

Steel Reinforced Polyethylene Plastic Composite Pipe

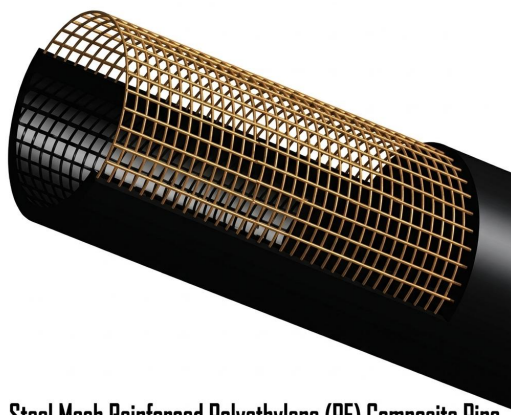
Product Introduction

Executive Standards:

HG/T 3690-2022: Steel reinforced polyethylene plastic composite pipes for industrial use

CJ/T 123-2016: Steel reinforced polyethylene plastic pipes for water supply

CJ/T 125-2014: Steel reinforced polyethylene plastic pipes for gas



Steel Mesh Reinforced Polyethylene (PE) Composite Pipe

Steel reinforced polyethylene plastic composite pipe is a new type of double-sided anti-corrosion pressure pipe, continuous formed on an extrusion production line, using high-quality low-carbon steel wire mesh as the reinforcement and pipe-grade polyethylene as the matrix.

Product Characteristics

Corrosion and Wear Resistance

The pipe-grade polyethylene used is a crystalline non-polar material with very stable chemical properties. It resists various chemical media erosions, has no electrochemical corrosion, and its wear resistance is 4 times that of steel pipes.

Sanitary Performance

The crystalline non-polar material is chemically stable. Its sanitary and safety indicators comply with GB9687-1988 "Hygienic standard for polyethylene products used as food packaging" and GB/T17219-1998 "Safety evaluation standard for drinking water distribution equipment and protective materials".

Smooth Inner Wall, Low Flow Resistance

It adopts an inner sizing process, making the inner surface smoother than steel pipes. The absolute equivalent roughness is 0.01mm (compared to 0.2mm for steel pipes), significantly increasing the flow capacity. It does not scale or wax, providing obvious energy-saving effects for long-term operation.

Long-term Hydrostatic Strength

Long-term hydrostatic strength tests conducted by the BROUTMAN Laboratory in Chicago, USA, according to ASTM D2837, D1598, and D1599 standards show that at 23°C, 60°C, and 80°C, the creep resistance and failure strength are far higher than pure plastic pipes of the same size.

Resistance to Rapid Crack Propagation and Environmental Stress Cracking

Due to the annular steel wire mesh, the radial load capacity of the composite pipe is greatly enhanced, thereby improving the resistance to rapid crack propagation and environmental stress cracking of the pipe wall.

Product Specifications (Main Dimensions)

Nominal Inner Diameter (DN/mm)	Inner Diameter & Tolerance (mm)	Wall Thickness (PN 1.0 MPa)	Wall Thickness (PN 1.6 MPa)	Wall Thickness (PN 2.0 MPa)	Wall Thickness (PN 2.5 MPa)	Wall Thickness (PN 4.0 MPa)
50	50			9.0	10.6	
65	65			9.0	10.6	
80	80			9.0	11.7	
100	100	9.0	9.0	11.7	11.7	2.0
150	150	10.0	10.0	12.0	12.0	16.0
200	200	10.0	10.0	12.0	12.0	
300	300	12.5	12.5	13.5	14.5	
400	400	15.0	15.0	15.5		
600	600	19.0	20.0	20.0		

Note: Partial list shown. For full detailed dimensions of DN50-DN800, please refer to standard CJ/T123-2016.

Physical and Mechanical Properties

Item	Requirement	Test Method
Carbon Black Content / %	2.0~2.5	GB/T13021
Carbon Black Dispersion	≤ Grade 3	GB/T18251
Oxidation Induction Time (OIT) / min	≥ 20 (210°C)	GB/T19466.6
Crack Stability under Pressure	No cracks	/
Longitudinal Dimension Retraction Rate / %	≤ 0.4 (110°C for 1h)	GB/T6671
20°C Hydrostatic Strength	No rupture, no leakage	GB/T6111
70°C Hydrostatic Strength	No rupture, no leakage	GB/T6111
Burst Strength	≥ 3 times nominal pressure	GB/T15560
Weather Resistance	OIT ≥ 20min after irradiation	GB/T3681-2011 Method A

Standards and Testing (CJ/T 123-2016 & CJ/T 125-2014)

Appearance: The inner and outer surfaces should be clean, without obvious scratches, dents, impurities, bubbles, or uneven colors. The ends should be flat and perpendicular to the pipe axis. The end faces must be sealed with polyethylene material.

Sanitary Performance: Pipes for drinking water distribution shall meet GB/T17219.

Standard Environment: Testing temperature at (23±2)°C, conditioning time ≥ 24h (GB/T2918).

Gas Composite Pipe: Nominal Pressures include 1.6 MPa, 1.0 MPa, and 0.8 MPa. Use Temperature ranges from -20°C to 40°C. Thermal Conductivity is 0.43 W/m·K (same as PE pipe, significantly lower than cast iron).

Nominal inner diameter DN/ID /mm	Average inside diameter	Nominal pressure, PN/MPa					Distance from steel wire to inner/outer wall /mm
	Permissible deviation 1%	1.0	1.6	2.0	2.5	4.0	
		Pipe body wall thickness and limit deviations /mm					
50		—	—	—	9.0+14	10.61.6	
65		—	—	—	9.04	10.61.6	

80	±1	—	—	—	9.0 古 14	11. 71. 8	≥1. 8
100		—	9. 0 吉 14	9. 0±14	11. 7 古 18	11. 718	
125		—	10. 01. 5	10. 01. 5	11. 8+1. 8	12. 31. 8	
150		12. 0 1. 8	12. 01. 8	12. 01. 8	12. 021	15. 5±25	
200		12. 0 1-8	12. 01. 8	12. 51. 9	12. 5+1. 9	—	
250	±0. 8	12. 0 518	12. 519	12. 51. 9	13. 0±20	—	≥2. 5
300		12. 5 1. 9	12. 51. 9	12. 5±3. 2	—	—	
350		15. 024	15. 024	15. 52. 6	—	—	
400	±0. 5	15. 0 524	15. 024	15. 5+2. 6	—	—	≥3. 0
450		15. 5 2. 6	16. 0±2. 6	16. 52. 6	—	—	
500		15. 5 +2. 6	16. 0+2. 6	16. 5+2. 6	—	—	
600		19. 0 +3. 0	20. 0±3. 0	—	—	—	

Note: When DN ≥ 250 and PN ≥ 2.0, the wall thickness increases inwardly due to the higher PN rating; the minimum allowable average internal diameter may be up to 1.5 mm less than the values listed in the table.

The pipe body refers to the section of the pipe that withstands the entire internal pressure。

- Pipe end configurations and dimensions shall be determined based on connection requirements; the wall thickness of the spigot section shall be no less than 90% of the main body wall thickness. Common structural designs may refer to Appendix A.

- Standard pipe lengths may be 6 m, 8 m, 10 m, or 12 m, with a permissible length deviation of +20 mm; lengths may also be agreed upon by the supplier and the purchaser.

- Out-of-roundness

The out-of-roundness of the pipe shall not exceed 5% of the nominal internal diameter.

Physical and mechanical properties

CJ/T123-2016

Item	Requirement	Experimental Parameters	Test Method
Thermal stability (Oxidation Induction Time) /min	≥ 20	200°C	GB/T19466.6
Resistance to crack growth under pressure	No cracking phenomenon	—	7.61
Longitudinal dimensional change /%	≤ 0.4	110°C, held for 1h	GB/T6671
20°C Short-term hydrostatic strength	No rupture, no leakage	Temperature: 20°C Time: 1h Pressure: PN×2.0	GB/T6111
80°C Hydrostatic strength	No rupture, no leakage	Temperature: 80°C Time: 165h Pressure: PN×1.5×0.6	
Bursting strength	Burst pressure not less than PN×3	Temperature: 20°C Time: Continuous pressure rise to bursting	GB/T15560
Weather resistance (Only applicable for non-black pipes)	After weathering, the following properties meet requirements: Thermal stability (200°C) ≥ 20 min	$E \geq 3.5 \text{ GJ/m}^2$	GB/T 3681

Gas Composite Pipe (CJ/T125-2014)

Specification (dn)	50	65	80	100	125	150	200	250	300	350	400	450	600
Wall Thickness (mm)	11	11	12	12	12	12	12	12	12	12	12	12	12
Nominal Pressure (MPa)	[cite: 1.6]		[cite: 1.0]				[cite: 0.8]						
Service Temperature (°C)	[cite: -20~40]												

Overhead Laying Bracket Spacing



Standard	50	65	80	100	125	150	200	250	300	350	400	450	500	600
Bracket Spacing (m)	2.5		3.0	3.5	4.0		5.0							6.5

Minum Allowable Bending Radius

Nomical Inner Diameter (dn/mm)	50	65	80	100	125	150	200	250	300	350	400	450	500	600
Optimal Allowable Bending Radius (r/m)	[cite: 80d]					[cite: 100d]				[cite: 110d]				

Steel Reinhorced Compositivty of Thermal Conductivity

Pipe Name	Thermal Conductivity (W/MK)	
Steel Reinforced Polyethylene Composite Pipe	0.43	PE Plastic Pipe
		Cast Iron Pipe
		0.43
		50-60.5

Steel Reinforced Polyethylene Plastic Composite Pipe Fittings

Executive Standards:

HG/T 3691-2022, CJ/T 124-2016, CJ/T 125-2014.

Steel Reinforced Polyethylene (PE) Plastic Composite Pipe Fittings

Product

Product Introduction

Executive Standards:

- HG/T 3691-2022: Steel reinforced polyethylene (PE) plastic composite pipe fittings for industrial use
- CJ/T 124-2016: Steel reinforced polyethylene (PE) plastic composite pipe fittings for water supply
- CJ/T 125-2014: Steel reinforced polyethylene (PE) plastic composite pipe fittings for gas



Steel-frame pipe fitting

Item	Requirement	Test Conditions	Test Method
Carbon black content / %	2.0~2.5	--	CB/T13021
Carbon black dispersion	≤ Grade 3	--	GBT18251
Oxidation Induction Time (OIT) / min	≥20	210°C	GB/T19466.6
20°C Hydrostatic Strength / MPa	No bursting, no leakage	Temperature: (30±2)°C, Time: 1h Pressure: 1.5PN	CB/T 6111
70°C Hydrostatic Strength / MPa	No bursting, no leakage	Temperature: (70±2)°C or higher operating temperature, Time: 165h Pressure: 1.5fT · PN	GB/T 6111
Bursting Strength / MPa	Burst pressure not less than 3 times nominal pressure	Temperature: (20±2)°C, Time: Continuous pressure rise bursting	GB/T15560
Connection Performance Test	No bursting, no leakage	Temperature: (20±2)°C, Time: 1h Pressure: 1.5PN	GD/T6111
	No bursting, no leakage	Temperature: (70±2)°C or higher operating temperature, Time: 165h Pressure: 1.5fT·PN	GB/T 6111
Tensile Peel Test	Plastic tear length not less than	Normal temperature	7.4.6
For joint welding quality inspection of electrofusion sleeves and electro-fusion heat tapes connected to pipe materials.			

Types of Fittings Available:

- Electrofusion Sleeves (Pure plastic and with steel skeleton)
- Transitional Electrofusion Sleeves
- 90° Elbows, 45° Elbows, 11.25° and 22.5° Elbows
- Electrofusion Flanges
- Equal Tees and Reducing Tees
- Reducing Straight Fittings
- Pipe Plugs (Pure plastic caps and metal blind plates)
- Sealing Gaskets (Full face and standard rubber gaskets)

Pipe Connection and Construction

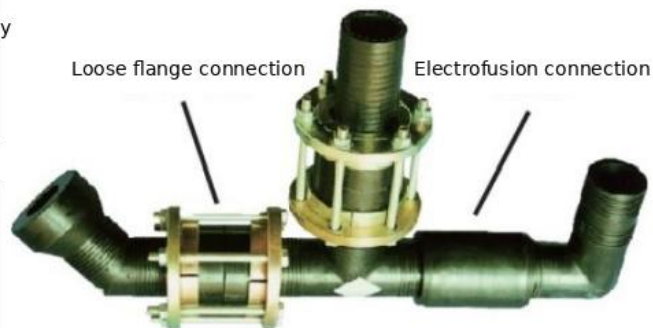
Executive Standard: CECS 315:2012 "Technical Specification for Steel Skeleton Plastic Composite Pipeline Engineering"

The connections of steel skeleton plastic composite pipes mainly include electrofusion connection and flange connection. The connection between composite pipes can use either electrofusion or flange; the connection with other metal pipes, PE pipes, valves, and meters uses flange connection.



The connections of steel skeleton polyethylene composite pipes mainly include electrofusion connections and flange connections.

The tensile strength and bursting strength of the electrofusion and flange connections of the steel skeleton polyethylene composite pipe are higher than the pipe itself.



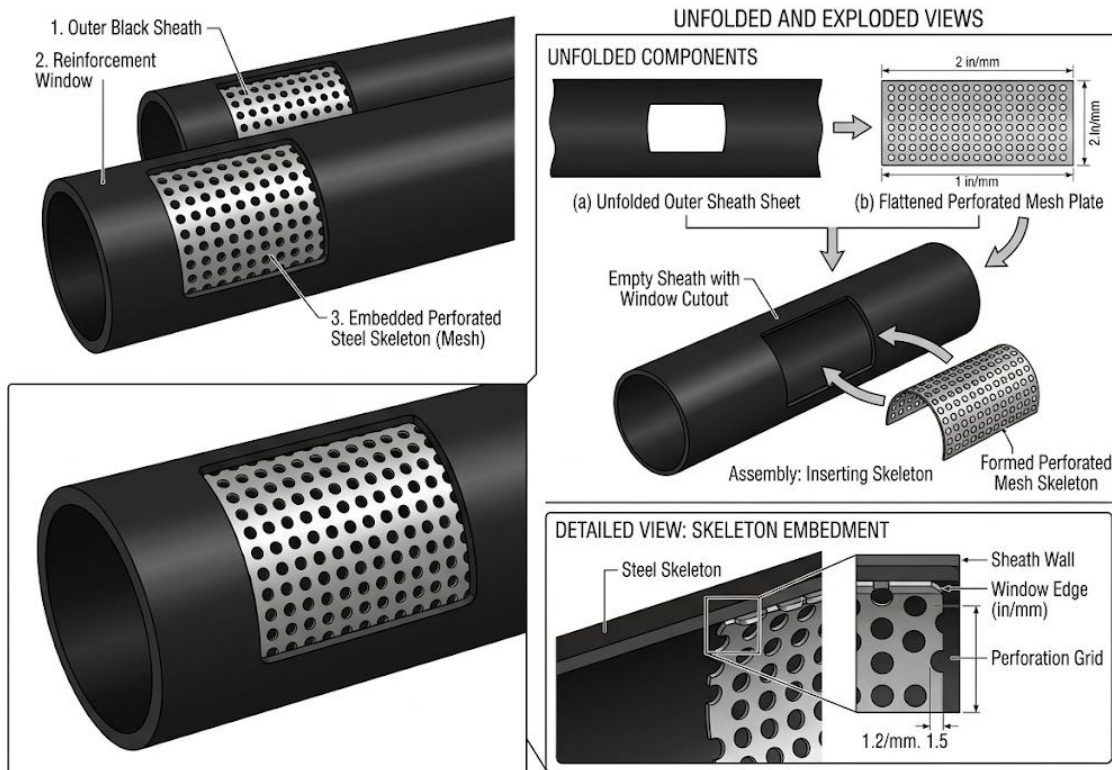
Schematic Diagram of Piping System Connect

The tensile strength and burst strength of the electrofusion and flange joints are higher than those of the pipe body itself.

Product Structure

The steel wire mesh reinforced polyethylene composite pipe is formed by winding high-strength steel wires in forward and reverse directions to form a reinforcement skeleton. Using high-density polyethylene as the base material and high-performance modified polyethylene bonding resin, it is continuously co-extruded on the production line.

TECHNICAL DIAGRAM: PERFORATED STEEL SKELETON REINFORCEMENT SYSTEM FOR INDUSTRIAL PIPING



Applications: Widely used in long-distance buried water supply, gas supply, metal ore powder, and other special corrosive fluid pipeline systems. It is the preferred pipe to replace traditional pipes like steel pipes.