208**	56	10	100	21	130
-	B	2	PN 1	**770 320 109**	68	11	110	22	140
-	G	2	PN 1	**770 320 209**	68	11	110	22	140

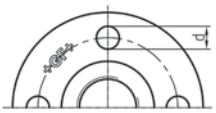


326
Screwed flange, drilled, 2 holes

EN	B/G	Dim. [inch]	PN	Code	a [mm]	b [mm]	d [mm]	k [mm]	z [mm]	A [mm]	B [mm]	H [mm]
-	B	½	PN 10	**770 326 104**	32	11	11.5	55	4	80	45	17
-	G	½	PN 10	**770 326 204**	32	11	11.5	55	4	80	45	17
-	B	¾	PN 10	**770 326 105**	38	11	11.5	65	4	90	64	19
-	G	¾	PN 10	**770 326 205**	38	11	11.5	65	4	90	64	19
-	B	1	PN 10	**770 326 106**	46	11	11.5	75	3	100	72	20
-	G	1	PN 10	**770 326 206**	46	11	11.5	75	3	100	72	20
-	B	1 ¼	PN 10	**770 326 107**	56	12	14.0	90	3	120	85	22
-	G	1 ¼	PN 10	**770 326 207**	56	12	14.0	90	3	120	85	22
-	B	1 ½	PN 10	**770 326 108**	63	13	14.0	100	4	130	95	23
-	G	1 ½	PN 10	**770 326 208**	63	13	14.0	100	4	130	95	23
-	B	2	PN 10	**770 326 109**	77	13	14.0	110	0	140	100	24
-	G	2	PN 10	**770 326 209**	77	13	14.0	110	0	140	100	24



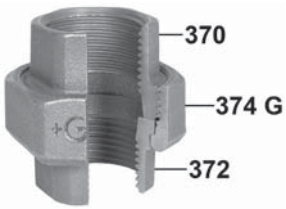


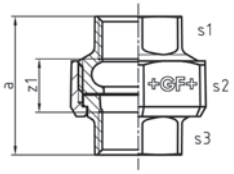


329
Screwed flange, drilled, 4 holes

- Diameter of pitch circle and sealing face compatible to EN 1092-2 and DIN 2566.
- * 8 holes

EN	B/G	Dim. [inch]	PN	Code	a [mm]	b [mm]	d [mm]	k [mm]	z [mm]	H [mm]	D [mm]
-	B	½	PN 16	**770 329 104**	35	14	14	65	7	20	95
-	G	½	PN 16	**770 329 204**	35	14	14	65	7	20	95
-	B	¾	PN 16	**770 329 105**	45	16	14	75	9	24	105
-	G	¾	PN 16	**770 329 205**	45	16	14	75	9	24	105
-	B	1	PN 16	**770 329 106**	52	17	14	85	7	24	115
-	G	1	PN 16	**770 329 206**	52	17	14	85	7	24	115
-	B	1 ¼	PN 16	**770 329 107**	60	17	19	100	7	26	140
-	G	1 ¼	PN 16	**770 329 207**	60	17	19	100	7	26	140
-	B	1 ½	PN 16	**770 329 108**	72	13	19	110	8	26	150
-	G	1 ½	PN 16	**770 329 208**	72	13	19	110	8	26	150
-	B	2	PN 16	**770 329 109**	87	16	19	125	5	29	165
-	G	2	PN 16	**770 329 209**	87	16	19	125	5	29	165
-	B	2 ½	PN 16	**770 329 110**	100	16	19	145	5	32	185
-	G	2 ½	PN 16	**770 329 210**	100	16	19	145	5	32	185
-	B	3	PN 10	**770 329 111**	115	18	19	160	6	36	200
-	G	3	PN 10	**770 329 211**	115	18	19	160	6	36	200
* -	B	3	PN 16	**770 329 115**	115	18	19	160	6	36	200
* -	G	3	PN 16	**770 329 215**	115	18	19	160	6	36	200
* -	B	4	PN 16	**770 329 112**	140	20	19	180	2	38	220
* -	G	4	PN 16	**770 329 212**	140	20	19	180	2	38	220

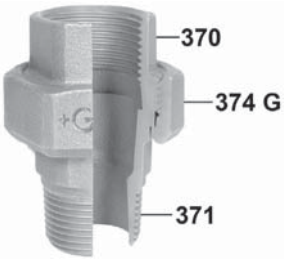


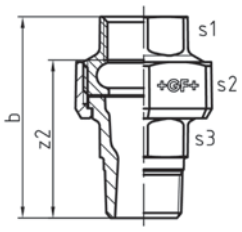


330
Union flat seat, ISO/EN U1

- Supplied without sealing gaskets; a and z1 include the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.
- * Inside hexagon

EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	z1 [mm]	s1 [mm]	s2 [mm]	s3 [mm]
•	B	¼	⅝	**770 330 102**	42	22	19	28	*10
•	G	¼	⅝	**770 330 202**	42	22	19	28	*10
•	B	⅜	¾	**770 330 103**	47	27	22	32	*12
•	G	⅜	¾	**770 330 203**	47	27	22	32	*12
•	B	½	1	**770 330 104**	48	22	26	41	26
•	G	½	1	**770 330 204**	48	22	26	41	26
•	B	¾	1 ¼	**770 330 105**	52	22	31	48	31
•	G	¾	1 ¼	**770 330 205**	52	22	31	48	31
•	B	1	1 ½	**770 330 106**	59	25	38	55	38
•	G	1	1 ½	**770 330 206**	59	25	38	55	38
•	B	1 ¼	2	**770 330 107**	65	27	48	67	48
•	G	1 ¼	2	**770 330 207**	65	27	48	67	48
•	B	1 ½	2 ¼	**770 330 108**	70	32	54	74	54
•	G	1 ½	2 ¼	**770 330 208**	70	32	54	74	54
•	B	2	2 ¾	**770 330 109**	80	32	66	90	66
•	G	2	2 ¾	**770 330 209**	80	32	66	90	66
•	B	2 ½	3 ½	**770 330 110**	85	31	85	111	85
•	G	2 ½	3 ½	**770 330 210**	85	31	85	111	85
•	B	3	4	**770 330 111**	96	36	96	130	96
•	G	3	4	**770 330 211**	96	36	96	130	96
-	B	4	5	**770 330 112**	111	39	120	151	122
-	G	4	5	**770 330 212**	111	39	120	151	122

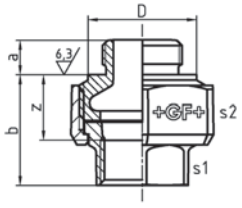




331
Union flat seat, ISO/EN U2

- Supplied without sealing gaskets; b and z2 include the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

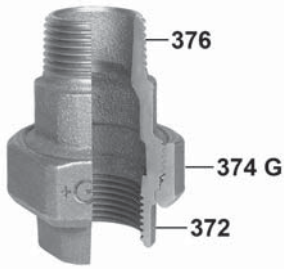
EN	B/G	Dim. [inch]	374 G [inch]	Code	b [mm]	z2 [mm]	s1 [mm]	s2 [mm]	s3 [mm]
•	B	¼	⅝	**770 331 102**	55	45	19	28	15
•	G	¼	⅝	**770 331 202**	55	45	19	28	15
•	B	⅜	¾	**770 331 103**	58	48	22	32	19
•	G	⅜	¾	**770 331 203**	58	48	22	32	19
•	B	½	1	**770 331 104**	66	53	26	41	23
•	G	½	1	**770 331 204**	66	53	26	41	23
•	B	¾	1 ¼	**770 331 105**	72	57	31	48	30
•	G	¾	1 ¼	**770 331 205**	72	57	31	48	30
•	B	1	1 ½	**770 331 106**	80	63	38	55	36
•	G	1	1 ½	**770 331 206**	80	63	38	55	36
•	B	1 ¼	2	**770 331 107**	90	71	48	67	48
•	G	1 ¼	2	**770 331 207**	90	71	48	67	48
•	B	1 ½	2 ¼	**770 331 108**	95	76	54	74	54
•	G	1 ½	2 ¼	**770 331 208**	95	76	54	74	54
•	B	2	2 ¾	**770 331 109**	107	83	66	90	66
•	G	2	2 ¾	**770 331 209**	107	83	66	90	66
-	B	2 ½	3 ½	**770 331 110**	118	91	85	111	85
-	G	2 ½	3 ½	**770 331 210**	118	91	85	111	85
-	B	3	4	**770 331 111**	131	101	96	130	95
-	G	3	4	**770 331 211**	131	101	96	130	95

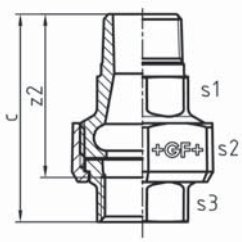


332
Union flat seat

- Supplied without sealing gaskets; b and z include the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. Rp/G [inch]	374 G [inch]	Code	a [mm]	b [mm]	z [mm]	s1 [mm]	s2 [mm]	D [mm]
-	B	¾	1 ¼	**770 332 105**	12	39	24	31	48	36
-	G	¾	1 ¼	**770 332 205**	12	39	24	31	48	36
-	B	1	1 ½	**770 332 106**	14	42	25	38	55	43
-	G	1	1 ½	**770 332 206**	14	42	25	38	55	43
-	B	1 ¼	2	**770 332 107**	16	50	31	48	67	53
-	G	1 ¼	2	**770 332 207**	16	50	31	48	67	53

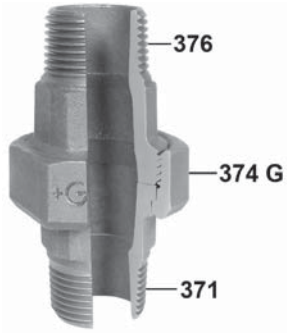


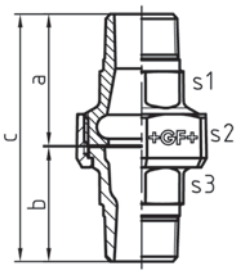


335
Union flat seat

- Supplied without sealing gaskets; c and z2 include the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	c [mm]	z2 [mm]	s1 [mm]	s2 [mm]	s3 [mm]
-	B	½	1	**770 335 104**	66	53	26	41	26
-	G	½	1	**770 335 204**	66	53	26	41	26
-	B	¾	1 ¼	**770 335 105**	72	57	32	48	31
-	G	¾	1 ¼	**770 335 205**	72	57	32	48	31
-	B	1	1 ½	**770 335 106**	82	65	38	55	38
-	G	1	1 ½	**770 335 206**	82	65	38	55	38
-	B	1 ¼	2	**770 335 107**	90	71	48	67	48
-	G	1 ¼	2	**770 335 207**	90	71	48	67	48
-	B	1 ½	2 ¼	**770 335 108**	95	76	54	74	54
-	G	1 ½	2 ¼	**770 335 208**	95	76	54	74	54

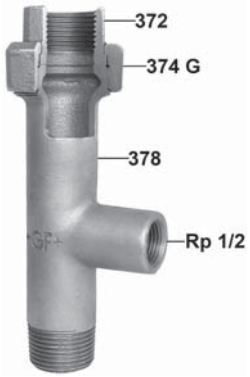


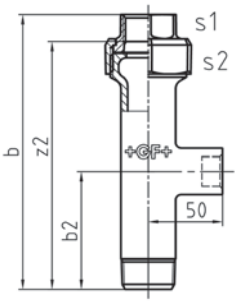


336
Union flat seat

- Supplied without sealing gaskets; c includes the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	b [mm]	c [mm]	s1 [mm]	s2 [mm]	s3 [mm]
-	B	½	1	**770 336 104**	43	40	85	26	41	23
-	G	½	1	**770 336 204**	43	40	85	26	41	23
-	B	¾	1 ¼	**770 336 105**	48	42	92	32	48	30
-	G	¾	1 ¼	**770 336 205**	48	42	92	32	48	30
-	B	1	1 ½	**770 336 106**	54	47	103	38	55	36
-	G	1	1 ½	**770 336 206**	54	47	103	38	55	36
-	B	1 ¼	2	**770 336 107**	57	55	114	48	67	48
-	G	1 ¼	2	**770 336 207**	57	55	114	48	67	48
-	B	1 ½	2 ¼	**770 336 108**	61	57	120	54	74	54
-	G	1 ½	2 ¼	**770 336 208**	61	57	120	54	74	54

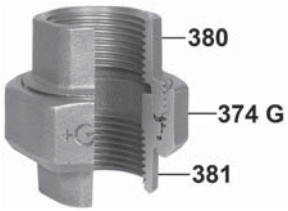


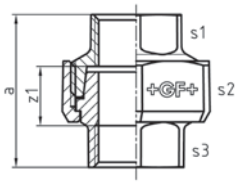


338
Distribution union flat seat

- Supplied without sealing gaskets; b and z2 include the seal thickness as per table "Sealing Gasket Dimension".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	b [mm]	b2 [mm]	z2 [mm]	s1 [mm]	s2 [mm]
-	G	¾	1 ¼	**770 338 220**	177	74	160	31	48
-	G	1	1 ½	**770 338 221**	174	67	155	38	55
-	G	1 ¼	2	**770 338 222**	174	59	153	48	67

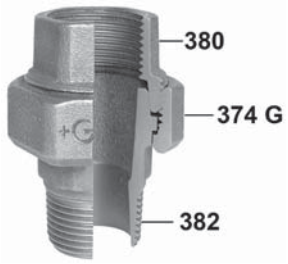


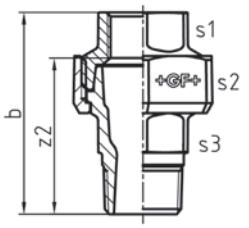


340
Union taper seat, ISO/EN U11

- Torque and notes for installation please find in "Technical Product Notes".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.
- * Inside hexagon
- ** Version

EN	B/G	Dim. [inch]	**	374 G [inch]	Code	a [mm]	z1 [mm]	s1 [mm]	s2 [mm]	s3 [mm]
•	B	⅛		½	**770 340 101**	38	24	15	26	15
•	G	⅛		½	**770 340 201**	38	24	15	26	15
•	B	¼		⅝	**770 340 102**	42	22	19	28	*10
•	G	¼		⅝	**770 340 202**	42	22	19	28	*10
•	B	⅜		¾	**770 340 103**	48	28	22	32	*12
•	G	⅜		¾	**770 340 203**	48	28	22	32	*12
•	B	½		1	**770 340 104**	48	22	26	41	25
•	G	½		1	**770 340 204**	48	22	26	41	25
•	B	½	s	1 ⅛	**770 340 120**	48	22	26	44	26
•	G	½	s	1 ⅛	**770 340 220**	48	22	26	44	26
•	B	¾		1 ¼	**770 340 105**	52	22	31	48	32
•	G	¾		1 ¼	**770 340 205**	52	22	31	48	32
•	B	1		1 ½	**770 340 106**	58	24	38	55	38
•	G	1		1 ½	**770 340 206**	58	24	38	55	38
•	B	1 ¼		2	**770 340 107**	65	27	48	67	48
•	G	1 ¼		2	**770 340 207**	65	27	48	67	48
•	B	1 ½		2 ¼	**770 340 108**	70	32	54	74	54
•	G	1 ½		2 ¼	**770 340 208**	70	32	54	74	54
•	B	2		2 ¾	**770 340 109**	78	30	66	90	66
•	G	2		2 ¾	**770 340 209**	78	30	66	90	66
•	B	2 ½		3 ½	**770 340 110**	90	36	85	111	85
•	G	2 ½		3 ½	**770 340 210**	90	36	85	111	85
•	B	3		4	**770 340 111**	101	41	96	130	96
•	G	3		4	**770 340 211**	101	41	96	130	96
•	B	4		5	**770 340 112**	114	42	120	151	120
•	G	4		5	**770 340 212**	114	42	120	151	120

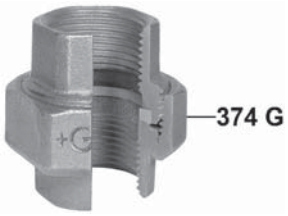


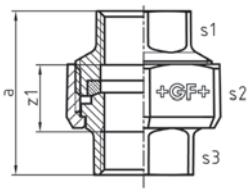


341
Union taper seat, ISO/EN U12

- Torque and notes for installation please find in "Technical Product Notes".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	b [mm]	z2 [mm]	s1 [mm]	s2 [mm]	s3 [mm]
•	B	¼	⅝	**770 341 102**	55	45	19	28	15
•	G	¼	⅝	**770 341 202**	55	45	19	28	15
•	B	⅜	¾	**770 341 103**	59	49	22	32	20
•	G	⅜	¾	**770 341 203**	59	49	22	32	20
•	B	½	1	**770 341 104**	66	53	26	41	23
•	G	½	1	**770 341 204**	66	53	26	41	23
•	B	¾	1 ¼	**770 341 105**	72	57	31	48	30
•	G	¾	1 ¼	**770 341 205**	72	57	31	48	30
•	B	1	1 ½	**770 341 106**	80	63	38	55	36
•	G	1	1 ½	**770 341 206**	80	63	38	55	36
•	B	1 ¼	2	**770 341 107**	90	71	48	67	48
•	G	1 ¼	2	**770 341 207**	90	71	48	67	48
•	B	1 ½	2 ¼	**770 341 108**	96	77	54	74	54
•	G	1 ½	2 ¼	**770 341 208**	96	77	54	74	54
•	B	2	2 ¾	**770 341 109**	106	82	66	90	66
•	G	2	2 ¾	**770 341 209**	106	82	66	90	66
•	B	2 ½	3 ½	**770 341 110**	122	95	85	111	85
•	G	2 ½	3 ½	**770 341 210**	122	95	85	111	85
•	B	3	4	**770 341 111**	134	104	96	130	95
•	G	3	4	**770 341 211**	134	104	96	130	95
-	B	4	5	**770 341 112**	153	117	120	151	120
-	G	4	5	**770 341 212**	153	117	120	151	120

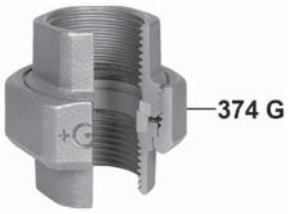


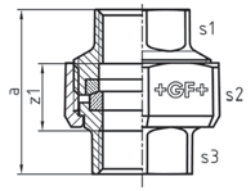


342
Union, spherical seat/taper seat Bronze to Iron, ISO/EN U11

- Torque and notes for installation please find in "Technical Product Notes".
- Not suitable for drinking water installation!
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	z1 [mm]	s1 [mm]	s2 [mm]	s3 [mm]
•	B	½	1 ⅛	**770 342 104**	48	22	26	44	26
•	G	½	1 ⅛	**770 342 204**	48	22	26	44	26
•	B	¾	1 ¼	**770 342 105**	52	23	31	48	31
•	G	¾	1 ¼	**770 342 205**	52	23	31	48	31
•	B	1	1 ½	**770 342 106**	58	24	38	55	38
•	G	1	1 ½	**770 342 206**	58	24	38	55	38
•	B	1 ¼	2	**770 342 107**	65	27	48	67	48
•	G	1 ¼	2	**770 342 207**	65	27	48	67	48
•	B	1 ½	2 ¼	**770 342 108**	70	32	54	73	54
•	G	1 ½	2 ¼	**770 342 208**	70	32	54	73	54
•	B	2	2 ¾	**770 342 109**	78	32	66	90	66
•	G	2	2 ¾	**770 342 209**	78	32	66	90	66

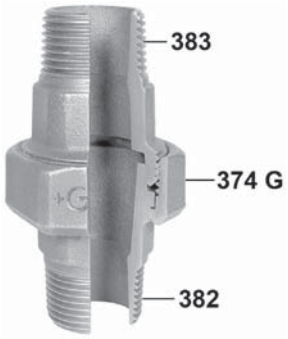


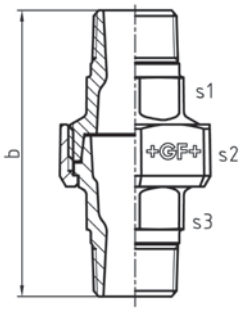


342a
Union, spherical seat/taper seat Bronze to Bronze, ISO/ENU11

- Torque and notes for installation please find in "Technical Product Notes".
- Not suitable for drinking water installation!
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	z1 [mm]	s1 [mm]	s2 [mm]	s3 [mm]
•	B	½	1 ⅛	**770 345 104**	48	22	26	44	26
•	G	½	1 ⅛	**770 345 204**	48	22	26	44	26
•	B	¾	1 ¼	**770 345 105**	52	23	31	48	31
•	G	¾	1 ¼	**770 345 205**	52	23	31	48	31
•	B	1	1 ½	**770 345 106**	58	24	38	55	38
•	G	1	1 ½	**770 345 206**	58	24	38	55	38
•	B	1 ¼	2	**770 345 107**	65	27	48	67	48
•	G	1 ¼	2	**770 345 207**	65	27	48	67	48
•	B	1 ½	2 ¼	**770 345 108**	75	32	54	73	54
•	G	1 ½	2 ¼	**770 345 208**	75	32	54	73	54
•	B	2	2 ¾	**770 345 109**	85	32	66	90	66
•	G	2	2 ¾	**770 345 209**	85	32	66	90	66

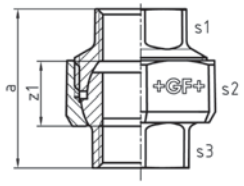




344
Union taper seat

- Torque and notes for installation please find in "Technical Product Notes".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

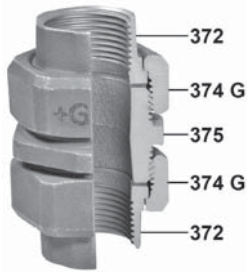
EN	B/G	Dim. [inch]	374 G [inch]	Code	b [mm]	s1 [mm]	s2 [mm]	s3 [mm]
-	B	¼	⅝	**770 344 102**	69	18	28	15
-	G	¼	⅝	**770 344 202**	69	18	28	15
-	B	⅜	¾	**770 344 103**	75	22	32	20
-	G	⅜	¾	**770 344 203**	75	22	32	20
-	B	½	1	**770 344 104**	85	26	39	23
-	G	½	1	**770 344 204**	85	26	39	23
-	B	¾	1 ¼	**770 344 105**	93	32	48	30
-	G	¾	1 ¼	**770 344 205**	93	32	48	30
-	B	1	1 ½	**770 344 106**	103	38	55	36
-	G	1	1 ½	**770 344 206**	103	38	55	36
-	B	1 ¼	2	**770 344 107**	114	48	67	48
-	G	1 ¼	2	**770 344 207**	114	48	67	48
-	B	1 ½	2 ¼	**770 344 108**	123	54	74	54
-	G	1 ½	2 ¼	**770 344 208**	123	54	74	54
-	B	2	2 ¾	**770 344 109**	136	66	90	67
-	G	2	2 ¾	**770 344 209**	136	66	90	67

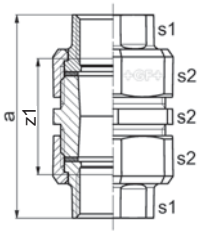


346
Union, spherical seat angular deviation max. 6°, ISO/EN U11

- Torque and notes for installation please find in "Technical Product Notes".
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	z1 [mm]	s1 [mm]	s2 [mm]	s3 [mm]
•	B	½	1 ⅛	**770 346 104**	48	22	26	44	26
•	G	½	1 ⅛	**770 346 204**	48	22	26	44	26
•	B	¾	1 ¼	**770 346 105**	52	23	31	48	31
•	G	¾	1 ¼	**770 346 205**	52	23	31	48	31
•	B	1	1 ½	**770 346 106**	58	24	38	55	38
•	G	1	1 ½	**770 346 206**	58	24	38	55	38
•	B	1 ¼	2	**770 346 107**	65	27	48	67	48
•	G	1 ¼	2	**770 346 207**	65	27	48	67	48
•	B	1 ½	2 ¼	**770 346 108**	75	32	54	73	54
•	G	1 ½	2 ¼	**770 346 208**	75	32	54	73	54
•	B	2	2 ¾	**770 346 109**	85	32	66	90	66
•	G	2	2 ¾	**770 346 209**	85	32	66	90	66

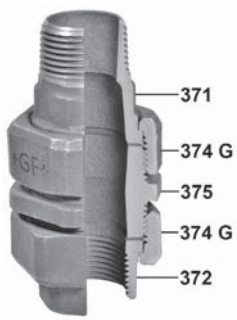


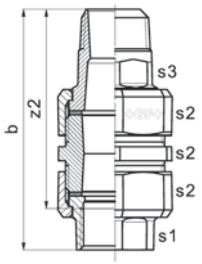


350
Service union flat seat, with internal threads

- Information about application and installation please find in "Technical Product Notes".
- Supplied with sealing gaskets; a and z1 include the seal thickness of 2mm each.
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	a [mm]	z1 [mm]	s1 [mm]	s2 [mm]
-	B	½	1	**770 350 104**	81	55	26	41
-	G	½	1	**770 350 204**	81	55	26	41
-	B	¾	1 ¼	**770 350 105**	85	55	31	48
-	G	¾	1 ¼	**770 350 205**	85	55	31	48
-	B	1	1 ½	**770 350 106**	93	59	38	55
-	G	1	1 ½	**770 350 206**	93	59	38	55

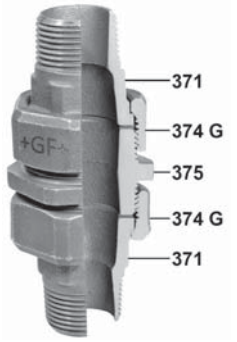


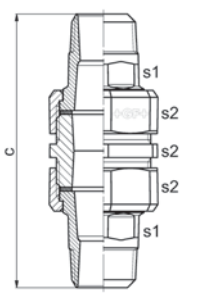


351
Service union flat seat, with internal and external thread

- Information about application and installation please find in "Technical Product Notes".
- Supplied with sealing gaskets; b and z2 include the seal thickness of 2mm each.
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	b [mm]	z2 [mm]	s1 [mm]	s2 [mm]	s3 [mm]
-	B	½	1	**770 351 104**	99	86	26	41	23
-	G	½	1	**770 351 204**	99	86	26	41	23
-	B	¾	1 ¼	**770 351 105**	105	90	31	48	30
-	G	¾	1 ¼	**770 351 205**	105	90	31	48	30
-	B	1	1 ½	**770 351 106**	114	97	38	55	36
-	G	1	1 ½	**770 351 206**	114	97	38	55	36

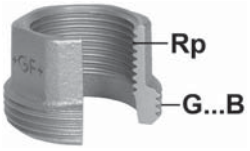


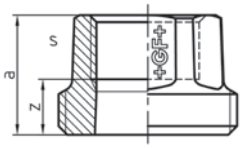


356
Service union flat seat, with external threads

- Information about application and installation please find in "Technical Product Notes".
- Supplied with sealing gaskets; c includes the seal thickness of 2mm each.
- 374 G ... refers to the thread size G according to ISO 228 of the union nut 374.

EN	B/G	Dim. [inch]	374 G [inch]	Code	c [mm]	s1 [mm]	s2 [mm]
-	B	½	1	**770 356 104**	117	23	41
-	G	½	1	**770 356 204**	117	23	41
-	B	¾	1 ¼	**770 356 105**	125	30	48
-	G	¾	1 ¼	**770 356 205**	125	30	48
-	B	1	1 ½	**770 356 106**	135	36	55
-	G	1	1 ½	**770 356 206**	135	36	55

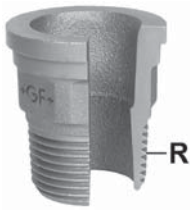


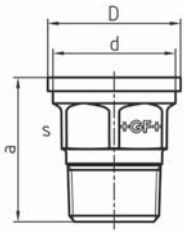


370
Union bush flat seat

- * Is usually not supplied as a separate piece.
- ** Version

EN	B/G	Dim. Rp [inch]	**	G...B [inch]	Code	a [mm]	z [mm]	s [mm]	Shape
* -	B	¼		⅝		21	11	19	hexagon
* -	G	¼		⅝		21	11	19	hexagon
* -	B	⅜		¾		23	13	22	hexagon
* -	G	⅜		¾		23	13	22	hexagon
-	B	½		1	**770 370 119**	25	12	26	hexagon
-	G	½		1	**770 370 219**	25	12	26	hexagon
-	B	½	s	1 ⅛	**770 370 120**	25	12	26	hexagon
-	G	½	s	1 ⅛	**770 370 220**	25	12	26	hexagon
-	B	¾		1 ¼	**770 370 105**	28	13	32	hexagon
-	G	¾		1 ¼	**770 370 205**	28	13	32	hexagon
-	B	1		1 ½	**770 370 106**	31	14	38	hexagon
-	G	1		1 ½	**770 370 206**	31	14	38	hexagon
-	B	1 ¼		2	**770 370 107**	33	14	48	hexagon
-	G	1 ¼		2	**770 370 207**	33	14	48	hexagon
-	B	1 ½		2 ¼	**770 370 108**	36	17	54	hexagon
-	G	1 ½		2 ¼	**770 370 208**	36	17	54	hexagon
-	B	2		2 ¾	**770 370 109**	42	18	66	hexagon
-	G	2		2 ¾	**770 370 209**	42	18	66	hexagon
-	B	2 ½		3 ½	**770 370 110**	41	14	85	octagon
-	G	2 ½		3 ½	**770 370 210**	41	14	85	octagon
-	B	3		4	**770 370 111**	48	18	96	octagon
-	G	3		4	**770 370 211**	48	18	96	octagon
* -	B	4		5		62	26	122	octagon
* -	G	4		5		62	26	122	octagon

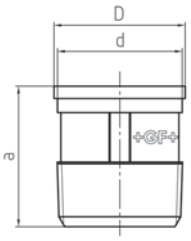




371
Union end flat seat, equal

- G ... refers to the thread size G of the union nut 374, which can be combined with the union end.
- * Is usually not supplied as a separate piece.

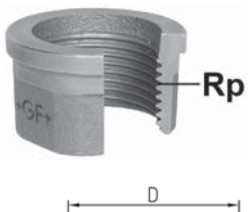
EN	B/G	Dim. R [inch]	G [inch]	Code	a [mm]	D [mm]	d [mm]	s [mm]	Shape
* -	B	¼	⅝		32	20.3	18.1	15	hexagon
* -	G	¼	⅝		32	20.3	18.1	15	hexagon
* -	B	⅜	¾		34	23.8	21.6	19	octagon
* -	G	⅜	¾		34	23.8	21.6	19	octagon
-	B	½	1	**770 371 104**	40	30.0	27.0	23	hexagon
-	G	½	1	**770 371 204**	40	30.0	27.0	23	hexagon
-	B	¾	1 ¼	**770 371 105**	42	38.6	35.5	30	hexagon
-	G	¾	1 ¼	**770 371 205**	42	38.6	35.5	30	hexagon
-	B	1	1 ½	**770 371 106**	47	44.4	40.9	36	hexagon
-	G	1	1 ½	**770 371 206**	47	44.4	40.9	36	hexagon
-	B	1 ¼	2	**770 371 107**	57	56.3	52.4	48	hexagon
-	G	1 ¼	2	**770 371 207**	57	56.3	52.4	48	hexagon
-	B	1 ½	2 ¼	**770 371 108**	57	62.3	58.4	54	hexagon
-	G	1 ½	2 ¼	**770 371 208**	57	62.3	58.4	54	hexagon
-	B	2	2 ¾	**770 371 109**	62	78.2	73.4	66	hexagon
-	G	2	2 ¾	**770 371 209**	62	78.2	73.4	66	hexagon
-	B	2 ½	3 ½	**770 371 110**	75	97.0	91.9	85	octagon
-	G	2 ½	3 ½	**770 371 210**	75	97.0	91.9	85	octagon
-	B	3	4	**770 371 111**	80	109.6	104.4	95	octagon
-	G	3	4	**770 371 211**	80	109.6	104.4	95	octagon

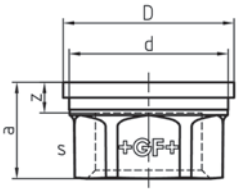


371
Union end flat seat, reducing

- Union end for 374 1 d=42.5
- G ... refers to the thread size G of the union nut 374, which can be combined with the union end.

EN	B/G	Dim. R [inch]	G [inch]	Code	a [mm]	D [mm]	d [mm]	Shape
-	B	1 - 1 ¼	1 ½	**770 371 115**	47	44.4	42.2	round

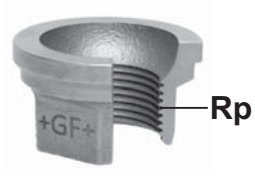


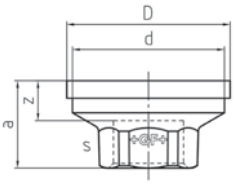


372
Union end flat seat, equal

- G ... refers to the thread size G of the union nut 374, which can be combined with the union end.
- * Is usually not supplied as a separate piece.
- ** Version
- I hex = Internal hexagon

EN	B/G	Dim. Rp [inch]	**	G [inch]	Code	a [mm]	D [mm]	d [mm]	z [mm]	s [mm]	Shape
* -	B	¼		⅝		20.0	20.3	18.1	10.0	10	I hex
* -	G	¼		⅝		20.0	20.3	18.1	10.0	10	I hex
* -	B	⅜		¾		22.0	23.8	21.6	12.0	12	I hex
* -	G	⅜		¾		22.0	23.8	21.6	12.0	12	I hex
-	B	½		1	**770 372 119**	22.0	30.0	27.1	9.0	25	hexagon
-	G	½		1	**770 372 219**	22.0	30.0	27.1	9.0	25	hexagon
-	B	½	s	1 ⅛	**770 372 104**	22.0	34.6	31.5	9.0	26	hexagon
-	G	½	s	1 ⅛	**770 372 204**	22.0	34.6	31.5	9.0	26	hexagon
-	B	¾		1 ¼	**770 372 105**	22.0	38.6	35.5	7.0	31	hexagon
-	G	¾		1 ¼	**770 372 205**	22.0	38.6	35.5	7.0	31	hexagon
-	B	1		1 ½	**770 372 106**	26.0	44.4	40.9	9.0	38	hexagon
-	G	1		1 ½	**770 372 206**	26.0	44.4	40.9	9.0	38	hexagon
-	B	1 ¼		2	**770 372 107**	31.0	56.3	52.4	12.0	48	hexagon
-	G	1 ¼		2	**770 372 207**	31.0	56.3	52.4	12.0	48	hexagon
-	B	1 ½		2 ¼	**770 372 108**	32.5	62.3	58.4	13.5	54	hexagon
-	G	1 ½		2 ¼	**770 372 208**	32.5	62.3	58.4	13.5	54	hexagon
-	B	2		2 ¾	**770 372 109**	35.0	78.2	73.4	11.0	66	hexagon
-	G	2		2 ¾	**770 372 209**	35.0	78.2	73.4	11.0	66	hexagon
-	B	2 ½		3 ½	**770 372 110**	39.0	97.0	91.9	12.0	85	octagon
-	G	2 ½		3 ½	**770 372 210**	39.0	97.0	91.9	12.0	85	octagon
-	B	3		4	**770 372 111**	45.0	109.6	104.4	15.0	96	octagon
-	G	3		4	**770 372 211**	45.0	109.6	104.4	15.0	96	octagon
* -	B	4		5		46.0	135.0	128.7	12.0	122	octagon
* -	G	4		5		46.0	135.0	128.7	12.0	122	octagon

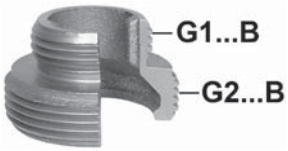


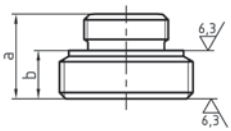


372
Union end flat seat, reducing

- G ... refers to the thread size G of the union nut 374, which can be combined with the union end.

EN	B/G	Dim. Rp [inch]	G [inch]	Code	a [mm]	D [mm]	d [mm]	z [mm]	s [mm]	Shape
-	B	1 - ¾	1 ½	**770 372 115**	25	44.4	41.0	10	32	hexagon
-	G	1 - ¾	1 ½	**770 372 215**	25	44.4	41.0	10	32	hexagon
-	B	1 ¼ - ¾	2	**770 372 133**	30	56.3	52.5	15	32	hexagon
-	G	1 ¼ - ¾	2	**770 372 233**	30	56.3	52.5	15	32	hexagon
-	B	1 ¼ - 1	2	**770 372 116**	31	56.3	52.4	14	38	hexagon
-	G	1 ¼ - 1	2	**770 372 216**	31	56.3	52.4	14	38	hexagon

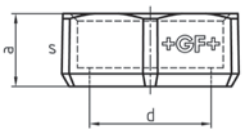




373
Union bush flat seat

- Sealing gaskets for sealing surface as per table "Sealing Gasket Dimension" (catalogue no. 332, symbol ○).

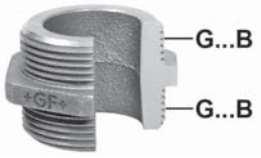
EN	B/G	G1...B [inch]	G2...B [inch]	Code	a [mm]	b [mm]
-	B	¾	1 ¼	**770 373 105**	27	15
-	G	¾	1 ¼	**770 373 205**	27	15
-	B	1	1 ½	**770 373 106**	29	15
-	G	1	1 ½	**770 373 206**	29	15
-	B	1 ¼	2	**770 373 107**	33	17
-	G	1 ¼	2	**770 373 207**	33	17

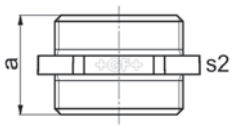


374
Union nut

- * Is usually not supplied as a separate piece.
- ** Version
- *** Union nut for 371 1 - 1¼

EN	B/G	Dim. [inch]	**	Dim. G [inch]	Code	a [mm]	d [mm]	s [mm]	Shape
* -	B	⅛		½		15	16.5	26	hexagon
* -	G	⅛		½		15	16.5	26	hexagon
* -	B	¼	s	⅝		15	18.4	28	hexagon
* -	G	¼	s	⅝		15	18.4	28	hexagon
* -	B	¼		¾		16	21.9	32	hexagon
* -	G	¼		¾		16	21.9	32	hexagon
-	B	⅜		¾	**770 374 116**	16	21.9	32	hexagon
-	G	⅜		¾	**770 374 216**	16	21.9	32	hexagon
-	B	⅜	s	⅞	**770 374 118**	17	24.9	36	hexagon
-	G	⅜	s	⅞	**770 374 218**	17	24.9	36	hexagon
-	B	½		1	**770 374 119**	18	27.3	41	hexagon
-	G	½		1	**770 374 219**	18	27.3	41	hexagon
-	B	½	s	1 ⅛	**770 374 120**	19	31.8	44	hexagon
-	G	½	s	1 ⅛	**770 374 220**	19	31.8	44	hexagon
-	B	¾		1 ¼	**770 374 105**	20	35.8	48	hexagon
-	G	¾		1 ¼	**770 374 205**	20	35.8	48	hexagon
-	B	¾	34,4	1 ¼	**770 374 135**	20	34.4	48	hexagon
-	B	1	s	1 ½	**770 374 106**	22	41.3	55	hexagon
-	G	1	s	1 ½	**770 374 206**	22	41.3	55	hexagon
-	B	1		1 ½	**770 960 180**	22	41.3	55	octagon
*** -	B	1	42,5	1 ½	**770 374 121**	22	42.5	55	hexagon
-	B	1 ¼		2	**770 374 107**	24	52.8	67	hexagon
-	G	1 ¼		2	**770 374 207**	24	52.8	67	hexagon
-	B	1 ½		2 ¼	**770 374 108**	25	58.8	74	hexagon
-	G	1 ½		2 ¼	**770 374 208**	25	58.8	74	hexagon
-	B	2		2 ¾	**770 374 109**	27	73.8	90	hexagon
-	G	2		2 ¾	**770 374 209**	27	73.8	90	hexagon
-	B	2 ½		3 ½	**770 374 110**	30	92.3	111	octagon
-	G	2 ½		3 ½	**770 374 210**	30	92.3	111	octagon
-	B	3		4	**770 374 111**	31	104.8	131	octagon
-	G	3		4	**770 374 211**	31	104.8	131	octagon
* -	B	4		5		35	129.2	151	octagon
* -	G	4		5		35	129.2	151	octagon

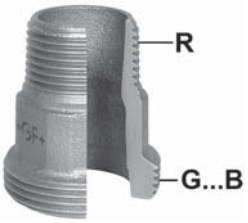


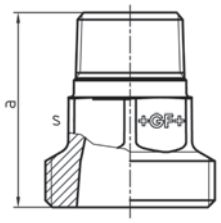


375
Union bush flat seat

- Union bush for 350, 351 and 356

EN	B/G	Dim. [inch]	G...B [inch]	Code	a [mm]	s2 [mm]
-	B	½	1	**770 375 104**	33	41
-	G	½	1	**770 375 204**	33	41
-	B	¾	1 ¼	**770 375 105**	37	48
-	G	¾	1 ¼	**770 375 205**	37	48
-	B	1	1 ½	**770 375 106**	37	55
-	G	1	1 ½	**770 375 206**	37	55

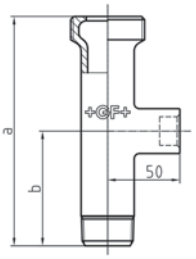




376
Union bush flat seat

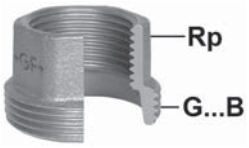
- ** Version

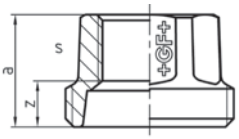
EN	B/G	Dim. R [inch]	**	G...B [inch]	Code	a [mm]	s [mm]	Shape
-	B	½		1	**770 376 105**	43.0	26	hexagon
-	G	½		1	**770 376 205**	43.0	26	hexagon
-	B	½	s	1 ⅛	**770 376 125**	41.5	26	hexagon
-	G	½	s	1 ⅛	**770 376 225**	41.5	26	hexagon
-	B	¾		1 ¼	**770 376 106**	48.0	32	hexagon
-	G	¾		1 ¼	**770 376 206**	48.0	32	hexagon
-	B	1		1 ½	**770 376 107**	54.0	38	hexagon
-	G	1		1 ½	**770 376 207**	54.0	38	hexagon
-	B	1 ¼		2	**770 376 108**	57.0	48	hexagon
-	G	1 ¼		2	**770 376 208**	57.0	48	hexagon
-	B	1 ½		2 ¼	**770 376 109**	61.0	54	hexagon
-	G	1 ½		2 ¼	**770 376 209**	61.0	54	hexagon
-	B	2		2 ¾	**770 376 110**	71.0	66	hexagon
-	G	2		2 ¾	**770 376 210**	71.0	66	hexagon



378
Distribution union bush, flat seat

EN	B/G	Dim. R [inch]	G...B [inch]	Code	a [mm]	b [mm]
-	G	¾	1 ¼	**770 378 220**	153	74
-	G	1	1 ½	**770 378 221**	146	67
-	G	1 ¼	2	**770 378 222**	141	59

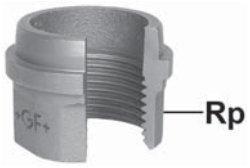


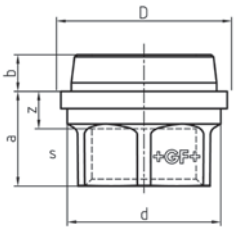


380
Union bush taper seat

- Is usually not supplied as a separate piece.
- ** Version

EN	B/G	Dim. Rp [inch]	**	G...B [inch]	Code	a [mm]	z [mm]	s [mm]	Shape
-	B	⅛		½		19	12	15	hexagon
-	G	⅛		½		19	12	15	hexagon
-	B	¼		⅝		21	11	19	hexagon
-	G	¼		⅝		21	11	19	hexagon
-	B	⅜		¾		23	13	22	hexagon
-	G	⅜		¾		23	13	22	hexagon
-	B	½		1		25	11	26	hexagon
-	G	½		1		25	11	26	hexagon
-	B	½	s	1 ⅛		25	11	26	hexagon
-	G	½	s	1 ⅛		25	11	26	hexagon
-	B	¾		1 ¼		28	13	32	hexagon
-	G	¾		1 ¼		28	13	32	hexagon
-	B	1		1 ½		31	14	38	hexagon
-	G	1		1 ½		31	14	38	hexagon
-	B	1 ¼		2		33	14	48	hexagon
-	G	1 ¼		2		33	14	48	hexagon
-	B	1 ½		2 ¼		36	17	54	hexagon
-	G	1 ½		2 ¼		36	17	54	hexagon
-	B	2		2 ¾		42	18	66	hexagon
-	G	2		2 ¾		42	18	66	hexagon
-	B	2 ½		3 ½		41	14	85	octagon
-	G	2 ½		3 ½		41	14	85	octagon
-	B	3		4		48	18	96	octagon
-	G	3		4		48	18	96	octagon
-	B	4		5		62	26	120	octagon
-	G	4		5		62	26	120	octagon

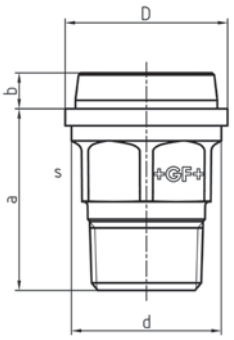




381
Union end taper seat

- Is usually not supplied as a separate piece.
- G ... refers to the thread size G of the union nut 374, which can be combined with the union end.
- ** Version
- I hex = Internal hexagon

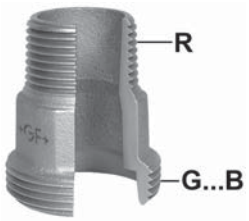
EN	B/G	Dim. Rp [inch]	**	G [inch]	Code	a [mm]	b [mm]	D [mm]	d [mm]	z [mm]	s [mm]	Shape
-	B	⅛		½		17.5	6.5	18.4	15.8	10.5	15	hexagon
-	G	⅛		½		17.5	6.5	18.4	15.8	10.5	15	hexagon
-	B	¼		⅝		20.5	6.0	20.3	18.1	10.5	10	I hex
-	G	¼		⅝		20.5	6.0	20.3	18.1	10.5	10	I hex
-	B	⅜		¾		22.0	6.5	23.8	21.6	12.0	12	I hex
-	G	⅜		¾		22.0	6.5	23.8	21.6	12.0	12	I hex
-	B	½		1		22.5	7.5	30.0	27.0	9.5	25	octagon
-	G	½		1		22.5	7.5	30.0	27.0	9.5	25	octagon
-	B	½	s	1 ⅛		21.0	8.0	34.6	31.5	8.0	26	hexagon
-	G	½	s	1 ⅛		21.0	8.0	34.6	31.5	8.0	26	hexagon
-	B	¾		1 ¼		22.5	8.0	38.6	35.5	6.5	30	hexagon
-	G	¾		1 ¼		22.5	8.0	38.6	35.5	6.5	30	hexagon
-	B	1		1 ½		26.5	8.5	44.4	40.9	8.5	38	hexagon
-	G	1		1 ½		26.5	8.5	44.4	40.9	8.5	38	hexagon
-	B	1 ¼		2		31.5	9.0	56.3	52.4	12.0	48	hexagon
-	G	1 ¼		2		31.5	9.0	56.3	52.4	12.0	48	hexagon
-	B	1 ½		2 ¼		33.0	9.5	62.3	58.4	14.0	54	hexagon
-	G	1 ½		2 ¼		33.0	9.5	62.3	58.4	14.0	54	hexagon
-	B	2		2 ¾		35.5	11.5	78.2	73.4	10.5	66	hexagon
-	G	2		2 ¾		35.5	11.5	78.2	73.4	10.5	66	hexagon
-	B	2 ½		3 ½		42.5	13.5	97.0	91.9	15.5	85	octagon
-	G	2 ½		3 ½		42.5	13.5	97.0	91.9	15.5	85	octagon
-	B	3		4		45.5	14.5	109.6	104.4	15.5	96	octagon
-	G	3		4		45.5	14.5	109.6	104.4	15.5	96	octagon
-	B	4		5		46.5	15.5	135.0	128.7	10.5	120	octagon
-	G	4		5		46.5	15.5	135.0	128.7	10.5	120	octagon

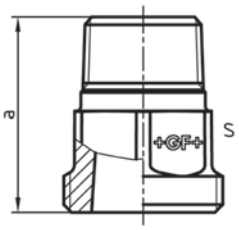


382
Union end taper seat

- Is usually not supplied as a separate piece.
- G ... refers to the thread size G of the union nut 374, which can be combined with the union end.

EN	B/G	Dim. R [inch]	G [inch]	Code	a [mm]	b [mm]	D [mm]	d [mm]	s [mm]	Shape
-	B	¼	⅝		32.0	6.0	20.3	18.1	15	hexagon
-	G	¼	⅝		32.0	6.0	20.3	18.1	15	hexagon
-	B	⅜	¾		34.0	6.5	23.8	21.6	19	octagon
-	G	⅜	¾		34.0	6.5	23.8	21.6	19	octagon
-	B	½	1		40.5	7.5	30.0	27.0	23	hexagon
-	G	½	1		40.5	7.5	30.0	27.0	23	hexagon
-	B	¾	1 ¼		43.8	8.0	38.6	35.5	30	hexagon
-	G	¾	1 ¼		43.8	8.0	38.6	35.5	30	hexagon
-	B	1	1 ½		49.5	8.5	44.4	40.9	36	hexagon
-	G	1	1 ½		49.5	8.5	44.4	40.9	36	hexagon
-	B	1 ¼	2		56.0	9.0	56.3	52.4	48	hexagon
-	G	1 ¼	2		56.0	9.0	56.3	52.4	48	hexagon
-	B	1 ½	2 ¼		58.0	9.5	62.3	58.4	54	hexagon
-	G	1 ½	2 ¼		58.0	9.5	62.3	58.4	54	hexagon
-	B	2	2 ¾		62.5	11.5	78.2	73.4	66	hexagon
-	G	2	2 ¾		62.5	11.5	78.2	73.4	66	hexagon
-	B	2 ½	3 ½		75.5	13.5	97.0	91.9	85	octagon
-	G	2 ½	3 ½		75.5	13.5	97.0	91.9	85	octagon
-	B	3	4		80.5	14.5	109.6	104.4	95	octagon
-	G	3	4		80.5	14.5	109.6	104.4	95	octagon
-	B	4	5		87.0	15.5	135.0	128.7	120	hexagon
-	G	4	5		87.0	15.5	135.0	128.7	120	hexagon

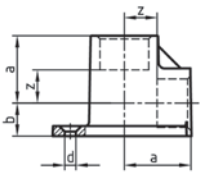


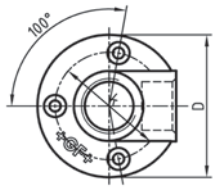


383
Union bush taper seat

- Is usually not supplied as a separate piece.

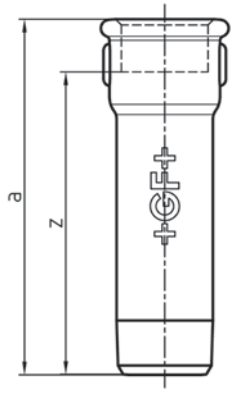
EN	B/G	Dim. R [inch]	G...B [inch]	Code	a [mm]	s [mm]	Shape
-	B	¼	⅝		35	19	hexagon
-	G	¼	⅝		35	19	hexagon
-	B	⅜	¾		39	22	hexagon
-	G	⅜	¾		39	22	hexagon
-	B	½	1		43	26	hexagon
-	G	½	1		43	26	hexagon
-	B	¾	1 ¼		48	32	hexagon
-	G	¾	1 ¼		48	32	hexagon
-	B	1	1 ½		54	38	hexagon
-	G	1	1 ½		54	38	hexagon
-	B	1 ¼	2		58	48	hexagon
-	G	1 ¼	2		58	48	hexagon
-	B	1 ½	2 ¼		61	54	hexagon
-	G	1 ½	2 ¼		61	54	hexagon
-	B	2	2 ¾		71	66	hexagon
-	G	2	2 ¾		71	66	hexagon





471
Bracket elbow

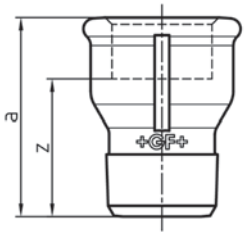
EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	d [mm]	z [mm]	k [mm]	D [mm]
-	G	⅜	**770 471 203**	25	12	4.5	15	41.5	60
-	G	½	**770 471 204**	28	14	5.5	15	44.5	62
-	G	¾	**770 471 205**	33	17	5.5	18	53.5	70



526
Extension tube

- * Due to overall fitting length, the length of the external thread does not comply with the standard.

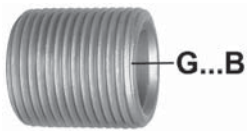
EN	B/G	Dim. [inch]	Length [mm]	Code	a [mm]	z [mm]
-	B	⅜	100	**770 526 119**	100	90
-	G	⅜	100	**770 526 219**	100	90
* -	B	½	30	**770 526 120**	30	17
* -	G	½	30	**770 526 220**	30	17
-	B	½	50	**770 526 121**	50	37
-	G	½	50	**770 526 221**	50	37
-	B	½	60	**770 526 122**	60	47
-	G	½	60	**770 526 222**	60	47
-	B	½	70	**770 526 123**	70	57
-	G	½	70	**770 526 223**	70	57
-	B	½	80	**770 526 124**	80	67
-	G	½	80	**770 526 224**	80	67
-	B	½	100	**770 526 125**	100	87
-	G	½	100	**770 526 225**	100	87
-	B	½	120	**770 526 126**	120	107
-	G	½	120	**770 526 226**	120	107
* -	B	¾	30	**770 526 127**	30	15
* -	G	¾	30	**770 526 227**	30	15
* -	B	¾	40	**770 526 128**	40	25
* -	G	¾	40	**770 526 228**	40	25
-	B	¾	60	**770 526 129**	60	45
-	G	¾	60	**770 526 229**	60	45
-	B	¾	70	**770 526 130**	70	55
-	G	¾	70	**770 526 230**	70	55
-	B	¾	80	**770 526 131**	80	65
-	G	¾	80	**770 526 231**	80	65
-	B	¾	100	**770 526 132**	100	85
-	G	¾	100	**770 526 232**	100	85
* -	B	1	40	**770 526 133**	40	23
* -	G	1	40	**770 526 233**	40	23
-	B	1	80	**770 526 134**	80	63
-	G	1	80	**770 526 234**	80	63
-	B	1	100	**770 526 135**	100	83
-	G	1	100	**770 526 235**	100	83

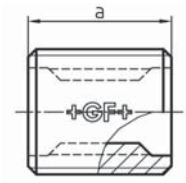


529a
Socket, internal and external thread, ISO/EN M4

- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations. Steel parts are hexagonal instead of beaded.

EN	B/G	Dim. [inch]	Code	a [mm]	s [mm]	z [mm]
ST -	B	¼	**770 529 102**	28	17	18
ST -	G	¼	**770 529 202**	28	17	18
ST •	B	⅜	**770 529 103**	35	22	25
ST •	G	⅜	**770 529 203**	35	22	25
•	B	½	**770 529 104**	43		30
•	G	½	**770 529 204**	43		30
•	B	¾	**770 529 105**	48		33
•	G	¾	**770 529 205**	48		33
•	B	1	**770 529 106**	55		38
•	G	1	**770 529 206**	55		38
-	B	1 ¼	**770 529 107**	60		41
-	G	1 ¼	**770 529 207**	60		41
-	B	1 ½	**770 529 108**	63		44
-	G	1 ½	**770 529 208**	63		44
-	B	2	**770 529 109**	70		46
-	G	2	**770 529 209**	70		46

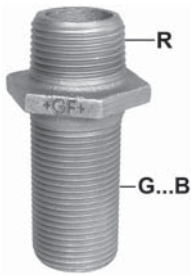


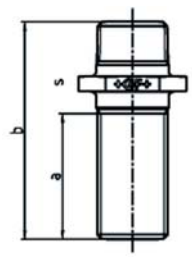


531
Nipple

- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations.

EN	B/G	G...B [inch]	Code	a [mm]
ST -	B	⅜	**770 970 145**	23
ST -	G	⅜	**770 970 245**	23
ST -	B	½	**770 970 146**	25
ST -	G	½	**770 970 246**	25
ST -	B	¾	**770 970 147**	30
ST -	G	¾	**770 970 247**	30
ST -	B	1	**770 970 148**	35
ST -	G	1	**770 970 248**	35

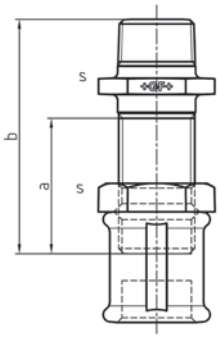




534
Longscrew hexagon nipple

- Hot dip galvanised, thread electroplated.

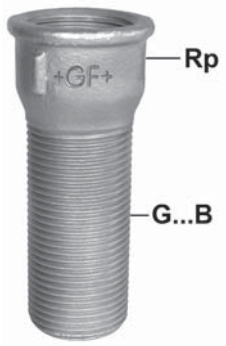
EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	s [mm]
-	G	½	**770 534 204**	46	77	32
-	G	¾	**770 534 205**	49	82	36
-	G	1	**770 534 206**	56	92	46

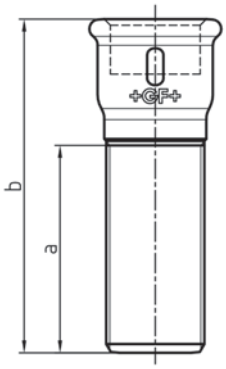


535
Longscrew hexagon nipple, complete

- * Large chamfer (gasket chamber)

EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	s [mm]
-	G	½	**770 535 204**	46	77	32
-	G	¾	**770 535 205**	49	82	36
-	G	1	**770 535 206**	56	92	46

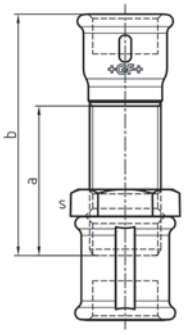




536
Longscrew socket

- Hot dip galvanised, thread electroplated.

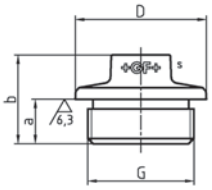
EN	B/G	Dim. [inch]	Length [mm]	Code	a [mm]	b [mm]
-	G	½	80	**770 536 204**	50	80
-	G	¾	90	**770 536 205**	57	90
-	G	1	100	**770 536 206**	65	100
-	G	1 ¼	116	**770 536 207**	75	116
-	G	1 ½	125	**770 536 208**	84	125
-	G	2	143	**770 536 209**	98	143



537
Longscrew socket, complete

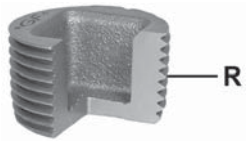
- * Large chamfer (gasket chamber)

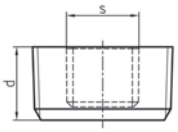
EN	B/G	Dim. [inch]	Code	a [mm]	b [mm]	s [mm]
-	G	½	**770 537 204**	50	80	32
-	G	¾	**770 537 205**	57	90	36
-	G	1	**770 537 206**	65	100	46
-	G	1 ¼	**770 537 207**	75	116	55
-	G	1 ½	**770 537 208**	84	125	60
-	G	2	**770 537 209**	98	143	73



595
Plug with one machined face

EN	B/G	G...B [inch]	Code	a [mm]	b [mm]	D [mm]	s [mm]
-	B	½	**770 595 104**	11	23	28	11
-	G	½	**770 595 204**	11	23	28	11
-	B	¾	**770 595 105**	11	24	35	17
-	G	¾	**770 595 205**	11	24	35	17
-	B	1	**770 595 106**	14	28	41	19
-	G	1	**770 595 206**	14	28	41	19

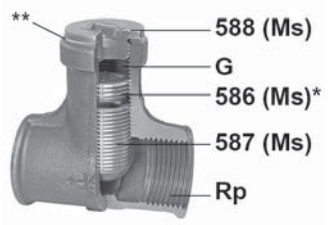


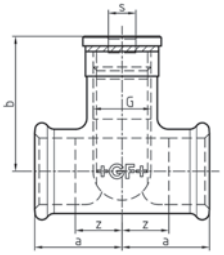


596
Plug, hexagon/square inside, ISO/EN T11

- ST ... these types of fittings are made from steel (galvanised finish = electroplated) and not suitable for drinking water installations.

EN	B/G	Dim. R [inch]	Code	d [mm]	s [mm]	Shape
ST -	B	⅛	**770 596 101**	8	5	hexagonal
ST -	G	⅛	**770 596 201**	8	5	hexagonal
ST -	B	¼	**770 596 102**	10	7	hexagonal
ST -	G	¼	**770 596 202**	10	7	hexagonal
ST •	B	⅜	**770 596 103**	10	8	hexagonal
ST •	G	⅜	**770 596 203**	10	8	hexagonal
•	B	½	**770 596 104**	15	10	square
•	G	½	**770 596 204**	15	10	square
•	B	¾	**770 596 105**	17	12	square
•	G	¾	**770 596 205**	17	12	square
•	B	1	**770 596 106**	19	16	square
•	G	1	**770 596 206**	19	16	square
-	B	1 ¼	**770 596 107**	22	22	square
-	G	1 ¼	**770 596 207**	22	22	square
-	B	1 ½	**770 596 108**	22	22	square
-	G	1 ½	**770 596 208**	22	22	square
-	B	2	**770 596 109**	27	27	square
-	G	2	**770 596 209**	27	27	square

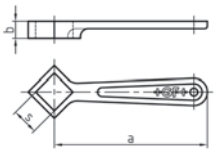




599a
Regulation socket

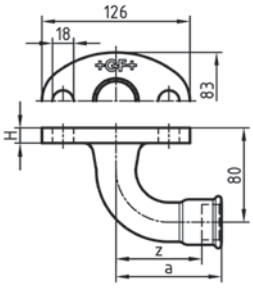
- * with backnut for anti-twist device
- ** Gasket

EN	B/G	Dim. Rp [inch]	G...B [inch]	Code	a [mm]	b [mm]	z [mm]	s [mm]
-	B	½	⅜	**770 599 104**	27	46	14	8
-	G	½	⅜	**770 599 204**	27	46	14	8
-	B	¾	½	**770 599 105**	32	56	17	10
-	G	¾	½	**770 599 205**	32	56	17	10
-	B	1	¾	**770 599 106**	38	65	21	12
-	G	1	¾	**770 599 206**	38	65	21	12
-	B	1 ¼	1 ⅛	**770 599 107**	45	81	26	17
-	G	1 ¼	1 ⅛	**770 599 207**	45	81	26	17
-	B	1 ½	1 ¼	**770 599 108**	47	77	28	22
-	B	2	1 ¾	**770 599 109**	57	99	33	27



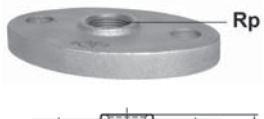
901
Stopcock spanner

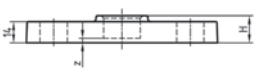
Dim. s [mm]	Code	a [mm]	b [mm]
10	**770 901 215**	88	11
12	**770 901 217**	95	12
14	**770 901 218**	110	13
17	**770 901 219**	130	14

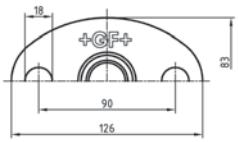


933
Water meter bend

EN	B/G	G...B [inch]	Code	a [mm]	z [mm]	H [mm]
-	G	¾	**770 933 205**	115	100	14
-	G	1	**770 933 206**	90	73	13
-	G	1 ¼	**770 933 207**	90	71	13







933a
Counter Flange to fig. 933

EN	B/G	Code	Dim. Rp [inch]	H [mm]	z [mm]
-	G	**770 932 205**	¾	18	3
-	G	**770 932 206**	1	19	2
-	G	**770 932 207**	1 ¼	22	3

FM certified assortment

Equal fittings, sizes ½ - ¾ - 1 - 1 ¼ - 1 ½ - 2

1	Long sweep bend	**90**	Elbow	**280**	Hexagon nipple
2		**92**		**290**	Plug, beaded
3		**94**		**291**	Plug, plain, hollow (a ... solid)
40	Long sweep bend 45°	**120**	Elbow 45°	**291a**	
41		**121**		**300**	Cap
1a	Short bend	**130**	Tee	**340**	Union taper seat
2a		**134**		**341**	
50	Bend 30°	***133**	Tee (* ½ - ¾ - 1)		
51		***135**			
53	Bend 15°	**180**	Cross		
54		**270**	Socket		

Reduced fittings

90 reducing

½ - ¼
½ - ⅜
¾ - ⅜
¾ - ½
1 - ½
1 - ¾
1 ¼ - ½
1 ¼ - ¾
1 ¼ - 1
1 ½ - ¾
1 ½ - 1
1 ½ - 1 ¼
2 - 1
2 - 1 ¼
2 - 1 ½

92 reducing

½ - ¾
¾ - ½
1 - ¾
1 - ¾
1 - 1 ¼
1 ¼ - ¾
1 ¼ - 1
1 ½ - 1
1 ½ - 1 ¼

130 reducing

½ - ¼	1 ¼ - 1 ¼ - ½
½ - ⅜	1 ¼ - 1 ¼ - ¾
½ - ¾	1 ¼ - 1 ¼ - 1
½ - 1	1 ¼ - 1 ½
¾ - ¼	1 ¼ - 1 ½ - 1
¾ - ⅜	1 ¼ - 2
¾ - ½	1 ½ - ½
¾ - ½ - ½	1 ½ - ½ - 1 ¼
¾ - ¾ - ⅜	1 ½ - ¾
¾ - ¾ - ½	1 ½ - ¾ - 1 ¼
¾ - 1	1 ½ - 1
¾ - 1 - ½	1 ½ - 1 - 1
1 - ¼	1 ½ - 1 ¼
1 - ⅜	1 ½ - 1 ¼ - 1 ¼
1 - ½	1 ½ - 1 ½ - ½
1 - ½ - ½	1 ½ - 1 ½ - ¾
1 - ½ - ¾	1 ½ - 1 ½ - 1
1 - ¾	1 ½ - 1 ½ - 1 ¼
1 - ¾ - ½	1 ½ - 2
1 - ¾ - ¾	1 ½ - 2 - 1 ¼
1 - 1 - ⅜	2 - ½
1 - 1 - ½	2 - ½ - 1 ½
1 - 1 - ¾	2 - ¾
1 - 1 ¼	2 - ¾ - 1 ½
1 - 1 ¼ - ¾	2 - 1
1 - 1 ½	2 - 1 - 1 ½
1 ¼ - ⅜	2 - 1 ¼
1 ¼ - ½	2 - 1 ¼ - 1 ½
1 ¼ - ½ - 1	2 - 1 ½
1 ¼ - ¾	2 - 1 ½ - 1 ½
1 ¼ - ¾ - ¾	2 - 2 - ½
1 ¼ - ¾ - 1	2 - 2 - ¾
1 ¼ - 1	2 - 2 - 1
1 ¼ - 1 - ¾	2 - 2 - 1 ¼
1 ¼ - 1 - 1	2 - 2 - 1 ½

180 reducing

¾ - ½
1 - ½
1 - ¾
1 ¼ - 1
1 ½ - 1
2 - 1

240, 241

½ - ⅜
¾ - ⅜
¾ - ½
1 - ½
1 - ¾
1 ¼ - ½
1 ¼ - ¾
1 ¼ - 1
1 ½ - ½
1 ½ - ¾
1 ½ - 1
1 ½ - 1 ¼
2 - ½
2 - ¾
2 - 1
2 - 1 ¼
2 - 1 ½

246

½ - ⅜
¾ - ⅜
¾ - ½
1 - ½
1 - ¾
1 ¼ - ½
1 ¼ - ¾
1 ¼ - 1
1 ½ - ¾
1 ½ - 1
1 ½ - 1 ¼
2 - 1
2 - 1 ¼
2 - 1 ½

Available in black and galvanised finish,
code-numbers (as standard article) see Product Range.

Technical Product Notes

Fittings sizes

Fitting sizes are designated based on the thread sizes defined in EN 10226-1 and ISO 7-1. Connection sizes of pipes, flanges or plumbing fixtures are designated according to thread sizes or nominal diameters (DN).

The following table shows the relationship between size of fittings and the nominal diameter (DN):

Thread size / fitting size	⅛	¼	⅜	½	¾	1	1 ¼	1 ½	2	2 ½	3	4
Nominal diameter DN (mm)	6	8	10	15	20	25	32	40	50	65	80	100

Material - malleable cast iron

Malleable cast iron is an iron-carbon alloy which combines the outstanding properties of cast iron (pourability) and steel (strength and ductility).

The chemical composition of the cast produces excellent castability, which makes malleable cast iron particularly suitable for making complicated shapes and producing thin walled parts.

In its cast state malleable cast iron is hard, brittle and unworkable, it only acquires its final microstructure after subsequent heat treatment known as annealing.

As a result of the annealing process (= malleabelising) very good workability and very good ductility are achieved while sufficiently high material strength is maintained.

There are two distinct types of malleable cast iron which are dependent on the annealing method. Their designation is a result of the appearance of the fracture surfaces:

1. Blackheart malleable cast iron
is annealed in an inert atmosphere (protective gas or vacuum) and has a uniform microstructure with a higher carbon content.

2. Whiteheart malleable cast iron
is annealed in an oxidising atmosphere, and in the process the carbon content of the surface zone is greatly reduced.

Due to the decarburisation of the microstructure whiteheart has a number of advantages when compared to blackheart malleable cast iron:

- **better galvanisability**
  (more homogenous formation of iron-zinc-alloy at the fittings surface)
- **higher strength** with the same elongation
- a limited weldability and solderability can be achieved by additional heat treatment in the factory (see also page 78).

Hot dip galvanising

With hot dip galvanizing a zinc layer is achieved by dipping the fitting into melted (liquid) zinc. Doing so multiple iron-zinc-layers are formed at the fitting surface, which provide an optimum of adhesion of the pure-zinc-layer on top.

Galvanising is a very commonly used process for increasing the corrosion resistance of iron based materials.
Zinc is in fact a relatively base metal and corrodes quickly in the presence of oxygen, but in the process it forms a very homogeneous outer layer, which protects from further corrosion.

Georg Fischer malleable cast iron fittings are hot dip galvanised to the requirements in EN 10242, using special procedural technique ensuring that uniform coating thicknesses significantly above the norm-requirement (500 g/m^2 equivalent to 70 µm in average) are achieved.
Due to the use of highly pure zinc raw material continuous receiving inspections and liquid zinc inspections Georg Fischer ensures the conformity with drinking water requirements and several other regulations (e.g. RoHS)

Electroplating

With electroplating zinc is deposited from an electrolyte by applying an electric current to the surface of the workpiece.

The zinc coating achieved in this way is simply a thin protection layer which is deposited on the base material (no alloy formation takes place with the base material).
The zinc coat thickness is a maximum of 25 µm.
Due to the lower corrosion protection electroplated zinc surfaces are not suitable for drinking water application (see also chapter steel fittings page 74).

Thread

General

Threads for pipes, valves, fittings and other pipework components which have a threaded connection are determined by international and national standards.

A basic distinction must be made between:

- **Jointing threads:**
  Pipe threads where pressure tight joints are made on the threads according to **EN 10226-1/-2*** respectively ISO 7-1. The respective national issue of EN 10226 replaced DIN 2999, BS 21, ...

- **Fastening threads:**
  Thread for joints not sealing on the threads according to **EN ISO 228-1**.

Difference between jointing threads/ fastening threads

The fundamental difference consists of the fact that:

- the pipe thread to **EN 10226-1** achieves a seal on the thread, mainly as a result of metallic compression (taper/parallel) of the interlocking thread surfaces in the jointing area. The sealing effect is improved by using an appropriate jointing medium.

- In contrast, the pipe thread to **EN ISO 228-1** is a purely mechanical fastening thread. Sealing of the components being connected is achieved between sealing faces with flat seat gaskets or by metal sealing surfaces.

* EN 10226-2 covers the taper internal thread Rc. This type of thread is not used in Continental Europe. As it is not produced by Georg Fischer no further explanations are given.

Full designation of pipe threads
using the example of thread size 1 ½

Jointing thread to EN 10226-1

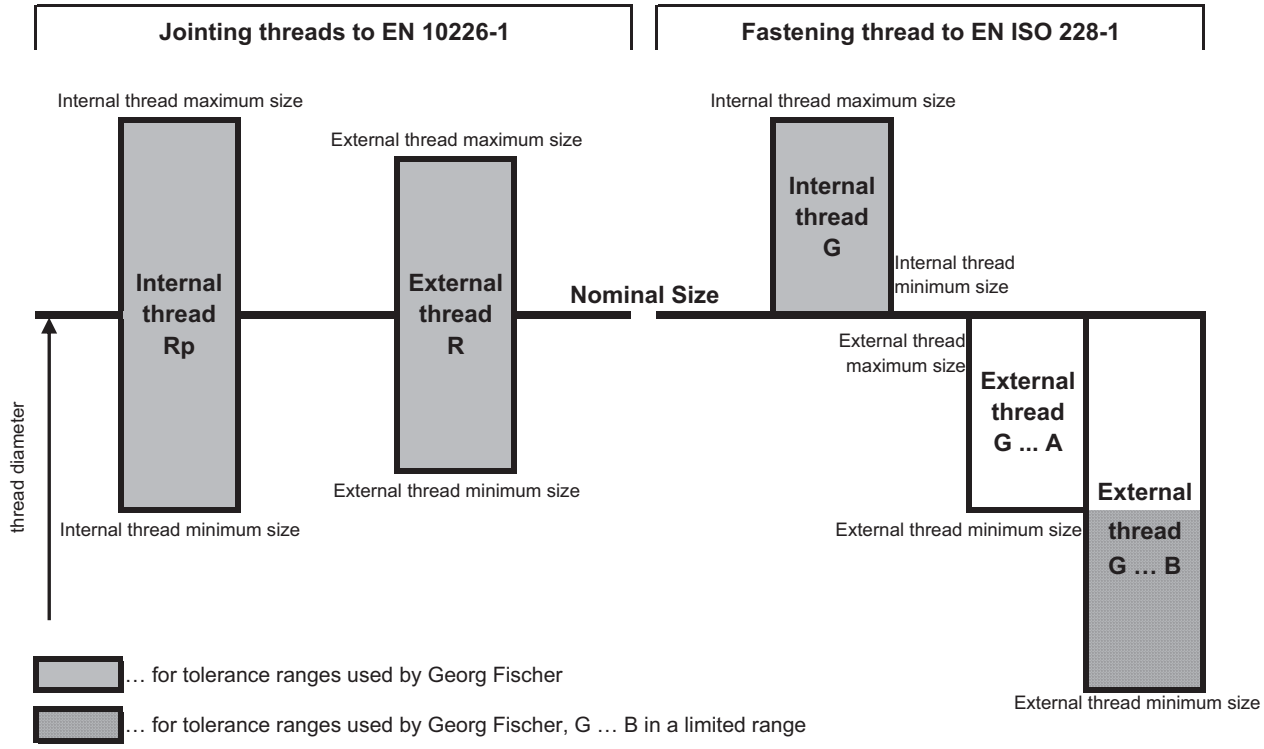
Internal thread (right-hand)	parallel	Rp 1 ½
External thread (right-hand)	taper	R 1 ½
Comment: the symbol LH is added to designate left-hand thread. Example: Rp 1 ½ - LH		

Fastening thread to EN ISO 228-1

Internal thread (right-hand)	parallel	G 1 ½
External thread (right-hand) Tolerance class A	parallel	G 1 ½ A
External thread (right-hand) Tolerance class B	parallel	G 1 ½ B
Comment: the symbol LH is added to designate left-hand thread. Example: G 1 ½ - LH		

For external threads to EN ISO 228-1 Georg Fischer exclusively uses part of the class B tolerances (see illstr. 1).

Comparison of the tolerances of jointing and fastening threads



illustr. 1 Tolerances of jointing and fastening threads

Combination of jointing threads (sealing on the thread) with fastening threads (not sealing on the thread)

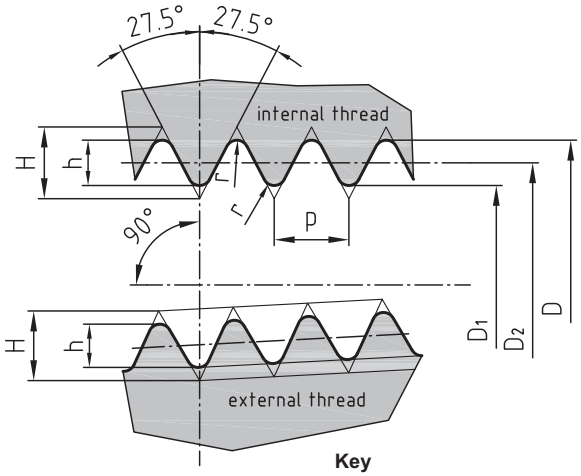
Connection of a parallel external thread according to EN ISO 228-1 with a parallel internal thread according to EN 10226-1: Due to the overlapping of the tolerance fields of the thread diameter (illustr. 1) of G … A and G … B with Rp it is not ensured that both threads can be screwed together. This can be secured by manufacturing the external thread G … B with limited range (illustr. 1 – lower half of G … B). Because of the missing metallic contact between the threads a sealing joint is not automatically achieved.

Connection of a taper external thread according to EN 10226-1 with a parallel internal thread according to EN ISO 228-1: Other than in the first case there is no problem in screwing both threads together / with the thread diameter.
But EN ISO 228-1 does not require a minimum length of the internal thread or a fully shaped thread profile. Both may lead to sealing problems and thus has to be regulated in the norm of the product foreseeing the G - thread.

Construction and function of jointing threads (which are sealing on the threads) to EN 10226-1 (ISO 7-1)

Thread types, dimensions, tolerances and designations per thread size are specified in standard EN 10226-1 (ISO 7-1).

The most important dimensions for these jointing threads (pipe threads) and medium and heavy-duty pipes are given in the table on page 74. Illustr. 2 shows the thread profile with its most important characteristics.



Key

p	Pitch	*D*	MajorØ
H	0,960 491 *p*	D_1	MinorØ
h	0,640 327 *p*	D_2	PitchØ
r	0,137 329 *p*		

illustr. 2 Thread profile

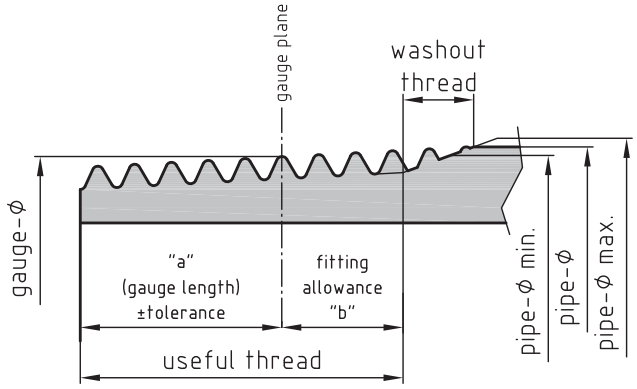
For taper external threads
(illustr. 3) There are some details to be considered. The taper is in the ratio of 1:16 (illustr. 4).

The total pipe thread length consists of 3 sections:

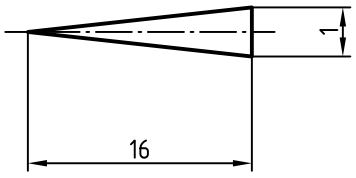
- Gauge length "a" (illustr. 3) is specified and may vary within the tolerances. The design is such that even with the minimum possible internal thread diameter the external thread can easily be screwed in and the sparingly applied sealing material is drawn perfectly into the joint.

- Distance "b" (illustr. 3) is the thread zone which is decisive for sealing. The length of the fully formed thread roots behind the gauge plane is dedicated to provide a sufficient tightening length for the tool, even with the maximum permissible internal thread diameter; this produces tight compression between the threads due to the taper 1:16 and thus a permanently reliable seal.

- The washout thread is not fully formed at the root, and must remain visible after a joint is made. If it is screwed in too tightly, (beyond the fitting allowance) there is a risk of leakage. To avoid a leak path the crests should be fully formed towards the whole useful thread length.

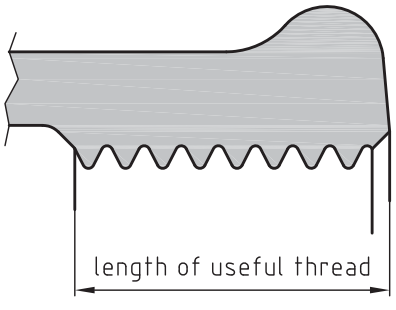


illustr. 3 Taper external thread R



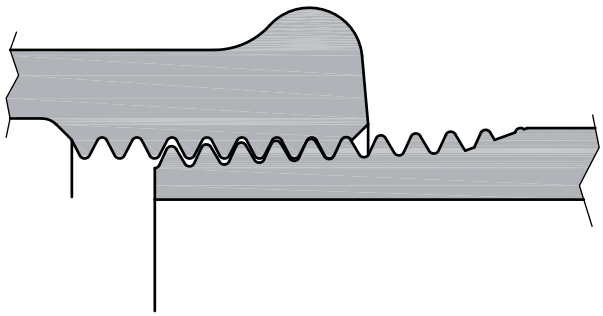
illustr. 4 Taper form of the 1:16 external thread diameter. The thread profile is at a right angle to the pipe axis.

For parallel internal threads
(illustr. 5) Care must be taken that the useful thread length allows the external thread to be screwed in, to achieve adequate compression and sealing, even when the external thread is at the maximum permitted gauge length.



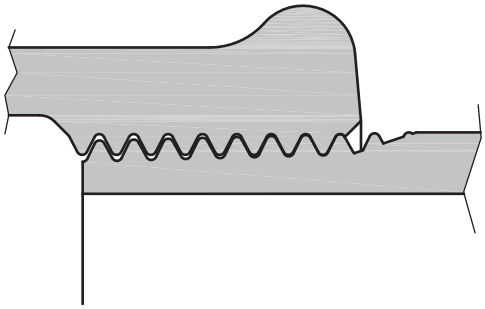
illustr. 5 Parallel internal thread Rp

As an example illustr. 6 shows a 1 inch joint with a fitting screwed on hand tight. There are still 2 ¾ threads available on the external thread for tightening with a wrench (see pipe thread table page 74 fitting allowance "b").



illustr. 6 Hand tight engagement

Illustr. 7 shows, the thread connection tightened according to the standard. It can be screwed together a little less or a little more to adjust the direction of the fitting's outlet (or the overall length of the pre-assembled pipeline). The connection is nevertheless perfectly pressure tight.



illstr. 7 Tightened with wrench

The **sealing effect on the thread** is achieved by the fact that the internal and external threads (pitch diameters) touch from the first moment of contact on and then compress when further tightened with a wrench.

Thus in a taper/parallel joint the **sealing material** only has to fill the inevitable deviations from the theoretical thread profile and roughness of the thread surfaces. Therefore only a small amount of suitable sealing material is necessary.

Tensile load, compressive stress or reversed bending stress on the joint are absorbed by the metal to metal contact.

To ensure the sealing effect of the taper/parallel joint actually takes place, the following points must be taken into account:

- The **thread cutting tool** must be adjusted so that the fitting can be screwed by hand, leaving enough thread (without sealant) for tightening with a wrench. In this way the necessary compression to achieve a seal is obtained even when the internal thread diameter is the maximum permissible.

- The end of the useful external thread (length a + b, see illustr. 3) should not be screwed in deeper than to the first fully formed thread of the internal thread (see illustr. 7), otherwise the compression required for sealing may be reduced by the incomplete root of the washout on the external threads.

Gauging

The inspection of both the jointing thread and the fastening thread is done with standardised plug and ring gauges.

It must be considered that gauges - inspection means comparative checking, not measuring.

Thread gauges for fastening threads:
The thread gauges used for checking fastening threads are go and no go plug gauges and/or go and no go ring gauges. These are standardised in EN ISO 228-2.
To assess the dimensional conformity to EN ISO 228-1 of thin walled parts the pitch diameter must be taken as an average between two diameter measurements offset by 90°. This is e.g. the case for union nuts.

Thread gauges for jointing threads:
The thread gauges used for checking jointing threads are limit gauges, plug gauges for internal threads and ring gauges for external thread. These were standardised to EN 10226-3 in 2005, identical to ISO 7-2 of 2000. The inspection takes place with so called limit gauges, not with go and no go gauges. Essential feature of these limit gauges is to show the result of a diameter-check by projection to the length of engagement of the gauge.

The face of the test specimen indicates the result at the tolerance step of the limit gauge. Details of the gauges and the inspection procedure are described in both above mentioned norms. Additional information about an important aspect of the gauging is given in the following paragraphs.

Gauging with the character of comparative checking has an implication for parallel internal threads Rp according to EN 10226-1, especially if they are chamfered.

This is because of the thread section removed by the chamfer. The bigger the chamfer, the deeper the taper plug gauge enters in; this means the thread diameter is shown bigger at the tolerance step, than it is in reality.

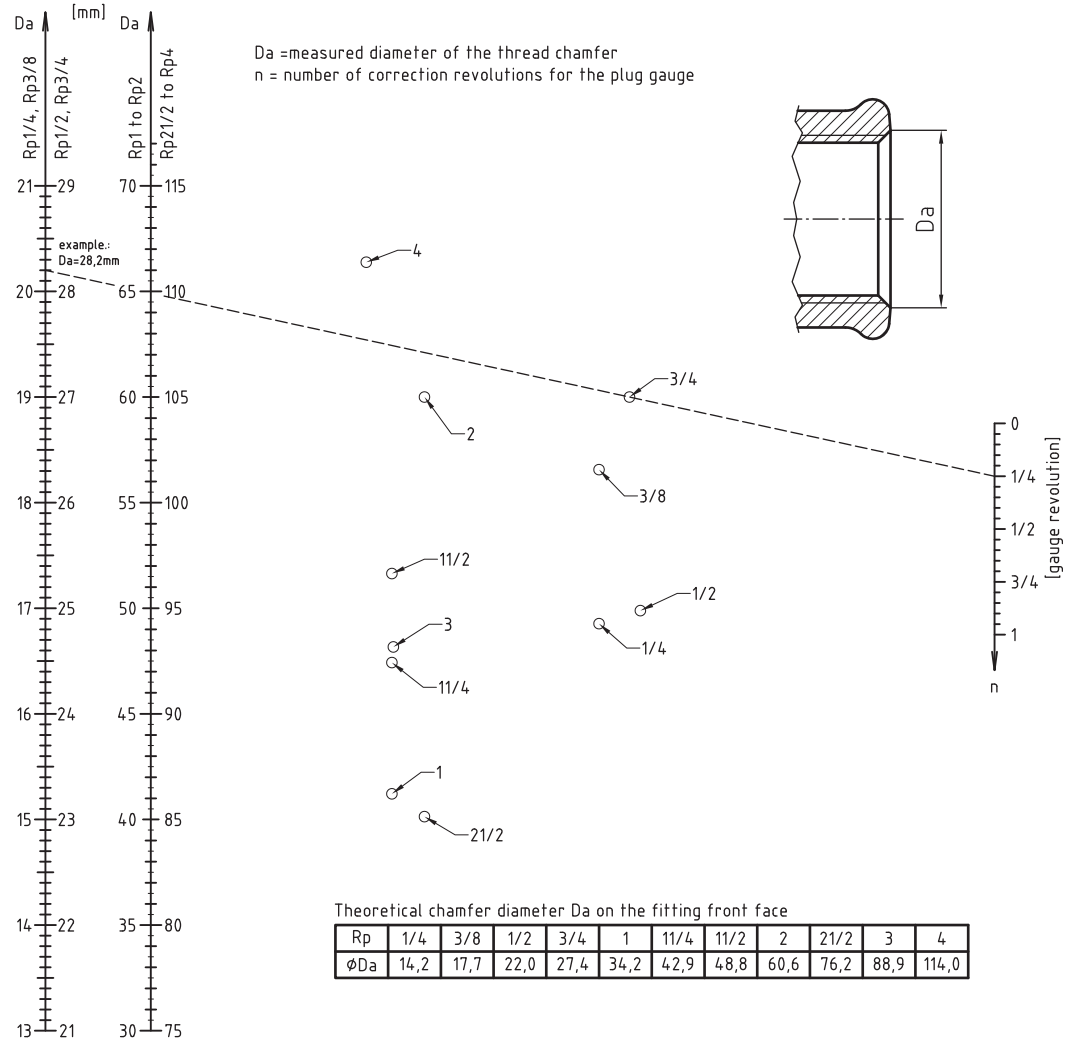
The plug gauges according to EN 10226-3 and ISO 7-2 imply a chamfer, removing ½ pitch of the internal thread. The resulting chamfer diameter on the example of a 90° chamfer is given in the table of illustr.8.

To indicate the distortion of the gauging result by a chamfer other than ½ pitch Georg Fischer has developed the nomogramm illustr. 8, which should be used as follows:

The outer diameter D_a (illustr. 8) of the thread chamfer is measured first. Then a straight line is drawn on the nomogram to join the points corresponding to the thread size and the measured diameter (D_a).
The point of intersection of this straight line with the n axis, indicates the number of necessary correction revolutions n.

Correction is carried out by retracting the plug gauge by n revolutions, back from the hand tight position.
The new position of the plug gauge indicates the actual size of the internal thread diameter.

Example:
On the elbow 90- ¾ G a chamfer diameter of (D_a=) 28.2 mm was measured. By joining the points D_a= 28.2 and ¾, and extending the line n = ¼ is read on the n axis.



Theoretical chamfer diameter Da on the fitting front face

Rp	1/4	3/8	1/2	3/4	1	11/4	11/2	2	21/2	3	4
⌀Da	14,2	17,7	22,0	27,4	34,2	42,9	48,8	60,6	76,2	88,9	114,0

illustr. 8 Nomogram (to be reproduced only with the express permission of Georg Fischer)

Pipe threads (EN 10226/ISO 7) and threaded pipes (EN 10255/ISO 65)
The most important dimensions

Thread size Nominal diameter DN		⅛ 6	¼ 8	⅜ 10	½ 15	¾ 20	1 25	1 ¼ 32	1 ½ 40	2 50	2 ½ 65	3 80	4 100
Pipe threads													
Plug gauge diameter (thread external diameter in the measuring plane)	mm	9,728	13,157	16,662	20,955	26,441	33,249	41,910	47,803	59,614	75,184	87,884	113,030
Pitch	mm	0,907	1,337	1,337	1,814	1,814	2,309	2,309	2,309	2,309	2,309	2,309	2,309
Number of threads per inch		28	19	19	14	14	11	11	11	11	11	11	11
Gauge length «a» (external thread)	mm	4,0	6,0	6,4	8,2	9,5	10,4	12,7	12,7	15,9	17,5	20,6	25,4
Tolerance for «a»	mm	± 0,9	± 1,3	± 1,3	± 1,8	± 1,8	± 2,3	± 2,3	± 2,3	± 2,3	± 3,5	± 3,5	± 3,5
Fitting allowance «b»	mm	2,5	3,7	3,7	5,0	5,0	6,4	6,4	6,4	7,5	9,2	9,2	10,4
Number of threads	pitch	2 ¾	2 ¾	2 ¾	2 ¾	2 ¾	2 ¾	2 ¾	2 ¾	3 ¼	4	4	4 ½
length [ca.=approx.]	ca. mm	7,0	10,0	10,0	13,0	15,0	17,0	19,0	19,0	24,0	27,0	30,0	36,0
Threaded pipes													
Outside diameter	mm	10,2	13,5	17,2	21,3	26,9	33,7	42,4	48,3	60,3	76,1	88,9	114,3
Surface area of the pipe	ca. m²/m	0,032	0,042	0,054	0,067	0,085	0,106	0,133	0,152	0,189	0,239	0,279	0,359
Medium duty													
Wall thickness	ca. mm	2,0	2,3	2,3	2,6	2,6	3,2	3,2	3,2	3,6	3,6	4,0	4,5
Inside diameter	ca. mm	6,2	8,9	12,6	16,1	21,7	27,3	36,0	41,9	53,1	68,9	80,9	105,3
Clear opening	ca. cm²	0,30	0,62	1,25	2,04	3,70	5,85	10,18	13,79	22,15	37,28	51,40	87,09
Capacity	ca. l/m	0,030	0,062	0,125	0,204	0,370	0,585	1,018	1,379	2,215	3,728	5,140	8,709
Pipe mass, plain end black pipe	ca. kg/m	0,40	0,64	0,84	1,21	1,56	2,41	3,10	3,56	5,03	6,42	8,36	12,20
Heavy duty													
Wall thickness	ca. mm	2,6	2,9	2,9	3,2	3,2	4,0	4,0	4,0	4,5	4,5	5,0	5,4
Inside diameter	ca. mm	5,0	7,7	11,4	14,9	20,4	25,7	34,4	40,3	51,3	67,1	78,9	103,5
Clear opening	ca. cm²	0,19	0,47	1,02	1,74	3,27	5,19	9,29	12,76	20,66	35,36	48,89	84,13
Capacity	ca. l/m	0,020	0,047	0,102	0,174	0,327	0,519	0,929	1,276	2,066	3,536	4,889	8,413
Pipe mass, plain end black pipe	ca. kg/m	0,49	0,77	1,02	1,44	1,87	2,93	3,79	4,37	6,19	7,93	10,30	14,50

For details see the relevant standards

Length tolerances

The permitted length tolerances for standardised types of fittings are given in the table below.
For straight parts (nipples, sockets, etc.) the tolerance refers to the face to face dimension.
For fittings with changes of direction (bends, elbows, tees) the tolerance refers to the face to centre (axis) dimension.

The stated tolerances for **unions** are referring to the individual union parts and not to the complete fitting.

Length tolerance — Dimensions in mm

Dimensions (overall lengths)			tolerance
	to	30	± 1,5
over 30	to	50	± 2,0
over 50	to	75	± 2,5
over 75	to	100	± 3,0
over 100	to	150	± 3,5
over 150	to	200	± 4,0
over 200			± 5,0

Angle tolerance

The axis of the fitting threads may deviate by a maximum of 0.5° from the specified angle.

Width across flats for malleable iron fittings

The catalogue section gives the sizes of wrenches required.

Steel fittings

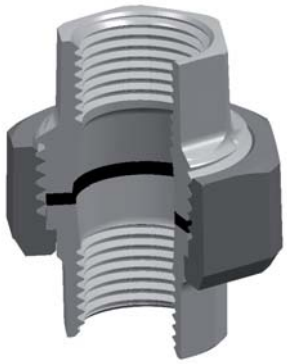
Some fittings up to max. ⅜ inch with straight design are exclusively offered by Georg Fischer in steel material. This option is foreseen by EN 10242, because of (casting-) technological reasons. Theses steel fittings are marked with "**ST**" in the catalogue section. For technical reasons the zinc coating of the steel fittings is done by electroplating. Galvanised steel fittings are therefore not suitable for drinking water installations. Georg Fischer steel fittings (apart from cat. nos. 290, 291, 531, 596) can be recognised by a code groove on the hexagon.

Union fittings

Flat seat unions

Flat seat unions are supplied without sealing gaskets (except fig. 350, 351, 356, 599a). The overall lengths and z dimensions refer to the assembled union with a sealing gasket 2 or 3 mm thick (see page 80 for sizes of sealing gaskets). The choice of a suitable sealing ring material depends on the working requirements. During production pressure tests are only carried out on the piece parts (union ends and union bushes).

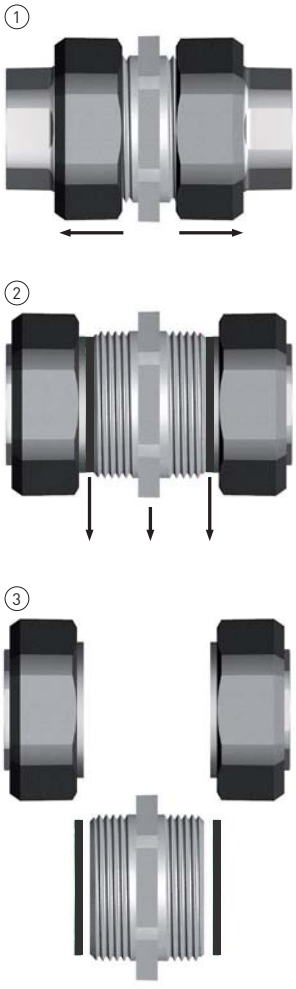
Flat seat unions can be dismantled completely and reassembled (see illustr. 9).



illustr. 9 Flat seat union Fig. 330

Flat seat service unions

The service union enables an easy mounting and dismounting of piping components (filters, check valves, regulating valves, heat exchangers, …) of a piping system.



illustr. 10 Dismantling of service union fig. 350

At the installed service union it is possible to dismantle the union bush radially (see illustr. 10) by unscrewing the union nuts. Thus creates space for dismounting the following component unproblematically. The union bush is longer than the thread length of a jointing thread Rp and R (according to EN 10226-1). As soon as the part is removed the space, which is needed to dismantle the following component completely, is available.

Up to present 2 conventional unions have been used – before and behind the piping component considered for dismounting. In comparison to this the shorter overall length of the service union saves space, and additionally time, as one threaded connection (sealing) less needs to be made.

Using the service union a good accessibility with the tool is only necessary at one position (no longer before and behind the dismounted component).

Due to the availability of versatile versions internal-/internal thread, internal-/external thread and external-/external thread (see page 54) the service union can be used in all imaginable situations.
2 gaskets suitable for the most common media (natural gas and LP gas, compressed air, oil and heating water) till 150°C/25 bar are supplied together with the service union.

Thus the service union is an ideal disconnecting joint (detachable connection) at a fixed assembled pipes that can be used for the purpose of new construction of a system or in existing ones for extension of the system or repairs.

Taper seat unions

Before use, seats of metallic sealing unions must be cleaned and lubricated. For potable water applications lubrication must be done with a potable water-approved non hardening thread sealant (e.g. thread sealing paste according to DIN 30660).

If taper seat unions are reused, Georg Fischer do not take over a warranty for the sealing performance.

Conical/spherical and spherical sealing seat unions

Fig. 342 and 342a offer high sealing efficiency due to specially formed sealing surfaces. Fig. 346 with spherically produced sealing surfaces allows a smooth angular movement from 0 to 6°.
Limits for the use of fig. 342, 342a and 346 see page 77. Fig. 342 and 342a are not suitable for use in drinking water installations.

Union piece parts

Most Georg Fischer flat seat union piece parts are available as «spare parts» (refer to chapter Product Range).

Piece parts of unions with metallic sealing, should not be exchanged or reused. Metallic sealing union piece parts are therefore only offered after technical clarification.

The dimensions of cast on flanges respectively seats of both, flat seat and metallic sealing union piece parts, are not standardised, neither on European nor on International level. They are subject to a works standard, which may be revised for technical reasons. Georg Fischer does not grant warranty for pressure tightness, if piece parts are exchanged or reused especially in connection with other brands and for re-use of unions with metallic sealing.

Guideline for tightening taper seat unions fig. 340, 341 and 344 (Final assembly) valid also for fig. 342, 342a, and 346

Fitting size	⅛	¼	⅜	½	¾	1	1 ¼	1 ½	2	2 ½	3	4
Tightening torque Nm	15	20	30	50 **) 60	65 **) 80	80 **) 100	150	180	240	310	350	470
max. allowable revolutions *)	¼	¼	¼	¼	½	½	½	½	½	½	½	½

*) maximal nut-revolutions after hand-tight fastening

**) deviating tightening torques for 342, 342a and 346

Application notes

Range of application

Malleable cast iron fittings are used for conveying liquids and gases up to the pressure and temperature limits specified in standard ISO 49 and EN 10242. Fittings and union piece parts are tested individually for leak tightness. The test pressures are above the values stipulated in the standard. Unless otherwise specified (see specially pressure tested fittings), the following working pressures and temperatures apply for the parts in the Georg Fischer range of malleable iron fittings.

Working temperature °C *)	Maximum permissible working pressure bar **)
-20 up to 120	25
between 120 and 300	interpolated values
300	20

*) The values are fluid temperatures under continuous operation conditions. Applications with specific environment temperatures require further technical assessment.

**) 1 bar = 10^5 N/m² = 100 kPa

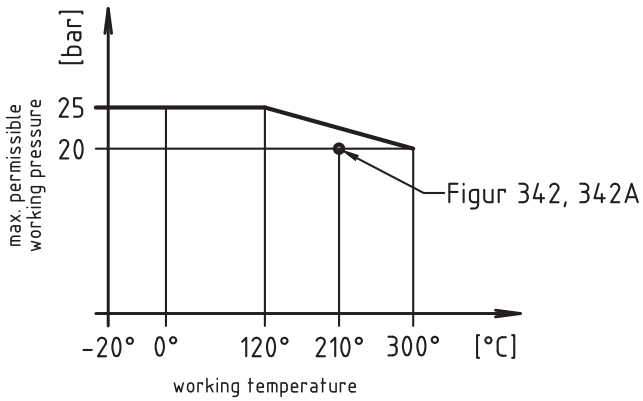
Standardisation and certification

Georg Fischer actively participates in international product- and application-related standardisation and important national standardisation projects. An active handling of actual and prospective regulations is of high importance as well.
The Pressure equipment directive 2014/68/EU, the construction product regulation No. 305/2011, RoHS-Directive 2011/65/EU and REACH can be mentioned as example. Actual information and if required conformity declarations are available at

www.fittings.at/contactform

Georg Fischer holds national approvals for important applications, especially gas and drinking water installations. Articles which have the international FM approval for fire extinguishing systems are listed at page 67.
The actual certificates/approvals are shown at

www.fittings.at/approvals



Exceptions:
Figure 342, 342a max. 210°C / max. 20 bar
Figure 346 max. 300°C / max. 20 bar

Installations of malleable iron fittings

The limits of use for specific applications can be found in international, European and national guidelines (e.g. norms, rules, regulations of regional supply companies etc.).

Specially pressure tested fittings

Fittings for higher working pressures than 25 bar are available on request in the dimension range from ⅜ to 3.
They are subjected to a separate individual test (at 100 bar test pressure), they are marked with yellow colour and the letter "P".
A test report acc. to EN 10204 is available on request.

Type tested fittings

These fittings are mainly used in gas-high pressure fire extinguishing systems according to the German VdS-Rules. **A type test** is carried out on fitting samples. The fitting body must withstand a pressure of 300 bar without bursting. (Attention: These test pressure should not be mixed up with the permissible working pressure).
Before delivery these parts are subjected to a separate individual pressure test, they are marked with red colour and with the letter "D".
A test report acc. to EN 10204 is available on request.
There is only a limited range of Georg Fischer malleable iron fittings available as type tested fittings. The list of type tested fittings is available on request.

Drinking water installations with hot dip galvanised malleable iron fittings

All other fittings than the ones marked with "ST" in the catalogue section, are hot dip galvanised in accordance with EN 10242 (and ISO 49). The protective layer formed by hot dip galvanizing consists of several iron-zinc alloy layers covered by a layer of pure zinc. During the first period of operation the reaction with the drinking water forms a homogenous protective layer. In the normal case of the positive cooperation of the influencing criteria the outer layer formation is accompanied by the natural removal of the pure zinc layer. To achieve this formation and to prevent corrosion damages different requirements, described in EN 12502-3 must be fulfilled.

Summarising the above norm the mayor influencing criteria must be taken into account:

- material property
- water quality
- operation conditions
- design and installation of the pipework system

Aiming hygienic conditions for drinking water the German DIN 50930 has defined additional requirements in its last edition of October 2013. These requirements on the one hand refer to the chemical composition of the zinc layer and on the other hand to the water conditions. Malleable cast iron fittings and steel pipes are grouped under the term “hot dip galvanised iron materials".

According to DIN 50930-6:2013-10 hot dip galvanised materials are applicable if the drinking water fulfils the following criteria:
$K_{B8,2} \leq 0{,}20$ mmol/l and coefficient S_1 according to DIN EN 12502-3 < 1 .

For unavoidable accompanying elements in the zinc layer for malleable cast iron fittings it is defined:
Pb ≤ 0,1 %, Bi ≤ 0,01 %, Cd ≤ 0,01 %, As ≤ 0,02 % and Sb ≤ 0,01 % (for steel pipes applies Pb ≤ 0,05%).

By using highly pure raw-zinc and continuous inwards inspections and zinc bath analysis, Georg Fischer ensures the fulfilment of these high requirements for the zinc layer.

Reusability of dismantled fittings

When the threaded joint between fittings and threaded pipes is correctly made, no permanent deformation of fittings occurs and the fittings may be reused.
In contrast to that permanent deformation of the external thread at the pipe occurs. Therefore pipes should not be reused after dismantling.

Taper (metalic) seat unions and union piece parts see page 76.

Welding and brazing

The EN-GJMW-400-5 material used for Georg Fischer fittings is not ideal for welding and brazing.
The chemical analysis of this material differs from weldable materials especially in the silicon, sulphur, manganese and carbon content.

The conditions necessary for welding or brazing are a maximum carbon content of 0.3% which can be achieved with an additional heat treatment. Elongation values are established approximately as required for welding and brazing qualities - measured on a 9 mm test bar.

In summary the Georg Fischer EN-GJMW-400-5 material is only **suitable** for welding or brazing after additional heat treatment. After this **additional** heat treatment we recommend that on welding applications welding tests are carried out on test components to ascertain whether the required standards have been met. This is important for welded connections because compared with soldering, changes in the microstructure are greater because of the higher temperatures during welding.

In either case, apart from material specific instructions further constructive and process engineering conditions are required in case of welding and brazing joints.

Sealing material

Sealing material for thread connections

In a taper/parallel threaded joint, the sealing material has the task of filling in unavoidable deviations from the theoretical thread profile, and roughness at the thread surface. Tensile load, compressive stress or reversed bending stress on the joint is absorbed by the metal to metal contact.

Only permitted sealing materials should be used to seal threads on potable water and gas installations. Testing of sealing agents is carried out according to EN 751 : Part 1 - anaerobic jointing compounds,
Part 2 - non-hardening jointing compounds,
Part 3 - unsintered PTFE tapes.

The alignment of already assembled fittings sometimes requires turning back of taper/parallel joints up to a maximum of 45°. To assure that sealing materials meets these requirement in countries where this procedure is practiced, an additional test criteria has been imposed by EN 751-2.
Those sealing materials additionally have to be marked with "Rp".

With regard to the technical application (gas, heating system, …) national regulations have to be considered. Supplementary to EN 751-2 for drinking water installations e.g. the German DIN 30660 – established due to a lack of international regulations – defines requirements with regard to hygienic aspects.
As a general rule, tests carried out for national approvals/certificates are based on the norm requirements above.
Sealing materials have to be chosen according to the working conditions of the application. If no experience in this field has been made, the below table may serve as guideline.
In any case the working limits given by the sealing material manufacturer have to be considered.

Connections on gaslines and pipelines for higher pressure requirements call for special care. For other application fields the relevant regulations on the use of thread connections must be complied with.

sealing material / medium		hemp with sealing compound	PTFE teflon standard sealing tape / PTFE sealing cord	PTFE teflon special sealing tape **)	Polyamid-cord impregnated with sealing compounds	anaerobic sealing compounds	
Thread size		½ - 4	½ - 1 ¼	½ - 2	½ - 4	½ - 2 ½	3 - 4
drinking water up to 60°C		●	●	●	●	●	○
waters within a system up to 130°C *)		●	●	●	●	●	○
natural gas, town gas and liquid gases		●	●	●	●	●	○
compressed air oiled and unoiled		●	●	●	●	●	○
steam	up to 150°C	-	●	●	○	●	○
	up to 200°C	-	-	●	-	●	○
	up to 250°C	-	-	●	-	-	-
heating and diesel oils, petrol	max. 80°C	-	●	●	-	●	○
hydraulic oils up to 200°C		-	●	●	-	○	○

● suitable ○ conditionally suitable - unsuitable

*) water for firefighting and waters within a system (in closed circuit systems inducted drinking water e.g. water in hot water heating, without chemical additives)

**) thick teflon tapes (with large area-related mass)

Sealing Gasket Dimensions (Gaskets should be sourced from specialist suppliers)

Jointing thread Fitting size R/Rp	Fastening thread G	**Gasket** Inside diameter x Outside diameter	Thickness	For **complete unions** (and/or regulation sockets and plugs) **Catalogue number**														
				95	**97**	**100**	**101**	**330**	**331**	**332**	**335**	**336**	**338**	**350**	**351**	**356**	**595**	**599a**
¼	⅝	13x20	2					●	●									
⅜	¾	17x24	2	●	●			●	●									
½	⅜	17x24	2															■
½	½	22x30	2														●	
½	1	21x30	2	●	●	●	●	●	●	●	●	●		■	■	■		
½	1 ⅛	24x34	2															
¾	½	21x28,5	2															■
¾	¾	27x36	2							○							●	
¾	1 ¼	27x38	2	●	●	●	●	●	●	●	●	●	●	■	■	■		
1	¾	26,5x34,5	2															■
1	1	34x43	2							○							●	
1	1 ½	32x44	2	●	●	●	●	●	●	●	●	●	●	■	■	■		
1 ¼	1 ¼	43x53	2							○								
1 ¼	1 ⅛	38x48	2															■
1 ¼	2	42x55	2	●	●			●	●	●	●	●	●					
1 ½	1 ¼	42x52	2															■
1 ½	1 ½	48x60	2							○								
1 ½	2 ¼	46x62	2	●	●			●	●	●	●	●						
2	1 ¾	54x64	3															■
2	2	61x73	3							○								
2	2 ¾	60x78	3	●	●			●	●	●								
2 ½	3 ½	75x97	3					●	●									
3	4	88x110	3					●	●									
4	5	115x135	3					●										

● recommended gasket ○ recommended gasket for figure no. 373 for the middle plane face

■ gaskets supplied

Jointing thread R/Rp	Nominal diameter, DN	Gasket (inside diameter x Outside diameter) can be used for **flanges, catalogue number**	
		326	**329**
½	15	22 x 43	24 x 51
¾	20	28 x 53	30 x 61
1	25	35 x 63	36 x 71
1 ¼	32	43 x 75	45 x 82
1 ½	40	49 x 85	49 x 92
2	50	61 x 95	61 x 107
2 ½	65	77 x 115	77 x 127
3	80	90 x 123	90 x 142
4	100	115 x 152	115 x 162

Basically gaskets are not supplied along with the unions, as there are various applications they are used for and the appropriate gasket material has to be chosen for the relevant working conditions.
As exception unions no. 350, 351, 356 and the regulation socket 599a (plug with gasket) are supplied with gaskets of the sizes specified above. Specification of the gasket material can be given on request.

Guideline for distance between support brackets on steel pipelines

Jointing thread	Steel pipes	
	Nominal diameter DN	Distance between brackets m
⅜	10	2,25
½	15	2,75
¾	20	3,00
1	25	3,50
1 ¼	32	3,75
1 ½	40	4,25
2	50	4,75
2 ½	65	5,50
3	80	6,00
4	100	6,00

Heat expansion in steel pipelines

Any temperature change in a pipeline results in a change in length, which can cause considerable stresses on the joints, fastening elements, the structural parts, appliances and plumbing fixtures. Although the heat expansion of steel is low compared to other piping materials, it must be taken into account for design and installation (compensation joints, compensators, ...).
A difference in temperature of 100 K (°C) will cause a 1 m steel pipe to expand by round 1.2 mm. Changes in length Δl of steel pipelines can be read from the table or can be calculated using the formula below. Usually the critical difference in temperature ΔT is the difference between the maximum working temperature and the temperature on installation.

Formula for calculating the change in length:
Δl [mm] = 0,012 x l [m] x ΔT [K or °C]

Changes in length of steel pipes due to differences in temperature

Pipe length l [m]	Difference in temperature ΔT [K or °C]									
	10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
	Change in length Δl [mm]									
1	0,12	0,24	0,36	0,48	0,60	0,72	0,84	0,96	1,08	1,20
2	0,24	0,48	0,72	0,96	1,20	1,44	1,68	1,92	2,16	2,40
3	0,36	0,72	1,08	1,44	1,80	2,16	2,52	2,88	3,24	3,60
4	0,48	0,96	1,44	1,92	2,40	2,88	3,36	3,84	4,32	4,80
5	0,60	1,20	1,80	2,40	3,00	3,60	4,20	4,80	5,40	6,00
6	0,72	1,44	2,16	2,88	3,60	4,32	5,04	5,76	6,48	7,20
7	0,84	1,68	2,52	3,36	4,20	5,04	5,88	6,72	7,56	8,40
8	0,96	1,92	2,88	3,84	4,80	5,76	6,72	7,68	8,64	9,60
9	1,08	2,16	3,24	4,32	5,40	6,48	7,56	8,64	9,72	10,80
10	1,20	2,40	3,60	4,80	6,00	7,20	8,40	9,60	10,80	12,00
11	1,32	2,64	3,96	5,28	6,60	7,92	9,24	10,56	11,88	13,20
12	1,44	2,88	4,32	5,76	7,20	8,64	10,08	11,52	12,96	14,40
13	1,56	3,12	4,68	6,24	7,80	9,36	10,92	12,48	14,04	15,60
14	1,68	3,36	5,04	6,72	8,40	10,08	11,76	13,44	15,12	16,80
15	1,80	3,60	5,40	7,20	9,00	10,80	12,60	14,40	16,20	18,00
16	1,92	3,84	5,76	7,68	9,60	11,52	13,44	15,36	17,28	19,20
17	2,04	4,08	6,12	8,16	10,20	12,24	14,28	16,32	18,36	20,40
18	2,16	4,32	6,48	8,64	10,80	12,96	15,12	17,28	19,44	21,60
19	2,28	4,56	6,84	9,12	11,40	13,68	15,96	18,24	20,52	22,80
20	2,40	4,80	7,20	9,60	12,00	14,40	16,80	19,20	21,60	24,00

Planning of Piping Systems

Sketching of pipework

Clear sketching of pipework

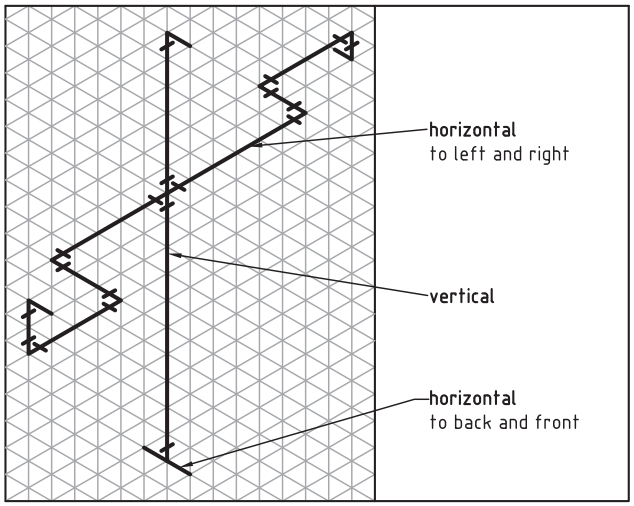
The isometric diagrams of pipes and horizontal projections are ideal for quick preparation when using the Georg Fischer installation method.

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.

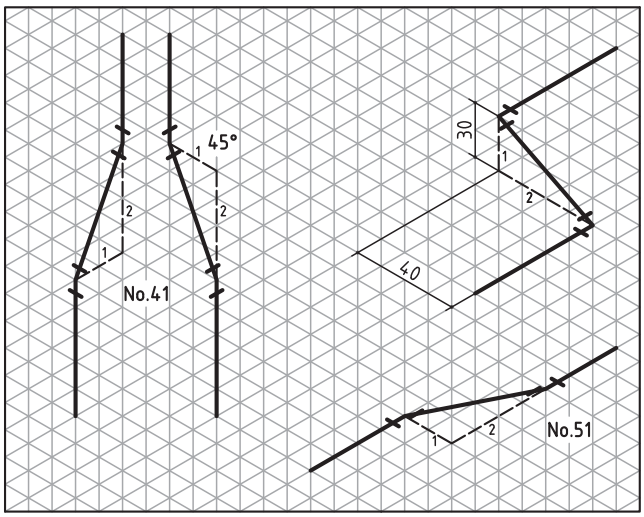
This type of representation enables quick outlining with no aids such as ruler, set square etc. either directly on the site of installation or according to a plan. The pipework system to be installed is always clearly recognisable with all necessary fittings, valves etc.

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:



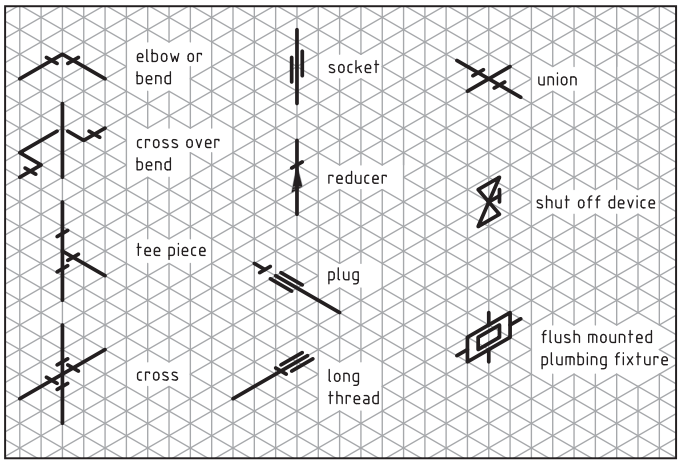
Pipelines sloping in relation to each other are drawn as shown in the example below:



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 standardised symbols.

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

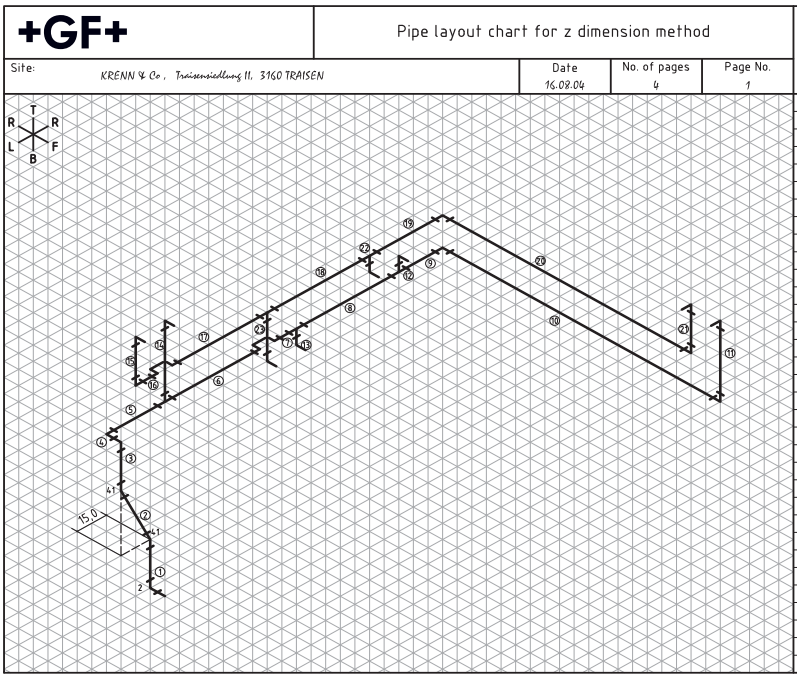


The Georg Fischer pipe layout chart

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:

- splitting in different steps of pipe installation possible
- quick drawing of a sketch
- clear collection of centre to centre dimensions
- easier calculation of tube lengths
- basis of the material bill
- basis for the calculation and invoicing
- offers a clear rationalisation effect: all tubes with same dimension can be measured, marked, cut and threaded in one go
- Stored togehter with the project documentation the sketches allow a clear tracing of the pipe layout even after years. Hence supports easier pipe work extensions and repair.



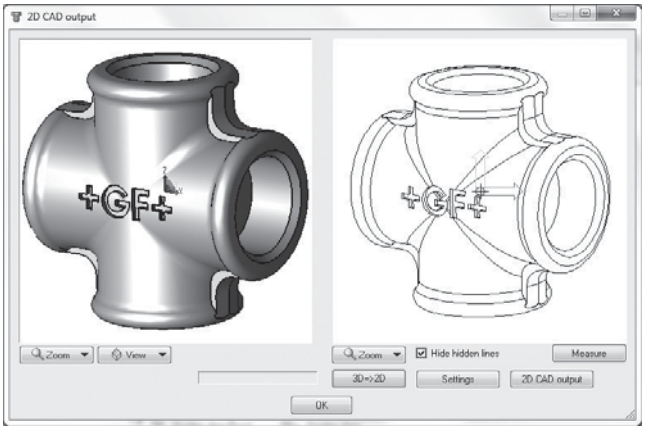
item	dimension M-M in cm	z dimensions in cm	pipe length in cm	inch dimension	
1	26.0	10.2	15.8	1	CW
2	21.2	6.8	14.4	1	CW
3	21.0	5.5	15.5	1	CW
4	7.3	-	90/92	1	CW
5	44.0	3.6	40.4	1	CW
6	62.0	5.5	56.5	3/4	CW
7	15.0	5.5	9.5	3/4	CW
8	48.0	3.0	45.0	3/4	CW
9	42.0	3.0	39.0	1/2	CW
10	205.0	3.0	202.0	1/2	CW
11	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

A master copy of the Georg Fischer pipe layout chart can be found on page 96.

Pipework in CAD

The planning tool used most by the Georg Fischer customers is the CAD-Library. It offers export of the whole malleable cast iron fittings assortment and the related standardised steel pipes in various CAD formats.

The fittings geometries in various 2D and 3D formats can be exported directly (without saving the files, using direct interfaces) from the CAD library to the most popular CAD software in order to design the pipe layout there.
The fittings geometry is marked at the internal thread with the length of (thread-)engagement according to z-measures of EN 10242. Product data accompany the fittings geometry and can be used for the material bill of the CAD-System.



CAD Library for malleable cast iron fittings can be requested at:

www.fittings.at/cad-library

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
- reduction of fittings and tube stock
- optimisation of transportation, elimination of material-related non-productive time
- the pipeline layout can easily be recognized by the pipeline diagram.

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**.
- compliance with the standardised measurements (conforming thread length and diameter) at the tubes manufactured on site, implying combined exact adjustment of the threading machine

Length of engagement

The nominal engagement length of the pipe external thread are according to EN 10242 / ISO 49 (rounded values):

Joint size	Average length of engagement in mm
⅛	**7**
¼	**10**
⅜	**10**
½	**13**
¾	**15**
1	**17**
1 ¼	**19**
1 ½	**19**
2	**24**
2 ½	**27**
3	**30**
4	**36**

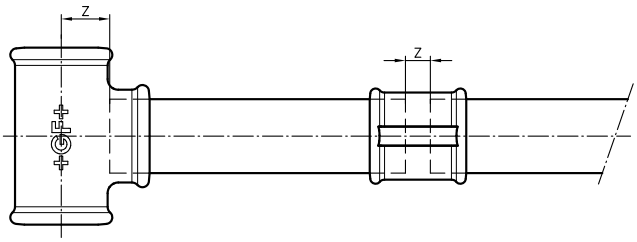
Note:
The laying length (z dimension) derives from the average length of engagement according to EN 10242 (ISO 49) shown in the table above.
Practise shows divergences to the average standard values related to the different sealing materials. Especially for bigger joint sizes shorter lenghts of engagement (= bigger z dimensions) might occur, which may differ round 2mm for 1 ¼ and 1 ½, and 4mm for the sizes bigger than this. It is recommended to establish test assemblies with the sealing material in question to allow proper correction of the tube lengths calculation by correction of the z measures.

z dimension and method of measuring for pipe prefabrication

z dimension

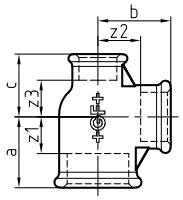
The z dimension - also called «laying length» is the middle distance between

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

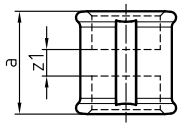


The z dimensions are calculated from the overall lengths less the average length of engagement. z dimensions were introduced by Georg Fischer to support the rational planning and preparation of work.

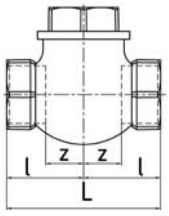
The z dimension is calculated as the difference between «dimension face - middle» (a, b or c) and length of engagement of the pipe thread.



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



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

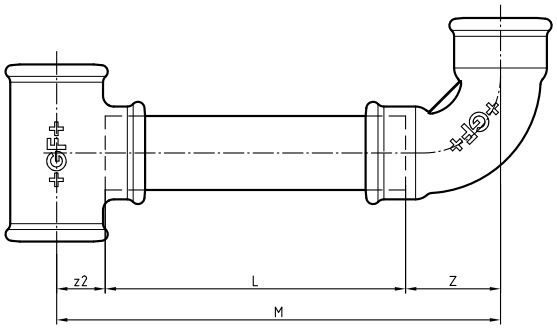
How to measure

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

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

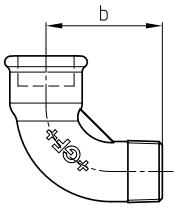
standardised measuring centre - centre = M

forms the basis for determining and using the z dimension.

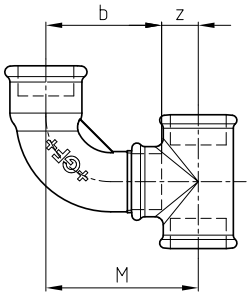


Pipe length L = M - (z2 + z)

z dimension and combinations of fittings



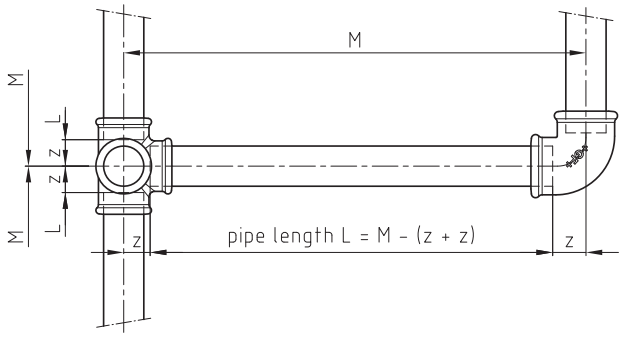
Fittings with external thread:
b is the distance of internal thread centre to face of the external thread.



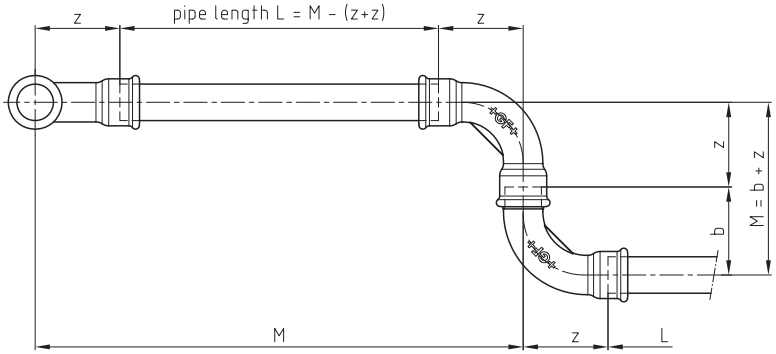
For fittings combinations with internal and external threads the distance of the axes arises from adding z + b:

M = z + b

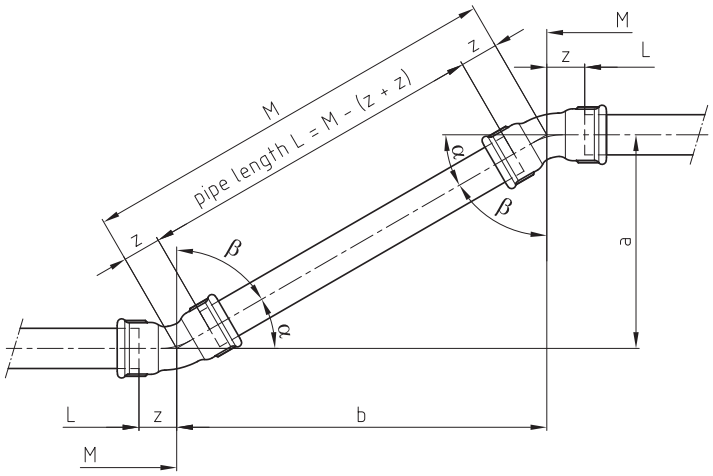
Examples of use



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



Exact pipe thread lengths produce exact M dimensions.



The M dimension for sloping pipe sections can easily be calculated by using the factor table or the numerical table.

Calculation of the length of sloping pipelines

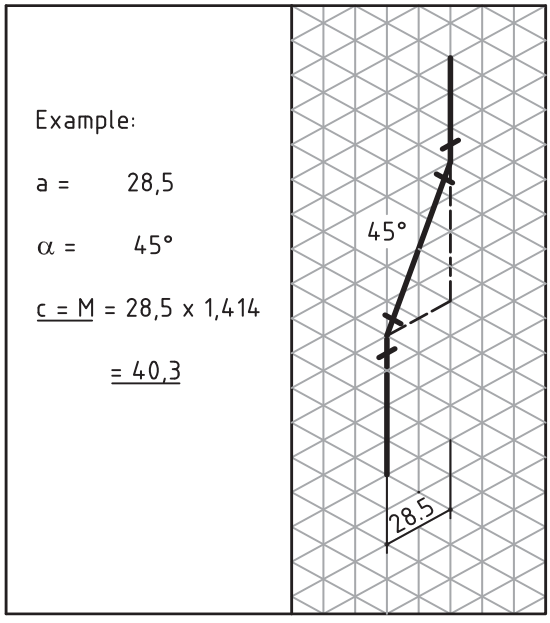
Parts of a pipeline diverging from the horizontal and verticals can only be accurately marked out in a few cases. Accurate results are obtained by rectangular measuring and determining the remaining (triangle) side lengths.

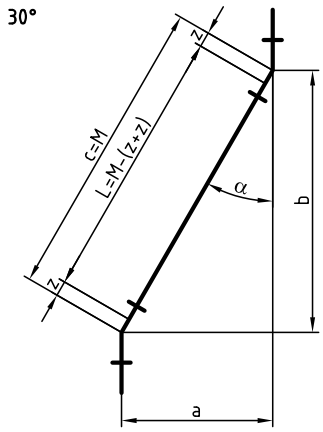
There are two possibilities for calculating the pipe lengths by means of the z dimensions:

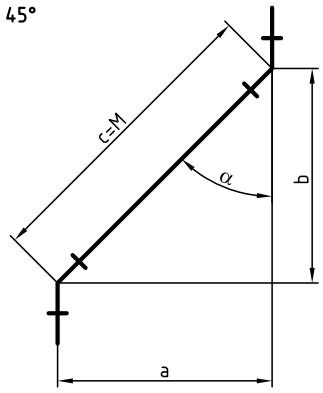
1. Factor table

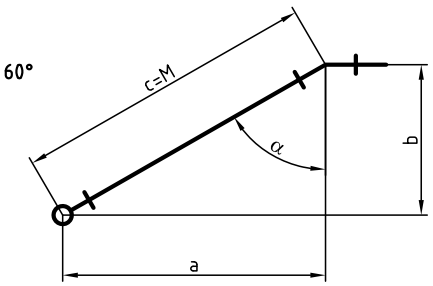
given:		a		b	
		Factor for		Factor for	
α	β	b	c = M	a	c = M
75°	15°	0,268	1,035	3,732	3,864
60°	30°	0,577	1,155	1,732	2,000
45°	45°	1,000	1,414	1,000	1,414
30°	60°	1,732	2,000	0,577	1,155
15°	75°	3,732	3,864	0,268	1,035

- 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.





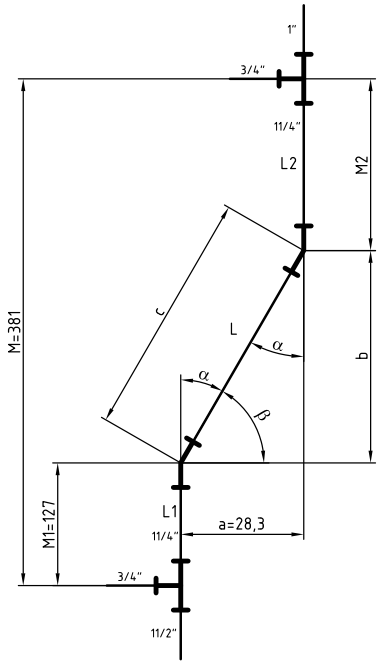




2. Numerical table

see table page 89.

Example:
Displacement of pipe axis at a riser.
Dimensions M, M1 and a are measured on site, all other dimensions are calculated by using the numerical table.



Planned fittings (from bottom to top):
1 tee no. 130 - 1 ½ x ¾ x 1 ¼
2 bends no. 51 - 1 ¼ (30°)
1 tee no. 130 - 1 ¼ x ¾ 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

Calculation of pipe length L:
Pipe length L = c - (2 x z dimension of bend no. 51 - 1 ¼)
z dimension bend = 33 mm = 3.3 cm

L = 56.6 - (2 x 3.3) = 56.6 - 6.6 = 50 cm

Calculation of pipe length L1:
Pipe length L1 = M1 - (sum of the z dimension of tee piece no. 130 - 1 ½ x ¾ x 1 ¼ and bend no. 51 - 1 ¼)
z dimension tee no. 130 (on 1 ¼ exit) = 17 mm = 1.7 cm
z dimension bend = 33 mm = 3.3 cm

L1 = 127 - (1.7 + 3.3) = 127 - 5 = 122 cm

Calculation of dimension M2:
M2 = M - (M1 + b), M1 = 127, b = 49

M2 = 381 - (127 + 49) = 381 - 176 = 205 cm

Calculation of pipe length L2:
Pipe length L2 = M2 - (sum of the z dimensions of bend no. 51 - 1 ¼ and tee piece no. 130 - 1 ¼ x ¾ x 1)
z dimension bend = 33 mm = 3.3 cm
z dimension tee no. 130 (on the 1 ¼ exit) = 17 mm = 1.7 cm

L2 = 205 - (3.3 + 1.7) = 205 - 5 = 200 cm

Table to calculate the lengths of sloping pipes (examples see page 86)

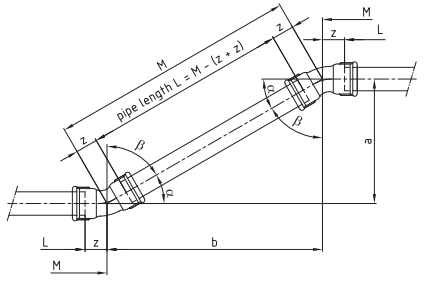
α	88,5°		87°		85°		80°		75°		70°		60°		45°		30°		15°		α
β	1,5°		3°		5°		10°		15°		20°		30°		45°		60°		75°		β
a	b	c	b	c	b	c	b	c	b	c	b	c	b	c	b	c	b	c	b	c	a
1	0,0	1,0	0,1	1,0	0,1	1,0	0,2	1,0	0,3	1,0	0,4	1,1	0,6	1,2	1	1,4	1,7	2	3,7	3,9	1
2	0,1	2,0	0,1	2,0	0,2	2,0	0,4	2,0	0,5	2,1	0,7	2,1	1,2	2,3	2	2,8	3,5	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

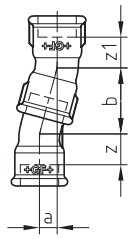
a = given dimension

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

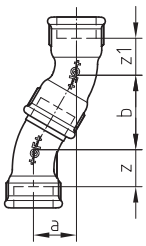


Fittings combinations

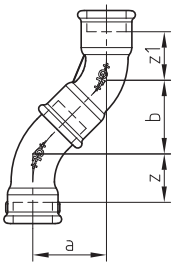
15°
53/54



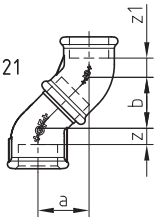
30°
50/51



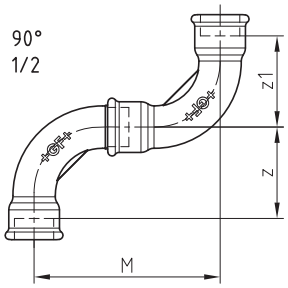
45°
40/41



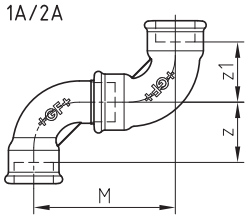
45°
120/121



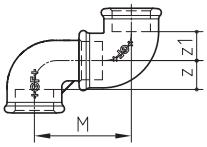
90°
1/2



90°
1A/2A

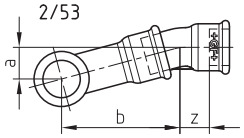


90°
90/92

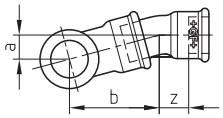


		15°	30°	45°			90°		
		53/54	50/51	40/41	120/121		1/2	1a/2a	90/92
⅜	**a**			**31**	**25**	**M**	**80**	**62**	**47**
	b			**31**	**25**	z = z1	38	26	15
	z			20	10				
	z1			20	10				
½	**a**	**9**	**21**	**37**	**26**	**M**	**90**	**77**	**52**
	b	**35**	**36**	**37**	**26**	z = z1	42	32	15
	z	15	17	23	9				
	z1	15	17	23	9				
¾	**a**	**11**	**26**	**45**	**30**	**M**	**114**	**85**	**61**
	b	**42**	**44**	**45**	**30**	z = z1	54	35	18
	z	18	21	28	10				
	z1	18	21	28	10				
1	**a**	**13**	**32**	**54**	**34**	**M**	**143**	**109**	**73**
	b	**47**	**55**	**54**	**34**	z = z1	68	46	21
	z	20	27	34	11				
	z1	20	27	34	11				
1 ¼	**a**	**16**	**39**	**70**	**40**	**M**	**181**	**133**	**86**
	b	**58**	**67**	**70**	**40**	z = z1	86	57	26
	z	24	33	45	14				
	z1	26	33	45	14				
1 ½	**a**	**16**	**42**	**76**	**45**	**M**	**202**	**151**	**96**
	b	**61**	**72**	**76**	**45**	z = z1	97	66	31
	z	26	37	49	17				
	z1	28	37	49	17				
2	**a**	**18**	**48**	**90**	**52**	**M**	**246**	**180**	**108**
	b	**66**	**83**	**90**	**52**	z = z1	116	78	34
	z	27	42	57	19				
	z1	27	42	57	19				
2 ½	**a**			**112**	**53**	**M**	**314**	**203**	**130**
	b			**112**	**53**	z = z1	149	88	42
	z			72	19				
	z1			72	21				
3	**a**			**129**	**60**	**M**	**365**	**224**	**146**
	b			**129**	**60**	z = z1	175	97	48
	z			83	22				
	z1			83	24				
4	**a**			**166**		**M**	**469**	**294**	**178**
	b			**166**		z = z1	224	129	60
	z			105					
	z1			105					

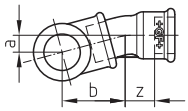
15°
2/53



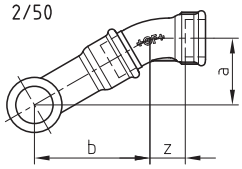
15°
2A/53



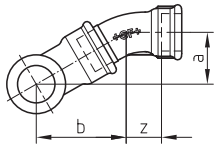
15°
90/53



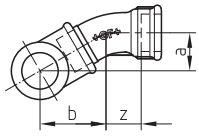
30°
2/50



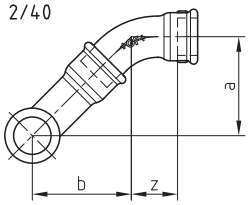
30°
2A/50



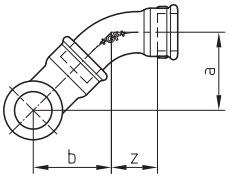
30°
90/50



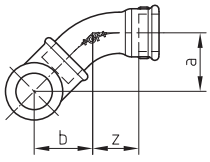
45°
2/40



45°
2A/40

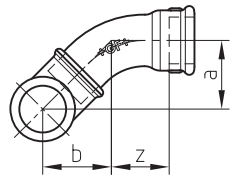


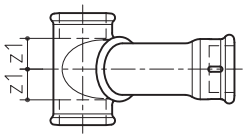
45°
90/40



		15°			30°			45°		
		2/53	2a/53	90/53	2/50	2a/50	90/50	2/40	2a/40	90/40
⅜	**a**							**44**	**35**	**28**
	b							**44**	**35**	**28**
	z							20	20	20
½	**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
¾	**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
1 ¼	**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
1 ½	**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
2 ½	**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

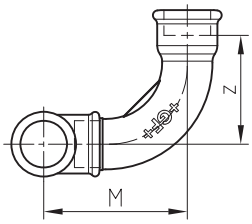
45°
130/40

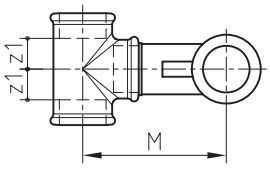




Equal run		Branch									
		⅜	½	¾	1	1 ¼	1 ½	2	2 ½	3	4
⅜	**a=b**	**28**									
	z1	15									
	z	20									
½	**a=b**	**28**	**32**								
	z1	13	15								
	z	20	23								
¾	**a=b**	**30**	**34**	**38**							
	z_1	13	15	18							
	z	20	23	28							
1	**a=b**	**33**	**36**	**40**	**45**						
	z1	13	15	18	21						
	z	20	23	28	34						
1 ¼	**a=b**	**35**	**39**	**44**	**47**	**57**					
	z1	13	15	17	21	26					
	z	20	23	28	34	45					
1 ½	**a=b**	**37**	**42**	**46**	**50**	**59**	**63**				
	z1	14	17	19	23	27	31				
	z	20	23	28	34	45	49				
2	**a=b**		**46**	**50**	**54**	**63**	**66**	**74**			
	z1		14	16	20	24	28	34			
	z		23	28	34	45	49	57			
2 ½	**a=b**		**52**	**57**	**60**	**69**	**72**	**79**	**91**		
	z1		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**	
	z1		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**
	z1				20		28	34	41	48	60
	z				34		49	57	72	93	105

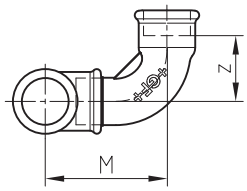
90°
130/1

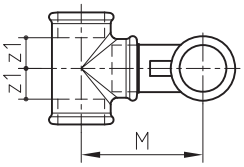




Equal run		Branch									
		⅜	½	¾	1	1 ¼	1 ½	2	2 ½	3	4
⅜	**M**	**57**									
	z1	15									
	z	38									
½	**M**	**58**	**63**								
	z1	13	15								
	z	38	42								
¾	**M**	**60**	**66**	**78**							
	z1	13	15	18							
	z	38	42	54							
1	**M**	**64**	**69**	**81**	**96**						
	z1	13	15	18	21						
	z	38	42	54	68						
1 ¼	**M**	**68**	**73**	**86**	**100**	**121**					
	z1	13	15	17	21	26					
	z	38	42	54	68	86					
1 ½	**M**	**70**	**77**	**89**	**104**	**124**	**136**				
	z1	14	17	19	23	27	31				
	z	38	42	54	68	86	97				
2	**M**		**83**	**95**	**110**	**130**	**141**	**164**			
	z1		14	16	20	24	28	34			
	z		42	54	68	86	97	116			
2 ½	**M**		**91**	**104**	**118**	**138**	**149**	**172**	**207**		
	z1		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**	
	z1		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**
	z1				20		28	34	41	48	60
	z				68		97	116	149	175	224

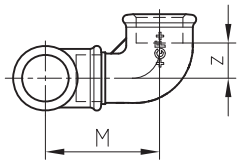
90°
130/1A

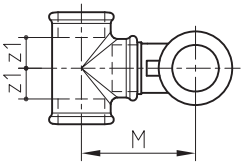




Equal run		Branch									
		⅜	½	¾	1	1 ¼	1 ½	2	2 ½	3	4
⅜	**M**	**51**									
	z1	15									
	z	26									
½	**M**	**52**	**60**								
	z1	13	15								
	z	26	32								
¾	**M**	**54**	**63**	**68**							
	z1	13	15	18							
	z	26	32	35							
1	**M**	**58**	**66**	**71**	**84**						
	z1	13	15	18	21						
	z	26	32	35	46						
1 ¼	**M**	**62**	**70**	**76**	**88**	**102**					
	z1	13	15	17	21	26					
	z	26	32	35	46	57					
1 ½	**M**	**64**	**74**	**79**	**92**	**105**	**116**				
	z1	14	17	19	23	27	31				
	z	26	32	35	46	57	49				
2	**M**		**80**	**85**	**98**	**111**	**121**	**136**			
	z1		14	16	20	24	28	34			
	z		32	35	46	57	49	78			
2 ½	**M**		**88**	**94**	**106**	**119**	**129**	**144**	**157**		
	z1		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**	
	z1		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**
	z1				20		28	34	41	48	60
	z				46		49	78	88	97	129

90°
130/92





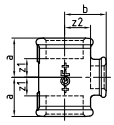
Equal run		Branch									
		⅜	½	¾	1	1 ¼	1 ½	2	2 ½	3	4
⅜	**M**	**47**									
	z1	15									
	z	15									
½	**M**	**48**	**52**								
	z1	13	15								
	z	15	15								
¾	**M**	**50**	**55**	**61**							
	z1	13	15	18							
	z	15	15	18							
1	**M**	**54**	**58**	**64**	**73**						
	z1	13	15	18	21						
	z	15	15	18	21						
1 ¼	**M**	**58**	**62**	**69**	**77**	**86**					
	z1	13	15	17	21	26					
	z	15	15	18	21	26					
1 ½	**M**	**60**	**66**	**72**	**81**	**89**	**96**				
	z1	14	17	19	23	27	31				
	z	15	15	18	21	26	31				
2	**M**		**72**	**78**	**87**	**95**	**101**	**108**			
	z1		14	16	20	24	28	34			
	z		15	18	21	26	31	34			
2 ½	**M**		**80**	**87**	**95**	**103**	**109**	**116**	**130**		
	z1		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**	
	z1		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**
	z1				20		28	34	41	48	60
	z				21		31	34	42	48	60

Assembly assistance

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

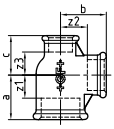
	Dimension	⅜		½		¾		1		1 ¼		1 ½		2		2 ½		3		4	
	Nominal thread length	10		13		15		17		19		19		24		27		30		36	
	Catalogue No.	z	b	z	b	z	b	z	b	z	b	z	b	z	b	z	b	z	b	z	b
Equal Fittings	**1**	38	42	42	48	54	60	68	75	86	95	97	105	116	130	149	165	175	190	224	245
	2	38	-	42	-	54	-	68	-	86	-	97	-	116	-	149	-	175	-	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	z1	z2
½ - ¾	18	15
¾ - ½	15	18
1 - ½	15	21
1 - ¾	18	21
1 ¼ - ½	15	25
1 ¼ - ¾	17	26
1 ¼ - 1	21	25
1 ½ - ½	17	29
1 ½ - ¾	19	29
1 ½ - 1	23	29
1 ½ - 1 ¼	27	29

130, Branch and run reduced



Dimension	z1	z2	z3
¾ - ½ - ½	15	18	15
¾ - ¾ - ½	18	18	18
1 - ½ - ¾	15	21	18
1 - ¾ - ¾	18	21	15
1 - ¾ - ½	18	21	18
1 - 1 - ¾	21	21	21
1 ¼ - ½ - 1	15	25	15
1 ¼ - ¾ - 1	17	26	18
1 ¼ - 1 - ¾	21	25	21
1 ¼ - 1 - 1	21	25	21
1 ¼ - 1 ¼ - ¾	26	26	26

Dimension	z1	z2	z3
1 ¼ - 1 ¼ - 1	26	26	25
1 ½ - ¾ - 1 ¼	19	29	17
1 ½- 1 – 1 ¼	23	29	21
1 ½ - 1 ¼ - 1	27	29	25
1 ½ - 1 ¼ - 1 ¼	27	29	26
1 ½ - 1 ½ - 1 ¼	31	31	29

a … dimension face - face (overall length)

b … dimension fitting axis - face external thread

z, z1, z2, z3 … z dimension

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.

Pipe layout chart for z dimension method

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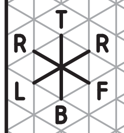

item	dimension M–M in cm	z dimensions in cm	pipe length in cm	inch dimension

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General terms and conditions of Georg Fischer Fittings GmbH, Traisen

according to 08/2015

1 Scope

1.1 These general conditions of sale apply to all deliveries of Georg Fischer Fittings-GmbH, A-3160 Traisen ("Georg Fischer") to the Buyer.
They shall also apply to all future transactions even if reference is not made explicitly to these general conditions of sale.

1.1 Provisions which deviate from or supplement these conditions of sale, in particular the Buyer's general conditions of purchase or verbal agreements, are not accepted by Georg Fischer, unless this has been confirmed in writing by Georg Fischer. These general conditions of sale even apply if Georg Fischer unconditionally makes the delivery in knowledge of Buyer's conflicting terms and conditions.

1.3 All forms of dispatch which enable proof of transmission in the form of a text, such as e.g. telefax, e-mail, etc. shall be deemed to be on a par with communi-cations in written form.

2 Offers

Georg Fischer's offers are not binding, unless agreed otherwise in writing. An order shall only be deemed accepted by Georg Fischer if confirmed in writing and if the order confirmation was received by Buyer.

3 Scope of Delivery

3.1 Georg Fischer reserves the right to introduce modifications to its range of products.

3.2 The order confirmation shall govern the scope and execution of the contract.

3.3 If the column „SP" of the current addition of the Sales Catalogue "Program and Index values" shows a specific quantity, such quantity reflects the minimum order quantity.

4 Data and Documentation

4.1 Technical documentation such as drawings, descriptions, illustrations, any indications of measurements, properties or weight and reference to norms shall serve the purpose of providing information only and do not contain any guarantees with respect to properties.
If and when it appears timely in view of technical progress Georg Fischer reserves the right to make appropriate modifications.

4.2 All technical documentation remains the intellectual property of Georg Fischer and may only be used for the purposes agreed upon or for the purposes indicated by Georg Fischer.

5 Confidentiality, Data Protection

5.1 Each party shall treat as confidential all non-public commercial or technical information pertaining to the other party of which it gains knowledge in the course of its business relationship with the other party. Such information shall neither be disclosed to third parties nor used for other purposes than those for which the information has been supplied.

5.2 Within the context of the contractual relationship with the Buyer the processing of personal data may be required. The Buyer hereby grants his approval in this respect and accepts that Georg Fischer may also disclose such data to third parties (e.g. sub-contractors) in Austria and abroad for the purpose of handling and maintaining business relations.

6 Regulations at the Place of Destination, Export Controls

6.1 The Buyer must draw the attention of Georg Fischer to local provisions of law or other regulations which refer to the execution of delivery and compliance with safety regulations and approval procedures.

6.2 In case of re-exports, the Buyer shall be responsible for compliance with pertinent export control regulations.

7 Price

7.1 Unless agreed otherwise, the prices shall be deemed quoted ex works according to Incoterms 2010 of the ICC(or latest edition), incl. standard packaging. All additional charges such as costs for freight, insurance, export, transit, import or other permits as well as legalisations ("Ancillary Costs") shall be borne by the Buyer. Likewise the Buyer shall bear the costs of all taxes, levies, charges and customs duties.

7.2 Upon request Buyer shall be provided with the Ancillary Costs accruing for the respective products, with the order confirmation at the latest.

8 Terms of Payment

8.1 Payments are to be made by the Buyer at the place in which the Georg Fischer company that issues
the invoice is located without any deductions such as cash discount, expenses, taxes and fees, in accordance with terms of payment agreed upon. Invoices are payable within 14 days net, unless otherwise agreed.

8.2 The Buyer shall only have a right of set-off and a right of retention with respect to claims which are either undisputed or have been established as being binding in law. In particular payments are also to be made if unessential parts of the delivery are still outstanding, provided that the use of the delivery is not rendered impossible as a result.

9 Reservation of Title

9.1 The delivered products shall remain the property of Georg Fischer until the Buyer has settled all claims which accrue to Georg Fischer against the Buyer at the time of the delivery.

9.2 Should the Buyer in the ordinary course of business resell any products to which title is reserved, the Buyer hereby internally assigns to Georg Fischer those rights which accrue to the Buyer against his customers arising out of the sale of products including all collateral rights, securities and reservations of title until Buyer has paid all of Georg Fischer's receivables, irrespective of whether the products were resold without or after processing. If the Buyer is in default with his payment obligations, he has to inform Georg Fischer about the assignment of claims and the applicable debtors, to provide all information necessary to collect the debt, hand over the relevant documentation and notify the debtors of the assignment. Until revoked by Georg Fischer, this assignment shall not preclude the Buyer's right to collect the assigned receivables.

9.3 If the value of the goods subject to the afore-mentioned retention of title - together with collateral securities provided to Georg Fischer - exceeds Georg Fischer's claims against the Buyer by more than 20%, Georg Fischer shall re-assign the rights mentioned under Section 9.2 to the Buyer at his request.

9.4 With the processing, combination and mixing of the products with other goods Georg Fischer acquires the co-ownership in the new good in proportion of the value of the Georg Fischer products in which title is reserved (final invoice amount incl. VAT) to the other processed, combined or mixed goods.

9.5 Should Buyer be in breach of contract, in particular payment default, Georg Fischer shall be entitled to take back the goods in which title is reserved after having issued a reminder and the Buyer is obliged to surrender such products.

10 Delivery

10.1 Delivery dates indicated by Georg Fischer are not binding, unless explicitly stated otherwise in the order confirmation explicitly. Any binding term of delivery begins as soon as the contract has been entered into, all official formalities such as permits for import and payment have been obtained and all essential technical issues have been settled. It shall be considered as met when the delivery is ready for dispatch.

10.2 The obligation to deliver is subject to the following conditions, i.e. the term of delivery will be extended or the delivery date will be postponed by a reasonable period of time:
a) if Georg Fischer does not receive in time the information necessary for the execution of the order or if subsequent changes causing delays are made by the Buyer;
b) if Georg Fischer is prevented from performing the delivery by an occurrence of force majeure. Force majeure shall equally be deemed to consist of unforeseeable circumstances for which Georg Fischer is not to be held responsible which make it unreasonably difficult or impossible for Georg Fischer to make the delivery, such as delays in deliveries or defective deliveries from the designated suppliers, industrial action, official measures, a shortage of raw materials or energy, significant disruptions of operations, for example by destruction of the plant as a whole or of important departments or as a result of the breakdown of essential facilities, serious transport hold-ups, e.g. as a result of road blockades. If these circumstances prevail for over six (6) months, both parties shall have the right to withdraw from the contract. The Buyer shall not be entitled to claim compensation for damages;
c) if the Buyer is in default in performance of its contractual obligations, in particular if it does not comply with the terms of payment or does not pro-vide the securities agreed upon in a timely manner.

10.3 If Georg Fischer is to be held responsible for exceeding the agreed term of delivery (including a reasonable extension thereof), Georg Fischer shall not be deemed in default until the Buyer has granted to Georg Fischer in writing a reasonable extension thereof of not less than one (1) month which equally is not met. Thereafter the Buyer shall be entitled to the remedies provided by law. Subject to limitations of Section 16, any claim the Buyer may have to compensation for damages for delay shall, however, be limited to a maximum of 10% of the price of the delayed delivery.

10.4 Partial deliveries shall be allowed. Georg Fischer may issue partial invoices for partial deliveries.

10.5 If the Buyer does not take in time delivery of goods which have been notified as been ready for dispatch, Georg Fischer shall be entitled to store the goods at the expense and at the risk of the Buyer and to invoice the goods as having been delivered. If the Buyer fails to effect payment, Georg Fischer shall in particular be entitled to dispose otherwise of the goods.

10.6 In the event that the Buyer cancels an order and Georg Fischer does not insist on performance of the contract, Georg Fischer shall be entitled to a penalty amounting to 10% of the contract price (forfeited penalty), as well as to damages in excess of this amount for which proof is submitted. The Buyer shall be entitled to provide evidence that Georg Fischer actually has suffered no damage or that its damage is considerably lower than the penalty forfeited.

11 Packaging

If the products are packaged in a way which is above and beyond the standard packaging, the extra packaging in question will be charged additionally.

12 Passing of Risk

12.1 The risk passes to the Buyer as soon as they have left Georg Fischer's works (EX WORKS, Incoterms 2010 ICC, or latest version), even if delivery is at Georg Fischer's the expense, under similar clauses or including installation or when carriage is organised and managed by Georg Fischer.

12.2 If delivery is delayed for reasons for which Georg Fischer is not to be held responsible, the risk shall pass to the Buyer upon notification that the goods are ready for dispatch.

13 Shipment and Insurance

13.1 Unless agreed otherwise, the Buyer shall bear the cost of carriage.

13.2 Insurance against damages of any kind whatsoever shall be the Buyer's responsibility. Even when insurance is arranged by Georg Fischer, it shall be deemed to have been taken out by order and for the account of the Buyer.

13.3 Any special requests regarding carriage and insurance shall be communicated to Georg Fischer in due time. Otherwise carriage shall be arranged by Georg Fischer at Georg Fischer's discretion – without, however, assuming responsibility – by the fastest and most cost-efficient method possible.
If it is individually agreed, that Georg Fischer bears the shipping costs, transport arrangements shall be made by Georg Fischer. If the Buyer issues special instructions in this connection, any additional costs will be charged to the Buyer.

13.4 In the event of damage to or loss of products during carriage, the Buyer shall mark the delivery documents accordingly and immediately have the damage ascertained by the carrier.
Not readily ascertainable damages incurred during carriage shall be notified to the carrier within six (6) workdays after receipt of the products.

14 Inspection and Acceptance of Delivery

14.1 The products are tested by Georg Fischer during manufacture to the usual extent. If the Buyer wishes more extensive testing, such tests must be agreed upon in writing and are to be paid by the Buyer.

14.2 The Buyer undertakes to comply with its statutory obligations of inspection and notice obligations. Defects in respect of weight, number of items or the external appearance and workmanship of the products must be reported by the latest five (5) workdays after receipt thereof. The Buyer must give
written notice of other defects immediately after discovery, in any case, however, within the agreed period of warranty. Notice of defects must be made in writing.

14.3 Defective parts must in any case be kept until claims under warranty or claims to compensation for damage have been finally clarified and must be made available to Georg Fischer upon request.

14.4 If so requested, Georg Fischer is to be given the opportunity to appraise the defect and/or the damage – either by itself or by third party experts - prior to commencement of repair work.

15 Liability for Defects

15.1 Upon receipt of a written request of the Buyer, Georg Fischer undertakes (at its own choice) to repair or replace as soon as possible and free of charge all products which it can be proven have become defective or unusable due to poor materials, faulty design, faulty workmanship, faulty operating or installation instructions.
In order to protect employees from toxic or radioactive substances which may have been transported through defective parts returned to Georg Fischer's sales organisation, said parts must be accompanied by a Material Safety Dis-closure Form. The form may be obtained from Georg Fischer's local sales company or via www.piping.georgfischer.com.
Parts which are replaced become the property of Georg Fischer, unless Georg Fischer waives such claim.

15.2 For products which are manufactured according to the Buyer's specifications, drawings or models, Georg Fischer's warranty is limited to proper materials and workmanship.

15.3 The Buyer is entitled to require rescission of the contract or a reduction of the contract price, if
- it is impossible to carry out a repair or make a subsequent delivery;
- Georg Fischer does not succeed in carrying out the repair or making a subsequent delivery within a reasonable period of time or
- Georg Fischer refuses to carry out the repair or make a subsequent delivery or is negligent in causing a delay in this respect.

15.4 For products or essential components manufactured by third party, Georg Fischer's warranty is limited to the warranty provided by said third party.

15.5 The warranty shall not apply to defects and damage in cases of insignificant deviations from the agreed quality or resulting from natural wear and tear, inadequate storage or maintenance, non-compliance with operating and assembly instructions, overloading, unsuitable operational supplements, defective construction work, unsuitable building ground, inappropriate repairs or alterations by the Buyer or third parties, use of non-original spare parts and other reasons for which Georg Fischer is not to be held responsible.

15.6 Claims based on warranty or liability shall become time-barred twelve (12) months after receipt of the delivery by the end user, at the latest, however, eighteen (18) months after dispatch of the delivery by Georg Fischer.

15.7 For Products that are customarily used for a building and caused such building's defectiveness or for products, which find application in underground pipeline construction,
a) Georg Fischer assumes in connection with the subsequent performance the proportionate dismantling and assembly costs for the restoration of the original state of the affected object as well as – in cases of negligence – all other direct damages (personal injury and property damage). Section 16, however, applies accordingly, and
b) in deviation of Section 15.6 warranty and liability claims, expire five (5) years after installation, but not later than seven (7) years after the manufacturing date.
Thereby, Georg Fischer assumes the costs of dismantling and assembly costs for the restoration of the original state of the affected object up to a maximum of € 730.000 per occurrence; this liability shall, moreover, be limited to an overall maximum of € 2.000.000 in the case of serial losses. This limitation shall not apply in cases of intent or blatant gross negligence on the part of Georg Fischer.

16 Limitation of Liability

Only in instances of intent and blatant gross negligence shall Georg Fischer (including his officers, his employees and other vicarious agents) be liable for breach of contractual and extra-contractual obligations, in particular due to frustration, delay, demonstrable false advice, pre-contractual liability. This disclaimer applies in particular to the liability of indirect and consequential damages, such as loss of production, loss of orders, claims for compensation by third parties and loss of profits.
Insofar Georg Fischer's liability thereby exists it is limited to foreseeable, typically occurring damage.
If one Party claims a breach of contract by the other party, it must take all necessary measures to mitigate the damage caused thereby, provided that this can be done with economically reasonable means.
If the party concerned does not comply with its duty to mitigate damages, the other party may demand adequate reduction of its obligation to pay damages.
This limitation of liability does not apply to any culpable infringement of essential contractual obligations, the lack of assured properties as well as in cases of compulsory liability according to the product liability law applicable to the respective product delivered.

17 Severability

Should certain provisions in these general conditions of sale in whole or in part be or become invalid or null and void, the contracting parties undertake to replace the invalid or null and void provision with a valid provision which comes as close as possible to fulfilling the meaning and purpose of the invalid or null and void provision.

18 Place of Performance and Place of Jurisdiction

18.1 Place of performance for the products shall be the Georg Fischer works from which the products are despatched.

18.2 **If any disputes arise out of the contractual relationship, the lawsuit is to be filed exclusively with the competent court in St. Pölten, Austria. Georg Fischer is, however, also entitled to bring an action before any other competent court.**

18.3 **The contractual relationship is subject to Austrian law (excluding the choice of law principles thereof and the United Nations Convention on Contracts for the International Sale of Goods) in accordance with the Austrian Code of Civil Law (ABGB) and the Austrian Code of Commercial Law (HGB).**

GF Piping Systems

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The technical data are not binding and not expressly warranted characteristics of the goods. They are subject to change. Our General Conditions of Sale apply.

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