



GRP Infrastructure
Water & Sewage Pipes
and Fittings



Preface

2 - 3 History

4 - 5 GRP Pipe Advantages

6 - 7 GRP Pipe Properties

8 - 9 GRP Pipe Diameter and Weight Table

10 - 11 GRP Coupling and Properties

12 - 13 GRP Coupling

14 - 15 Performance Standards

16 - 17 Performance Test and Standards

18 Controls

19 Quality Control

20 Performance Tests and Quality Control

21 Rigidity Classification and Pressure Class

22 - 23 Engineering Service and Velocity of Wave Propagation

24 GRP Pipe Chemical Table

25 Installation Procedures

26 Standart Drain

27 - 28 Genarating Drain Filling

29 Above Pipe Compress

30 - 31 Installation of Couplings with Elastomer Gasket

32 GRP Pipe and Fittings

33 Equal Tee Fittings

34 - 36 Unequal Tee Fittings

37 Elbows

38 Flanges

39 Reductions

40 WYE (Angled Tee)

41 - 45 Certificates and Documents

Prestigious company with its Potable Water,
Waste Water, Drainage, Natural Gas,
Telecommunication pipes and fittings

Esen Plastik, with its continuous investments,
presents products ranges above 2000 types to
global market.



Esen Plastic JSC has been established by 1976 to manufacture plastic pipes and fittings.

Esen Plastic continues its production and all other activities in its 130,000 m² facilities in İzmir Atatürk Organized Industrial Zone and Adana Hacı Sabancı Organized Industrial Zone

Esen Plastic continues to be a pioneer in the market by adding advanced production technologies and market demands to its existing product range. By investing on developing production technologies; Esen Plastic JSC serves with 200,000 tons of capacity in production plants, generates 600 employees, with its engineers and employees. Esen Plastic JSC has employed 20,000 people in Turkey.

- GRP Pipes for Infrastructure
- HDPE Corrugated Sewage Pipes and Fittings,
- PE 100 Water Network Pipes
- PE 32 Water Network Pipes
- PE 80 Natural Gas Pipes
- HDPE Telecommunication Data Pipes
- HDPE Microduct Fiberoptic Casing Tubes
- PVC Potable Water Pipe
- PVC Drainage Pipe

Objective

Esen Plastic, with its factories in İzmir and Adana, aims to become a leader in the infrastructure sector in the domestic and international markets and has taken part in very important & remarkable projects and adopted the main duty of increasing the trust in Turkish goods and its contribution to the economy of our country.

Esen Plastic, continues its investments with the aim of promoting the product and service quality it offers to its customers, providing faster and dynamic service, making production in different regions of our country close to the market and creating employment for the people of our country.



ESEN GRP Pipe and Fittings

4 / 5

ESEN GRP Pipes are manufactured from 200 mm to 4000 mm diameter in accordance with international standards. ESEN GRP pressurized and unpressurized pipes are used in drinking water, irrigation water and sewage systems.

ESEN GRP Pipes are highly resistant to chemicals. Resistance to chemicals varies according to the type of resin used in the pipe. ESEN GRP Pipes are designed specially according to transported chemical and the fluid temperature.

GRP PIPE ADVANTAGES

ESEN GRP Pipes are produced by using composite material technology using glass fiber, polyester resin and silica sand which have superior properties in terms of performance, quality and economy compared to conventional materials.

- High corrosion resistance
- Lightweight and elastic structure
- Superior hydraulic properties
- Long service life
- Eco-friendly product
- High strength structure
- Low operating and maintenance costs
- Fast and easy installation
- Compatibility with ground movements
- Economic transportation cost

GRP PIPE USAGE AREAS

- Transmission and distribution lines of irrigation projects
- Transmission lines and networks of drinking water plants
- Waste water transmission, treatment plant and sea discharge lines
- Rain water line
- Power plant connection lines
- Industrial lines
- Road crossing
- Renewal of existing pipe lines by pushing



Resistant and Long Life

Esen Plastik GRP Pipes are manufactured according to AWWA, ASTM, ISO, EN, BS and TSE standards.

It is used to determine the long-term performance values of the products;

Long Term Tensile Corrosion Test (ASTM3681)

Circular Deviation Strength Test in Wet Conditions (ISO10471)

Long-Term Specific Circle Stiffness (ISO 10468)

It successfully meets stringent tests such as the Long Term Damage Pressure Test (ASTM 2992). These tests contain the required physical parameters corresponding to a service life of 50 years.



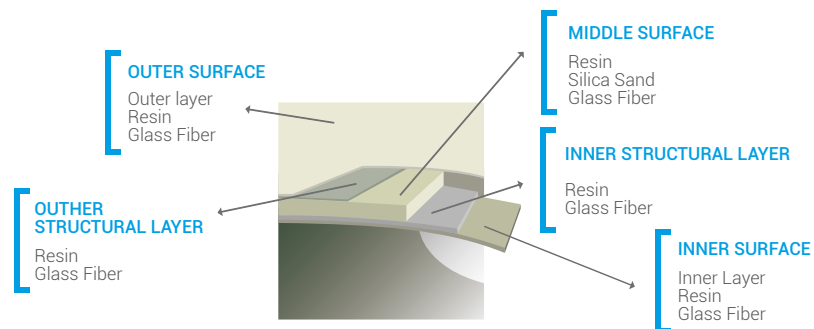
ESEN GRP Pipe and Fittings

GRP PIPE PROPERTIES

	min.	max.
Diameters	200 mm	4000 mm
Rigidity (SN)	500 N/m ²	10.000 N/m ²
Pressure Resistance (PN)	1 PN	40 PN

CHEMICAL RESISTANCE GUIDE

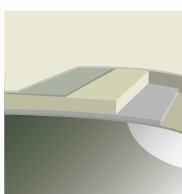
ESEN GRP Pipes are highly resistant to chemicals. Resistance to chemicals varies according to the type of resin used in the pipe. ESEN GRP Pipes are specially designed according to the chemicals to be transported. Please inform ESEN Plastik about the chemical you will carry. **ESEN Plastic Project Design Team** will be proud to help you.



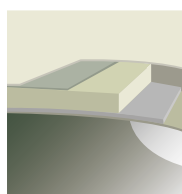
STANDART RIGIDITY CLASSES

Different SN classes can be produced according to your project. The pipes are manufactured in three standard hardness.

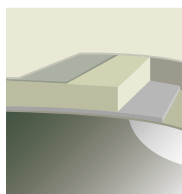
SN 2500



SN 5000



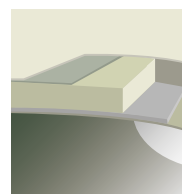
SN 10000



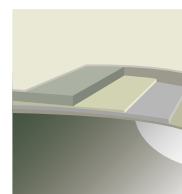
STANDARD PRESSURE RANGE

Pipes are manufactured between PN 1 and PN 32 pressure classes.

PN 1



PN 32



GRP PIPE MINIMUM WALL THICKNESSES (mm)

GRP Pipe Nominal Diameter (mm)	GRP Pipe OD min. (mm)	GRP Pipe OD max. (mm)	SN 2500						SN 5000		
			PN 6	PN 10	PN 16	PN 20	PN 25	PN 32	PN 6	PN 10	PN 16
200	206	208	2,50	2,50	2,45	2,45	2,49	2,91	2,98	2,98	2,90
300	309	311	3,30	3,30	3,28	3,25	3,25	3,83	4,02	3,94	3,90
350	359,8	362	3,76	3,74	3,66	3,63	3,64	4,30	4,62	4,62	4,45
400	410,6	413	4,20	4,19	4,08	4,06	4,02	4,75	5,24	5,21	4,97
450	461,4	464	4,71	4,60	4,46	4,43	4,42	5,22	5,88	5,74	5,45
500	512,2	515	5,21	5,03	4,87	4,82	4,82	5,70	6,53	6,28	5,96
600	614	617	6,26	5,89	5,69	5,62	5,64	6,62	7,90	7,41	7,01
700	715,8	719	7,26	6,70	6,46	6,42	6,41	7,54	9,18	8,48	7,98
800	817,6	821	4,98	7,55	7,27	7,21	7,17	8,51	10,47	9,50	9,00
900	921,4	925	9,10	8,37	8,04	7,96	7,98	9,43	11,70	10,68	10,02
1000	1023,4	1028	9,99	9,22	8,85	8,75	8,74	9,55	12,90	11,74	10,88
1100	1125,4	1130	10,88	9,98	9,62	9,54	9,50	11,28	14,02	12,81	12,06
1200	1226,4	1231	11,80	10,82	10,42	10,29	10,27	12,20	15,20	13,86	13,02
1300	1328,9	1333,5	12,87	11,71	11,29	12,72	12,72	13,17	16,50	14,99	14,14
1400	1431,2	1436	13,72	12,45	11,93	11,91	11,88	14,09	17,70	16,12	15,17
1500	1533,2	1538	14,65	13,39	12,82	12,70	12,65	15,01	18,90	17,14	16,09
1600	1635,2	1640	15,57	14,24	13,63	13,50	13,41	15,94	20,09	18,25	17,02
1700	1737,2	1742	16,50	14,99	14,35	14,29	14,18	16,86	21,29	19,25	19,62
1800	1839	1844	17,44	15,84	15,16	14,99	14,94	17,86	22,49	20,38	18,66
1900	1941	1946	18,37	16,70	15,98	15,78	15,78	18,78	23,69	21,50	20,15
2000	2043	2048	19,28	17,46	16,78	16,48	16,55	19,71	24,89	22,51	21,17
2100	2145	2150	20,20	18,21	17,41	17,28	17,31	20,63	26,09	23,50	22,18
2200	2246,8	2252	21,10	19,15	18,31	18,06	18,08	21,55	27,12	24,62	23,10
2300	2347,6	2353	22,01	19,90	19,13	18,86	18,84	22,48	28,31	25,74	24,11
2400	2449,6	2455	22,93	20,75	19,84	19,74	19,60	23,40	29,50	26,86	25,13
2500	2552,6	2558	23,86	21,61	20,66	20,43	20,37	24,32	30,72	27,88	26,15
2600	2654,4	2660	24,78	22,46	21,46	21,22	21,22	25,25	31,92	28,87	27,17
2700	2754,2	2760	25,69	23,20	22,18	22,01	21,98	31,92	28,87	29,98	28,18
2800	2857,2	2863	26,61	23,95	22,99	22,71	21,14	27,09	34,30	31,06	29,20
2900	2959,2	2965	29,31	26,41	25,34	25,07	24,23	29,82	37,80	34,24	32,11
3000	3062	3068	32,01	28,87	27,69	27,43	27,31	32,55	41,30	37,41	35,03
3100	3163,9	3170	32,94	29,76	28,49	28,27	28,12	33,61	42,61	38,59	36,11
3200	3265,8	3272	33,88	30,65	29,28	29,11	28,94	34,66	43,92	39,77	37,19
3300	3367,7	3374	34,91	31,59	30,18	29,96	29,79	35,70	45,27	41,02	38,33
3400	3469,6	3476	35,95	32,54	31,09	30,82	30,64	36,74	46,62	42,26	39,47
3500	3571,6	3578	36,98	33,50	32,00	31,67	31,52	42,31	47,97	43,45	40,62
3600	3673,4	3680	38,02	34,46	32,91	32,53	32,40	47,88	49,32	44,64	41,77
3700	3745,3	3782	34,74	31,34	30,00	29,64	29,58	35,46	44,98	40,69	38,07
3800	3877,2	3884	40,09	36,22	34,60	34,36	34,16	40,95	52,01	46,99	44,06
3900	3979,1	3986	41,13	37,17	35,51	35,22	35,01	41,99	53,36	48,25	45,20
4000	4081	4088	42,17	38,13	36,42	36,08	35,86	43,03	54,71	49,51	46,34

• The tables are provided for informational purposes

GRP PIPE MINIMUM WALL THICKNESSES (mm)

WEIGHT

SN 5000			SN 10000						WEIGHT	
PN 20	PN 25	PN 32	PN 6	PN 10	PN 16	PN 20	PN 25	PN 32	MIN. (kg/mt)	MAX. (kg/mt)
2,88	2,86	2,91	3,60	4,40	3,49	3,45	3,39	2,49	2,82	5,43
3,87	3,86	4,96	4,96	4,96	4,82	4,74	4,68	4,63	5,66	11,30
4,41	4,37	4,35	5,75	5,75	5,46	5,36	5,31	5,26	7,46	15,38
4,90	4,86	4,84	6,57	6,55	6,12	6,00	6,02	5,88	9,58	20,13
5,39	5,37	5,32	7,40	7,30	6,78	6,64	6,54	6,50	11,83	25,63
5,88	5,86	5,80	8,24	8,02	7,41	7,26	7,17	7,10	14,39	31,78
6,90	6,85	6,82	9,99	9,45	8,74	8,54	8,42	8,36	20,26	46,50
7,88	7,80	7,80	11,64	10,90	10,05	9,82	9,67	9,59	27,07	65,43
8,90	8,80	8,79	13,30	12,29	11,36	11,06	10,92	10,78	34,78	83,47
9,89	9,82	9,78	13,29	13,75	12,68	12,36	12,18	12,08	43,69	104,98
10,86	10,79	10,73	16,44	15,20	13,99	13,63	13,42	13,27	54,14	128,84
11,83	11,77	11,71	17,91	16,60	15,26	14,91	14,67	14,50	64,06	154,57
12,85	12,74	12,66	19,45	17,96	16,54	16,14	15,82	15,74	75,58	183,08
13,88	13,80	13,73	21,10	19,48	17,91	17,52	17,18	17,02	88,88	215,50
14,76	14,73	14,67	22,65	20,98	19,22	18,75	18,42	18,26	159,19	249,30
15,82	15,74	15,70	24,20	22,38	20,54	19,90	19,67	19,50	182,28	285,57
16,94	16,67	16,65	25,75	23,76	21,83	21,31	20,92	20,74	206,87	324,30
17,87	16,89	17,59	27,31	25,26	23,14	22,54	22,18	21,89	225,10	365,49
18,84	18,62	18,54	28,86	26,65	24,45	23,67	23,41	23,12	260,83	409,13
19,82	19,54	19,57	30,42	28,03	25,66	25,01	24,58	24,36	289,02	455,25
20,78	20,56	20,51	31,97	29,53	26,96	26,34	25,82	25,60	204,05	503,83
21,76	21,58	21,46	33,52	30,93	28,27	27,46	27,07	26,83	224,74	554,86
22,74	22,50	22,39	34,91	32,31	29,48	28,79	28,32	27,98	246,29	605,60
23,62	23,52	23,31	36,45	33,76	30,87	30,11	29,56	29,22	268,58	660,85
24,68	24,44	24,32	38,00	35,06	32,19	31,35	30,82	30,46	291,77	719,12
25,75	25,38	26,13	39,57	36,58	33,50	32,58	32,05	31,70	316,05	780,60
26,73	26,47	26,36	41,12	37,72	34,86	33,91	33,22	32,93	342,55	843,71
27,69	27,40	27,18	42,64	39,34	35,99	35,14	34,46	34,16	368,36	908,00
28,67	28,42	28,23	44,21	40,84	37,30	36,37	35,71	35,32	399,86	976,81
31,51	31,29	31,05	47,38	44,96	41,11	40,09	39,35	38,92	426,32	1046,97
34,34	34,16	33,88	50,54	49,08	44,92	43,80	42,99	42,52	452,77	1117,12
35,51	35,24	34,96	53,60	50,67	46,34	45,16	44,36	43,85	481,61	1193,04
36,67	36,31	36,05	56,66	52,25	47,75	46,51	45,72	45,19	510,46	1268,96
37,72	37,35	37,15	58,41	53,86	49,23	47,93	47,09	46,61	542,49	1350,34
38,78	38,39	38,25	60,16	55,46	50,70	49,36	48,46	48,03	574,52	1431,72
39,91	39,50	39,35	61,90	57,06	52,16	50,77	49,90	49,39	609,06	1518,02
41,04	40,61	40,46	63,65	58,66	53,63	52,19	51,34	50,75	643,61	1604,31
37,42	37,14	36,90	57,27	53,49	48,91	47,73	46,78	46,32	679,63	1692,74
43,31	42,75	42,65	67,14	61,87	56,57	55,04	54,05	53,47	720,82	1786,71
44,37	43,90	43,72	68,89	63,47	57,98	56,46	55,43	54,90	756,50	1882,82
45,42	45,05	44,79	70,63	65,07	59,38	57,88	56,81	56,32	792,18	1978,93

• The tables are provided for informational purposes

ESEN GRP COUPLING PROPERTIES

Esen GRP pipe couplings use EPDM seals which are not deformed. Resistant to chemicals. Precise sealing with excellent dimension tolerances.



ESEN GRP

Coupling Properties

Glass reinforced plastic pipes are attached with pressure and non-pressurized lines and with coupling connection system which provides precise sealing. Couplings are produced using the same raw materials and the same process technique as Standard GRP pipes. Connection sleeves produced from GRP pipes are processed in sleeve manufacturing machine and slots are opened according to EPDM REKA seal and stopper tolerances. Esen Plastik EPDM seals provide double sided sealing with its special structure.

Nominal Diameter DN (mm)	Outer Diameter MAX. (mm)	Coupling Length (mm)	Weight MIN. (kg/mt)	Nominal Diameter DN (mm)	Outer Diameter MAX. (mm)	Coupling Length (mm)	Weight MIN. (kg/mt)
200	257,4	270	5,17	2000	2154,9	330	91,61
300	358,8	270	9,28	2100	2259,9	330	97,83
350	413,1	270	11,34	2200	2365,0	330	104,21
400	465,1	270	12,84	2300	2469,0	330	110,23
450	518,8	270	14,93	2400	2574,1	330	116,91
500	572,2	270	17,06	2500	2680,2	330	138,70
600	676,3	330	24,79	2600	2785,2	360	159,88
700	780,3	330	28,73	2700	2888,2	360	168,52
800	886,4	330	34,20	2800	2994,3	360	176,83
900	992,5	330	38,40	2900	3099,9	360	183,07
1000	1097,5	330	42,57	3000	3205,5	360	189,30
1100	1202,6	330	47,84	3100	3310,6	360	198,33
1200	1306,6	330	50,11	3200	3415,8	360	207,36
1300	1418,8	330	53,37	3300	3521,1	360	224,04
1400	1524,5	330	58,53	3400	3626,4	380	240,72
1500	1629,6	330	63,54	3500	3731,8	380	252,01
1600	1734,6	330	69,00	3600	3837,1	400	276,74
1700	1839,7	330	74,62	3700	3942,4	400	289,11
1800	1944,7	330	80,02	3800	4047,8	400	301,74
1900	2049,8	330	85,94	3900	4153,1	400	314,74
				4000	4258,5	400	327,75

- Datas have been arranged as 6 BAR for informational purposes
- Esen Plastik has a right to change the technical details acc. to projects.

ESEN GRP Coupling

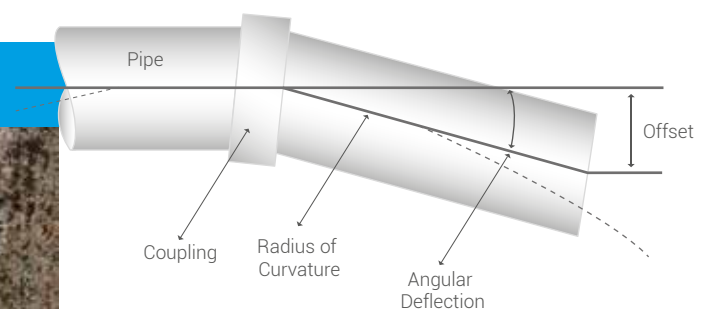
ESEN GRP couplings are produced using the same raw materials and same production technique as GRP Pipes. The sealing grooves of the produced couplings are opened with full dimension tolerances in fully automatic machines and the elastomeric EPDM REKA seals are installed to ensure precise sealing.

Esen GRP sleeves allow perfect angular deviations in the laying stage with excellent dimension and working tolerance range. These angular deviations are as follow.

Nominal Pipe Diameter (mm)	Pressure (PN) Bar			
	Nominal Angular Deflection (Degree)			
	1-16	20	25	32
DN ≤ 500	3	2,5	2	1,5
500 < DN ≤ 900	2	1,5	1,3	1
900 < DN ≤ 1800	1	0,8	0,5	0,5
DN < 1800	0,5	NA	NA	NA

Nominal Pipe Diameter (mm)	Nominal Angular Deflection (Degree)	Nom. Offset (mm)			Nom. Radius of Curvature (m)		
		Pipe Length			Pipe Length		
		3(m)	6(m)	12(m)	3(m)	6(m)	12(m)
DN ≤ 500	3	157	314	628	57	115	229
500 < DN ≤ 900	2	106	208	419	86	172	344
900 < DN ≤ 1800	1	52	105	209	172	344	688
DN < 1800	0,5	26	52	105	344	688	1376

Esen Elastomeric EPDM REKA seals provide safer installation simplicity compared to others and provide absolute water tightness even at high pressures



ESEN GRP Coupling

Compared to other couplings manufactured with different machines and different production techniques, ESEN GRP Couplings provide easier and safer installation in all weather conditions and all kinds of ground conditions. Compared to other systems, ESEN GRP Couplings have the same flexural properties as the pipes.



The cross section of the ESEN GRP Coupling is as shown in the picture above before pressure is applied to the pipeline.



You can see the cross section of the ESEN GRP Coupling and the state of the pipeline after the pressure is applied in the picture above.

Elastomeric Epdm Reka Seals; with excellent dimension tolerance, the sealing ring is pressed against the sleeve wall.

The stopper part located between the two seals prevents the ends of the two pipes from hitting each other during damage.



Performance Standards

Standards developed by ASTM, AWWA and ISO; This includes a range of glass fiber reinforced pipe applications, including water, domestic wastewater, and chemical transport. The common point of all these standards is that they are all performance-based. In other words, the performance tests required for GRP Pipe are determined in these standards.

Performance Standards

Standard	Concept	Standard	Concept
AWWA C950	Potable Water Pipe	EN14364	Drainage and Waste Water Pipe
AWWA M45	GRP Design Guide	ASTM D3262	Unpressurized Waste Water Pipe
ISO 10639	Potable Water Pipe	ASTM D3517	Potable Water Pipe
ISO10467	Drainage and Waste Water Pipe	ASTM D3754	Pressurized Waste Water Pipe
EN 1796	Potable Water Pipe	BS 5480	Potable or Waste Water Pipe

ASTM:

Nowadays there are different ASTM Product Standards used for various glass fiber reinforced pipe applications. Hydrostatic pressure test (ASTM D4161) is applied to flexible connection pipes with diameters from 200 mm to 3700 mm to simulate the operating condition. These standards include many quality control and qualification tests. ESEN PLASTIC GRP Pipe has the capacity to meet the requirements of all these ASTM standards.

AWWA:

AWWA C950 is one of the most comprehensive product standards for glass fiber reinforced pipes. This standard includes comprehensive requirements for quality control and prototype proficiency testing for pipes and fittings to be used in pressurized waterline applications. ESEN PLASTIC GRP Pipe is designed to meet the performance requirements of this standard. A new AWWA M-45 booklet contains several sections that include the design of GRP pipes laid underground and above ground.

EN:

This product standard applies to GRP pipes used in water and wastewater transportation applications with diameters from 100mm to 4000mm.

ESEN PLASTIC GRP pipe has been designed to meet the requirements of this standard.

ISO:

This product standard applies to GRP pipes used in water and wastewater transportation applications between 50 mm and 4000 mm in diameter. It covers pipes of 5 stiffness (SN630 - SN1250 -SN2500-SN5000 and SN10000) for proficiency tests and all product tests for pipes and sleeves and operating pressures from 1 bar to 32 bar. ESEN PLASTIC GRP Pipe is designed to meet the requirements of this standard.





Performance Tests

The minimum performance requirements of the pipe proof of suitability by sampling;

The minimum performance requirements for all standards GRP pipes are both short and long term

- Connection
- Ring Deflection
- Long Term Pressure Strength
- Corrosion Resistance Capacity

ESEN PLASTIC performs the tests of "TS EN 1796, TS EN 14364, ASTM D3517, ASTM D3262, ASTM D3754, AWWA C950, DIN16869, ISO 10467 and ISO 10639" Standards in ISO 17025 Accredited Laboratory to meet the requirements.

Performance

Tests

RAW MATERIALS :

The raw materials are supplied with certifications conforming to the quality criteria set by **ESEN PLASTIC**. In addition, all raw materials are subjected to sample tests prior to production. With these tests, it is determined that the raw materials are in compliance with the relevant standards and the criteria of Esen GRP laboratory.

GLASS FIBER :

Direct Winding Roving; The cylindrical package is supplied in coils such that the yarn structures are not damaged.

Cropable Wick; unidirectional continuous fibers. Reinforced glass fibers; The adhesive is held together by means of resin. Fibers of different thicknesses, weights and widths are available. Thanks to the tulle structures on the surface, layers with high resin content are formed.

RESIN :

The polyester resins are dissolved in styrene monomer. Thus, the cross-linking of the resin to the final thermoset structure is achieved. Organic peroxide catalyst is used to cure the polyester resin

SILICA SAND :

Silica Sand is used to increase pipe rigidity and the pipe is located around the neutral axis, the sand used generally has a high silica content.



Controls

The circumferential and axial load carrying capacities of the produced pipes are proved by routine tests. In addition, the pipe structure and composition are checked and approved by tests

Controls during manufacturing process;

- Visual Inspection
- Barcol Hardness
- Wall Thickness Measurement
- Pipe Length Measurement
- Outer Diameter Measurement
- Hydrostatic Leak Test

Inspections by taking samples;

- Pipe Stiffness
- Structural damage deflection test without any damage
- Strapping Tensile Strength
- Axial Tensile Strength

Performance Tests and Quality Control

QUALITY CONTROL

ESEN PLASTIC GRP Pipe production technology includes detailed quality control program. The compliance of the production and tests of pipes and fittings with international standards and Turkish standards is ensured with this program.

QUALITY CONTROL TESTS

Raw materials are tested before production. Tests include the compliance of raw materials and manufactured products (pipe, coupling, fittings) with standards. These tests ensure that the pipe materials used comply with the specified standards.

In **ESEN PLASTIC**, certification works in accordance with ISO 9001 standards that are provided with the total quality approach implemented with the mutual participation of all employees.

Measured Qualifications

Limits of Change

Wall thickness of pipes	%10 of the specified thickness of a single point
Visual Inspection	Standard
Pipe Length	± 60 mm
Pipe Diameter	EN 1796, EN 14364, ISO 10467, AWWA C950 relevant outer diameter series conforms with (Seri – 1) table
Pipe Stiffness	Min. 33 Barcol
Pipe Rigidity	ASTM D-2412, EN 1228, ISO 7685 Standard
Pipe Axial Tensile Strength	EN 1393, ISO 8513 Standard
Pipe Circle Tensile Strength	EN 1394, ISO 8521 Standard
Layer Adhesion	ASTM Standart D-2584 Standard

Classification of pipes according to working pressure is done according to C 950 Standard project criteria in AWWA and project characteristics in M45

PERFORMANCE TESTS and QUALITY CONTROL

	Controlling Process	Frequency
RAW MATERIALS	Polyester resin	Each lot
	Sand	Each lot
	Chop / Hoop (Glass Fiber Products)	Each lot
	Seal / Stopper Stiffness	Each lot
	Seal / Stopper Dimension	Each lot
VISUAL CONTROL	Visual Control, Pipe ends	Each lot
	Visual Control, Inner and outer surface	Each lot
	Visual Control, Coupling inner and outer surface, coupling conduit	Each Coupling
	Visual Control, Fittings	Each Fitting
	Visual Control, Marking (Pipe coupling, fittings)	Each Pipe, Coupling, Fittings
	Visual Control – Coupling Installation	Each connection with Coupling
DIMENSIONAL CONTROL	Pipe/Coupling Inner Diameters Control	By the beginning of production
	Pipe Wall Thickness Control	Each Pipe
	Pipe Outer Diameter	Each Pipe
	Pipe DOS, Chamfering and Calibration Control	Each Pipe
	Pipe Length	Each Pipe
	Fittings Dimensional Control	Each Fittings
	(Length, DOS, Angle, Chamfering and Calibration)	
TECHNICAL PARAMETERS	Rigidity Test	Once a day or in each 50 pcs pipe
	Crack Control in Inner Surface - Test A	Once a day or in each 50 pcs pipe
	Delamination Control - Test B	Once a day or in each 50 pcs pipe
	Surface Stiffness	Each Pipe
	Axial Tensile Strength	Once a day or in each 50 pcs pipe
	Ring Tensile Strength	Once a day or in each 50 pcs pipe
	Pipe Leakage Test	Each pipe
	Composite Test	Once a day or in each 50 pcs pipe
	Impact Resistance Test	In each Shift
	Water Absorbtion Test	Once a day or in each 50 pcs pipe
LONG TERM TESTS	Long Term Tensile Corrosion Test	Type Test
	Deviation from Circularity Strength Test in Wet Conisitions	Type Test
	Long Term Specific Ring Stiffness	Type Test
	Long Term Impact Pressure Test	Type Test

Performance Standards

RIGIDITY CLASSIFICATION

Nominal rigidity values in ISO and AWWA C950 standards;

ISO	AWWA
SN 1250	9 psi
SN 2500	18 psi
SN 5000	36 psi
SN 10000	72 psi

Long Term Rigidity : ISO No requirements for long-term stiffness have been specified in ISO and AWWA

PRESSURE CLASSES

In ISO, pressure classes (PN) are made by accepting them in the bar unit to be applied. Nominal pressure classes:1, (2,5) ,(4), 6, (9) ,10, (12), (15), 16, (18), (20), 25, 32

In AWWA C950, the GRP rated pressures are classified as follows. Psi 50, 100, 150, 200, 250

DEFLECTION RATIOS:

ISO and AWWA C950 have the same initial deflection requirements. The same classification system is valid in standard.

Class	Level A	Level B	Class	Level A	Level B
SN 500	24,4	40,8	SN 2500	14,3	23,9
SN 625	22,7	37,8	SN 4000	12,2	20,4
SN 1000	19,4	32,4	SN 5000	11,3	18,9
SN 1250	18,0	30,0	SN 8000	9,7	16,2
SN 2000	15,4	25,7	SN 10000	9,0	15,0

Our Expert Engineering Staff

Esen Plastik; Provides engineering support to its customers before and after procurement in order to use the product and technology accurately and efficiently.



Engineering Services

WAVE PROPAGATION VELOCITY

SN 2500						
DN		300	400	450	800	≥900
PN 6	m/s	430	390	380	360	350
PN 10	m/s	430	420	420	410	400
PN 16	m/s	520	510	510	500	490
PN 20	m/s	570	550	550	540	530
PN 25	m/s	580	570	570	560	550

SN 5000						
DN		300	400	450	800	≥900
PN 6	m/s	440	420	390	370	370
PN 10	m/s	450	440	440	430	420
PN 16	m/s	510	490	500	480	480
PN 20	m/s	550	530	530	520	510
PN 25	m/s	580	570	570	560	550

SN 10000						
DN		300	400	450	800	≥900
PN 6	m/s	490	470	460	440	430
PN 10	m/s	470	450	440	420	410
PN 16	m/s	510	500	510	490	480
PN 20	m/s	560	560	550	540	530
PN 25	m/s	570	570	570	560	560

- All data are prepared for information purposes according to 12m pipe. Clear information will vary depending on the pipe laying conditions.

Please contact Esen Plastik for clear data.

Esen Plastik with its expert engineers, supports its customers by considering the highest benefit in all stages of the projects.

Engineering services provided by Esen Plastik:

- Hydraulic calculations
- Concrete fixing mass calculations
- Connections with different materials
- Stress analysis of pipelines
- Technical and isometry drawings
- Field engineering services
- Supervisor service

COMPOSITE MATERIAL TECHNOLOGY

Composite Material is the new material that is formed by combining two or more number of materials , the best properties or combining them to create a new feature.

With the developing technology and industrialization, the need for materials has enabled the exploration and development of new composite materials.

Esen Plastik GRP pipes are composite materials and have all the superior features of this technology.

GRP PIPE Chemical Table

ESEN GRP Pipes are specially designed according to the chemicals to be transported.
The table below is for informational purposes

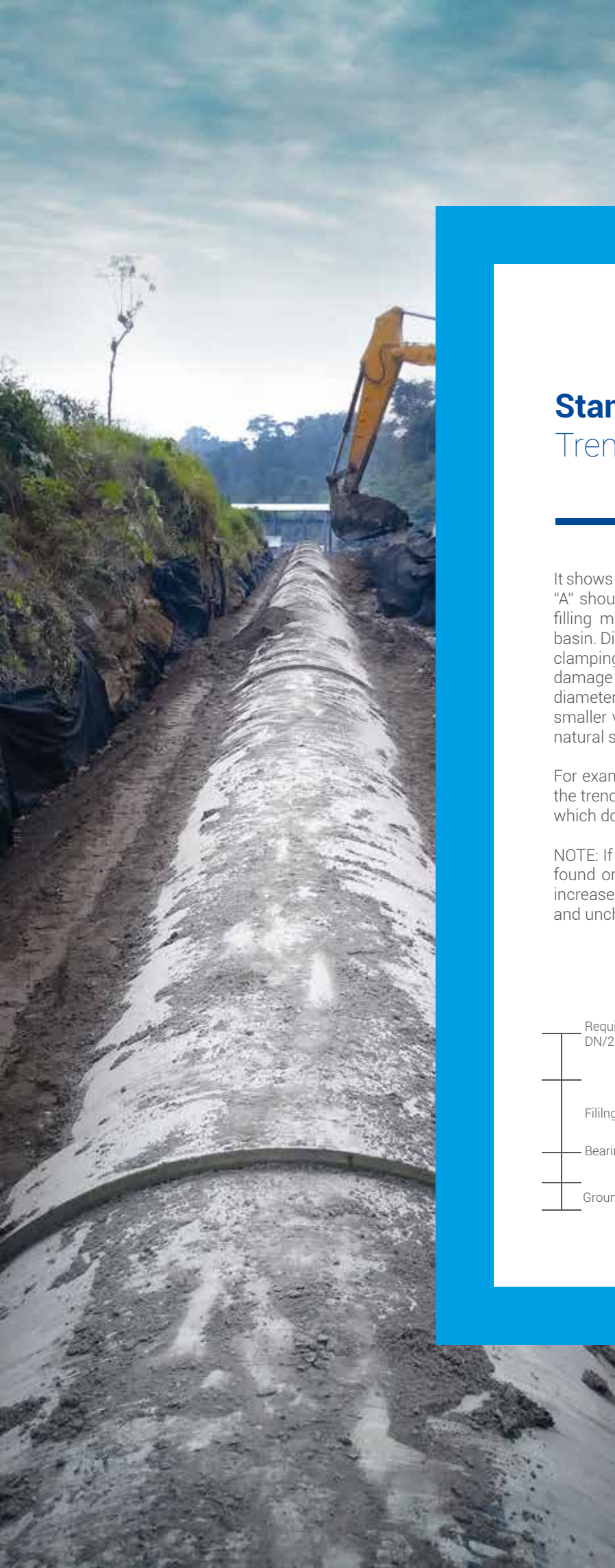
Chemical	Standard GRP Pipe	Special GRP Pipe	Chemical	Standard GRP Pipe	Special GRP Pipe
Bleached Hydrosulphite		●	Copper Sulphate	●	●
Acrylic Acid		●	Barium Hydroxide		●
Aluminum Oxide	●	●	Barium Carbonate		●
Aluminum Chloride	●	●	Barium Chloride		●
Aluminum Fluoride	●	●	Barium Sulfate		●
Aluminum Hydroxide		●	Benzoic Acid		●
Aluminum Nitrate	●	●	Beer		●
Aluminum Potassium Sulfate	●	●	Zinc Chlorate		●
Ammonia Gas		●	Distilled Water		●
Ammonium Carbonate		●	Sea Water		●
Ammonium Bisulfat		●	Diesel Fuel		●
Ammonium Bicarbonate		●	Natural Gas		●
Ammonium Chloride	●	●	Ethyl Alcohol		●
Ammonium Citric Acid		●	Ethylene Glycol		●
Ammonium Fluoride		●	Ferro Chloride		●
Ammonium Hydroxide		●	Nitrate Ferro		●
Ammonium Nitrate	●	●	Ferro Sulphate		●
Ammonium Persulfate		●	Phthalic Acid		●
Ammonium Phosphate	●	●	Floboinic Acid		●
Ammonium Sulfate	●	●	Fluosilic Acid		●
Analin Sulfat		●	Formic Acid		●
Acetic Acid		●	Phosphoric Acid		●
Acidic Chloride	●	●	Phosphorium Pentoxide		●
Acid Ferric Nitrate	●	●	Kerosene		●
Acid Ferric Sulfat	●	●	Glycerine		●
Copper Fluoride		●	Gluconic Acid		●
Copper Chloride	●	●	Glucose		●
Copper Nitrate	●	●	Crude Oil, Sour		●
Copper Cyanide		●	Crude Oil, Sweet		●

Pipe Laying

Procedure

The appropriate installation procedure for GRP Pipe varies depending on the rigidity of the pipe, the depth of the trench, the width, the natural soil properties, the additional loads on the pipeline and the filling material. In order to support the pipe in a healthy way, the natural ground should be firmly wrapped around the pipe area filler. The following pipe installation procedures are provided to assist in the proper laying of the pipe.



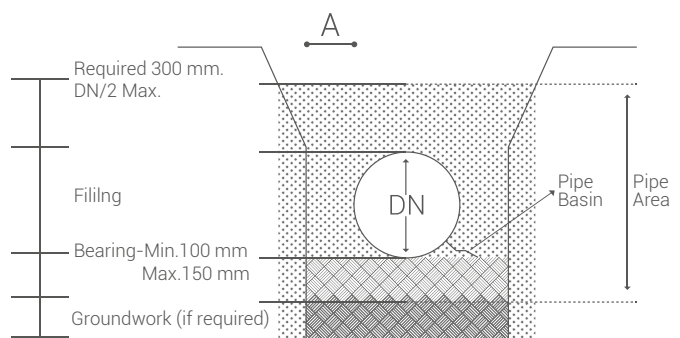


Standard Trench

It shows the typical trench section dimensions. The dimension "A" should always be wide enough to ensure that sufficient filling material can be placed and compacted in the pipe basin. Dimension "A" should also be wide enough to allow the clamping equipment to operate in a manner that does not damage the pipe. Typical "A" size, except for very small diameters, the minimum is 0.4 DN. For larger diameters, a smaller value for "A" may be appropriate, depending on the natural substrate, filler material and compression technique.

For example, in the 1st, 2nd and 3rd groups of natural soils, the trench can be kept narrower by using SC1 and SC2 fillers which do not require much compression.

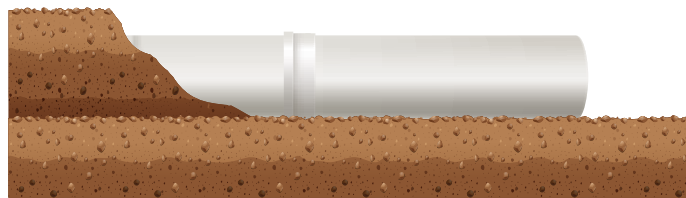
NOTE: If soft, loose, unstable or expanding natural ground is found on the bottom of the trench, it may be necessary to increase the thickness of the bearing pad to provide regular and unchanged support along the pipe.



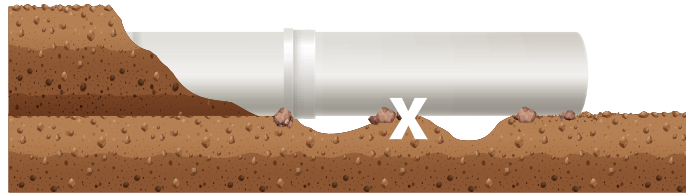
Pipe Trench Filling

The pipes may float due to heavy rainfall or may be exposed to thermal expansion, which may result from high temperature differences between day and night. In order to avoid such nonconformities, it is recommended that each pipe, which has been completed, be filled to the surface level.

If pieces of the pipe is assembled but the filling process will pass; first, the joints in the middle of each pipe should be filled to the top to prevent movement. Correct selection and tightening of the pipe area filler are crucial for controlling vertical deflection and for pipe performance.



Correct bearing support



Wrong bearing support

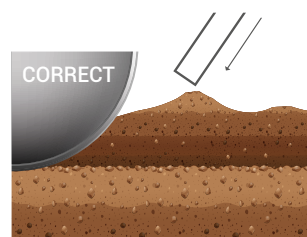
Filling Material Group	Definition of Filling Materials
SC1	Crushed stone containing less than 15% sand, maximum 25% amount of material
SC2	Less than 12% fine grain containing clean coarse materials
SC3	Clean coarse materials containing 12% or more fine grains Sandy or fine grains containing less than 70% fine grains
SC4	Fine-grained materials containing more than 70% fine-grained pieces



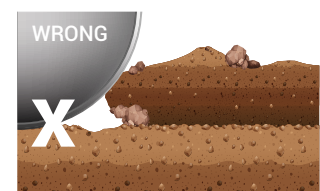
Pipe Trench Filling

It should be ensured that the filling material does not contain trash and foreign materials which may damage the pipe and cause the lateral support to decrease. Located in the basin region between the bottom of the pipe and the bearing. The filling and compression of the material must be carried out before the remaining filling material is placed. The amount of energy consumed in the compression method should be checked as well as the thickness of the compacted fill layer. The appropriate filling process is generally carried out in layers between 100 mm and 300 mm thickness depending on the filling material and the compression method.

Gravel or crushed stone is used as filling material, When these materials are relatively easy to compress. The thickness of the filler layer is 300 mm. Since thinner materials require more compression energy, the thickness of the filler layer should be limited. In order to support the pipe well, it should be ensured that each filling layer is well compacted.



Providing appropriate basin support.



Inappropriate basin support.

On-Pipe Compression

When it reaches the top of the pipe, it should not exceed 1.5% of the pipe diameter. This initial amount of ovalization will depend on the amount of energy required to achieve the desired relative degree of compression. High amounts of energy required for SC3 and SC4 fillers can cause this ovalization limit to be exceeded. In this case, can be considered the use of pipes or other filling materials of higher rigidity.

Filler Type	Hand Operated Impact Compactor	Hand Operated Vibratory Plate Compactor	Suggestions
Type SC1		Tip SC1	Two-time transition provides a good compression.
Type SC2		Tip SC2	2-4 transitions depending on desired density and height.
Type SC3	100 - 200 mm		The number of transition and layer height depends on the desired density. Optimal or close moisture content. Check compression.
Type SC4	100 - 150 mm		It may require high compression energy. Check that if the moisture content is ideal. Make sure that the compression is done correctly.

Permissible initial vertical deflection values	Vertical Deflection (of Diameter %)
Large Diameter (DN ≥ 300) Beginning	3
Small Diameter (DN ≥ 250) Beginning	2

TRAFFIC LOADS

Loads Type	Strength (Kn)	Strength (lbs)	Depth of Embedment (m)
AASHTO H20 (C)	72	16000	1
BS 153 HA (C)	90	20000	1,5
ATV LKW 12 (C)	40	9000	1
ATV SLW 30 (C)	50	11000	1
ATV SLW 60 (C)	100	22000	1,5
Cooper E80	Demiryolu		3

- Minimum pipe area filling floor module is taken as 6.9 Mpa

With the Type 1 mounting version, the pipe area up to 300 mm in height must be tightened. In areas that will be subject to traffic load, the trench filler is compacted to the natural ground to minimize road surface settlements. It provides the thickness of the soil cover on the pipe required for the operation of various compaction equipment on the pipe. Care should be taken not to apply high compression energy to the top of the pipe, which may cause deformity of the pipe circularity. At the same time, the material in this section should not be left loose and should be reached to the desired density.

WATER- HUMMBER IMPACT :

The impact of the water-hammer is a change in the flow rate of pipe systems caused by the sudden decrease or increase of the system pressure. These changes are caused by sudden opening and closing of the valves, sudden stopping of the pumps in the event of a power failure or sudden operation during commissioning. The water- hammer pressure in the GRP pipes and steel and ductile pipes are is 49.9% . The water-hammer impact pressure in GRP pipes is approximately 39.9% of the rated pressure. The water-hammer stroke is calculated by the following formula.


$$\Delta H = (W \cdot \Delta V) / g$$

ΔH : Change in pressure (m)

ΔV : Change in fluid velocity (m/sn)

w: Surge wave celerity (m/sn)

g: Gravitational acceleration (m/sn²)



Double Sided
Elastomer Sealed
Coupling Mounting

Double Sided

Elastomer Sealed Coupling Mounting

30 / 31

A - REKA COUPLING

The following steps (1-5) must be followed when fitting the Reka couplings.

Step 1 Foundation and Bearing

The bearing should be dug in such a way that at each point of the coupling, the head rests on the coupling to prevent it from hanging and to ensure continuous support of the pipe. After the jointing process is completed, the filling and bearing of the coupling area should be made properly.

Step 2 Cleaning the Coupling

The grooves of the double-sided couplings and the Epdm Reka seal to be placed in the couplings should be thoroughly cleaned until they are clear of dirt and oil.

Step 3 Installing the Seals

The elastomer seal is placed in the groove of the coupling such that the protrusions of the Epdm Reka seal are facing out of the groove. Do not apply lubricant into the groove or on the seal during gasket installation. However, the seal duct can be moistened with water for easy installation of the seals.

Step 4 Apply Lubricant to Elastomer Seal

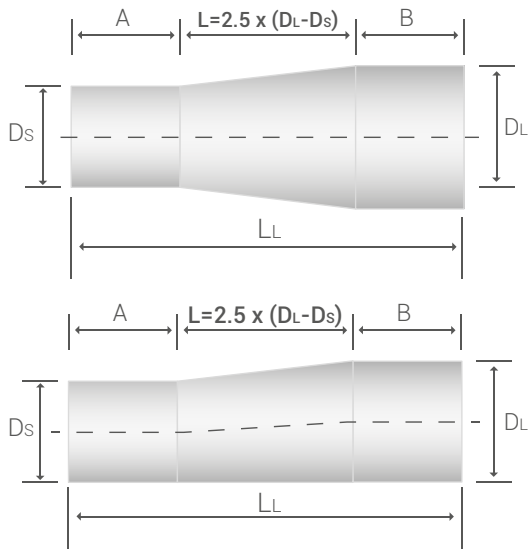
Then apply a thin layer of lubricant to Epdm Reka Seal. The amount of lubricant that should be used in each coupling must be kept constant.

Step 5 Cleaning the Pipe Opening and Applying Lubricant

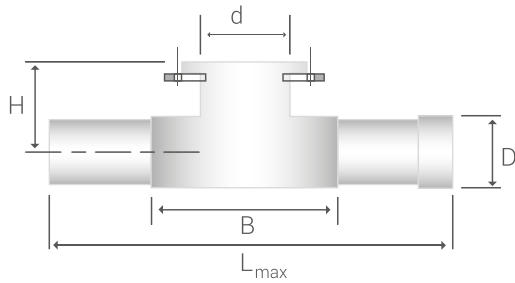
The pipe opening that will pass into the coupling must be cleaned from sand, dust, dirt and oil. Check the sealing surface of the pipe opening for any damage. Apply a thin layer of lubricant to the area of the pipe up to the Pieces marked with a black strip. Make sure that the coupling and the pipe opening remain clean after the lubricant has been applied. A plastic sheet of approximately 1 m² or a clean cloth to be placed under the jointing area has been found to be an effective way of ensuring that the pipe ends and seals remain clean.

Esen GRP Pipe and Fittings

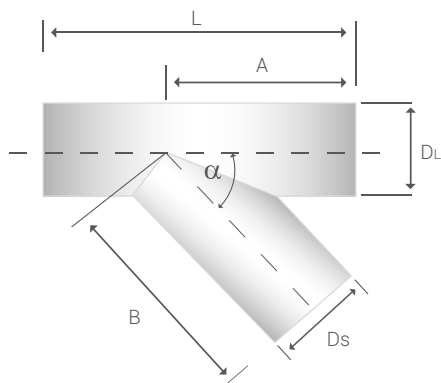
REDUCER



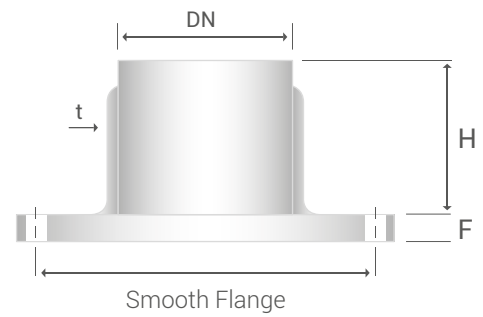
TEE PIECES



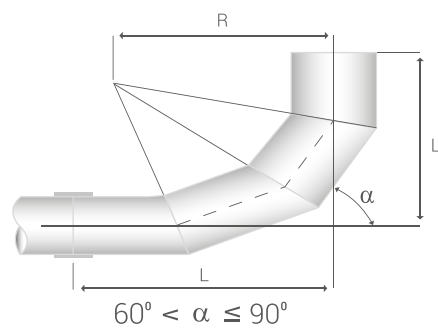
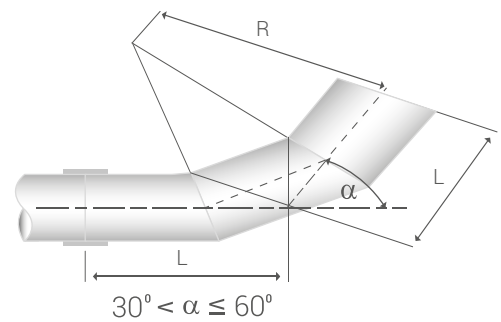
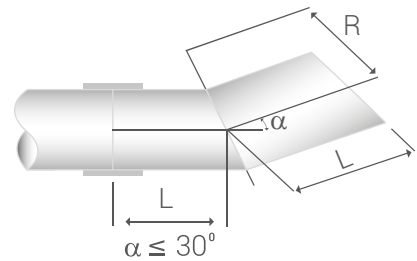
C PIECES - WYE (Angled Tee)

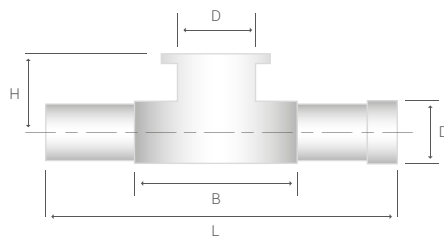
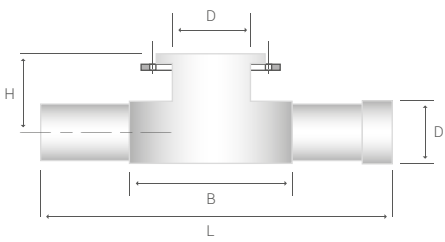


FLANGE



ELBOW





Equal TEE Pieces

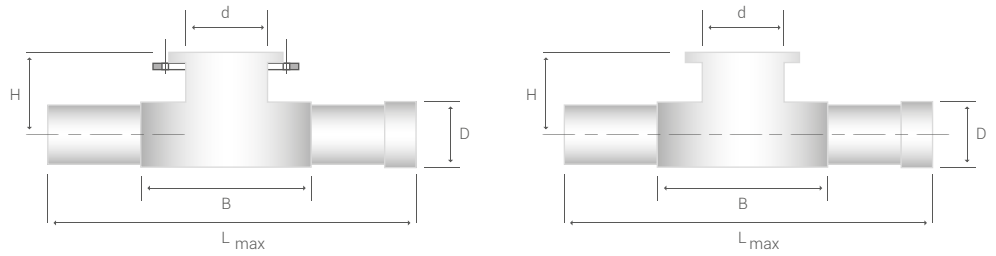
GRP FITTINGS

D (mm)	PN (1 - 6)		PN 10		PN 16	
	L (max.)mm	H (max.)mm	L (max.)mm	H (max.)mm	L (max.)mm	H (max.)mm
300	1000,4	450,4	1000,4	450,4	1200,4	550,4
350	1200,4	530,4	1200,4	530,4	1400,4	630,4
400	1300,4	610,4	1300,4	610,4	1500,4	690,4
450	1400,4	660,4	1400,4	660,4	1600,4	740,4
500	1500,4	720,4	1500,4	720,4	1700,4	820,4
600	1700,4	790,4	1700,4	790,4	1800,4	870,4
700	1900,4	870,4	1900,4	870,4	2100,4	990,4
800	2100,4	970,4	2100,4	970,4	2400,4	1120,4
900	2200,4	1050,4	2200,4	1050,4	2600,4	1250,4
1000	2400,4	1150,4	2400,4	1150,4	2800,4	1350,4
1100	2600,4	1220,4	2600,4	1220,4	3000,4	1450,4
1200	2800,4	1320,4	2800,4	1320,4	3200,4	1550,4
1300	2900,4	1400,4	2900,4	1400,4	3500,4	1680,4
1400	3100,4	1480,4	3100,4	1480,4	3700,4	1780,4
1500	3300,4	1590,4	3300,4	1590,4	3900,4	1890,4
1600	3400,4	1660,4	3400,4	1660,4	4100,4	2010,4
1700	3600,4	1740,4	3600,4	1740,4	4300,4	2110,4
1800	3700,4	1810,4	3700,4	1810,4	4500,4	2210,4
1900	3900,4	1890,4	3900,4	1890,4	4800,4	2340,4
2000	4000,4	1970,4	4000,4	1970,4	5000,4	2470,4
2100	4200,4	2040,4	4200,4	2040,4	5200,4	2540,4
2200	4300,4	2120,4	4300,4	2120,4	5300,4	2620,4
2300	4500,4	2190,4	4500,4	2190,4	5600,4	2740,4
2400	4600,4	2270,4	4600,4	2270,4	5700,4	2790,4
2500	4800,4	2370,4	4800,4	2370,4	5900,4	2900,4
2600	5000,4	2450,4	5000,4	2450,4	6100,4	3000,4
2700	5100,4	2520,4	5100,4	2520,4	6200,4	3070,4
2800	5300,4	2600,4	5300,4	2600,4	6400,4	3150,4
2900	5400,4	2680,4	5400,4	2680,4	6600,4	3250,4
3000	5600,4	2750,4	5600,4	2750,4	6700,4	3300,4
3100	5700,4	2830,4	5700,4	2830,4	6900,4	3400,4
3200	5900,4	2900,4	5900,4	2900,4	7100,4	3500,4
3300	6100,4	3010,4	6100,4	3010,4	-	-
3400	6300,4	3130,4	6300,4	3130,4	-	-
3500	6500,4	3230,4	6500,4	3230,4	-	-
3600	6600,4	3280,4	6600,4	3280,4	-	-
3700	6800,4	3380,4	6800,4	3380,4	-	-
3800	7000,4	3460,4	7000,4	3460,4	-	-
3900	7100,4	3540,4	7100,4	3540,4	-	-
4000	7300,4	3610,4	7300,4	3610,4	-	-

• Fitting lengths and diameters may vary according to project pipe length, Pn and project specifications.

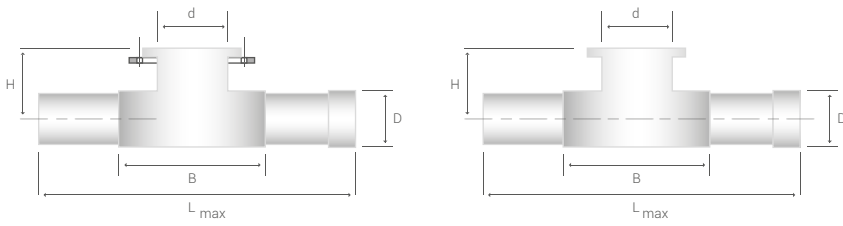
Unequal
TEE Pieces

GRP FITTINGS



D (mm)	d (mm)	PN (1 - 6)		PN 10		PN 16	
		L (max.)mm	H (max.)mm	L (max.)mm	H (max.)mm	L (max.)mm	H (max.)mm
300	150	800,4	400,4	800,4	400,4	800,4	430,4
	200	900,4	430,4	900,4	430,4	1000,4	480,4
	250	900,4	430,4	900,4	430,4	1000,4	480,4
350	150	800,4	430,4	800,4	430,4	800,4	450,4
	200	900,4	450,4	900,4	450,4	1000,4	500,4
	250	900,4	450,4	900,4	450,4	1000,4	500,4
400	150	800,4	460,4	800,4	460,4	800,4	490,4
	200	900,4	490,4	900,4	490,4	1000,4	540,4
	250	900,4	490,4	900,4	490,4	1000,4	540,4
450	150	800,4	480,4	800,4	480,4	800,4	510,4
	200	900,4	510,4	900,4	510,4	1000,4	590,4
	250	900,4	510,4	900,4	510,4	1100,4	590,4
500	150	800,4	510,4	800,4	510,4	800,4	540,4
	200	900,4	540,4	900,4	540,4	1000,4	620,4
	250	1000,4	570,4	1000,4	570,4	1100,4	640,4
600	300	1000,4	620,4	1000,4	620,4	1200,4	720,4
	400	1300,4	720,4	1300,4	720,4	1500,4	790,4
	450	1400,4	740,4	1400,4	740,4	1600,4	820,4
700	200	900,4	660,4	900,4	660,4	1000,4	690,4
	400	1400,4	790,4	1400,4	790,4	1600,4	890,4
	600	1800,4	870,4	1800,4	870,4	2000,4	970,4
800	200	900,4	710,4	900,4	710,4	1000,4	760,4
	400	1500,4	870,4	1500,4	870,4	1700,4	990,4
	600	1800,4	940,4	1800,4	940,4	2100,4	1070,4
900	300	1300,4	870,4	1300,4	870,4	1500,4	1000,4
	500	1700,4	1000,4	1700,4	1000,4	2000,4	1120,4
	800	2100,4	1050,4	2100,4	1050,4	2400,4	1200,4
1000	300	1300,4	950,4	1300,4	950,4	1600,4	1100,4
	500	1800,4	1070,4	1800,4	1070,4	2100,4	1220,4
	800	2200,4	1120,4	2200,4	1120,4	2500,4	1300,4
1100	500	1700,4	1150,4	1700,4	1150,4	2000,4	1300,4
	800	2100,4	1200,4	2100,4	1200,4	2500,4	1370,4
	1000	2400,4	1220,4	2400,4	1220,4	2800,4	1420,4
1200	500	1800,4	1220,4	1800,4	1220,4	2100,4	1370,4
	800	2200,4	1270,4	2200,4	1270,4	2500,4	1450,4
	1000	2400,4	1300,4	2400,4	1300,4	2800,4	1300,4

• Fitting lengths and diameters may vary according to project pipe length, Pn and project specifications.



Unequal TEE Pieces

GRP FITTINGS

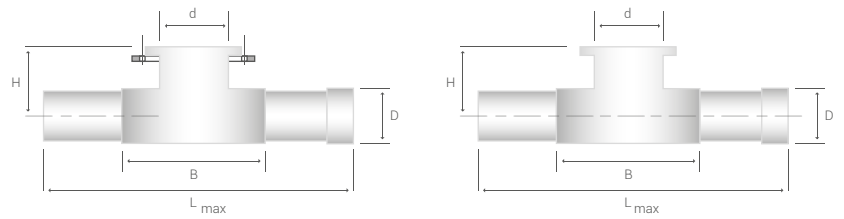
34 / 35

D (mm)	d (mm)	PN (1 - 6)		PN 10		PN 16	
		L (max.)mm	H (max.)mm	L (max.)mm	H (max.)mm	L (max.)mm	H (max.)mm
1300	500	1800,4	1300,4	1800,4	1300,4	2200,4	1480,4
	800	2200,4	1350,4	2200,4	1350,4	2600,4	1550,4
	1000	2500,4	1380,4	2500,4	1380,4	2900,4	1600,4
1400	500	1800,4	1360,4	1800,4	1360,4	2200,4	1560,4
	800	2200,4	1410,4	2200,4	1410,4	2700,4	1630,4
	1000	2500,4	1430,4	2500,4	1430,4	3000,4	1680,4
1500	500	1900,4	1440,4	1900,4	1440,4	2300,4	1640,4
	800	2300,4	1490,4	2300,4	1490,4	2700,4	1710,4
	1000	2600,4	1510,4	2600,4	1510,4	3000,4	1760,4
1600	500	1900,4	1510,4	1900,4	1510,4	2400,4	1740,4
	800	2300,4	1560,4	2300,4	1560,4	2800,4	1810,4
	1000	2600,4	1590,4	2600,4	1590,4	3100,4	1860,4
1700	500	1900,4	1560,4	1900,4	1560,4	2400,4	1810,4
	800	2300,4	1610,4	2300,4	1610,4	2900,4	1890,4
	1000	2600,4	1640,4	2600,4	1640,4	3200,4	1940,4
1800	500	2000,4	1640,4	2000,4	1640,4	2500,4	1890,4
	800	2400,4	1690,4	2400,4	1690,4	2900,4	1960,4
	1000	2600,4	1710,4	2600,4	1710,4	3200,4	2010,4
1900	500	2000,4	1690,4	2000,4	1690,4	2500,4	1960,4
	800	2400,4	1740,4	2400,4	1740,4	3000,4	2040,4
	1000	2600,4	1760,4	2600,4	1760,4	3300,4	2090,4
2000	500	2000,4	1770,4	2000,4	1770,4	2600,4	2040,4
	800	2400,4	1820,4	2400,4	1820,4	3000,4	2120,4
	1000	2700,4	1840,4	2700,4	1840,4	3300,4	2170,4
2100	800	2400,4	1870,4	2400,4	1870,4	3000,4	2170,4
	1000	2700,4	1890,4	2700,4	1890,4	3300,4	2220,4
	1200	3000,4	1920,4	3000,4	1920,4	3600,4	2270,4
2200	800	2500,4	1940,4	2500,4	1940,4	3000,4	2220,4
	1000	2700,4	1970,4	2700,4	1970,4	3300,4	2270,4
	1200	3000,4	1990,4	3000,4	1990,4	3600,4	2320,4
2300	800	2500,4	1990,4	2500,4	1990,4	3100,4	2320,4
	1000	2700,4	2020,4	2700,4	2020,4	3400,4	2370,4
	1200	3000,4	2040,4	3000,4	2040,4	3700,4	2420,4
2400	1200	3000,4	2120,4	3000,4	2120,4	3700,4	2470,4
	1600	3500,4	2170,4	3500,4	2170,4	4300,4	2570,4
	2000	4000,4	2220,4	4000,4	2220,4	5000,4	2720,4
2500	1200	3000,4	2200,4	3000,4	2200,4	3800,4	2550,4
	1600	3600,4	2250,4	3600,4	2250,4	4400,4	2650,4
	2000	4100,4	2300,4	4100,4	2300,4	5100,4	2800,4
2600	1200	3000,4	2270,4	3000,4	2270,4	3900,4	2650,4
	1600	3600,4	2320,4	3600,4	2320,4	4500,4	2750,4
	2000	4100,4	2370,4	4100,4	2370,4	5200,4	2900,4

- Fitting lengths and diameters may vary according to project pipe length, Pn and project specifications.

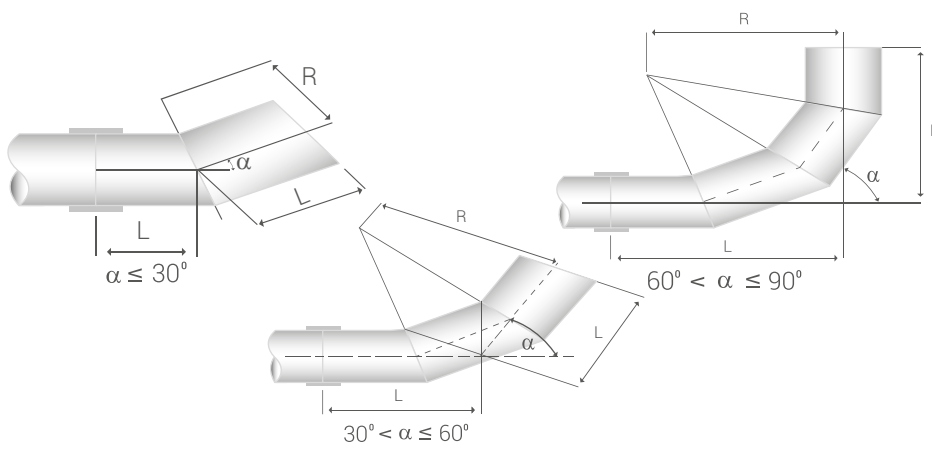
Unequal
TEE Pieces

GRP FITTINGS



D (mm)	d (mm)	PN (1 - 6)		PN 10		PN 16	
		L (max.)mm	H (max.)mm	L (max.)mm	H (max.)mm	L (max.)mm	H (max.)mm
2700	1000	3000,4	2300,4	3000,4	2300,4	3600,4	2650,4
	1600	3600,4	2370,4	3600,4	2370,4	4500,4	2800,4
	2000	4100,4	2420,4	4100,4	2420,4	5200,4	2950,4
2800	1000	2900,4	2370,4	2900,4	2370,4	3600,4	2700,4
	1600	3700,4	2450,4	3700,4	2450,4	4500,4	2850,4
	2000	4200,4	2500,4	4200,4	2500,4	5200,4	3000,4
2900	1000	3000,4	2430,4	3000,4	2430,4	3700,4	2800,4
	1600	3700,4	2500,4	3700,4	2500,4	4600,4	2950,4
	2000	4200,4	2550,4	4200,4	2550,4	5300,4	3100,4
3000	1000	3000,4	2500,4	3000,4	2500,4	3700,4	2850,4
	1600	3700,4	2580,4	3700,4	2580,4	4600,4	3000,4
	2000	4200,4	2630,4	4200,4	2630,4	5300,4	3150,4
3100	1000	3000,4	2550,4	3000,4	2550,4	3700,4	2900,4
	1600	3700,4	2630,4	3700,4	2630,4	4600,4	3050,4
	2000	4200,4	2680,4	4200,4	2680,4	5300,4	3200,4
3200	1000	3000,4	2630,4	3000,4	2630,4	3800,4	3000,4
	1600	3800,4	2700,4	3800,4	2700,4	4700,4	3150,4
	2000	4300,4	2750,4	4300,4	2750,4	5400,4	3300,4
3300	1000	3000,4	2680,4	3000,4	2680,4	-	-
	1600	3800,4	2760,4	3800,4	2760,4	-	-
	2000	4300,4	2810,4	4300,4	2810,4	-	-
3400	1600	3000,4	2830,4	3000,4	2830,4	-	-
	2400	4800,4	2930,4	4800,4	2930,4	-	-
	3000	5600,4	3010,4	5600,4	3010,4	-	-
3500	1600	3000,4	2880,4	3000,4	2880,4	-	-
	2400	4800,4	2980,4	4800,4	2980,4	-	-
	3000	5600,4	3060,4	5600,4	3060,4	-	-
3600	1600	3000,4	2960,4	3000,4	2960,4	-	-
	2400	4900,4	3060,4	4900,4	3060,4	-	-
	3000	5600,4	3130,4	5600,4	3130,4	-	-
3700	1600	3000,4	3010,4	3000,4	3010,4	-	-
	2400	4900,4	3110,4	4900,4	3110,4	-	-
	3000	5600,4	3180,4	5600,4	3180,4	-	-
3800	1600	3000,4	3090,4	3000,4	3090,4	-	-
	2400	4900,4	3190,4	4900,4	3190,4	-	-
	3000	5700,4	3260,4	5700,4	3260,4	-	-
3900	1600	3000,4	3140,4	3000,4	3140,4	-	-
	2400	4900,4	3240,4	4900,4	3240,4	-	-
	3000	5700,4	3310,4	5700,4	3310,4	-	-
4000	1600	3000,4	3210,4	3000,4	3210,4	-	-
	2400	5000,4	3310,4	5000,4	3310,4	-	-
	3000	5700,4	3390,4	5700,4	3390,4	-	-

• Fitting lengths and diameters may vary according to project pipe length, Pn and project specifications.



Elbows

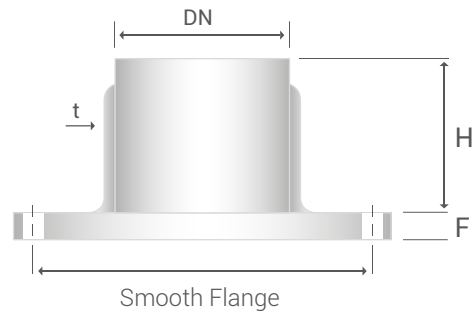
GRP FITTINGS

DN	R	11.25° L	22.5° L	30° L	45° L	60° L	90° L
300	450,4	285,4	320,4	320,4	410,4	460,4	660,4
350	450,4	285,4	320,4	320,4	410,4	460,4	660,4
400	525,4	285,4	310,4	310,4	435,4	510,4	710,4
450	600,4	335,4	360,4	360,4	485,4	560,4	810,4
500	675,4	335,4	385,4	385,4	535,4	635,4	960,4
600	750,4	335,4	385,4	385,4	535,4	635,4	960,4
700	900,4	335,4	410,4	410,4	610,4	710,4	1175,4
800	1050,4	410,4	435,4	435,4	660,4	785,4	1200,4
900	1170,4	410,4	460,4	460,4	710,4	860,4	1450,4
1000	1200,4	410,4	485,4	485,4	735,4	885,4	1500,4
1100	1270,4	435,4	510,4	510,4	760,4	935,4	1550,4
1200	1320,4	485,4	535,4	535,4	810,4	1100,4	1650,4
1300	1370,4	485,4	535,4	535,4	835,4	1125,4	1700,4
1400	1420,4	510,4	560,4	560,4	885,4	1175,4	1750,4
1500	1470,4	510,4	585,4	585,4	900,4	1200,4	1800,4
1600	1570,4	560,4	660,4	660,4	1125,4	1350,4	2000,4
1700	1670,4	610,4	685,4	685,4	1200,4	1400,4	2100,4
1800	1770,4	685,4	785,4	785,4	1300,4	1500,4	2300,4
1900	1870,4	685,4	785,4	785,4	1300,4	1600,4	2400,4
2000	1970,4	710,4	810,4	810,4	1400,4	1600,4	2500,4
2100	2070,4	710,4	820,4	820,4	1400,4	1600,4	2500,4
2200	2170,4	785,4	885,4	885,4	1500,4	1700,4	2700,4
2300	2270,4	785,4	885,4	885,4	1600,4	1700,4	2800,4
2400	2370,4	810,4	910,4	910,4	1700,4	1800,4	2900,4
2500	2470,4	810,4	910,4	910,4	1800,4	1800,4	2900,4
2600	2600,4	1100,4	1200,4	1200,4	1800,4	2000,4	3100,4
2700	2700,4	1000,4	1200,4	1200,4	1800,4	2100,4	3100,4
2800	2800,4	1100,4	1200,4	1200,4	1900,4	2200,4	3300,4
2900	2900,4	1100,4	1200,4	1200,4	1900,4	2100,4	3300,4
3000	3000,4	1200,4	1200,4	1200,4	2000,4	2200,4	3500,4
3100	3100,4	1200,4	1300,4	1300,4	2000,4	2200,4	3500,4
3200	3200,4	1300,4	1300,4	1300,4	2100,4	2300,4	3700,4
3300	3300,4	1300,4	1300,4	1300,4	2100,4	2300,4	3700,4
3400	3400,4	1300,4	1400,4	1400,4	2200,4	2400,4	3900,4
3500	3500,4	1300,4	1400,4	1400,4	2200,4	2400,4	3900,4
3600	3600,4	1400,4	1500,4	1500,4	2300,4	2500,4	4100,4
3700	3700,4	1400,4	1500,4	1500,4	2300,4	2600,4	4100,4
3800	3800,4	1500,4	1500,4	1500,4	2400,4	2600,4	4300,4
3900	3900,4	1500,4	1500,4	1500,4	2400,4	2600,4	4300,4
4000	4000,4	1500,4	1500,4	1500,4	2500,4	2700,4	4500,4

• Fitting lengths and diameters may vary according to project pipe length, Pn and project specifications.

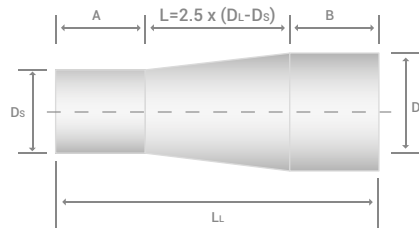
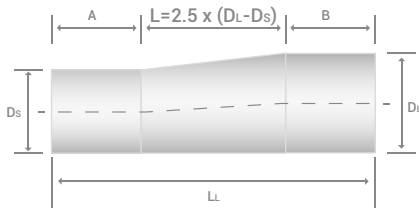
Flanges

GRP FITTINGS



Nominal Dia (DN) mm	PN 0 -16 (bar)		
	F (mm)	T (mm)	H (mm)
300	40,4	20,4	700
350	45,4	23,4	700
400	45,4	23,4	700
450	50,4	25,4	700
500	50,4	25,4	700
600	60,4	30,4	1000
700	65,4	33,4	1000
800	70,4	35,4	1000
900	75,4	38,4	1000
1000	80,4	40,4	1000
1100	90,4	45,4	1000
1200	95,4	48,4	1000
1300	100,4	50,4	1000
1400	105,4	53,4	1000
1500	105,4	53,4	1000
1600	110,4	55,4	1000
1700	115,4	58,4	1000
1800	120,4	60,4	1000
1900	125,4	63,4	1000
2000	130,4	65,4	1000
2100	135,4	68,4	1300
2200	140,4	70,4	1300
2300	145,4	73,4	1300
2400	150,4	75,4	1300
2500	160,4	78,4	1300
2600	165,4	81,4	1300
2700	170,4	83,4	1300
2800	175,4	86,4	1300
2900	180,4	88,4	1300
3000	185,4	91,4	1500
3100	190,4	94,4	1500
3200	195,4	97,4	1500
3300	200,4	100,4	1500
3400	205,4	103,4	1500
3500	210,4	106,4	1500
3600	215,4	108,4	1500
3700	220,5	111,4	1500
3800	225,5	114,4	1500
3900	230,5	117,4	1500
4000	235,5	120,4	1500

• Fitting length and diameters can be changed according to project specifications.



Reducers

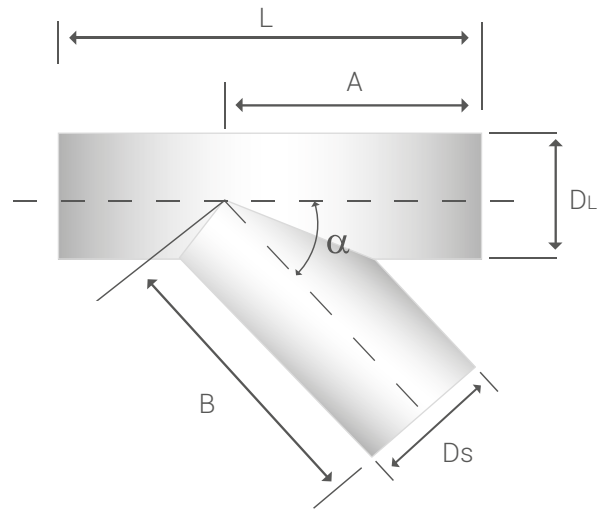
GRP FITTINGS

DL (mm)	DS (mm)	A=B (mm)	L (mm)	LL (mm)
300	200,4	400,4	250,4	1050,4
300	250,4	400,4	125,4	925,4
350	250,4	400,4	250,4	1050,4
350	300,4	400,4	125,4	925,4
400	300,4	400,4	250,4	1050,4
400	350,4	400,4	125,4	925,4
450	350,4	400,4	250,4	1050,4
450	400,4	400,4	125,4	925,4
500	350,4	400,4	375,4	1175,4
500	400,4	400,4	250,4	1050,4
600	400,4	400,4	500,4	1300,4
600	500,4	400,4	250,4	1050,4
700	500,4	400,4	500,4	1300,4
700	600,4	400,4	250,4	1050,4
800	600,4	400,4	500,4	1300,4
800	700,4	400,4	250,4	1050,4
900	700,4	400,4	500,4	1300,4
900	800,4	400,4	250,4	1050,4
1000	800,4	400,4	500,4	1300,4
1000	900,4	400,4	250,4	1050,4
1100	900,4	400,4	500,4	1300,4
1100	1000,4	400,4	250,4	1050,4
1200	1000,4	500,4	500,4	1500,4
1200	1100,4	500,4	250,4	1250,4
1300	1100,4	500,4	500,4	1500,4
1300	1200,4	500,4	250,4	1250,4
1400	1200,4	500,4	500,4	1500,4
1400	1300,4	500,4	250,4	1250,4
1500	1300,4	500,4	500,4	1500,4
1500	1400,4	500,4	250,4	1250,4
1600	1500,4	600,4	250,4	1450,4
1600	1400,4	600,4	500,4	1700,4
1700	1500,4	600,4	500,4	1700,4
1700	1600,4	600,4	250,4	1450,4
1800	1400,4	600,4	1000,4	2200,4
1800	1600,4	600,4	500,4	1700,4
1900	1700,4	600,4	500,4	1700,4
1900	1800,4	600,4	250,4	1450,4
2000	1600,4	600,4	1000,4	2200,4
2000	1800,4	600,4	500,4	1700,4

DL (mm)	DS (mm)	A=B (mm)	L (mm)	LL (mm)
2100	1900,4	600,4	500,4	1700,4
2100	2000,4	600,4	250,4	1450,4
2200	2000,4	600,4	500,4	1700,4
2200	2100,4	600,4	250,4	1450,4
2300	2100,4	600,4	500,4	1700,4
2300	2200,4	600,4	250,4	1450,4
2400	2200,4	600,4	500,4	1700,4
2400	2300,4	600,4	250,4	1450,4
2500	2300,4	750,4	500,4	2000,4
2500	2400,4	750,4	250,4	1750,4
2600	2400,4	750,4	500,4	2000,4
2600	2500,4	750,4	250,4	1750,4
2700	2500,4	750,4	500,4	2000,4
2700	2600,4	750,4	250,4	1750,4
2800	2600,4	750,4	500,4	2000,4
2800	2700,4	750,4	250,4	1750,4
2900	2700,4	750,4	500,4	2000,4
2900	2800,4	750,4	250,4	1750,4
3000	2800,4	750,4	500,4	2000,4
3000	2900,4	900,4	250,4	1750,4
3100	2900,4	900,4	500,4	2300,4
3100	3000,4	900,4	250,4	2050,4
3200	3000,4	900,4	500,4	2300,4
3200	3100,4	900,4	250,4	2050,4
3300	3100,4	900,4	500,4	2300,4
3300	3200,4	900,4	250,4	2050,4
3400	3200,4	900,4	500,4	2300,4
3400	3300,4	900,4	250,4	2050,4
3500	3300,4	1050,4	500,4	2600,4
3500	3400,4	1050,4	250,4	2350,4
3600	3400,4	1050,4	500,4	2600,4
3600	3500,4	1050,4	250,4	2350,4
3700	3500,4	1050,4	500,4	2600,4
3700	3600,4	1050,4	250,4	2350,4
3700	3600,4	1050,4	500,4	2600,4
3800	3700,4	1050,4	250,4	2350,4
3900	3700,4	1100,4	500,4	2700,4
3900	3800,4	1100,4	250,4	2450,4
4000	3800,4	1100,4	500,4	2700,4
4000	3900,4	1100,4	250,4	2450,4

• Fitting length and diameters can be changed according to project specifications.

[WYE (Angled Tee)
GRP FITTINGS



Nominal Dia D _L (mm)	Nominal Dia D _s (mm)	B (mm)	A (mm)	L (mm)
300	200	600,4	624,4	1100,4
300	300	700,4	695,4	1200,4
350	250	650,4	660,4	1200,4
350	300	700,4	695,4	1200,4
350	350	750,4	730,4	1200,4
400	300	700,4	695,4	1200,4
400	350	750,4	730,4	1200,4
400	400	800,4	766,4	1200,4
450	350	750,4	730,4	1250,4
450	400	800,4	766,4	1250,4
450	450	850,4	801,4	1300,4
500	300	700,4	695,4	1200,4
500	400	800,4	766,4	1250,4
500	500	900,4	836,4	1300,4
600	400	800,4	766,4	1250,4
600	500	900,4	836,4	1350,4
600	600	1000,4	904,4	1400,4
700	500	900,4	836,4	1350,4
700	600	1000,4	907,4	1400,4
700	700	1100,4	978,4	1500,4
800	600	1000,4	907,4	1400,4
800	700	1100,4	978,4	1500,4
800	800	1200,4	1049,4	1550,4

Nominal Dia D _L (mm)	Nominal Dia D _s (mm)	B (mm)	A (mm)	L (mm)
900	700	1100,4	978,4	1500,4
900	800	1200,4	1049,4	1550,4
900	900	1300,4	1119,4	1600,4
1000	800	1200,4	1049,4	1550,4
1000	900	1300,4	1119,4	1600,4
1000	1000	1400,4	1190,4	1700,4
1200	1000	1400,4	1190,4	1700,4
1200	1100	1500,4	1261,4	1750,4
1200	1200	1600,4	1331,4	1800,4
1400	1200	1600,4	1331,4	1850,4
1400	1300	1700,4	1402,4	1900,4
1400	1400	1800,4	1473,4	1900,4
1600	1200	1600,4	1331,4	1850,4
1600	1400	1800,4	1473,4	2000,4
1600	1600	2000,4	1614,4	2100,4
1800	1400	1800,4	1473,4	2000,4
1800	1600	2000,4	1614,4	2100,4
1800	1800	2200,4	1756,4	2200,4
2000	1600	2000,4	1614,4	2100,4
2000	1800	2200,4	1756,4	2200,4
2000	2000	2400,4	1897,4	2300,4
2400	1800	2200,4	1756,4	2200,4
2400	2000	2400,4	1897,4	2400,4
2400	2400	2800,4	2180,4	2600,4

• Fitting lengths and diameters may vary according to project pipe length, Pn and project specifications.

 TÜRK AKREDITASYON KURUMU

AKREDİTASYON SERTİFİKASI

Deney Laboratuvarı olarak faaliyet gösteren,

ESEN PLASTİK SAN.VE TİC. A.Ş. PLASTİK VE CTP Deney Laboratuvarı

Atatürk Organize Sanayi Bölgesi 10000 Sok. No:71 Büyükdüğü 35520 İZMİR / TÜRKİYE

TÜRKAK tarafından yapılan denetim sonucunda TS EN ISO/IEC 17025:2012 Standardına göre Ek te yer alan kapsamlarda akredite edilmiştir.

Akreditasyon No : AB-0688-T
Akreditasyon Tarihi : 7 Kasım 2013
Revizyon Tarihi / No : 2 Mart 2018 / 05

Bu Sertifika, yukarıda açık adı ve adresi yazılı Kuruluşun TS E Standardına, ilgili Yönetmelik ve Tebliğlere uygunluğunu sınırlı 2022 tarihine kadar gösterir.

 Dr. H. G.

Türk Akreditasyon Kurumu (TÜRKAK) ISO/IEC 17025 altında Avusturya Akreditasyon Uzmanları Laboratuvar Akreditasyon Belgesi (ILAC) ile çok taraflı anlaşma (MLA)MIR

1701-04/01

Akreditasyon Sertifikası Eki (Sayfa 1/1)

Akreditasyon Kapsamı

ESEN PLASTİK SAN.VE TİC. A.Ş. PLASTİK VE CTP Deney Laboratuvarı

Akreditasyon No: AB-0688-T
Revizyon No: 06 Tarih: 02.03.2018

Deney Laboratuvarı

Adres : Hacı Ömer Sabancı O.İ.İ., Atatürk Bulvarı No.55 Sarıçam / 01250 ADANA/TÜRKİYE

Yal : +9 352 376 70 11
Faks : +9 352 376 70 10
E-Posta : plastik@esen.com.tr
Website : www.esenplastik.com.tr

Deneyi Yapılan Malzemeler / Ürünler	Deney Adı	Deney Metodu (İstatistik, Uzmanlarca Standartlar, Belirli İşlemler)
Plastikler, Termoplastik Boru ve Elime Parçaları, Plastik Boru Sistemleri	Boyutların Tayini	TS EN ISO 2120
Cam Elsal Takviyeli Termoplastik (GAP) Boru ve Elime Parçaları	Belirli bir Çaplı Çubuk Eğilme Tayini (Max d=4000 mm)	TS ISO 7668 (Metot B)
	Görünür Başlangıç Hızla Deformasyonuna Dayanımın İspatlanması (Max=200 kN)	TS ISO 10466
	Görünür Başlangıç Boru Çekme Mukavemetinin Tayini (Max=200 kN)	TS ISO 9513 (Metot A)
	Görünür Başlangıç Çıvrısal Çekme Mukavemetinin Tayini (Max=200 kN)	TS ISO 9521 (Metot A, Metot D)
	Berilof Seramik Çizgiyle Sertlik Tayini	TS EN 58
	Kısa Süreli İç Basıncı Altında Sedirilmeliğin Tayini	ISO 7511 (Metot A)

KAPSAM SÖZÜMÜ

 Dr. H. İbrahim ÇETİN
Genel Sekreter

NSF International

789 N. Dixboro Road, Ann Arbor, MI 48105 USA

RECOGNIZES

Esen Plastik San. Tic. A.S.

Facility: Izmir, Turkey

AS COMPLYING WITH NSF/ANSI 61 AND ALL APPLICABLE REQUIREMENTS.
PRODUCTS APPEARING IN THE NSF OFFICIAL LISTING ARE
AUTHORIZED TO BEAR THE NSF MARK.



ANSI Accredited Program
NSF
Certification Program
Accredited by the
American National
Standards Institute



Certification Program
Accredited by the
Standards Council
of Canada


This certificate is the property of NSF International and must be returned upon request. This certificate remains valid as long as this client has products in Listing for the referenced standards. For the most current and complete Listing information, please access NSF's website (www.nsf.org).

A handwritten signature in black ink, appearing to read "Theresa Bellish".

November 25, 2015
Certificate# C0264033 - 01

Theresa Bellish
General Manager, Water Systems


Certificates and Our documents



SERTİFİKA

TUV
AUSTRIA

TS OHSAS 18001:2007 Yönetim Sistemi



ESEN PLASTİK SAN. VE TİC. A.Ş.


MERKEZ: A.O.S.B. M.KEMAL ATATÜRK BULVARI NO:69-71-73
TR-35620 ÇİĞLİ / İZMİR
ŞUBE : HACI SABANCI O.S.B. ATATÜRK BULVARI NO:55
TR-01790 SARIÇAM / ADANA

Yukarıda belirtilen kuruluş TÜV AUSTRIA CERT prosedurlerine göre standart şartlarını karşıladığını kanıtlamıştır.

Kapsam


Sert PVC Temiz ve Drenaj Su Boruları, Polietilen Borular ve Ek Parçaları, Cam Takviyeli Plastik Parçaları üretimi ve satışı.

Sertifika Kayıt No. 20116193005070



Belgelendirme Kuruluşu
TUV AUSTRIA CERT GMBH

Belgelendirme TÜV AUSTRIA CERT teknik ve belgelendirme prosedürü gerçekleştirilmiştir ve düzenli gözetim denetimlerine tabidir. Sertifika geçerlidir.
TUV AUSTRIA CERT GMBH Deutschstraße 10 A-1730 Wien



019766-17-4



YÖNETİM SİSTEM SERTİFİKASI

Certificate of Registration

ISO/IEC 27001:2013

Sertifika No
Certificate No
IS-190734

İlk Ücretsiz Tarih: Initial Registration Date: 19/02/2019	Yeniden Dönüşüm Tarih: Re-issue Date: —	Geçerlilik Tarihi: Expiry Date: 18/02/2020	İlk Tarih: First Date: 18/02/2012
---	---	--	---

ESEN PLASTİK SANAYİ VE TİCARET ANONİM ŞİRKETİ

Merkezi: A.O.S.B. Mustafa Kemal Atatürk Bulvarı No:69-71-73 ÇİĞLİ İlçesi TÜRKİYE
Şubesi: Hacı Sabancı O.S.B. Atatürk Bulvarı No:55 Sarıçam Adana TÜRKİYE

Bu sertifika, yukarıda adı geçen kurumun sisteminin, istenilen standartta sürdürülebilirlik durumunda ve Proks tarafından yapılmış en az bir kez yapılacak güncellenen denetimler sonucunda yukarıda belirtilen tarihte geçerlidir.

This certificate will remain current subject to the company maintaining its system to the required standard and the result of the surveillance audits, which will be carried out at the least once in a year.

Sertifikanın geçerliliği QR kod kullanılarak veya sertifika numarası ile <https://tbls.turkca.org.tr> adresinden kontrol edilebilir.
Validity of Certificate could be controlled by QR code or by Certificate no via <https://tbls.turkca.org.tr>

Ayrıca bilgiler Proks tarafından onaylanmıştır.
Has been approved by Proks.

Kapsam
Scope of Activities

Sert PVC Temiz ve Drenaj Su Boruları, Polietilen Borular, Korozyon Boruları ve Ek Parçaları, Cam Elverişli Plastik (CFR) Borular ve Ek Parçaları Üretim ve Satış, Gözetim ve Ölçü Ticaret İşlemleri ve Bu İşlemere İlişkin Eğitim, Değerlendirme, Muhasebe, Finans ve Bilgi İşleme Faaliyetlerinin Bilgi Varlıkları ile İlgili Yarı Otomatik Kurumun Amacıyla Kullanıldığı Gözetim Önemli Geçerli Uygulanabilirlik Bilgisi (SUA) - Versiyon: 80/08/002 - 02/01/2018



019766-17-4





Certificates and
Our documents

 TÜRKİYE CUMHURİYETİ
TİCARET BAKANLIĞI 

Yetkilendirilmiş Yükümlü Sertifikası
İSEN PLASTİK SAN.VE TİC.A.Ş.

Bu belge, 4458 sayılı Gümrük Kanununun 5/A maddesine istinaden yukarıda unvanı kayıtlı kişi adına, yetkilendirilmiş yükümlü statüsünün sağladığı hak ve kolaylıklardan yararlandırılmak üzere düzenlenmiştir.



Sertifika No: **TR/AEOF/19350005**

Ad Soyad **Nihal KINIK**
Unvan **Ege Gümrük ve
Dış Ticaret
Bölge Müdürü.**

EESENPLASTIK

www.esenplastik.com.tr





Izmir Plant:

Atatürk Organize Sanayi Bölgesi
10006 Sk. No:71 B.Çiğli - İzmir / TÜRKİYE
Tel: 0232 376 70 11 Fax: 0232 376 70 10

esen@esen.com
www.**esenplastik**.com.tr