

Glass-fibre reinforced (frp) piping utilises a highly chemical and corrosion resistant vinylester or polyester resin manufactured in composite layers with fibreglass reinforcing. The resulting piping system has high strength and yet is light in weight when compared to metals.

Frp systems are suitable for chemical and physically aggressive environments and will provide a long service life. They are suitable for a wide range of applications, operating at temperatures up to 115°C and at working pressures of up to PN25.

## section guide

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## application guide

- ✓ Operating temperatures up to 115°C
- ✓ High mechanical strength
- ✓ Low thermal conductivity
- ✓ Rigid - wide support centres
- ✓ Adhesive or laminated jointing systems
- ✓ Lightweight compared to metals
- ✓ Operating pressures up to PN25

# about: frp

Glass-fibre Reinforced Polyester (GRP) and Glass-fibre Reinforced Epoxy (GRE) are composite materials characterised by the high strength of the glass fibre and the corrosion resistance of the resin. These combined benefits produce an advantageous list of benefits when compared to traditional materials:

## Corrosion resistance

- Long service life
- No linings, coatings or other protection needed
- Low maintenance costs

## Lightweight

- 1/4 weight of steel or ductile iron
- Lower transport and handling costs

## Smooth bore

- Low friction loss reduces pumping energy and lowers operating costs
- Minimal scale build up

## Low thermal conductivity

- Reduces the need for lagging

## UV Resistant

- Can be used in exposed locations without UV degradation



## General properties of frp

GRP and GRE piping is the material of choice where high levels of corrosion and/or high strength is required. The following table compares some of the key properties with steel:

Typical Properties	FRP	Steel	St/Steel
Property			
Glass fibre content by weight, %	30 - 80	-	-
Flexural strength, MPa	689 - 1862	1931	206 - 241
Flexural modulus, GPa	34 - 48	2068	1931
Tensile strength at yield, MPa	561 - 1724	199 - 227	206 - 241
Compressive strength, MPa	310 - 482	193	206
Ultimate tensile elongation, %	1.6 - 2.8	38 - 39	50 - 60
Heat distortion at 1.82 MPa, °C	177 - 204	-	-
Continuous heat resistance, °C	260	-	-

Typical Properties	Filament wound GRP or GRE
Property	
Coefficient of thermal expansion, in./in./°C	15.3 - 22.86
Thermal conductivity Watt/centimetre - °C	0.00187 - 0.00288
Specific gravity	1.8 - 1.9

## Product Range

### Pipes

The selection of the pipe is dependent on the application and project specification. Pipes in diameters up to 300mm are manufactured by filament winding (cross winding). Larger diameter pipes are manufactured by hoop winding.

Pipes are available in diameters from DN25 up to DN1000, with working pressures from PN4 to PN25,

### Fittings

A range of fittings is available in diameters to match the pipes. Fittings are hand laminated, except for collars and flanges, which are rotation cast.

### Joining

System diameters up to 300mm may be joined using adhesive bonded joints. This method is quick and reliable, using socket ended pipes. All pipes may also be joined using laminated butt joints, providing excellent axial strength.

### Available Resins

Pipes and fittings are available manufactured from the following Vinylester and Polyester resins:

Standard Epoxy Vinyl Ester	Urethane Modified Vinyl Ester	Novolac Epoxy Vinyl Ester	High Crosslinked Epoxy Vinyl Ester
Flexible Epoxy Vinyl Ester	Rubber Modified Vinyl Ester	Fire Retardant Epoxy Vinyl Ester	Bisphenol Fumarate Polyester

## Applications for frp piping

### Chemical and process engineering

GRP/GRE products offer good chemical resistance at elevated temperatures and pressures and vacuum conditions to most acids, chemicals and other corrosive elements. The additional excellent mechanical resistance at pressure and the excellent product properties makes frp the most suitable material for transporting/storing fluids and water at high temperatures.

### Petrochemicals

GRP and GRE pipes and accessories are commonly used in the oil industry, not only for the transport of oil in the oil fields but also for sewerage and brines derived from this activity. These materials are also used for transporting hydrocarbons and in fire extinguishing systems and includes, as well as pipelines, also tanks and process vessels for petroleum products.

### Pulp and paper

Our GRP systems are especially recommended for the processing and the transport/storage of wood pulp, whitening agents, colouring and residues. In the printing works, they are used commonly for the transport of liquid residues with acidic and solvent contents.

### Firfighting systems

All GRP/GRE products offered guarantee high security in case of fire and have often been used in industrial systems with higher fire risk, especially for buried lines in chemical and power plants.

### Water and sewerage

From raw water intakes to treatment plants and main distribution networks, there are proven solutions to meet all market needs. The products have been tested and approved by major potable and sewerage authorities worldwide for the use in water applications.

### Power generation

The low maintenance requirement, due to its corrosion resistance, has made GRP pipes a highly appreciated material in vital power plant water lines. Used in the major cooling systems, GRP large diameter pipes are a well approved solution for sea water applications, as well as for internal cooling pipelines.

### Desalination

GRP sea water intakes and outfalls to all piping systems.

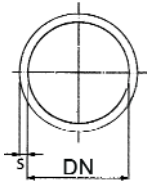
### Food and drink

GRP systems may be used for the secure transport and storage of food related liquids. The sugar, wine, olive, brewing and canning industries benefit from the low thermal conductivity and the good resistance of GRP against aggressive acids, chemicals and cleaning liquids.

### Shipbuilding and offshore

The excellent corrosion resistance, its lightness and fire resistance, makes GRP/GRE products the first choice for cooling circuits, storage, transport and general construction.



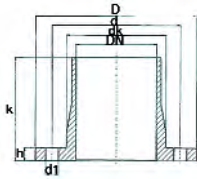


## Pipe

PN25			PN16		PN10		PN6		PN4	
DN	S	Price	S	Price	S	Price	S	Price	S	Price
25	5.0									
32	5.0									
40	5.0									
50	5.0									
65	5.0									
80	5.0									
100	5.0									
125	5.0									
150	6.0	on application								
200	8.0		5.1							
250	10.0		6.4							
300	12.0		7.7							
350	14.0		9.0	on application	5.6					
400	16.0		10.3		6.4					
500	20.1		12.8		8.0					
600	24.1		15.4		9.6		5.8			
700	28.1		18.0		11.2	on application	6.7	on application		
800	32.1		20.5		12.8		7.7		5.1	
900	36.1		23.1		14.4		8.7		5.8	on application
1000	40.1		25.7		16.0		9.6		6.4	

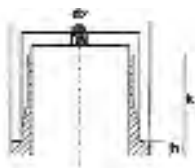
## Laminated Joint System - LJS

### LJS Collar



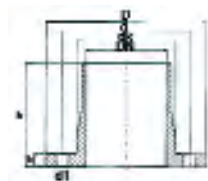
DN	dk	d	D	hmin	kmin	d1	No of holes	Bolt size	Price
100	118	148	180	10	150	10	4	M8	
125	143	173	205	10	200	10	4	M8	
150	168	198	230	10	200	10	4	M8	
200	218	248	280	12	200	10	8	M8	
250	268	298	330	12	250	10	8	M8	
300	318	355	380	12	250	10	8	M8	
350	370	395	430	14	300	10	8	M8	
400	420	450	480	14	300	12	8	M10	
500	524	560	600	14	350	12	12	M10	on application
600	624	660	700	16	375	12	12	M10	
700	724	770	800	16	375	12	16	M10	
800	824	860	900	16	375	12	16	M10	
900	924	970	1020	18	400	15	16	M12	
1000	1024	1070	1120	18	400	15	16	M12	
1200	1228	1270	1320	18	400	15	20	M12	
1400	1428	1470	1520	20	400	15	20	M12	
1600	1628	1680	1730	22	400	19	24	M16	
1800	1832	1880	1930	24	400	19	24	M16	
2000	2028	2080	2130	26	400	19	24	M16	

## LJS Flange



DN	dk	d2	h PN6	hPN10	h PN16	kmin	Price
25	45	68	14	14	14	200	
32	57	78	14	14	14	200	
40	63	88	14	14	14	200	
50	75	102	14	14	16	200	
65	89	122	14	14	20	200	
80	105	138	14	14	22	200	
100	132	158	14	16	24	200	
125	155	188	14	18	30	200	
150	185	212	16	22	34	200	on application
200	235	268	18	28	44	250	
250	291	320	18	30	50	250	
300	341	370	18	34	52	300	
350	385	430	20	40	56	300	
400	439	482	22	44	64	300	
500	542	585	26	46	80	300	
600	642	685	28	58		400	
700	745	800	34	66		400	
800	847	905	44	80		400	
900	949	1005	50	90		500	
1000	1052	1110	60	100		500	

## LJS Flange



DN	dk	d	D	hmin PN6	hmin PN10	hmin PN16	kmin	Price
25	49	85	115		16	18	200	
32	56	100	140		18	22	200	
40	68	110	150		18	22	200	
50	78	125	165		20	24	200	
65	97	145	185		22	26	200	
80	112	160	200		24	28	200	
100	132	180	220		24	28	200	
125	161	210	250		26	30	200	
150	186	240	285		28	34	200	on application
200	240	295	340	24	30	38	250	
250	294	350	395	26	34	44	250	
300	344	400	445	28	34	46	300	
350	398	460	505	30	38	52	300	
400	448	515	565	34	42	56	300	
500	552	620	670	36	44	68	300	
600	656	725	780	40	48		400	
700	768	840	895	44	54		400	
800	872	950	1015	48	60		400	
900	972	1050	1115	50	62		400	
1000	1076	1160	1230	54	68		400	

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Give our expert team a call:

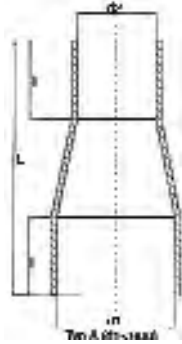
**0800 975 79 71**

Or from outside of the UK: +44 191 521 3111



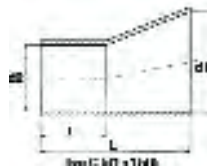
# laminated jointed fittings

## LJS Concentric Reducer



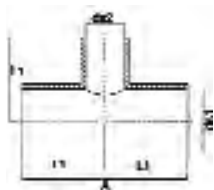
DN1 d1	DN2 d2	L	I	Price
25	15	125	50	
25	20	113	50	
32	20	130	50	
32	25	118	50	
40	25	138	50	
40	32	120	50	
50	32	145	50	
50	40	125	50	
65	40	163	50	
65	50	138	50	
80	50	235	80	
80	65	223	80	
100	65	248	80	
100	80	210	80	
125	80	313	100	on application
125	100	263	100	
150	100	325	100	
150	125	263	100	
200	125	388	100	
200	150	325	100	
250	150	450	100	
250	200	325	100	
300	200	450	100	
300	250	325	100	
350	250	450	100	
350	300	325	100	
400	250	675	150	
400	350	425	150	
400	300	550	150	
500	300	800	150	
500	350	675	150	
500	400	550	150	
600	400	800	150	
600	500	550	150	

## LJS Eccentric Reducer



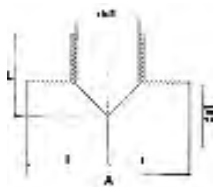
DN1 d1	DN2 d2	L	I	Price
150	100	225	100	
150	125	163	100	
200	125	288	100	
200	150	255	100	
250	150	350	100	
250	200	225	100	
300	200	350	100	
300	250	225	100	
350	250	350	100	
350	300	225	100	
400	250	525	150	
400	300	400	150	
400	350	375	150	on application
500	300	650	150	
500	350	525	150	
500	400	400	150	
600	400	650	150	
600	500	400	150	
700	500	650	150	
700	600	400	150	
800	600	700	200	
800	700	450	200	
900	700	700	200	
900	800	450	200	
1000	800	700	200	
1000	900	450	200	

## LJS Reducing Tee



DN	Ds2	L1	L2	A	Price
50	32	120	120	240	
50	40	120	120	240	
65	40	130	130	260	
65	50	130	130	260	
80	50	135	135	270	
80	65	135	135	270	
100	65	145	145	290	
100	80	145	145	290	
125	80	150	160	300	
125	100	150	160	300	
150	100	190	170	380	
150	125	190	170	380	
200	125	250	195	500	on application
200	150	250	215	500	
250	150	310	240	620	
250	200	310	275	620	
300	200	375	300	750	
300	250	375	335	750	
350	250	450	360	900	
350	300	450	400	900	
400	300	500	450	1000	
400	350	500	450	1000	
450	350	550	525	1100	
450	400	550	525	1100	
500	400	600	550	1200	
500	450	600	600	1200	
600	450	650	650	1300	
600	500	650	650	1300	

## LJS Equal Tee



DN	L	A	Price
25	110	220	
32	115	230	
40	115	230	
50	120	240	
65	130	260	
80	135	270	
100	145	290	
125	150	300	
150	190	280	on application
200	250	500	
250	310	620	
300	375	750	
350	450	900	
400	500	1000	
450	550	1100	
500	600	1200	
600	650	1300	

### Don't see what you want?

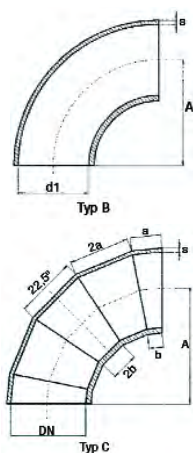
We have access to a huge range of products that are not featured in our Handbook.

If you don't see what you want, give our team a call.



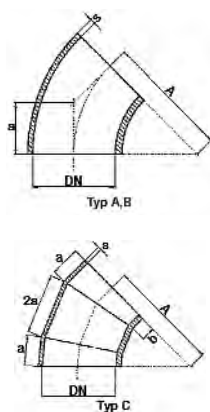
# laminated jointed fittings

## LJS 90° Bend



DN	A	a	b	Type	Price
25	120			A	
32	120			A	
40	120			A	
50	120			A	
65	120			A	
80	120			A	
100	150			B	
125	180			B	
150	225			B	
200	300			B	
250	375			B	on application
300	450			B	
350	525			B	
400	600			B	
500	750			B	
600	900	239	119	B,C	
700	1050	279	139	C	
800	1200	319	159	C	
900	1350	358	179	C	
1000	1500	398	199	C	

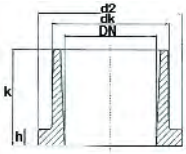
## LJS 45° Bend



DN	A	a	b	Type	Price
25	120	16		A,B	
32	120	20		A,B	
40	120	25		A,B	
50	120	31		A,B	
65	120	41		A,B	
80	120	50		A,B	
100	150	62		B	
125	180	75		B	
150	225	93		B	
200	300	124		B	
250	375	155		B	on application
300	450	186		B	
350	525	217		B	
400	600	249		B	
500	750	311		B	
600	900	373		B	
700	1050	278	139	C	
800	1200	318	159	C	
900	1350	358	179	C	
1000	1500	398	199	C	

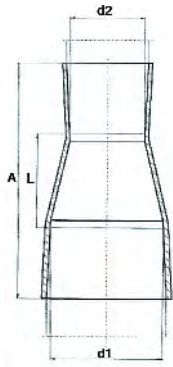
## Adhesive Bonded Joint System - AJS

### AJS Collar



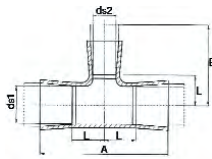
DN	dk	d2	Taper°	hmin PN10	hmin PN16	k	Price
25	45	68	5	14	14	58	
32	57	78	5	14	14	58	
40	63	88	5	14	14	58	
50	75	102	2.7	14	16	90	
65	89	122	2.7	14	20	90	
80	105	138	2.7	14	22	90	
100	132	158	2.7	16	24	90	on application
125	155	188	2.7	18	30	90	
150	185	212	2.7	22	34	90	
200	235	268	2.7	28	44	105	
250	291	320	2.7	30	50	115	
300	341	370	2.7	34	52	130	

### AJS Concentric Reducer



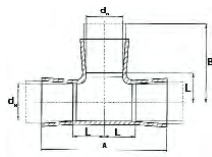
DN1,d1	DN2,d2	L	Taper°	A	Price
32	25	40	5	150	
40	25	40	5	150	
40	32	40	5	150	
50	32	40	2.7	185	
50	40	40	2.7	185	
65	50	65	2.7	235	
80	50	100	2.7	270	
80	65	90	2.7	260	
100	50	150	2.7		
100	65	115	2.7	285	
100	80	80	2.7	250	
125	65	175	2.7	345	on application
125	80	140	2.7	310	
125	100	90	2.7	260	
150	80	200	2.7	370	
150	100	150	2.7	320	
150	125	90	2.7	260	
200	100	280	2.7	365	
200	125	215	2.7	400	
200	150	150	2.7	335	
250	150	280	2.7	475	
250	200	150	2.7	360	
300	200	280	2.7	505	
300	250	150	2.7	385	

## AJS Reducing Tee



DN	Ds2	Taper <sup>o</sup>	L	A	B	Price
65	50	2.7	60	290	145	
80	50	2.7	70	310	155	
80	65	2.7	70	310	155	
100	50	2.7	80	330	165	
100	65	2.7	80	330	165	
100	80	2.7	80	330	165	
125	50	2.7	90	350	175	on application
125	65	2.7	90	350	175	
125	80	2.7	90	350	175	
125	100	2.7	90	350	175	
150	50	2.7	100	370	185	
150	65	2.7	100	370	185	
150	80	2.7	100	370	185	
150	100	2.7	100	370	185	
150	125	2.7	100	370	185	
200	80	2.7	130	460	215	
200	100	2.7	130	460	215	
200	125	2.7	130	460	215	
200	150	2.7	130	460	215	
250	100	2.7	160	540	245	
250	125	2.7	160	540	245	
250	150	2.7	160	540	245	
250	200	2.7	160	540	260	
300	150	2.7	190	630	275	
300	200	2.7	190	630	290	
300	250	2.7	190	630	300	

## AJS Equal Tee



DN	L	A	B	Taper <sup>o</sup>	Price
25	35	180	90	5	
32	35	180	90	5	
40	35	180	90	5	
50	50	270	135	2.7	
65	65	290	150	2.7	
80	70	310	155	2.7	
100	80	330	165	2.7	on application
125	95	350	180	2.7	
150	100	370	185	2.7	
200	130	460	230	2.7	
250	160	540	270	2.7	
300	190	630	315	2.7	



### Need advice?

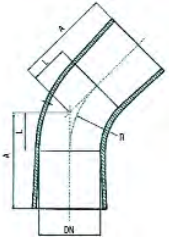
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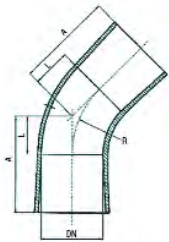


## AJS 60° Bend



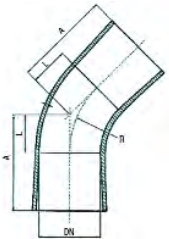
DN	L	A	R	Taper°	Price
50	63	148	100	2.7	
65	74	159	120	2.7	
80	74	159	120	2.7	
100	92	177	150	2.7	
125	109	194	180	2.7	on application
150	135	220	225	2.7	
200	178	278	300	2.7	
250	221	331	375	2.7	
300	265	390	450	2.7	

## AJS 30° Bend



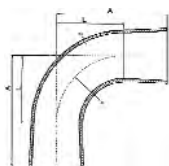
DN	L	A	R	Taper°	Price
50	32	117	100	2.7	
65	37	122	120	2.7	
80	37	122	120	2.7	
100	45	130	150	2.7	
125	53	138	180	2.7	on application
150	65	150	225	2.7	
200	85	170	300	2.7	
250	105	190	375	2.7	
300	125	210	450	2.7	

## AJS 45° Bend



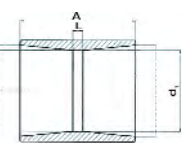
DN	L	A	R	Taper°	Price
50	46	130	100	2.7	
65	55	140	120	2.7	
80	55	140	120	2.7	
100	67	152	150	2.7	
125	80	165	180	2.7	on application
150	98	183	225	2.7	
200	130	230	300	2.7	
250	160	270	375	2.7	
300	191	316	450	2.7	

## AJS 90° Bend



DN	L	A	R	Taper°	Price
25	85	140	80	5	
32	90	145	85	5	
40	105	160	100	5	
50	105	190	100	2.7	
65	125	210	120	2.7	
80	125	210	120	2.7	on application
100	155	240	150	2.7	
125	185	270	180	2.7	
150	230	315	225	2.7	
200	305	405	300	2.7	
250	380	490	375	2.7	
300	455	580	450	2.7	

## AJS Collar



DN	L	A	Taper°	Price
25	10	120	5	
32	10	120	5	
40	10	120	5	
50	10	170	2.7	
65	10	170	2.7	
80	10	170	2.7	
100	10	170	2.7	
125	10	170	2.7	on application
150	10	170	2.7	
200	10	200	2.7	
250	10	220	2.7	
300	10	250	2.7	
350	10	290	2.7	
400	10	330	2.7	

