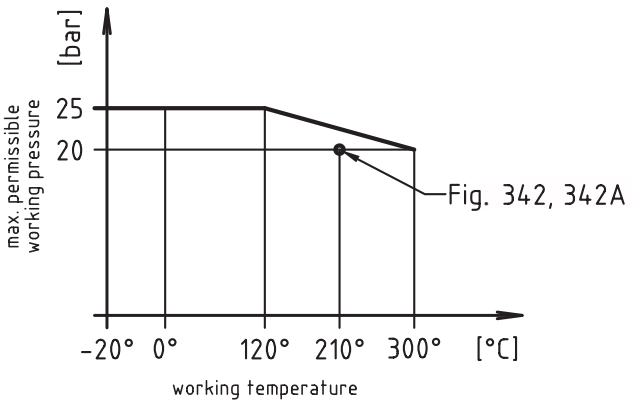
Application notes

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

*) 1bar = 10^5N/m² = 100kPa



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 3/8 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 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. (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 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.

Hot dip galvanised malleable iron fittings

Apart from the steel fittings (marked with "**ST**") galvanised items in the George Fischer range of fittings are hot dip galvanised, in accordance with the requirements in ISO 49 and/or EN 10242, and DIN 50930-6.

The protective coat consists of several iron-zinc alloy layers covered by a layer of pure zinc. To avoid damage by corrosion in hot dip galvanised pipework systems the build-up of homogeneous, protective layers is necessary. To achieve this state certain conditions (e.g. as described in EN 12502-3) are necessary.

The effect of the following parameters must be taken into account:

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

Under normal circumstances the outer layer formation arising from the positive combination of this criteria is accompanied by the physical wearing away of the pure zinc coating.

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 75.

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 mainly 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 be 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 for thread connections

Sealing material

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 conical / cylindrical joints up to a maximum of 45°. To assure that the sealing tape meets those requirements, in countries where this procedure is practiced, additional requirements have to be met. These sealing tapes have to be additionally marked with "Rp" according EN 751-2.

Paraliq PM35 sealing paste and paraliq fleece are not hardening and have been tested to DIN 30660 and authorised by DVGW and ÖVGW for gas (up to 4 or 5 bar/80° C), drinking water installations (up to 16 bar/95° C) and water installation systems (6 bar/ 130°C) conforming to standards in domestic installations. Sealing materials must be suitable for the application and working conditions. If no other practical data is available, the table below provides a guide.

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	Georg Fischer products						Foreign manufactured products			
	hemp with Paraliq PM35 sealing compound	Paraliq PM35-Vlies thread sealing tape		hemp and synthesol sealing compound	synthesol-fleece sealing tape		PTFE teflon standard sealing tape	PTFE teflon special sealing tape **)	Polyamid-cord impregnated with sealing compounds	anaerobic sealing compounds
Thread size	1/2-4	1/2-21/2	3-4	1/2-4	1/2-21/2	3-4	1/2-11/4	1/2-2	1/2-4	1/2-4
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 to150°C	-	-		-	-		●	●	○	●
up to250°C	-	-		-	-		-	●	-	●
heating and diesel oils, petrol max. 80°C	-	-		●	●	●	●	●	-	●
hydraulic oils up to 200°C	-	-		-	-		●	●	-	○

● suitable ○ conditionally suitable - unsuitable

*) 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)

Other media on request!

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**														Can be used for **Special dimensions of union piece parts, catalogue number**		
				95	**97**	**100**	**101**	**330**	**331**	**332**	**335**	**336**	**338**	**595**	**599a**	**1330**	**1335**	**370**	**372**	**376**
1/4	5/8	13x20	2					●	●											
3/8	3/4	17x24	2	●	●			●	●											
1/2	3/8	17x24	2												■					
1/2	1/2	22x30	2							○				●						
1/2	1	21x30	2	●	●	●	●	●	●	●	●	●								
1/2	11/8	24x34	2													■	■	●	●	●
3/4	1/2	21x28,5	2												■					
3/4	3/4	27x36	2							○				●						
3/4	11/4	27x38	2	●	●	●	●	●	●	●	●	●	●			■	■			
1	3/4	26,5x34,5	2												■					
1	1	34x43	2							○				●						
1	11/2	32x44	2	●	●	●	●	●	●	●	●	●	●			■	■			
11/4	11/4	43x53	2							○										
11/4	11/8	38x48	2												■					
11/4	2	42x55	2	●	●			●	●	●	●	●	●							
11/2	11/4	42x52	2												■					
11/2	11/2	48x60	2							○										
11/2	21/4	46x62	2	●	●			●	●	●	●	●								
2	13/4	54x64	3												■					
2	2	61x73	3							○										
2	23/4	60x78	3	●	●			●	●	●										
21/2	31/2	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**
1/2	15	22x 43	24 x 51
3/4	20	28x 53	30 x 61
1	25	35x 63	36 x 71
11/4	32	43x 75	45 x 82
11/2	40	49x 85	49 x 92
2	50	61x 95	61 x 107
21/2	65	77x 115	77 x 127
3	80	90x 123	90 x 142
4	100	115x 152	115 x 162

Except for catalogue nos. 599a, 1330 and 1335 gaskets are not supplied together with the unions because the appropriate sealing material must be selected according to the conditions of use.

Guideline for distance between support brackets on steel pipelines

Jointing thread	Steel pipes	
	Nominal diameter DN	Distance between brackets m
3/8	10	2,25
1/2	15	2,75
3/4	20	3,00
1	25	3,50
11/4	32	3,75
11/2	40	4,25
2	50	4,75
21/2	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. These effects **must** be taken into account when installing steel pipelines. A difference in temperature of 100 K will cause a 1 m steel pipe to expand by 1.2 mm. Changes in length of steel pipelines can be read from the table or can be calculated using the formula below. Usually the critical difference in temperature is the difference between the maximum working temperature and the temperature on installation.

Formula for calculating the change in length:
$\Delta l = 0{,}012 \times l \times \Delta T$

Changes in length of steel pipes due to differences in temperature

Pipe length l (m)	Difference in temperature ΔT (K)									
	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