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Dear Valued Customer,

Thank you very much for your interest in our company. Future Iron Pipes provides water networks infrastructure solutions that exceeds your requirements. our products portfolio includes externally coated black and galvanized steel pipes. External coating is 3LPE, 3LPP, FBE and FBP. in addition, black steel pipes are internally lined by cement mortar. In this catalogue you can find all information about our products and their applications. We are at your service. for further information please contact us at :

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www.fip.ps

Future Iron Pipes (FIP) is recognized as a key manufacturer of coated and lined steel pipes in Middle East and the Arab World. The company provides a wide range of external coating applications including 3LPE, 3LPP, FBE and FBP in compliance with national and international standards PS, AWWA, DIN, BS,ASTM and any other specific requirements.

The production of FIP has been recognized by its quality, accuracy, and reliability. Our brand, products, and services have been approved, selected, appreciated and accredited over time, assuring the highest quality measures to every client.

Originality, projection towards the future, dynamic relationships with market segments and constant development; that's what FIP stands for. We are fully prepared to meet the needs , demands generated by the expansion of water distribution systems, natural gas, oil pipelines and related projects.

Future Iron Pipes provides external anti-corrosive, 3 layered PE/PP coating according the international and Palestinian quality measures, plus internal cement mortar lining for pipes. Our capacities are always satisfying , and many times exceeding local demands. Established over 16000m^2 space, FIP utilizes a computerized and modern coating system, and a production capacity that exceeds an average of 1,500,000 linear meters of coated pipes per year. We serve our clients in pipe diameter range from 1/2"-16" (15 mm – 400 mm) and length ranges from 6.0 meters to 12.2 meters.

شركة المستقبل للأنابيب المعدنية:

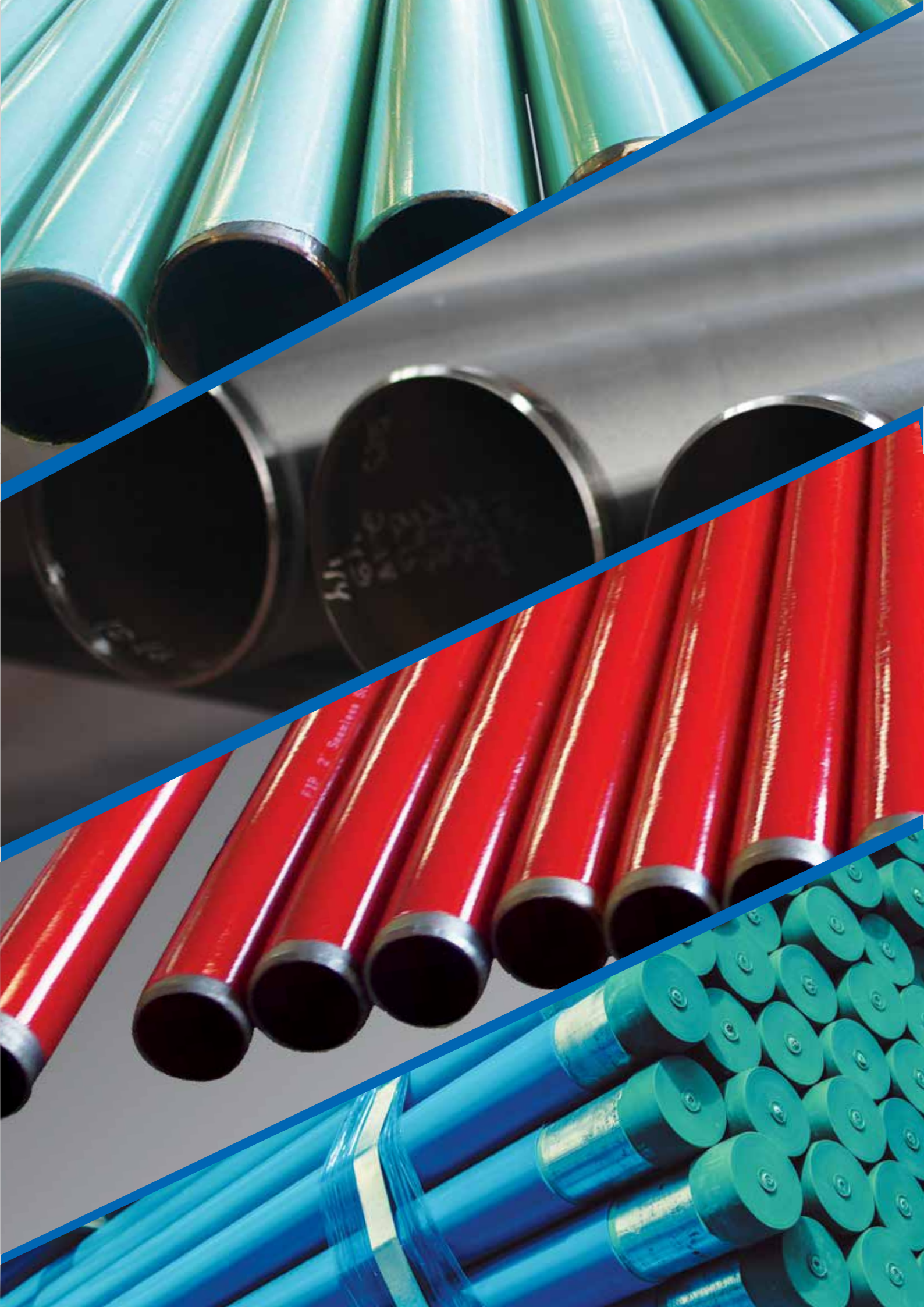
تأسست شركة المستقبل للأنابيب سنة 2008. وهي الشركة الوحيدة في فلسطين التي تقوم بعزل الأنابيب التي تتراوح أقطارها من 1/2" إلى 16" من الخارج بثلاث طبقات ومن الداخل بطبقه من الملاط الإسمنتي للأنابيب التي تتراوح أقطارها من 3" إلى 16" بالإضافة لطلاء الأنابيب بمادة الابوكسي من الخارج .

منتجاتنا تستخدم في مشاريع البنية التحية والتي تتضمن شبكات وخطوط المياه والغاز والمجاري (الصرف الصحي) والحريق وجميع الأعمال ذات الصلة.

الشركة حاصلة على العديد من الشهادات المحلية والعالمية التي تضمن لزبائننا منتجات ذات جودة عالية ومنها شهادة الجودة الفلسطينية (PS325) , شهادة إدارة الجودة العالمية (ISO9001:2008) . ومطابقة للمواصفة الأمريكية AWWA والألمانية DIN.

منتجات الشركة:

- أنابيب معزولة بثلاث طبقات من البولي ايثيلين /أو البولي بروبلين ومن الداخل بالملاط الإسمنتي(3LPE/3LPP).
- أنابيب مطلية ببودرة الابوكسي تحت التأثير الحراري للأنابيب المغمورة بالمياه أو السطحية (FBE).
- أنابيب مطلية ببودرة البوليستر تحت التأثير الحراري وذلك لأنظمة إطفاء الحريق (FBP).
- عزل وصلات الأنابيب بأنواعها المختلفة من الداخل بالملاط الإسمنتي (Steel Pipes Fittings).



Production standards :

Related standards and specifications

Origin	Standard	Description
External coating		
Palestinian	PS 325-6	Steel pipes with protective coatings –external extruded polyethylene coating –three layer coating
American	AWWA C215	Extruded polyethylene coatings for exterior of steel water pipelines
German	DIN 30670	Polyethylene coatings of steel pipes and fittings
British	BS EN ISO 21809-1:2011	Petroleum and natural gas industries. External coatings for buried or submerged pipelines used in pipeline transportation systems. Polyolefin coatings (3-layer PE and 3-layer PP)
German	DIN 30678	Polypropylene coatings for steel pipes
Internal cement lining		
Palestinian	PS 325-1	Steel pipes with protective coating-internal coating by cement mortar
American	AWWA C205	Cement–Mortar Protective Lining and Coating for Steel Water Pipe
External painting		
American	AWWA C210	Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
American	AWWA C213	Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines
Steel pipes		
Palestinian	PS186	Steel welded pipes for general use
Palestinian	PS141	Steel pipes suitable for screw threading
German	DIN2440	Steel tubes medium weight suitable for screwing
German	DIN 2441	Steel tubes; heavy-weight threaded pipes
American	ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
American	ASTM A106	Seamless Carbon Steel Pipe for High-Temperature Service
American	ASTM A795	Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
American	ASTM A589	Seamless and Welded Carbon Steel Water-Well Pipe
American	API 5L	Welded and Seamless pipe suitable for use in conveying gas, water, and oil in both the oil and natural gas industries
American	AWWA C200	Steel Water Pipe—6 In. (150 mm) and Larger
American	ASME / ANSI B36.10	welded and seamless wrought steel pipe
	SI 530	steel welded pipes for general use
	SI 103	Steel pipes suitable for screw threading
Jordanian	JS1832:2008 ASTM A106:2006	Standard specification for seamless carbon steel pipe for high -temperature service
Jordanian	JS 137-2006	Pipe-steel pipes welded and seamless used for gas and water
Quality management standard		
International	ISO 9001:2008	Quality management systems

*Please contact us for your special requirement out of our general production standards .

Coating and lining:

Definition, Types, and Applications

Future Iron pipes provides many steel pipes coating options including Polyethylene, Polypropylene, Epoxy, Polyester and Internal cement lining

Types of coating and lining :

- 3LPE :Three Layer Polyethylene Coating.
- 3LPP : Three Layer Polypropylene Coating.
- FBE: Fusion Bonded Epoxy Powder Coating.
- FBP: Fusion Bonded Polyester Powder Coating.
- Cement Mortar Lined Steel Pipe.

Fusion bonded epoxy / Polyester powder coating

Description:

FBE: Fusion Bonded Epoxy Powder coating
FBE is a high performance anti-corrosion coating that provides excellent protection for small and large diameter pipelines with moderate operating temperatures. The thickness of the FBE coating is up to 400 microns.
FBP: Fusion Bonded Polyester Powder coating
FBP is widely used in fire fighting piping systems applications. pipes are coated with polyester powder with a minimum thickness of 150 microns

Production stages :

Abrasive cleaning with steel grit/shot is required to achieve a surface purity grade of Sa 2 1/2 with a roughness of (40-90 µm). The steel must reach a temperature of 170-220C°.The FBE/P is deposited by an electro-static spray process. The coating cures quickly. Once cured, the pipe is cooled for safe handling and inspection.

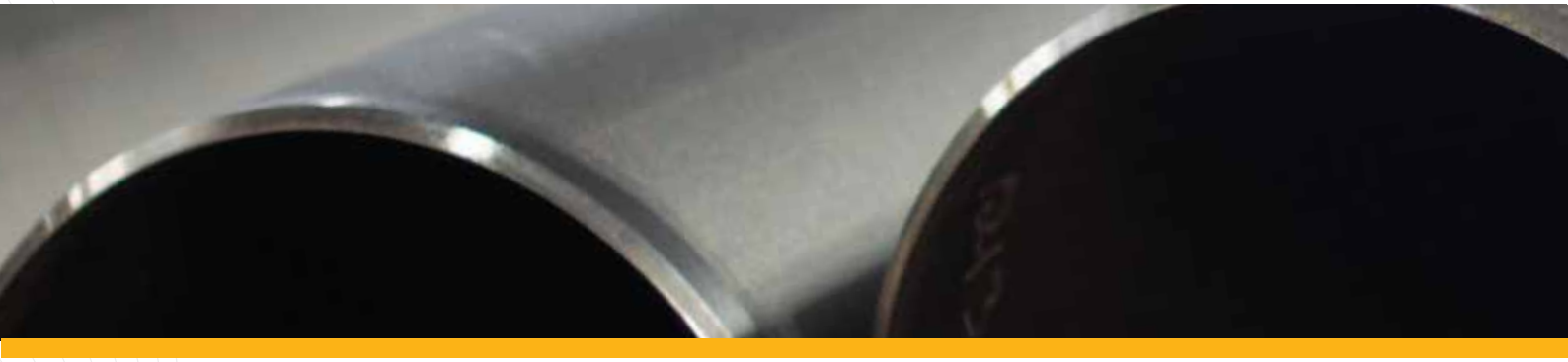
Three Layer Polyethylene / Polypropylene coating Description:

The 3-layered Polyethylene (3LPE) is a multilayer thermoplastic coating designed to provide maximum long term corrosion resistance and mechanical protection to steel pipes. This technology has the advantages of excellent adhesion, long term corrosion resistance, cathodic dispondment and impact resistances properties that are essential for maintaining pipelines integrity and durability.

The layers are composed of:

- Base layer (Epoxy): The Epoxy layer protects steel pipes, improves the pipes surface adhesion and resistance to cathodic dispondment.
- Adhesive layer: This layer improves the adhesion of the polyethylene layer to the epoxy layer and to strengthen its resistance to peeling.
- Polyethylene layer: Protects the previous layers from any mechanical damage or corrosion, it also works as an electric insulator to steel pipes.

Production stages :



1

First stage :

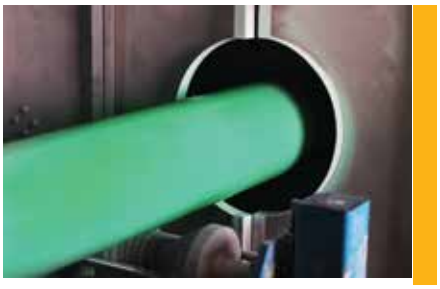
The surfaces that are to be coated shall be first thoroughly cleaned from any dirt ,rust and scales. the pipes surfaces are cleaned by blasting them with steel shot grit to a cleanliness degree of Sa 2 1/2

2

Second stage :

Cleaned pipes are then heated to 180-200 C

3



Third stage :

Special powder epoxy paint (FBE).This layer provides corrosion resistance to steel pipes by an electro-static spray process to a thickness larger than 60 microns.

4

Fourth stage :

Special adhesive is applied to pipe surfaces by extrusion method. the adhesive layer bonds the FBE layer with the PE layer.

5

Fifth stage :

Polyethylene/ Polypropylene is applied by extrusion method according to the specifications and technical requirement. Polyethylene layer ensures protection against mechanical damage and excellent protection against risks such as heat and UV layer.

The following table shows 3LPE external coating overall thickness :

Pipe size (inches)	Thickness(mm)		
	Normal	Medium	Large
Up to 4"	1.5	1.8	2.5
Larger than 4"-10"	1.8	2.0	2.7
Larger than 10"-16"	2.0	2.2	2.9

Data is in accordance with PS325 and DIN30670

6

Sixth stage :

pipes are cooled immediately after extrusion for safe handling and inspection

7

Seven stage :

coating ends are removed to facilitate the welding process of pipes ends

Marking:

Each pipe is marked with the following data

- Pipe manufacturer's code or name.
- Nominal Pipe Size (NPS)
- Wall thickness measured in mm.
- Grade of pipe.
- The word (3LPE).
- Coating thickness.
- Applicable standards.
- The date and hour of production (dd/ mm/yy, hh:mm).

Advantages of 3LPE systems:

- High resistance to penetration.
- High compressive and impact strength.
- High rigidity.
- High elasticity and resistance to tearing.
- High electric insulation.
- High resistance to chemicals and oxidization
- Withstanding high temperatures ;(PE resists up to 70C°, while PP resists up to 120C°.)

Did you know?

"3LPE coated pipes ensures an extended lifetime for steel pipes up to 50 years!!"

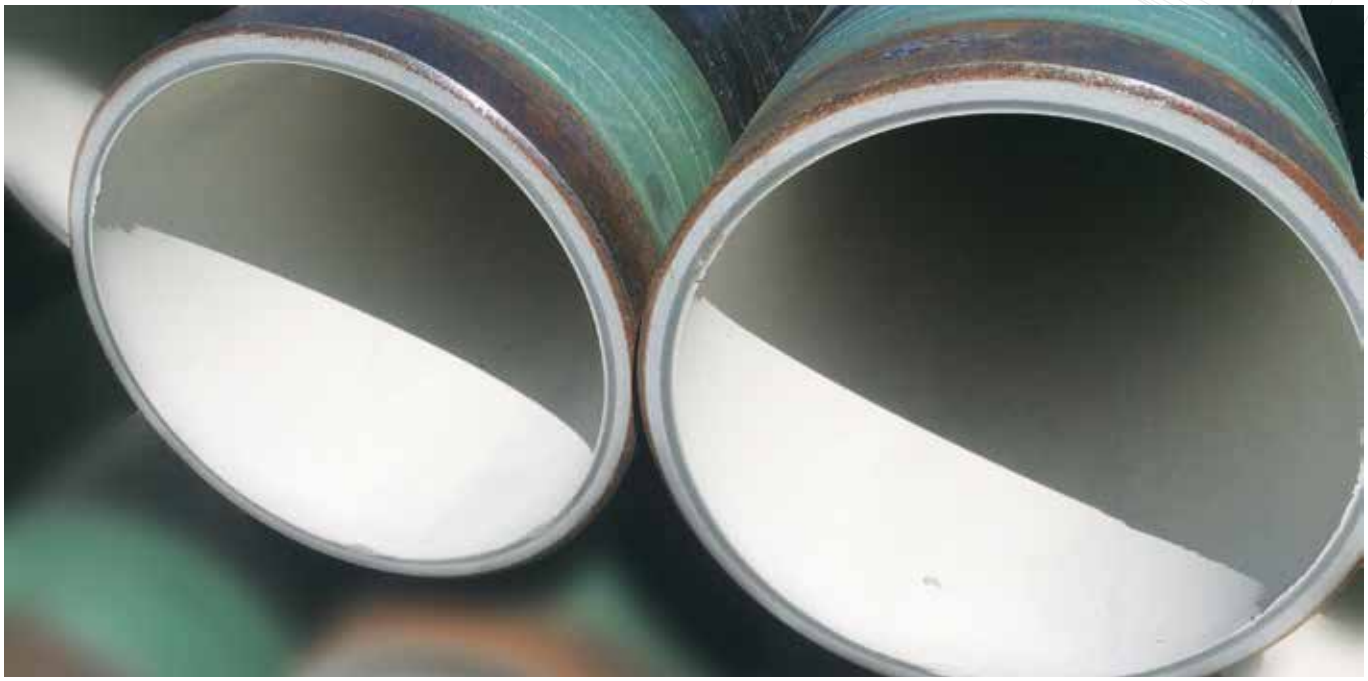
Cement Mortar Lining(CML)

Introduction :

The internal cement mortar lining provides protection to pipelines interior surface. in two ways. First, it is a "cement pipe within a steel pipe". Second, by creating a "Zone of Alkalinity". This zone between the cement lining and the pipe wall, neutralizes the corrosive properties of the liquid medium and blocks corrosion of the pipe wall. As a result effect, the "Zone of Alkalinity" serves as a second layer of defense against internal corrosion. Unlike other types of internal linings, which allow pipe corrosion to spread down the line once they are chipped or damaged in any spot, the cement lining prevents corrosion from spreading along the pipe wall.

Description:

Cement Mortar Lining (CML) is a centrifugally applied continuous lining of dense Portland cement mortar with a smooth and uniform finish. This product was developed to provide an economical form of internal corrosion and abrasion protection for potable water pipes.



Sulfate Resistance Cement (SRC) is primarily used when the nature of the environment is highly concentrated with sulfate that would generate several reactions that could attack the cement and damage it , such as sewage water and highly concentrated soils.

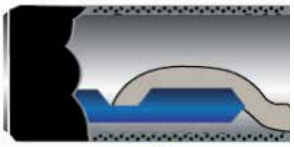
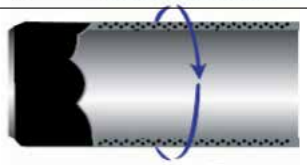
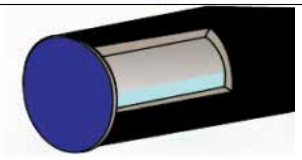
Advantages:

- Excellent durability to sulfate attack due to low C3A and low alkali content
- High strength.

Production stages

lining is applied by using a high-speed centrifugal process. this method assures, excellent quality control of cement-mortar lining. FIP produces cement lining products that are dense, smooth, uniform, well bonded to the pipe wall, and offer very little frictional resistance to water flow.

the production processes are summarized as shown

Stage	Description	Illustration
Cleaning	The internal surface of the pipe is cleaned from any mill residues or tabulations or any accumulation of dirt, rust or oil and grease.	
Lancing	The machine is calibrated to apply a specific amount of cement according to the pipe size and the required thickness of the coating and then the cement is applied to the pipe using a cement hose.	
Spinning	The pipe then is spun to distribute the cement uniformly using centrifugal spinning in this way the water to cement ratio is lower and the lining will have improved cement strength.	
Curing	After spinning the water is expelled from the pipe then the pipe is closed with a cap to ensure good hydration of the cement mortar, the humidity and temperature are controlled to maximize the strength of the mortar	

Lining Thickness

Pipe Size (inch)	Lining Thickness (mm)	Allowed Tolerance (mm)
3-6"	4	-1.0 , +2.0
8-10"	6	-1.5 , +2.0
12-22"	8	-1.5 , +3.0

According to PS325-1

Pipe Size (inch)	Lining Thickness(mm)	Allowed Tolerance (mm)
4-10"	6	-1.6, +3.2
11-23"	8	-1.6, +3.2

According to AWWA C205-07

Materials and Application

• Raw materials.

• Sand

Fine aggregate for cement mortar consists of sea washed sand, with a 100% percent passed Sieve No. 4. Sand provided to the plant is usually sieved in order to prevent any larger size stones from entering the mixture. When the source of material is changed, new sieve test is conducted.

• Cement

Portland cement / Sulfate resistance cement.

The used cement is stored in a weather-tight, dry, and well ventilated conditions.

• Water

The water used for cement mortar and for curing linings shall conform to the applicable requirements of ASTM C94. The used water is fresh potable drinking water, free from injurious amounts of oil, acid, strong alkalies, salts and organic matter.

Mixing and application

Preparations:

Before lining, surfaces to be lined shall be cleaned to assure the removal of any impurities and mill residues that could affect the adherence between the lining and the pipe internal surface. The mixture shall be homogenous and free of any impurities that affect the lining quality.

Placement:

During the application of the lining by a spinning machine, the entire quantity of mortar required for the completion of the lining of the pipe section shall be placed without interruption. After the cement mortar is distributed to a uniform thickness, the spinning speed is increased to produce a dense mortar with a smooth surface. Surplus water is removed by tilting the pipe when moving on the outbound rack. The lining at the ends of the pipe section shall be left square and uniform with respect to the longitudinal axis of the pipe, and the lining holdbacks shall be as specified by the purchaser for the type of joint required. The default ends have no holdbacks.

Curing:

Immediately after the completion of spinning, the pipe sections are moved to a curing area. Care shall be exercised to prevent damage to the lining. The total curing period shall be equivalent to 96 hr of moist cure and the minimum, pipe ends are covered with plastic during the curing period.

Sampling and testing:

Compression test samples of (10cm x 10cmx10cm) are prepared to achieve the quality control requirements of the used standards or the client requirements.

How to Order ?

Application	Steel Pipe					External Coating			Internal Lining	
	Size	Steel Grade	Standards	Preprocess	Wall Thick-ness	Type	Thickness (mm)	Standard	Internal Lining	Standard
Waterworks	"3	GRB	ASTM A53	Black Steel	3.96mm	3LPE	1.8mm	PS325-6	CML	PS325-1
→ Waterworks/ Waste Water Pipelines	1/2"-16"	→ GRA	Refer to Data Tables [1]	→ Black Steel	Refer to Data Tables [2]	→ 3LPE	→ 1.5-2.9	→ DIN30670	→ CML [3]	→ PS325-1
→ Oil & Gas Pipelines		→ GRB		→ Galvanized		→ 3LPP	→ 1.5-2.9	→ PS325-6	→ SRC [4]	→ AWWA C215
→ Fire Fighting Systems		→ X42				→ FPE	→ Up to 0.4	→ AWWA	→ No Lining	
→ Industrial Products						→ FPP	→ Up to 0.4	→ C215		

1 Related Standards and Specifications
2 Mechanical, and Statistical Data of Steel Pipes
3 Cement Mortar Lining
4 Sulfate Resistance Cement

Quality control

The quality control starts with metallographic inspection of raw material and continues up to shipping stage. Quality control processes , final inspection and laboratory tests are done in accordance with the following national and international standards.

1. PS 325
2. AWWA C215-04
3. DIN 30670
4. AWWA C205-07

Tests and inspections

1

Cleanliness and roughness test.

2

Thickness of overall coating .

3

Coating continuity.

4

Wet & Dry cement thickness .

5

Wet & Dry cement surface .

Laboratory tests:

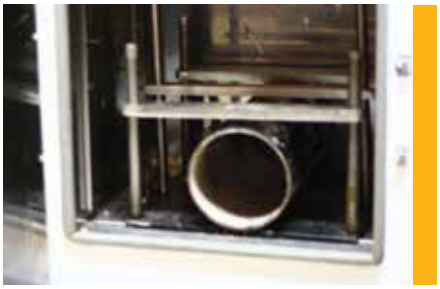
1

Peeling test.

2

Impact test.

3



Penetration assessment.

4

Elongation test.

- **Cement mortar - lining laboratory tests**
- Compressive strength.
- Water /Cement ratio after centrifugal applying of cement –mortar.
- Cement /Sand ratio.

Our quality control plan is summarized as follows :

Type of test	**Method**	**Frequency**
Pipe surface	visual	every pipe
Blast cleaning and roughness	using special measuring device	twice per shift
Pipe temperature	heat sensor	continuously
Appearance and continuity	visual	every pipe
Coating thickness testing	thickness gauge	three times per shift
Cut back	meter tape	once per shift
Holiday inspection	on-line holiday detector	100%
Impact resistance	according to standards	once per order
Adhesion (Peeling resistance) test	according to standards	once per order
Indentation test	according to standards	once per order
Elongation test	according to standards	raw material change/ customer request

Mechanical, and statistical data of steel pipes:

Pipes nominal diameter	DN designator	Outside Dia	Wall thickness		Nominal weight (Kg/m)			
					BPE	BTC	GPE	GTC
Inch	mm	mm	Inch	mm				
1/2	15	21.3	0.104	2.65	1.22	1.23	1.27	1.28
3/4	20	26.7	0.104	2.65	1.58	1.59	1.65	1.66
1	25	33.4	0.128	3.25	2.44	2.46	2.53	2.55
1 1/4	32	42.2	0.128	3.25	3.14	3.17	3.26	3.29
1 1/2	40	48.3	0.128	3.25	3.61	3.65	3.74	3.78
2	50	60.3	0.144	3.65	5.10	5.17	5.27	5.34
3	80	88.9	0.159	4.05	8.47	8.64	8.73	8.90
4	100	114.3	0.177	4.50	12.10	12.40	12.44	12.74
6	150	168.3	0.191	4.85	19.20	19.80	19.70	20.30

BPE: Black Plain End
BTC: Black Threaded Coupled
GPE: Galvanized Plain End
GTC: Galvanized Threaded Coupled
Hydro test at a pressure of 50 bar.
[1]:Grade B

(DIN 2440 / SI 103[1] / ASTM A53 / PS 141[1])

Mechanical, and statistical data of steel pipes :

Pipes nominal diameter	DN designator	Outside dia	Wall thickness		Nominal weight (Kg/m)				Test pressure(Bar)[1]
Inch	mm	mm	Inch	mm	BPE	BTC	GPE	GTC	
1/2	15	21.3	0.109	2.77	1.27	1.27	1.33	1.33	48.0
3/4	20	26.7	0.113	2.87	1.69	1.69	1.75	1.75	48.0
1	25	33.4	0.133	3.38	2.50	2.50	2.60	2.60	48.0
1 1/4	32	42.2	0.140	3.56	3.39	3.40	3.51	3.52	76.0
1 1/2	40	48.3	0.145	3.68	4.05	4.04	4.19	4.20	76.0
2	50	60.3	0.154	3.91	5.44	5.46	5.62	5.64	172.0
3	80	88.9	0.216	5.49	11.29	11.35	11.55	11.61	172.0
4	100	114.3	0.237	6.02	16.07	16.23	16.44	16.63	151.0
6	150	168.3	0.280	7.11	28.26	28.58	28.81	29.13	124.0

BPE: Black Plain End
BTC: Black Threaded Coupled
GPE: Galvanized plain end
GTC: Galvanized Threaded Coupled
1:Grade B

(ASTM A 53 SCH 40) ERW / Seamless

Black Steel Pipes

Outside Dia		Test Pressure(Bar)			Allowable Working Pressure(Bar)			Wall Thickness		C-M thickness	Weight			Flow Data	
											pipe	pipe+C-M	Water content	pipe C-M I.D	Cross section
Inch	mm	GRA	GRB	X42	GRA	GRB	X42	Inch	mm	mm	Kg	Kg	Kg	Cm	Cm^2
3	88.9	111	129	156	92	106	129	5/32	3.97	4	8.3	10.5	4.2	7.3	42
		133	155	187	111	129	155	3/16	4.76	4	9.9	12.1	4	7.1	40
		155	181	207	129	151	181	7/32	5.56	4	11.4	13.6	3.8	7.0	38
4	114.3	86	101	122	72	84	101	5/32	3.97	4	10.8	13.8	7.6	9.8	76
		103	121	146	87	101	121	3/16	4.76	4	12.9	15.8	7.4	9.7	74
		121	141	169	100	117	141	7/32	5.56	4	14.9	17.8	7.1	9.5	71
		138	161	194	115	134	161	1/4	6.35	4	16.9	19.7	6.9	9.4	69
6	168.3	59	68	102	44	57	68	5/32	3.97	4	16.1	20.5	18.2	15.2	182
		70	82	123	58	68	82	3/16	4.76	4	19.2	23.7	17.8	15.1	178
		82	96	144	69	80	96	7/32	5.56	4	22.3	26.7	17.5	14.9	175
		94	109	164	78	91	109	1/4	6.35	4	25.4	29.7	17.1	14.8	171
		105	123	184	87	102	123	9/32	7.14	4	28.4	32.7	16.7	14.6	167
		117	137	205	98	114	137	5/16	7.94	4	31.4	35.7	16.4	14.4	164
		141	164	207	117	137	164	3/8	9.53	4	37.3	41.5	15.7	14.1	157
8	219.1	45	52	79	38	44	52	5/32	3.97	6	21.1	29.9	31.1	19.9	311
		54	63	94	45	52	63	3/16	4.76	6	25.2	34.0	30.7	19.8	307
		63	73	110	52	61	73	7/32	5.56	6	29.28	38.0	30.2	19.6	302
		72	84	126	60	70	84	1/4	6.35	6	33.3	42.0	29.7	19.4	297
		81	94	142	69	79	94	9/32	7.14	6	37.3	46.0	29.2	19.3	292
		90	105	157	75	87	105	5/16	7.94	6	41.3	49.9	28.7	19.1	287
		108	126	189	90	105	126	3/8	9.53	6	49.2	57.6	27.8	18.8	278
		126	147	207	105	122	147	7/16	11.11	6	57	65.3	26.8	18.5	268

(ASTM A53 / ASTM A106 / API 5L / (ASME / ANSI B36.10) / SI 530 / PS186)

Outside Dia		Test Pressure(Bar)		Allowable Working Pressure (Bar)		Wall Thickness		C-M thickness	Weight			Flow Data	
									pipe	pipe+C-M	water Content	pipe C-M I.D	Cross section
Inch	mm	GRB	X42	GRB	X42	Inch	mm	mm	Kg	Kg	Kg	Cm	Cm^2
10	273.1	42	63	35	42	5/32	3.97	6	26.3	37.6	50.3	25.3	503
		50	76	42	51	3/16	4.76	6	31.5	42.7	49.7	25.2	497
		59	88	49	59	7/32	5.56	6	36.7	47.7	49.1	25.0	491
		67	101	56	67	1/4	6.35	6	41.8	52.8	48.4	24.8	484
		76	114	63	76	9/32	7.14	6	46.8	57.8	47.8	24.7	478
		84	126	70	84	5/16	7.94	6	51.9	62.8	47.2	24.5	472
		101	152	84	101	3/8	9.53	6	61.9	72.7	46.0	24.2	460
		118	177	98	118	7/16	11.11	6	71.8	82.4	44.8	23.9	448
		134	207	112	135	1/2	12.7	6	81.5	92	43.6	23.6	436
12	323.9	36	53	30	35	5/32	3.97	8	31.3	49.1	70.6	30.0	706
		43	64	35	43	3/16	4.76	8	37.5	55.2	69.9	29.8	699
		50	75	41	50	7/32	5.56	8	43.6	61.2	69.2	29.7	692
		57	85	47	57	1/4	6.35	8	49.7	67.2	68.4	29.5	684
		64	96	53	64	9/32	7.14	8	55.8	73.2	67.7	29.4	677
		71	107	59	71	5/16	7.94	8	61.8	79.2	67.0	29.2	670
		85	128	71	85	3/8	9.53	8	73.8	91	65.5	28.9	655
		99	149	83	99	7/16	11.11	8	85.7	102.7	64.1	28.6	641
		113	193	95	114	1/2	12.7	8	97.5	114.2	62.7	28.2	627
14	355.6	32	48	27	32	5/32	3.97	8	34.4	54.1	86.4	33.2	864
		39	58	32	39	3/16	4.76	8	41.2	60.7	85.6	33.0	856
		45	68	38	45	7/32	5.56	8	48	67.4	84.7	32.8	847
		52	78	43	52	1/4	6.35	8	54.7	74.1	83.9	32.7	839
		58	87	48	58	9/32	7.14	8	61.4	80.7	83.1	32.5	831
		65	97	54	65	5/15	7.94	8	68.1	87.2	82.3	32.4	823
		78	116	65	78	3/8	9.53	8	81.3	100.3	80.7	32.1	807
		90	136	75	91	7/16	11.11	8	94.4	113.2	79.1	31.7	791
		103	155	86	103	1/2	12.7	8	107.4	126	77.5	31.4	775
16	406.4	28	42	24	28	5/32	3.97	8	39.4	62	114.9	32.8	1149
		34	51	28	34	3/16	4.76	8	47.2	69.7	113.9	38.1	1139
		40	59	33	40	7/32	5.56	8	54.9	77.3	113.0	37.9	1130
		45	68	38	45	1/4	6.35	8	62.6	84.9	112.0	37.8	1120
		51	76	42	51	9/32	7.14	8	70.3	92.5	111.1	37.6	1111
		57	85	47	57	5/16	7.94	8	78	100.1	110.2	37.5	1102
		68	102	57	68	3/8	9.53	8	93.2	115.2	108.3	37.1	1083
		79	119	66	79	7/16	11.11	8	108.3	130.1	106.5	36.8	1065

(ASTM A53 / ASTM A106 / API 5L / (ASME / ANSI B36.10) / SI 530 / PS186)

Mechanical, and statistical data of steel pipes(Cont): fire fighting pipes

Dimensions, Weights, and Test pressure for light weight fire protection pipe—Schedule 10(A)

Dimensions & Weights							Test pressure			
NPS Desingnator	Outside Diameter		Nominal wall thickness		Plain end pipes weight		Furnace -welded		Seamless and ERW	
	in	mm	in	mm	lb/ft	Kg/m	Psi	MPa	Psi	MPa
3/4	1.050	26.7	0.083	2.11	0.86	1.28	500	3.45	700	4.83
1	1.315	33.4	0.109	2.77	1.41	2.09	500	3.45	700	4.83
11/4	1.660	42.2	0.109	2.77	1.81	2.69	500	3.45	1000	6.89
11/2	1.900	48.3	0.109	2.77	2.09	3.11	500	3.45	1000	6.89
2	2.375	60.3	0.109	2.77	2.64	3.93	500	3.45	1000	6.89
21/2	2.875	73.0	0.120	3.05	3.53	5.26	500	3.45	1000	6.89
3	3.500	88.9	0.120	3.05	4.34	6.46	500	3.45	1000	6.89
31/2	4.000	101.6	0.120	3.05	4.98	7.41	500	3.45	1200	8.27
4	4.500	114.3	0.120	3.05	5.62	8.37	500	3.45	1200	8.27
5	5.563	141.3	0.134	3.4	7.78	11.58	B	B	1200	8.27
6	6.625	168.3	0.134	3.4	9.30	13.85	B	B	1000	6.89
8	8.625	219.1	0.188C	4.78	16.96	25.26	B	B	800	5.51
10	10.75	273.1	0.188C	4.78	21.23	31.62	B	B	700	4.83
A	Schedule 10 corresponds to Schedule 10S as listed in ANSI B 36.19 for NPS 3/4 through 6 only.									
B	Furnace-welded pipe is not made in sizes larger than NPS 4.									
C	Not Schedule 10.									

Dimensions, weights, test pressures for standard-weight fire protection pipe—Schedule 30 and Schedule 40

Dimensions & Weights									Test Pressure			
NPS Desingnator	Outside diameter		Nominal wall thickness		Plain end		Threaded with couplings B		Furnace -welded		Seamless and ERW	
	in	mm	in	mm	lb/ft	Kg/m	lb/ft	Kg/m	psi	Mpa	psi	Mpa
1/2	0.840	21.3	0.109	2.77	0.85	1.27	0.85	1.27	700	4.83	700	4.83
3/4	1.050	26.7	0.113	2.87	1.13	1.69	1.13	1.68	700	4.83	700	4.83
1	1.315	33.4	0.133	3.38	1.68	2.5	1.68	2.5	700	4.83	700	4.83
11/4	1.660	42.2	0.140	3.56	2.27	3.39	2.28	3.4	1000	6.89	1000	6.89
11/2	1.900	48.3	0.145	3.68	2.72	4.05	2.73	4.07	1000	6.89	1000	6.89
2	2.375	60.3	0.154	3.91	3.66	5.45	3.69	5.5	1000	6.89	1000	6.89
21/2	2.875	73.0	0.203	5.16	5.80	8.64	5.83	8.68	1000	6.89	1000	6.89
3	3.500	88.9	0.216	5.49	7.58	11.29	7.62	11.35	1000	6.89	1000	6.89
31/2	4.000	101.6	0.226	5.74	9.12	13.58	9.21	13.71	1200	8.27	1200	8.27
4	4.500	114.3	0.237	6.02	10.80	16.09	10.91	16.25	1200	8.27	1200	8.27
5	5.563	141.3	0.258	6.55	14.63	21.79	14.82	22.07	C	C	1200	8.27
6	6.625	168.3	0.280	7.11	18.99	28.29	19.20	28.6	C	C	1200	8.27
8	8.625	219.1	0.277A	7.04	24.72	36.82	25.57	38.09	C	C	1200	8.27
10	10.750	273.1	0.307A	7.8	34.27	51.05	35.78	53.29	C	C	1000	6.89
A	NPS 1/2 through 6—Schedule 40; NPS 8 and 10—Schedule 30.											
B	Based on 20-ft (6.1-m) lengths											
C	Furnace-welded pipes are not made in sizes larger than NPS 4.											

(ASTM A795)

Heat shrinkable sheets

Heat Shrinkable Sheets:

Heat shrinkable sheets are used to cover the welding area between two pipes in order to make sure that no corrosion is permitted in the area of welding to ensure full protection of coated pipes.
Future Iron Pipes recommends the use of these sheets.

Basic installation of Shrinkable Sheets:

- Clean the area with steel wire brush, including 10 cm of the PE coated pipes ends.
- Heat the pipe with a gas burner to 70-75C^{o}.
- Apply shrinkable sheets and make sure to press all over the pipe while heating. Finally heat the adhesive layer at the end of the sheet.

Advantages of shrinkable sheets:

- Field friendly.
- No high pre-heat required.
- Easy to install.
- Low cost.

Handling and Storage:

A reasonable amount of care in handling the pipes should be taken during stockpiling. necessary measures are taken to ensure that pipes will not be dropped, dragged, or bumped against other pipes or objects. Other items, such as fittings and accessories shall be stored in a convenient area away from construction traffic, protected from damage and theft. Safety precautions shall be taken during jobsite storage and stockpiling. Coated pipes and fittings shall be moved using a crane with a nylon sling or cushioned cable for safe handling.

Handling:

Pipes with beveled ends shall be placed in an even and clean ground preventing any type of dirt or stones to become in contact with the pipes. This can be assured by using wooden stands covered with rubber to protect the coating from any accidental impacts.

Pipes lifting and transportation must be done by using soft non-metallic grips to bind the pipes without damaging the coatings.

Storing:

Pipes must be stored in a way that assures minimum movement of thier bundles.

Packing:

The pipes are packed individually or as bundles to achieve full protection and safe handling.

Bases and separators:

FIP recommends the following table for proper storage of coated pipes.

Pipe size range	Number of separators (layers between pipes)	
	With internal lining	Without internal lining
60.5-168.3 mm	10	12
219.1-406.4 mm	5	8

Weight (tons)	No. of wooden bases used
<10	2
10-20	4
>20	6

The minimum distance between wooden bases used (for 12.2m length pipes) must be 4 meters so that the pipes' weight is distributed evenly on the bases. The below photo illustrates the way they must be placed.

It must be taken into consideration that the width of the wooden bases and separators must be at least 100 mm.

Lifting:

Pipes lifting must always be horizontal to overcome any unexpected slippage or failure. It's important not to use chains, gears or cables to lift the pipes since it may cause undesired damage. Rubber or plastic coated slings are recommended for lifting the pipes.

Using a Forklift:

It's possible to use a forklift to lift the pipes, but there are several considerations that must be done to assure no damages during lifting using forklifts.

1- The fork surface must be wide and clean.
2- Pipes products may not be pushed with the forklift.
3- The fork surface must be covered with rubber to avoid damages during lifting
4- Place the forks of the forklift under the bundle in a way that assures balance of the bundles.
5- Calibrate the speed so that the pipes don't roll on the forks surface.

Transporting:

The transportation may be done via trucks, trains or ships and the following must be insured:

- Make sure that there is no abrasion between the pipes or between the pipes and the truck bars; rubber or plastic may be used to cover the bars if necessary. Bases and separators must be used to assure pipes stability during transportation.
- Plastic cabs are used to close the ends of the pipes to avoid any impurities.
- The maximum number of pipes that are permitted to be loaded must be according to the following table:

Size		Pipes per trailer
Outside diameter		Number of coated pipes
inch	mm	
2	60.3	800
3	88.9	221
4	114.3	154
6	168.3	81
8	219.1	54
10	273.1	35
12	323.9	27
16	406.1	14

Instructions to unloading personnel at delivery site:

1. Make sure that the truck is parked on level ground. Engage hand brakes and chock wheels.
2. The trailer's chains or straps shall be removed after checking that the load has not shifted and stable.
3. make sure that the forklift have a capacity rating that is sufficient to handle the load.
4. To prevent possible injury or damage the forks should slowly enter the pack between the top and bottom boards of the pallet.
5. Avoid unnecessary standing on the load. stay away from dangerous area during loading and unloading.
6. Do not use backhoes, end loaders or other handling equipment to push or pull the load off the trailer.

Steel pipe fittings

Future Iron Pipes provides all required fittings and accessories related to pipe installation, designed and manufactured to meet the client requirements .

Lining of fittings

The fittings are lined with cement mortar according to AWWA C205

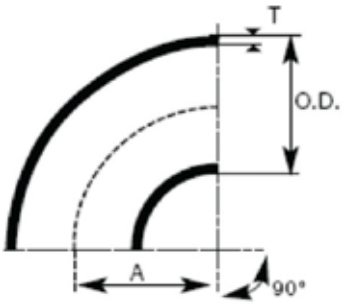
Standards:

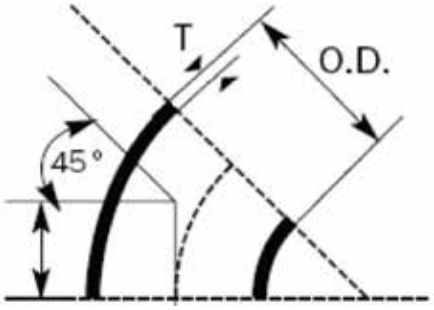
Steel pipes fittings:

ASTM A234 / A234M: Piping fittings of wrought carbon steel and alloy steel for moderate and high temperature service

Internal cement lining:

AWWA C205: Cement–mortar protective lining and coating for steel water pipe

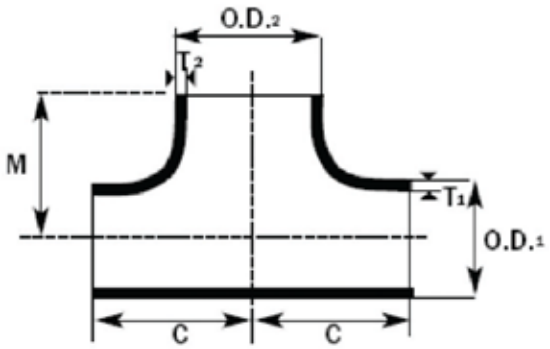




Long radius elbows

Nominal size(in)	Outside diameter(mm)	Center to end (A)		Wall thickness (mm)(T)								
		90 deg . Elbows	45 deg. Elbows	SCH10	SCH20	SCH30	STD	SCH40	SCH60	XS	SCH80	SCH100
2	60.3	76	35	2.77		3.18	3.91	3.91		5.54	5.54	
3	88.9	114.3	50.8	3.05		4.78	5.49	5.49		7.62	7.62	
4	114.3	152.4	63.5	3.05		4.78	6.02	6.02		8.56	8.56	
6	168.27	228.6	95.25	3.04			7.11	7.11		10.97	10.97	
8	219.08	304.8	127	3.76	6.35	7.04	8.18	8.18	10.31	12.7	12.7	15.09
10	273.05	381	158.75	4.19	6.35	7.8	9.27	9.27	12.7	12.7	15.09	18.26
12	323.85	457.2	190.5	4.57	6.35	8.38	9.53	10.31	14.27	12.7	17.48	21.44
14	355.6	533.4	222.25	6.35	7.92	9.53	9.53	11.13	15.09	12.7	19.05	23.83
16	406.4	609.6	254	6.35	7.92	9.53	9.53	12.7	16.66	12.7	21.44	26.19

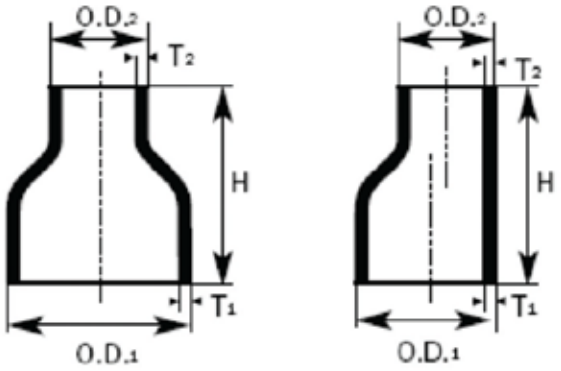
(ASTM A234 / A234M)



Reducing tee

Nominal size (in)	Outside diameter at bevel(mm)		Center to end (mm)		Wall thickness (mm)									
					SCH10		STD		SCH40		XS		SCH80	
	D1	D2	C	M	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
3×2	88.90	60.30	85.85	76.20	3.05	2.77	5.49	3.91	5.49	3.91	7.62	5.54	7.62	5.54
4×2	114.30	60.30	104.90	88.90	3.05	2.77	6.02	3.91	6.02	3.91	8.56	5.54	8.56	5.54
4×3	114.30	88.90	104.90	98.55	3.05	3.05	6.02	5.49	6.02	5.49	8.56	7.62	8.56	7.62
6×3	168.27	88.90	143.00	123.95	3.40	3.05	7.11	5.49	7.11	5.49	10.97	7.62	10.97	7.62
6×4	168.27	114.3	143.00	130.30	3.40	3.05	7.11	6.02	7.11	6.02	10.97	8.56	10.97	8.56
8×4	219.08	114.3	177.80	155.70	3.76	3.05	8.18	6.02	8.18	6.02	12.70	8.56	12.7	8.56
8×6	219.08	168.27	177.80	168.40	3.76	3.40	8.18	7.11	8.18	7.11	12.70	10.97	12.7	10.97
10×6	273.05	168.27	215.90	193.80	4.19	3.40	9.27	7.11	9.27	7.11	12.70	10.97	15.09	10.97
10×8	273.05	219.08	215.90	203.20	4.19	3.76	9.27	8.18	9.27	8.18	12.70	12.70	15.09	12.70
12×6	323.85	168.27	254.00	219.20	4.57	3.40	9.53	7.11	10.31	7.11	12.70	10.97	17.48	10.97
12×8	323.85	219.08	254.00	229.00	4.57	3.76	9.53	8.18	10.31	8.18	12.70	12.70	17.48	12.70
12×10	323.85	273.05	254.00	241.30	4.57	4.19	9.53	9.27	10.31	9.27	12.70	12.70	17.48	15.09
14×6	355.6	168.27	279.40	238.00	6.35	3.40	9.53	7.11	11.13	7.11	12.70	10.97	19.05	10.97
14×8	355.6	219.08	279.40	247.65	6.35	3.76	9.53	8.18	11.13	8.18	12.70	12.70	19.05	12.70
14×10	355.6	273.05	279.40	257.00	6.35	4.19	9.53	9.27	11.13	9.27	12.70	12.70	19.05	15.09
14×12	355.6	323.85	279.40	270.00	6.35	4.57	9.53	9.53	11.13	10.31	12.70	12.70	19.05	17.48
16×6	406.4	168.27	304.8	264.00	6.35	3.40	9.53	7.11	12.7	7.11	12.7	10.97	21.474	10.97
16×8	406.4	219.08	304.8	273.00	6.35	3.76	9.53	8.18	12.7	8.18	12.7	12.70	21.474	12.70
16×10	406.4	273.05	304.8	282.70	6.35	4.19	9.53	9.27	12.7	9.27	12.7	12.70	21.474	15.09
16×12	406.4	323.85	304.8	295.40	6.35	4.57	9.53	9.53	12.7	10.31	12.7	12.70	21.474	17.48
16×14	406.4	355.60	304.8	304.80	6.35	6.35	9.53	9.53	12.7	11.13	12.7	12.70	21.474	19.05

(ASTM A234 / A234M)



Concentric and eccentric reducers

Nominal size(in)	Outside diameter at bevel(mm)		Wall thickness (mm)										Length(H)
	OD1	OD2	SCH10		STD		SCH40		XS		SCH80		
			T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	
3×2	88.9	60.3	3.05	2.77	5.49	3.91	5.49	3.91	7.62	5.54	7.62	5.54	88.90
4×2	114.3	60.3	3.05	2.77	6.02	3.91	6.02	3.91	8.56	5.54	8.56	5.54	101.60
4×3	114.3	88.9	3.05	3.05	6.02	5.49	6.02	5.49	8.56	7.62	8.56	7.62	101.60
6×3	168.27	88.9	3.40	3.05	7.11	5.49	7.11	5.49	10.97	7.62	10.97	7.62	139.70
6×4	168.27	114.3	3.40	3.05	7.11	6.02	7.11	6.02	10.97	8.56	10.97	8.56	139.70
8×4	219.08	114.3	3.76	3.05	8.18	6.02	8.18	6.02	12.70	8.56	12.7	8.56	152.40
8×6	219.08	168.27	3.76	3.40	8.18	7.11	8.18	7.11	12.70	10.97	12.7	10.97	152.40
10×6	273.05	168.27	4.19	3.40	9.27	7.11	9.27	7.11	12.70	10.97	15.09	10.97	177.80
10×8	273.05	219.08	4.19	3.76	9.27	8.18	9.27	8.18	12.70	12.70	15.09	12.70	177.80
12×6	323.85	168.27	4.57	3.40	9.53	7.11	10.31	7.11	12.70	10.97	17.48	10.97	203.20
12×8	323.85	219.08	4.57	3.76	9.53	8.18	10.31	8.18	12.70	12.70	17.48	12.70	203.20
12×10	323.85	273.05	4.57	4.19	9.53	9.27	10.31	9.27	12.70	12.70	17.48	15.09	203.20
14×6	355.6	168.27	6.35	3.40	9.53	7.11	11.13	7.11	12.70	10.97	19.05	10.97	330.20
14×8	355.6	219.08	6.35	3.76	9.53	8.18	11.13	8.18	12.70	12.70	19.05	12.70	330.20
14×10	355.6	273.05	6.35	4.19	9.53	9.27	11.13	9.27	12.70	12.70	19.05	15.09	330.20
14×12	355.6	323.85	6.35	4.57	9.53	9.53	11.13	10.31	12.70	12.70	19.05	17.48	330.20
16×6	406.4	168.27	6.35	3.40	9.53	7.11	12.7	7.11	12.7	10.97	21.474	10.97	355.60
16×8	406.4	219.08	6.35	3.76	9.53	8.18	12.7	8.18	12.7	12.70	21.474	12.70	355.60
16×10	406.4	273.05	6.35	4.19	9.53	9.27	12.7	9.27	12.7	12.70	21.474	15.09	355.60
16×12	406.4	323.85	6.35	4.57	9.53	9.53	12.7	10.31	12.7	12.70	21.474	17.48	355.60
16×14	406.4	355.6	6.35	6.35	9.53	9.53	12.7	11.13	12.7	12.70	21.474	19.05	355.60

(ASTM A234 / A234M)

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