

Prosperous always.

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## RTP Product Manual



# bortek

**Zyfire**

***Prudence Partnership Prestige***

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## 1. Company Profile

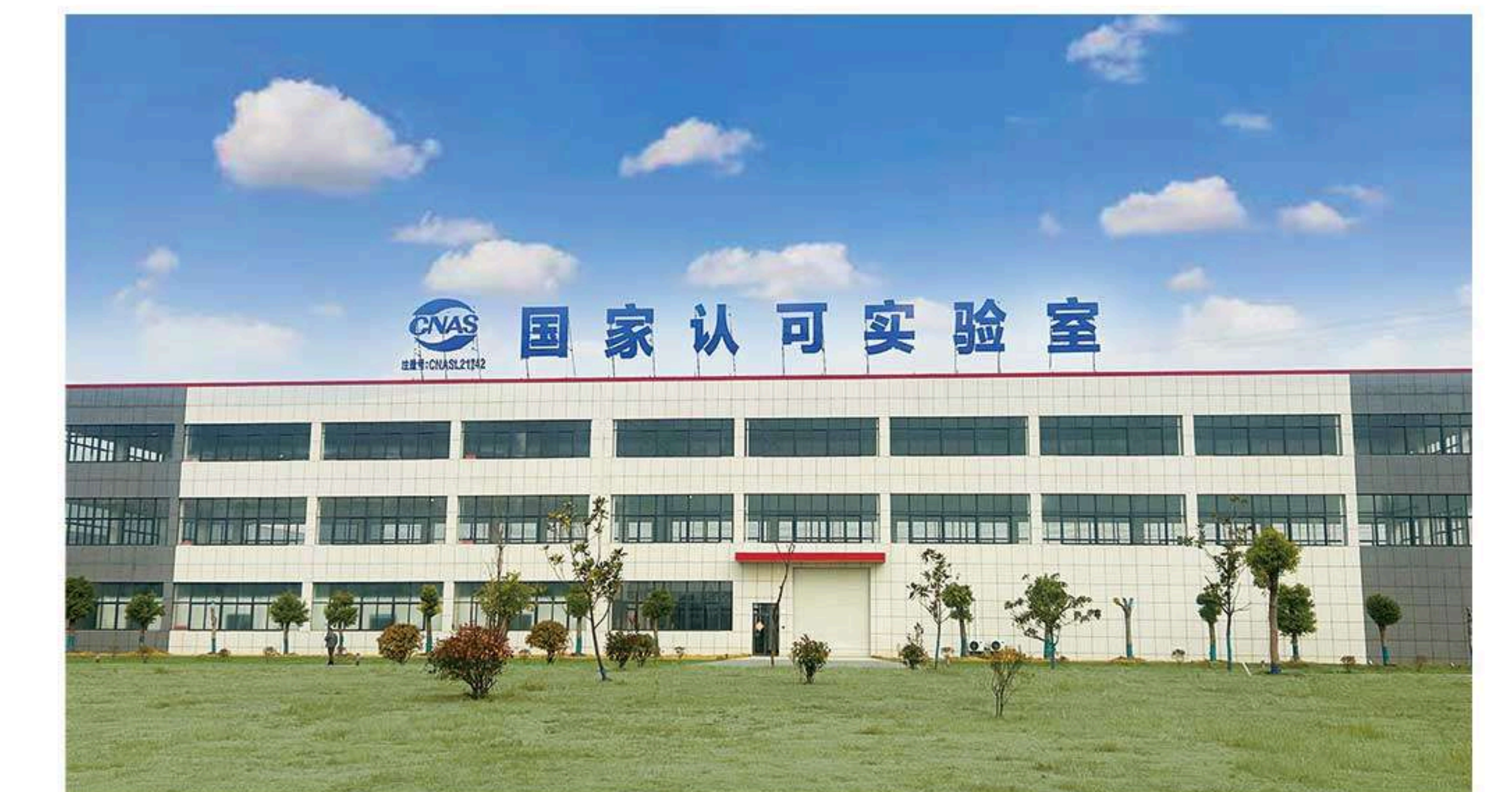
Anhui United Pipeline Co., Ltd. is a wholly-owned subsidiary of a public listed company of ZYfire Hose Corporation (stock code: 871694), located in Chuzhou, Anhui, China, half an hour's drive away from Nanjing Metropolitan Area, the core city of the Yangtze River Delta Economic Zone.

With the development vision of 'Becoming world leading high-tech pipeline company', our company focuses on the research, development, production and sales of flexible reinforced thermoplastic composite pipe RTP, and the original core technology realizes the construction of the key process structure of the product. The company works closely with Southeast University, Zhejiang University, Nanjing Tech University, Changzhou University, Nanjing Institute of Technology, Jiangsu University of Science and Technology. We have strong R&D strength, with 6 PhDs as R&D project leaders, including 2 overseas PhDs.

Our company takes technological innovation as the core strategy for enterprise development, and the testing center has passed the professional accreditation of China National Accreditation Service for Conformity Assessment (CNAS), which has national and international recognized testing capabilities. We have built Anhui Province Enterprise R&D Center, Chuzhou City Enterprise Technology Center, Chuzhou City Digital Workshop, applied for a total of 38 patents, 29 authorized patents, passed ISO9001, ISO14001, ISO45001, API American Petroleum Institute and a series of authoritative certificates such as TS certification.

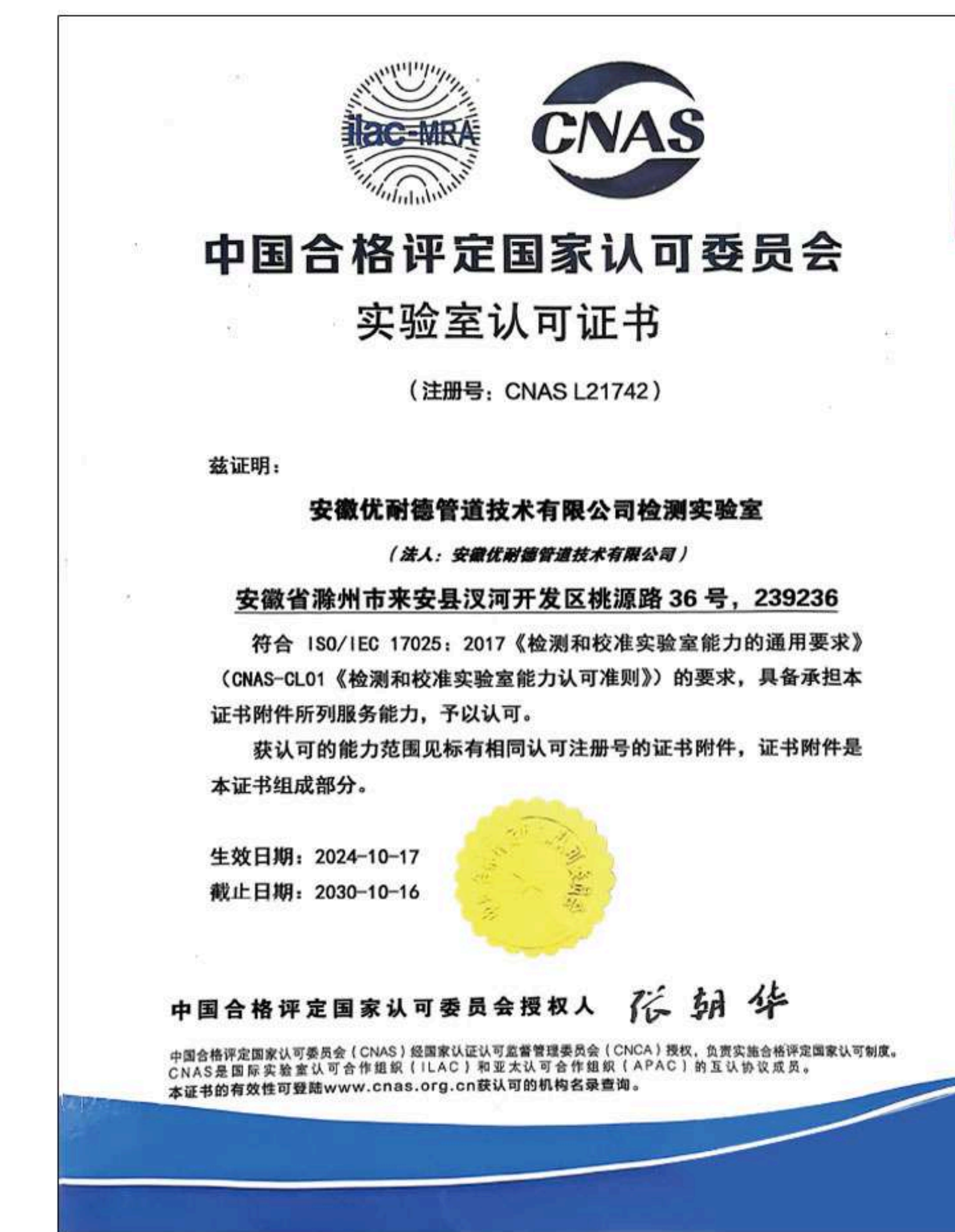
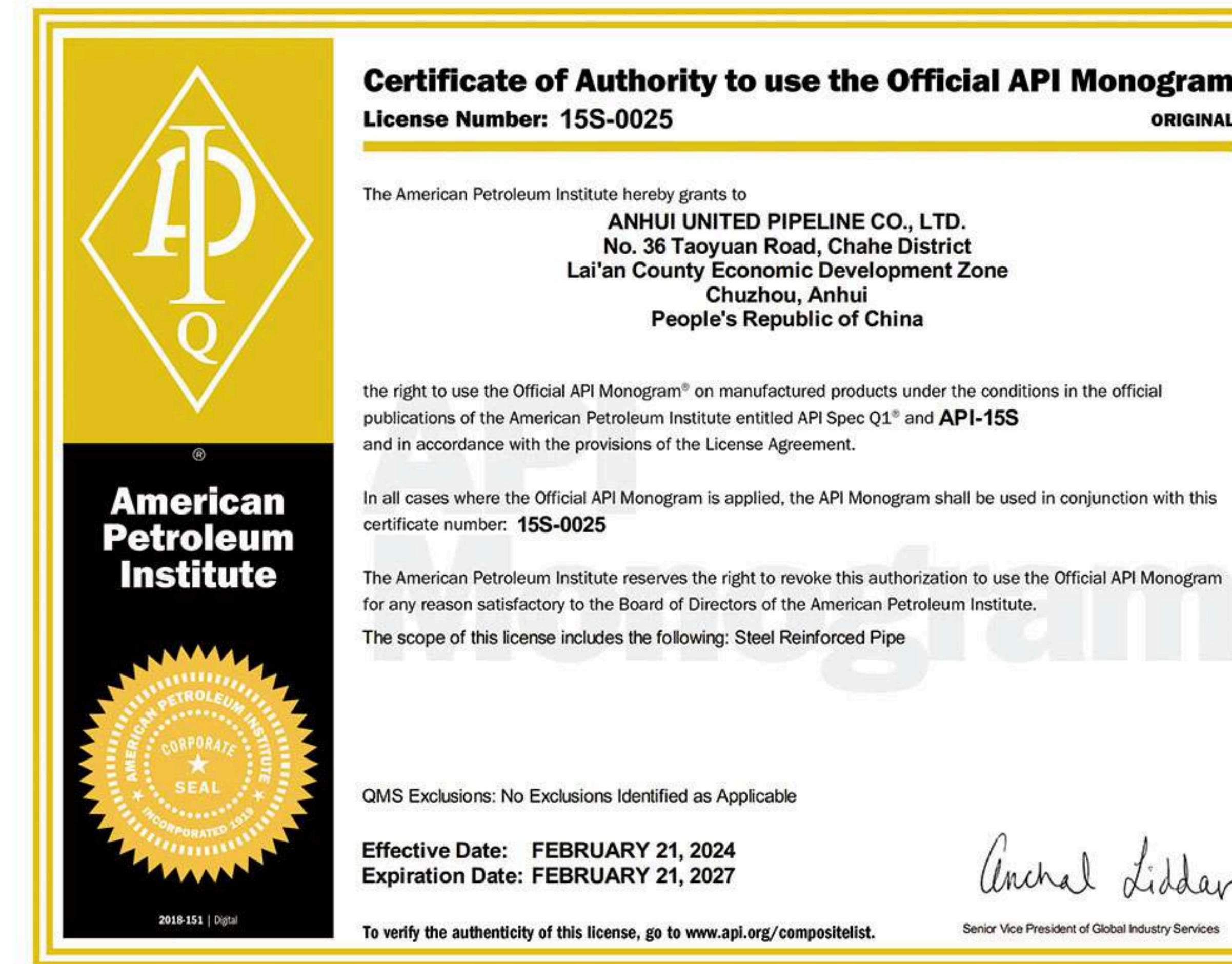
The company now covers an area of 200,000 square meters, plant construction area of 150,000 square meters, with more than 100 sets of more advanced R&D, production, testing equipment in the industry, production lines all use intelligent high-end equipment. Through the structural design and optimization of products and material modification, the company has realized the application of localized and standardized equipments in the whole industrial chain. Through the innovative update and process optimization of RTP production line, the company has realized the application of key equipments for the first set of key equipments in the industry, which makes the products more competitive.

The main products of the ZYfire Group, including RTP, layflat polyurethane hoses and wear-resistant composite steel pipes with polyurethane lined, are widely used in many fields such as oil and gas extraction, mineral development, slurry transportation, emergency rescue, industrial, mining, agriculture and municipal engineering, and are exported to more than 70 countries and regions such as Europe, America and the Middle East. In the future, the company will adhere to the development concept of 'top quality, top technology, top service', and take the power of technology and pipeline to enjoy better and brighter future.

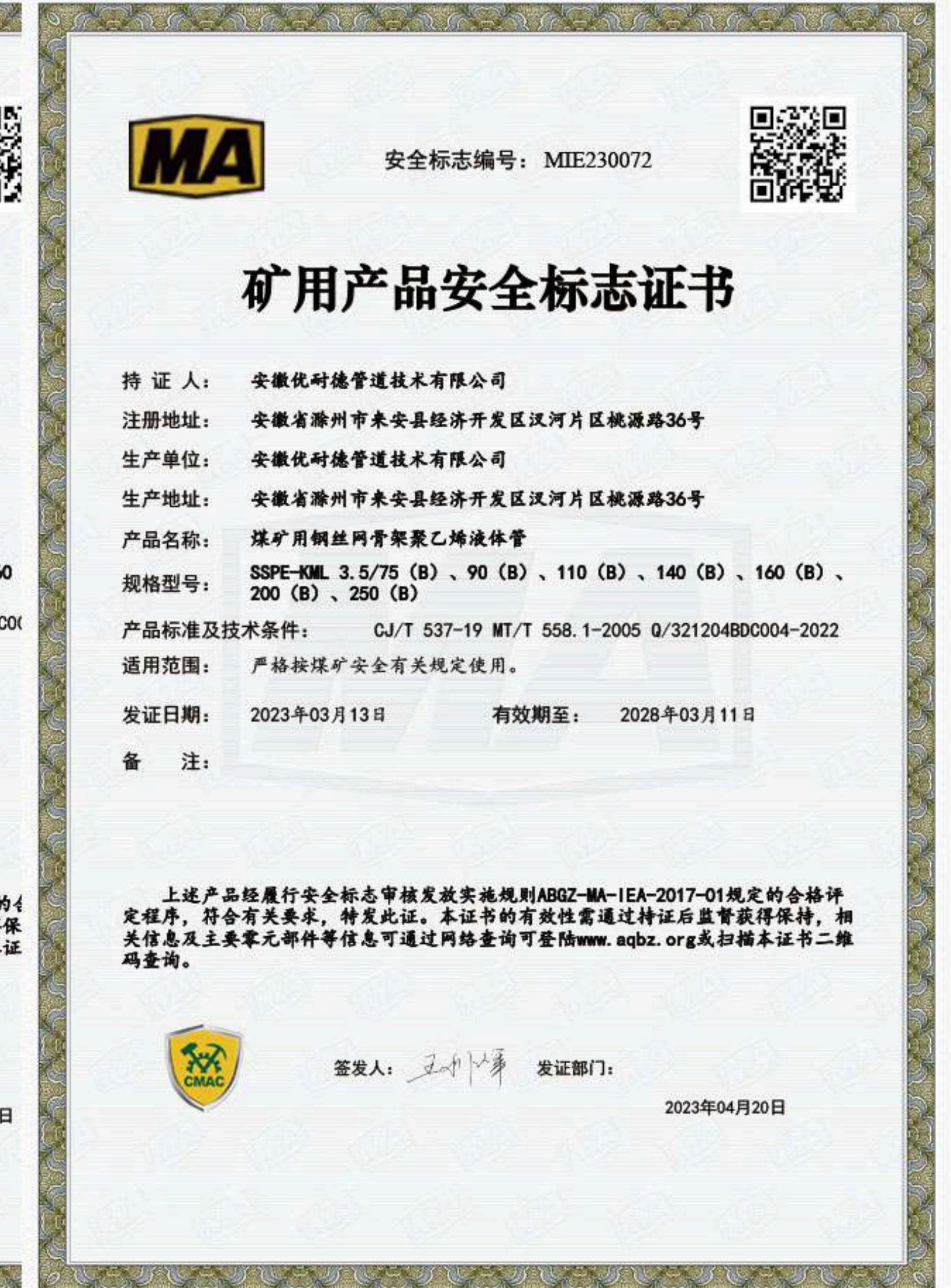
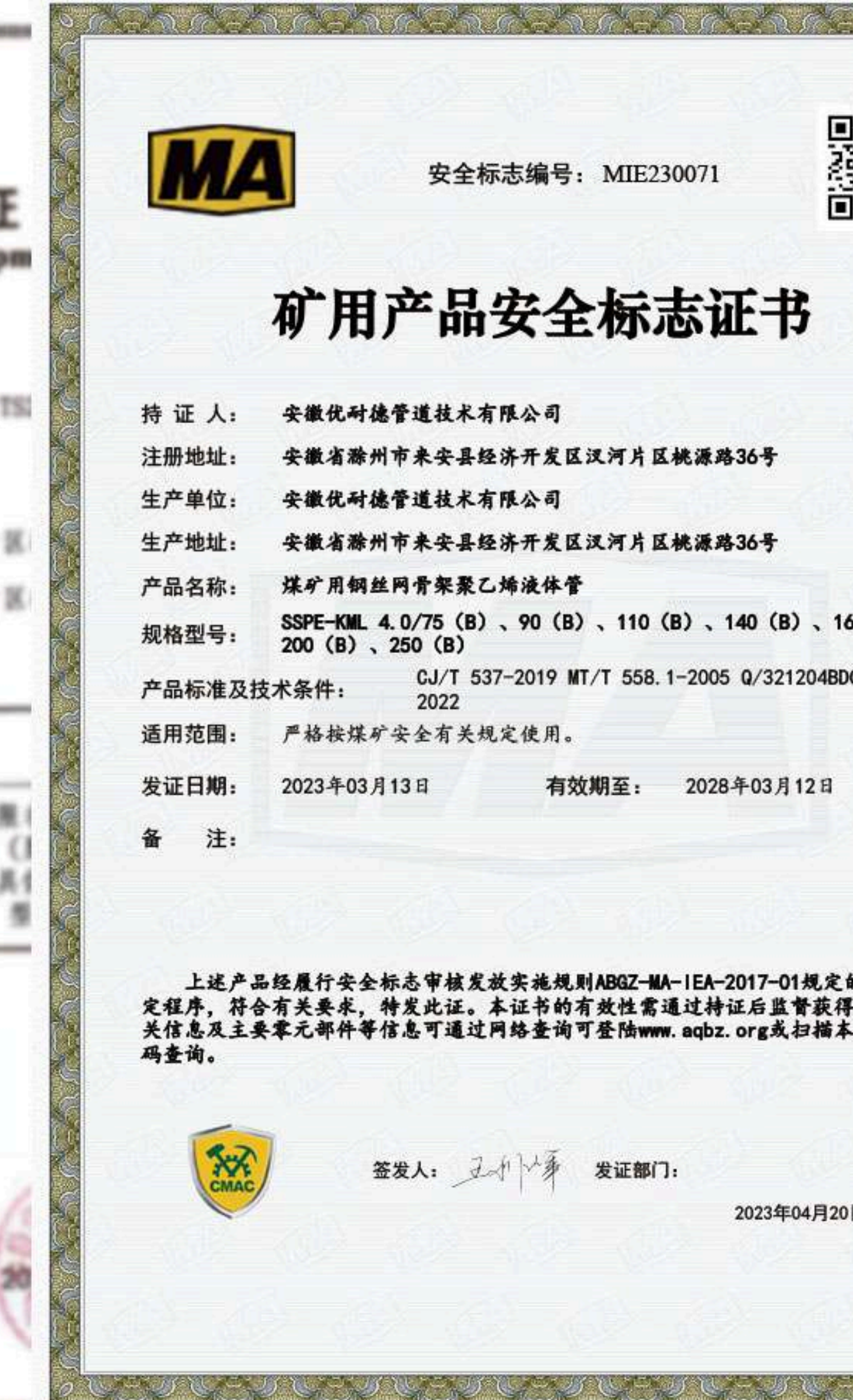
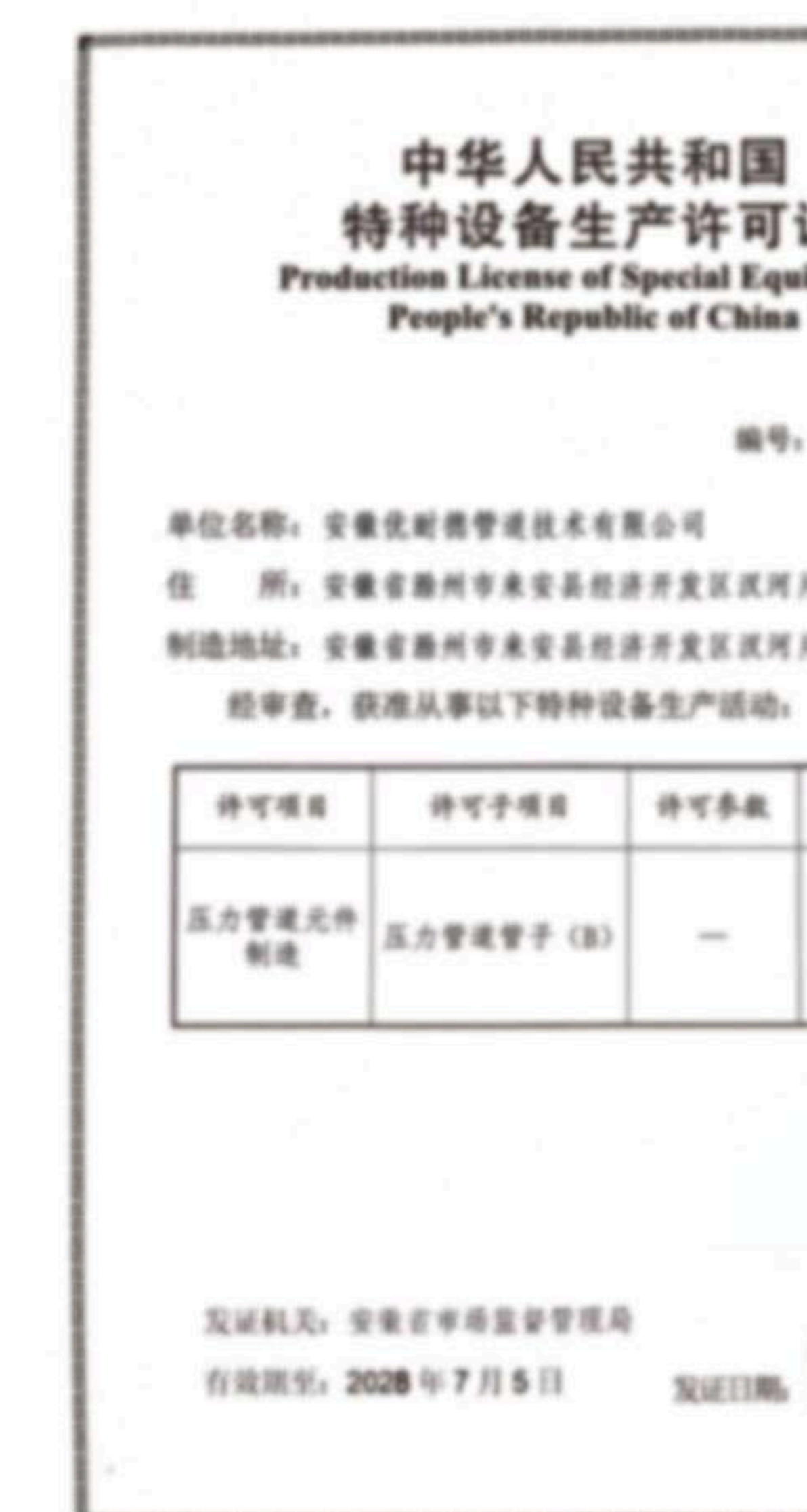


## 2. Company Qualifications and Technical Capabilities

- National High-tech Enterprise
- ISO Management System
- Municipal Enterprise Technology Center
- 30+ Core Technology Patents



- API 15S Product Certificate
- API Q1 Quality Management System Certificate
- CNAS National Accreditation Laboratory
- Mining Safety License
- Manufacture License of Special Equipment



### 3.Product Introductions

#### ► Product Description:

Spoolable Reinforced Thermoplastic Pipes (Reinforced Thermoplastic Pipes, referred to as RTP) are composite pipes consisting of a medium transmission layer made of polyethylene, cross-linked polyethylene, or heat-resistant polyethylene. The reinforcement layer is formed by unidirectional polyester industrial filaments, aramid fibers, fiberglass, or steel wires (ropes) combined with thermoplastic matrix resin. These materials are continuously spirally wound in left and right directions and heated to form a mesh-like skeleton. The outer protective layer is made of polyethylene or heat-resistant polyethylene. The entire structure is bonded and formed through extrusion, resulting in a continuous, cohesive pipe.

#### ► Product Features:

- ① Good flexibility, long continuous length, can be supplied in coils and rolls with fewer joints, easy installation, low comprehensive construction cost.
- ② Impact resistance, no cracking or leakage.
- ③ Corrosion and scale resistance. The inner and outer layers are thermoplastic, which can effectively resist the erosion of acid, alkali, salt spray, sulfide and other media and reduce the maintenance frequency.
- ④ Good flexibility, strong adaptability to the terrain, can follow the bends, and is not affected by changes in the earth's crust and uneven settlement of the foundation.
- ⑤ High pressure resistance, nominal pressure of 2.5-32MPa, can be customized according to customer needs or working conditions.
- ⑥ Good temperature resistance, wide range of applicable temperature: according to different materials, it can reach -60°C~130°C, which can meet the extreme environmental requirements.
- ⑦ Flexible structural design, can be added according to the need for gas barrier, tensile, wear-resistant, heating or insulation and other functional layers.



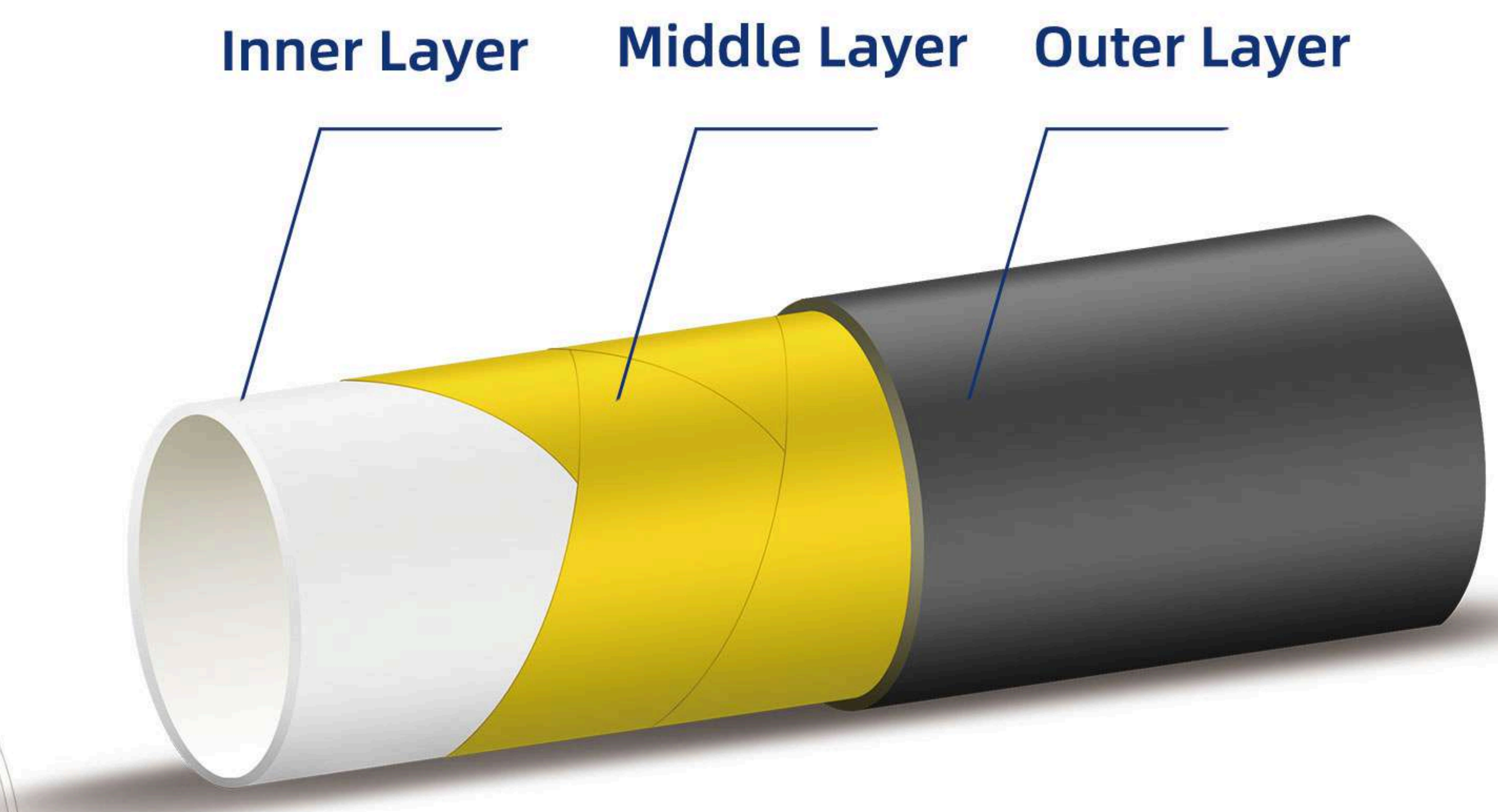
#### ► Product Structure:

RTP is a bonded, spoolable, reinforced plastic composite pipe composed of three-layer structural materials manufactured through advanced composite processes.

**Inner Layer** (Media Transmission Layer): Materials primarily include PE100, PE-RT II, PE-X, PA, PVDF, etc.

**Middle Layer** (Reinforcement Layer): Materials mainly consist of glass fiber, aramid fiber, polyester fiber, steel wire (rope), etc.

**Outer Layer** (Protective Layer): Typically HDPE or PE-RT II. Anti-ultraviolet (UV) stabilizers and antioxidants can be added to the protective layer outside the RTP pipeline laid on the surface.



#### ► Application Scope:

Suitable for oil and gas fields, energy, mining, chemical industries, and other sectors, transporting media including multiphase fluids, gaseous hydrocarbons, liquid hydrocarbons, chemicals, non-potable water, slurry, fly ash, brine, and more.

**Pipe Specifications:** 2"-8" (50mm-200mm)

**Nominal Pressure:** 350psi-4640psi (2.5MPa-32MPa), customized based on client requirements or operating conditions.

**Media Temperature:** Up to 130°C (266°F), depending on material.

**Laying methods:** Buried below frost layer or surface-laid.

## 4. Product classification

### 4.1 Polyester Fiber Tape-Reinforced RTP

Liner Layer: PE100, PE-RT II, PE-X, PA, etc.

Reinforcement Layer: Polyester fiber tape.

Outer Protective Layer: White UV-stabilized or other colored HDPE/PE-RT II, etc.

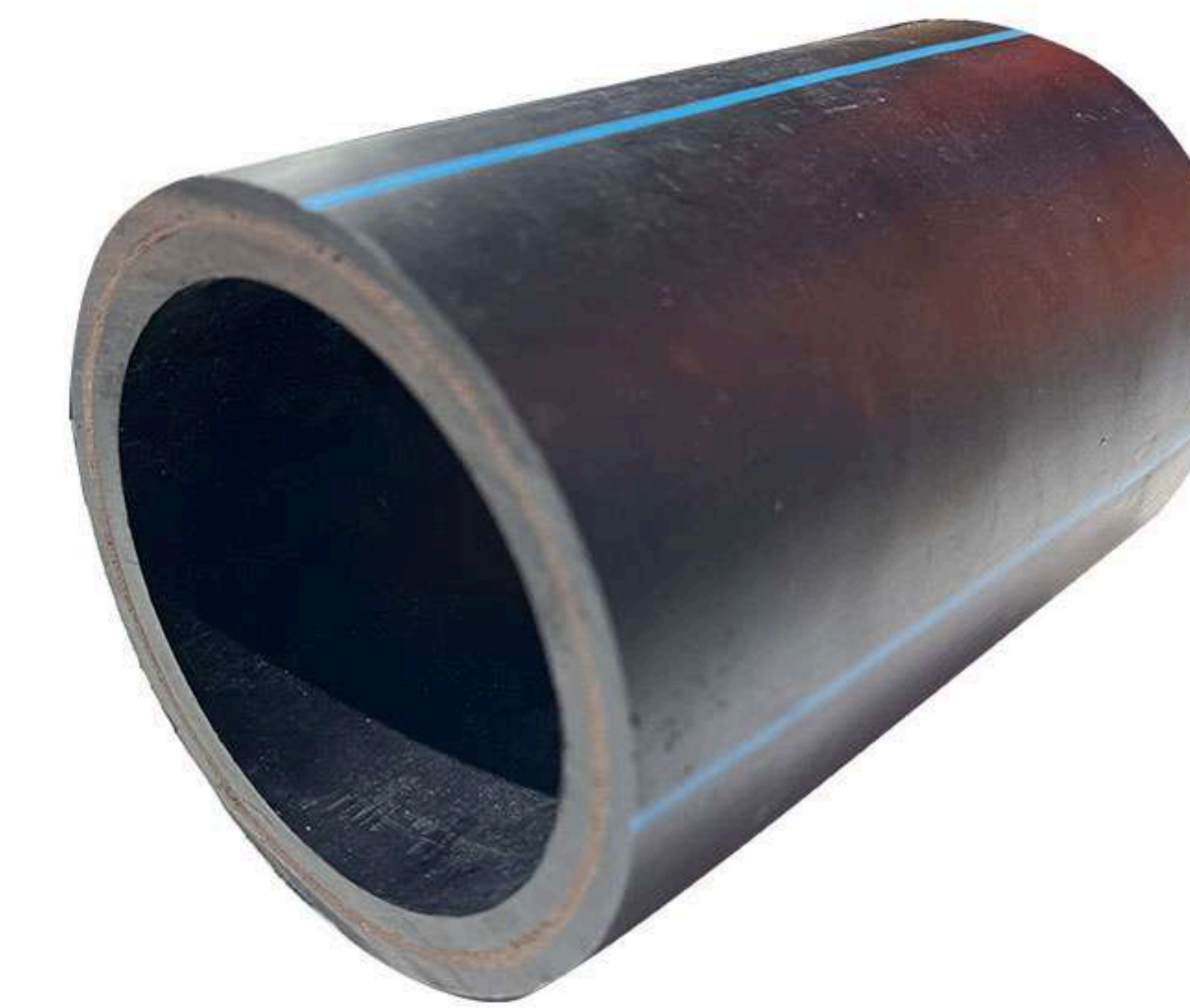


### 4.2 Steel Wire (Rope) Tape-Reinforced RTP

Liner Layer: PE100, PE-RT II, PE-X, PA, etc.

Reinforcement Layer: High-strength steel wire (rope) tape.

Outer Protective Layer: White UV-stabilized or other colored HDPE/PE-RT II, etc.



Polyester Fiber Tape-Reinforced RTP										
Nominal diameter	Inside diameter	Nominal pressure		Outside diameter	Pipe Weight	Reel specifications	Single length	Reel weight	Full plate weight	Minimum bending radius
		psi	MPa							
inch	mm	psi	MPa	mm	kg/m	mm	m	kg	kg	mm
2"	50	3500	24.0	92	4.05	2500*2000	720	1200	4200	1250
		3000	20.0	83	3.0	2500*2000	880	1200	3850	1250
		2500	17.5	76	2.5	2500*2000	1050	1200	3800	1250
		1500	10.5	73	2.2	2500*2000	1140	1200	3700	1250
		1000	7.0	72	2.05	2500*2000	1170	1200	3600	1250
		750	5.0	71	1.75	2500*2000	1200	1200	3300	1250
		500	3.5	69	1.55	2500*2000	1270	1200	3200	1250
		3000	20.0	113	5.8	3200*2800	900	1400	6600	2000
3"	75	2500	17.5	110	4.9	3200*2800	950	1400	6100	2000
		1500	10.5	107	3.8	3200*2800	1000	1400	5200	2000
		1000	7.0	104	3.6	3200*2800	1000	1400	5000	2000
		750	5.2	102	3.1	3200*2800	1100	1400	4850	2000
		500	3.5	100	2.9	3200*2800	1100	1400	4600	2000
4"	100	1500	10.5	146.5	7.10	3750*2800	700	1700	6700	2500
		1000	7.0	138.1	5.70	3750*2800	700	1700	5700	2500
		750	5.2	131.4	4.95	3750*2800	800	1700	5700	2500
		500	3.5	129.2	4.70	3750*2800	800	1700	5500	2500
5"	125	1000	7.0	160.4	8.60	3750*2800	600	1700	6900	3200
		750	5.2	157.2	7.65	3750*2800	600	1700	6300	3200
		500	3.5	154.2	6.65	3750*2800	600	1700	5700	3200
6"	150	1000	7.0	193	11.5	3750*2800	300	1700	5150	3800
		750	5.2	187	9.4	3750*2800	300	1700	4520	3800
		500	3.5	185	8.7	3750*2800	300	1700	4310	3800
8"	200	750	5.2	235	14.4	4200*2800	180	2000	4600	5000
		500	3.5	233	13.3	4200*2800	180	2000	4400	5000

1. The outer diameter of the pipe, the length of each disc, and the full disc weight are approximate values and may vary depending on specific circumstances.
2. The burst pressure of the pipe is  $\geq 3.75$  times the nominal pressure.

Steel Wire (Rope) Tape-Reinforced RTP										
Nominal diameter	Inside diameter	Nominal pressure		Outside diameter	Pipe Weight	Reel specification	Single length	Reel weight	Full plate weight	Minimum bending radius
		psi	MPa							
inch	mm	psi	MPa	mm	kg/m	mm	m	kg	kg	mm
2"	50	3500	24	76	3.99	2500*2000	850	1200	4588	1250
		3000	20.7	76	3.77	2500*2000	850	1200	4406	1250
		2500	17.5	75	3.24	2500*2000	890	1200	4083	1250
		1500	10.5	74	3.17	2500*2000	890	1200	4026	1250
		1000	7.0	72	2.39	2500*2000	920	1200	3396	1250
		750	5.5	71	2.14	2500*2000	920	1200	3171	1250
3"	75	500	3.5	71	2.14	2500*2000	920	1200	3171	1250
		3000	20.7	103	6.05	3200*2800	1100	1400	8056	2000
		2500	17.5	102	5.70	3200*2800	1100	1400	7670	2000
		1500	10.5	101	4.69	3200*2800	1090	1400	6517	2000
		1000	7.0	100	4.55	3200*2800	1090	1400	6360	2000
		750	5.5	98	3.49	3200*2800	1130	1400	5339	2000
4"	100	500	3.5	97	3.15	3200*2800	1130	1400	4960	2000
		3000	20.7	137	11.65	3700*2800	580	1900	8656	2500
		2500	17.5	137	11.65	3700*2800	580	1900	8656	2500
		1500	10.5	130	7.56	3700*2800	800	1900	7945	2500
		1000	7.0	129	6.61	3700*2800	840	1900	7454	2500
		750	5.5	128	6.42	3700*2800	840	1700	7096	2500
5"	125	500	3.5	125	4.62	3700*2800	840	1700	5584	2500
		3000	20.7	167	17.06	3700*2800	385	1700	8268	3200
		2500	17.5	165	14.87	3700*2800	385	1700	7426	3200
		1500	10.5	158	9.92	3700*2800	410	1700	5768	3200
		1000	7.0	157	8.79	3700*2800	410	1700	5306	3200
		750	5.5	156	8.52	3700*2800	410	1700	5195	3200
6"	150	500	3.5	154	6.86	3700*2800	410	1700	4512	3200
		3000	20.7	200	26.02	3700*2800	110	1700	4562	3800
		2500	17.5	194	20.61	3700*2800	120	1700	4173	3800
		1500	10.5	185	12.88	3700*2800	130	1700	3375	3800
		1000	7.0	184	10.91	3700*2800	130	1700	3119	3800
		750	5.5	183	10.59	3700*2800	130	1700	3076	3800
8"	200	500	3.5	181	8.63	3700*2800	130	1700	2822	3800
		2250	15.5	251	31.30	/	/	/	/	5000
		1500	10.5	243	23.67	/	/	/	/	5000
		1000	7.0	236	16.25	/	/	/	/	5000
		750	5.5	235	14.50	/	/	/	/	5000
500	3.5	234	14.06	/	/	/	/	5000		

1. The outer diameter of the pipe, the length of each disc, and the full disc weight are approximate values and may vary depending on specific circumstances.
2. The burst pressure of the pipe is  $\geq 2.75$  times the nominal pressure.

### 4.3 Aramid Fiber Tape-Reinforced RTP

Liner Layer: PE100, PE-RT II, PE-X, PA, PPS, PVDF, etc.

Reinforcement Layer: Aramid fiber tape.

Outer Protective Layer: White UV-stabilized or other colored HDPE/PE-RT II, etc.



### 4.4 Glass Fiber Tape-Reinforced RTP

Liner Layer: PE100, PE-RT II, PE-X, PA, PPS, PVDF, etc.

Reinforcement Layer: Glass fiber tape.

Outer Protective Layer: White UV-stabilized or other colored HDPE/PE-RT II, etc.



Aramid Fiber Tape-Reinforced RTP										
Nominal diameter	Inside diameter	Nominal pressure		Outside diameter	Pipe Weight	Reel specification	Single length	Reel weight	Full plate weight	Minimum bending radius
		psi	MPa							
inch	mm	psi	MPa	mm	kg/m	mm	m	kg	kg	mm
2"	50	3500	24	84.6	3.72	2500*2000	750	1200	3991	1250
	50	3000	20.7	84.6	3.72	2500*2000	750	1200	3991	1250
	50	2500	17.5	78.0	2.80	2500*2000	810	1200	3467	1250
	50	1500	10.5	76.8	2.62	2500*2000	950	1200	3687	1250
	50	1000	7.0	75.6	2.43	2500*2000	940	1200	3484	1250
	50	750	5.5	75.6	2.43	2500*2000	940	1200	3484	1250
	50	500	3.5	75.6	2.43	2500*2000	940	1200	3484	1250
	3"	75	3000	20.7	113.0	5.79	3200*2800	830	1400	6207
75		2500	17.5	110.6	5.27	3200*2800	830	1400	5776	2000
75		1500	10.5	102.8	3.80	3200*2800	1100	1400	5584	2000
75		1000	7.0	101.6	3.55	3200*2800	1100	1400	5302	2000
75		750	5.5	101.6	3.55	3200*2800	1100	1400	5302	2000
75		500	3.5	101.6	3.55	3200*2800	1100	1400	5302	2000
4"		100	2500	17.5	141.0	7.97	3750*2800	590	1700	6405
	100	1500	10.5	132.0	5.77	3750*2800	800	1700	6315	2500
	100	1000	7.0	130.8	5.46	3750*2800	800	1700	6070	2500
	100	750	5.5	129.6	5.13	3750*2800	840	1700	6011	2500
	100	500	3.5	129.6	5.13	3750*2800	840	1700	6011	2500
5"	125	1500	10.5	166.6	9.61	3750*2800	490	1700	6408	3200
	125	1000	7.0	159	7.36	3750*2800	530	1700	5599	3200
	125	750	5.5	158.8	7.36	3750*2800	530	1700	5599	3200
	125	500	3.5	157.6	6.96	3750*2800	530	1700	5387	3200
6"	150	1500	10.5	193.6	11.84	3750*2800	310	1700	5370	3800
	150	1000	7.0	187.0	9.65	3750*2800	310	1700	4691	3800
	150	750	5.5	185.8	9.2	3750*2800	310	1700	4555	3800
	150	500	3.5	184.6	8.74	3750*2800	340	1700	4671	3800
8"	200	750	5.5	238.0	12.85	3900*2800	175	1900	4148	5000
		500	3.5	236.8	12.29	3900*2800	175	1900	4050	5000

Glass Fiber Tape-Reinforced RTP										
Nominal diameter	Inside diameter	Nominal pressure		Outside diameter	Pipe Weight	Reel specification	Single length	Reel weight	Full plate weight	Minimum bending radius
		psi	MPa							
inch	mm	psi	MPa	mm	kg/m	mm	m	kg	kg	mm
2"	50	3500	24.0	79.8	3.59	3700*1200	920	1200	5524	1250
		3000	20.7	78.6	3.36	3700*1200	920	1200	4678	1250
		2500	17.5	77.4	3.13	3700*1200	920	1200	4273	1250
		1500	10.5	73.8	2.47	3700*1200	1100	1200	4269	1250
		1000	7.0	72.6	2.25	3700*1200	1100	1200	3818	1250
		750	5.5	71.4	2.04	3700*1200	1100	1200	3389	1250
		500	3.5	70.2	1.83	3700*1200	1100	1200	3180	1250
		3"	75	3000	20.7	108.2	5.74	3700*1200	420	1400
2500	17.5			107.0	5.43	3700*1200	420	1400	3336	2000
1500	10.5			102.2	4.19	3700*1200	470	1400	3299	2000
1000	7.0			99.8	3.60	3700*1200	470	1400	3040	2000
750	5.5			98.6	3.31	3700*1200	550	1400	3023	2000
500	3.5			97.4	3.02	3700*1200	550	1400	2880	2000
4"	100			2500	17.5	137.4	8.33	3700*2400	440	1700
		1500	10.5	131.4	6.35	3700*2400	440	1700	4322	2500
		1000	7.0	129.0	5.58	3700*2400	600	1700	4850	2500
		750	5.5	127.8	5.20	3700*2400	740	1700	5326	2500
		500	3.5	125.4	4.45	3700*2400	740	1700	5067	2500
		5"	125	1500	10.5	161.8	9.38	3700*2400	360	1700
1000	7.0			158.2	7.96	3700*2400	360	1700	4170	3200
750	5.5			157.0	7.49	3700*2400	360	1700	4015	3200
500	3.5			154.6	6.57	3700*2400	360	1700	3860	3200
6"	150			1500	10.5	191.2	12.70	4300*2400	240	1900
		1000	7.0	186.4	10.47	4300*2400	240	1900	4293	3800
		750	5.5	184.0	9.37	4300*2400	240	1900	4168	3800
		500	3.5	181.6	8.29	4300*2400	240	1900	4046	3800
8"	200	750	5.5	237.4	13.91	/	/	/	/	5000
		500	3.5	233.8	11.82	/	/	/	/	5000

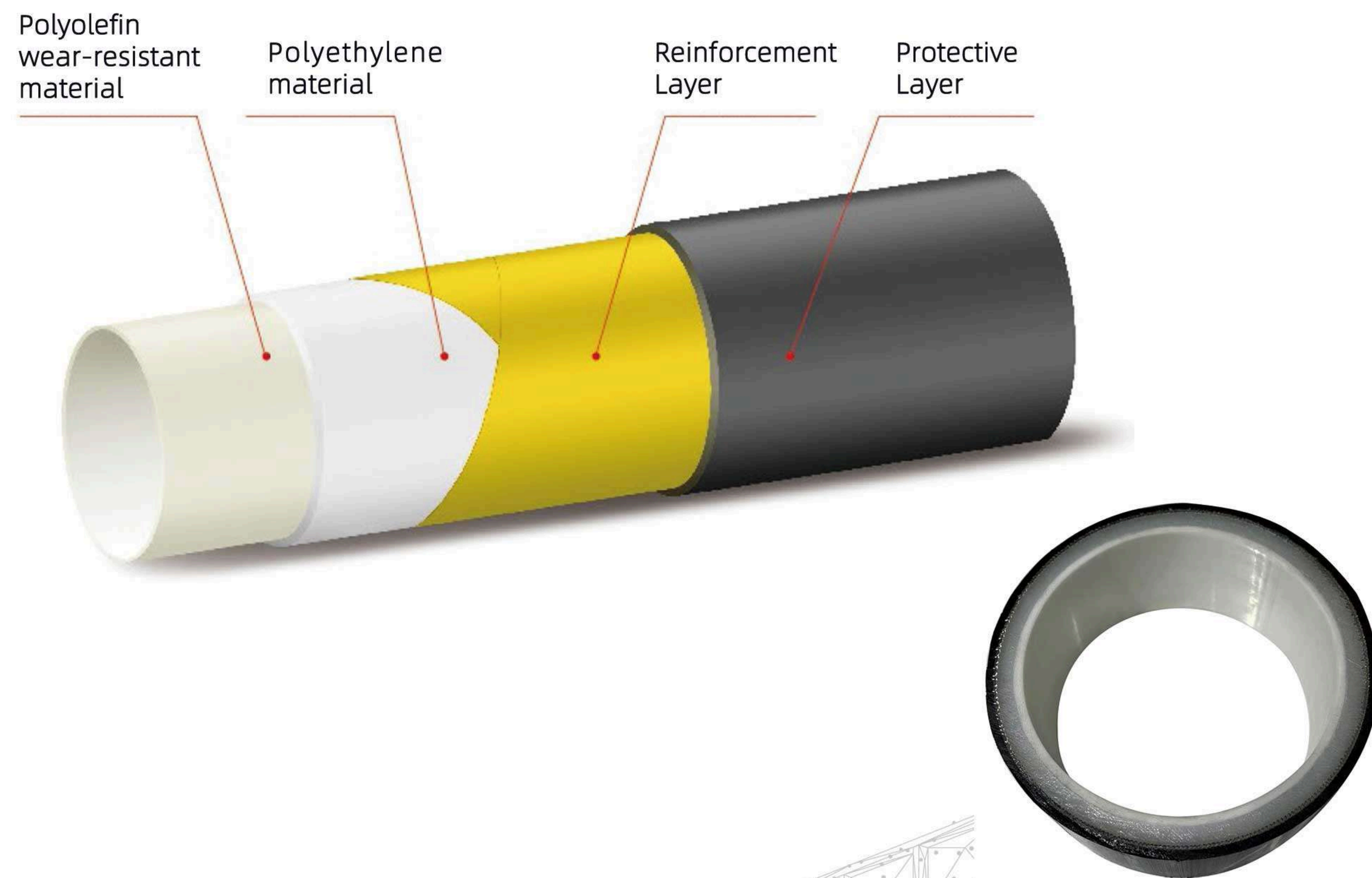
1. The outer diameter of the pipe, the length of each disc, and the full disc weight are approximate values and may vary depending on specific circumstances.  
 2. The burst pressure of the pipe is  $\geq 3.75$  times the nominal pressure.

1. The outer diameter of the pipe, the length of each disc, and the full disc weight are approximate values and may vary depending on specific circumstances.  
 2. The burst pressure of the pipe is  $\geq 3.75$  times the nominal pressure.

## 4.5 Steel Fiber Reinforced Polyethylene Wear-Resistant Composite Pipe

### ► Product Structure

This composite pipe consists of a polyolefin wear-resistant material extruded with polyethylene as the base matrix. The reinforcement framework is formed by combining steel fibers or steel cord tapes with adhesive resin or polyethylene, which are continuously spiral-wound at a specific angle. During winding, heat is applied to bond the reinforcement layer. Polyethylene or modified polyethylene is then extruded as the protective layer and fused with the reinforcement layer through heating, resulting in a consolidated wear-resistant composite pipe.



### ► Product Characteristics:

The inner pipe material, extruded with polyolefin wear-resistant material and polyethylene, provides exceptional wear resistance. As a bonded-type pipe, it features a stable composite structure with uniform stress distribution and high load-bearing capacity, delivering superior performance in high-pressure resistance, high-temperature resistance, low expansion, and creep resistance. This product is primarily designed for long-distance slurry transport, coal slurry transport in power plants, tailings slurry transport, and solid-liquid two-phase transport applications.

### ► Product Advantages:

#### **High Pressure Resistance**

Withstands pressures ranging from 1.6MPa to 32MPa at room temperature.

#### **Excellent Wear Resistance**

The wear-resistant layer, extruded with polyolefin wear-resistant material and polyethylene material, provides strong anti-wear capabilities.

#### **Corrosion Resistance**

Polyethylene has a saturated molecular structure, offering good chemical stability and resistance to various corrosive media, with dual-sided anti-corrosion properties.

#### **Good Flexibility**

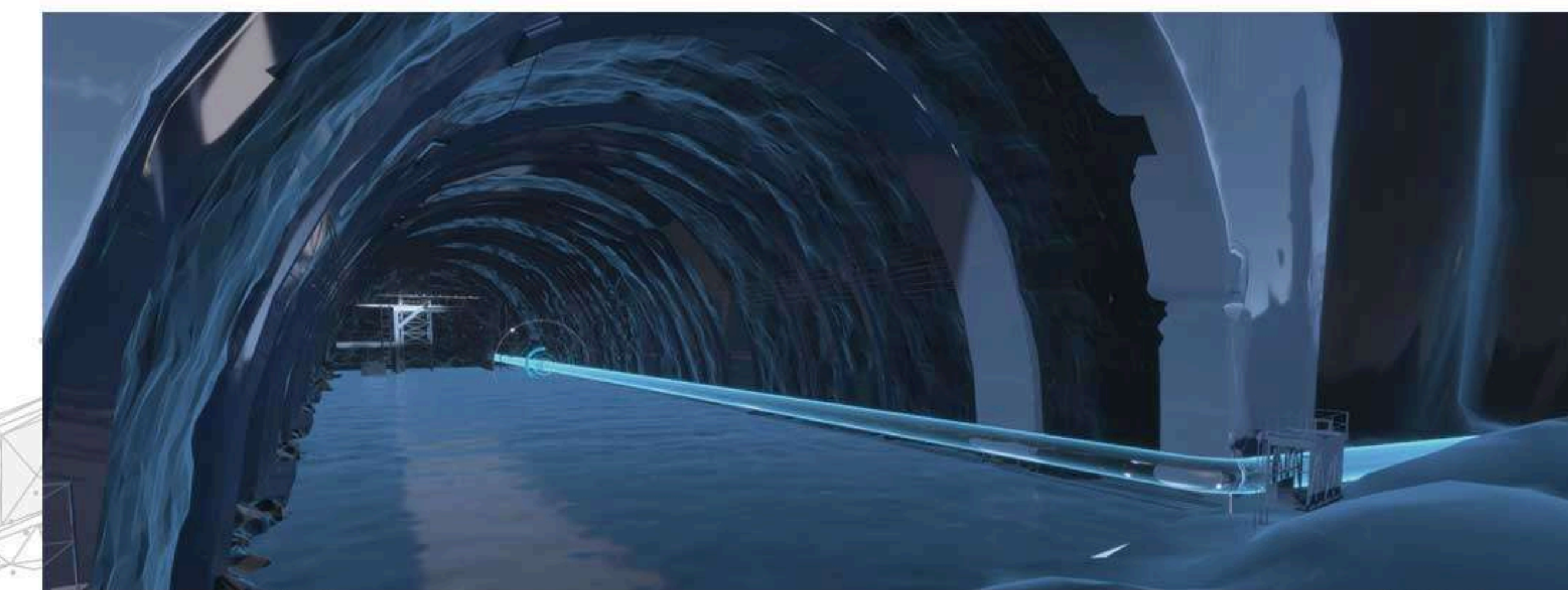
The wear-resistant layer, extruded with polyolefin wear-resistant material and polyethylene material, provides strong anti-wear capabilities.

#### **Low Expansion Coefficient**

The steel fibers are fused with the pipe, resulting in a low expansion coefficient at high temperatures and minimal deformation.

#### **Easy Installation**

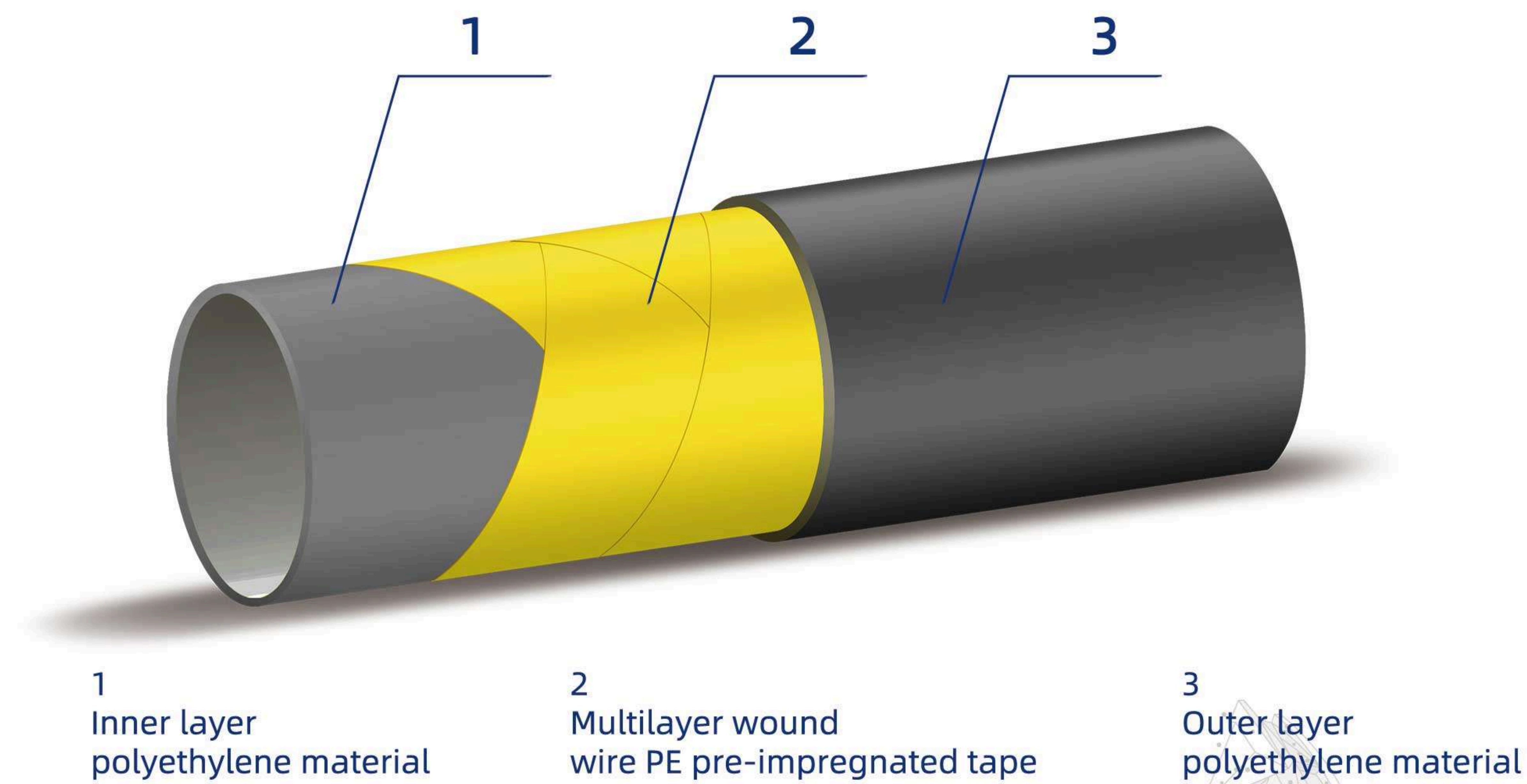
Reliable joint connections, with various connection options available for different working conditions, offering high cost-effectiveness.



## 4.6 Steel Wire Reinforced Polyethylene Liquid Pipe for Coal Mine

### ► Product Structure:

The pipe consists of flame-retardant, anti-static specialized modified polyethylene material as the inner and outer layers. The middle reinforcement layer is formed by continuous left-right spiral winding of cold-drawn steel wire (diameter not exceeding 0.40mm) PE pre-impregnated tape. The inner and outer layers are fused with the reinforcement layer through an extrusion molding process to form an integrated structure.



### ► Product Advantages:

Excellent Flame Retardant and Anti-Static Properties.

Strong Corrosion Resistance, High Pressure Resistance, and Superior Mechanical Performance.

Lightweight, Long Lifespan, Fast Construction, and Easy Installation.

Excellent Sealing Performance: After pipe connection, the sealing is reliable, and no leakage is observed during pressure tests.

Low Noise During Transportation: The smooth pipe wall and high surface finish reduce fluid resistance, significantly lowering noise generated during flow.



► The product has obtained the Coal Safety Mark Certificate issued by the National Mining Product Safety Mark Center



## 5.Product Connection Methods

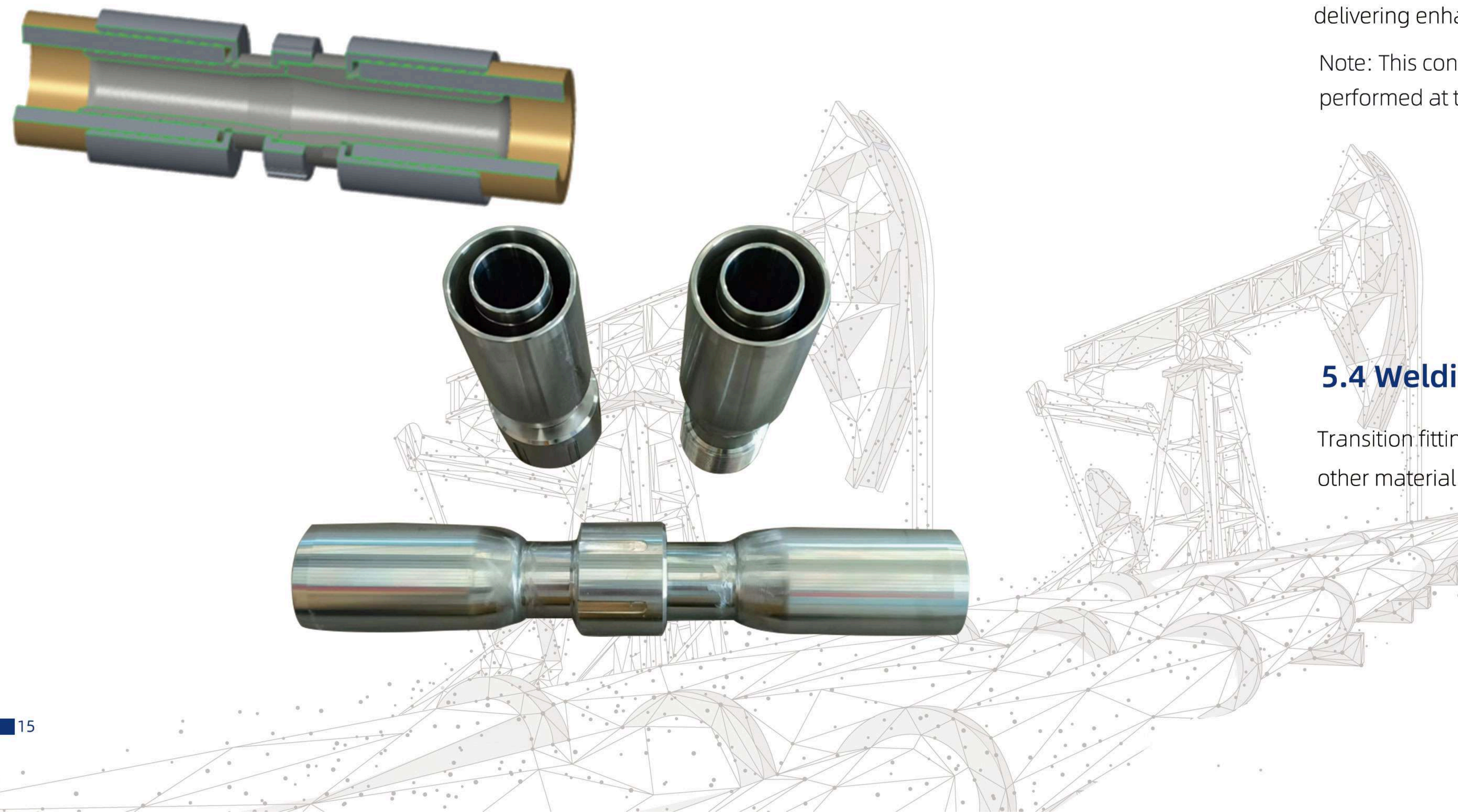
Connections are made using specialized joint assembly equipment. Mechanical pressure or tension forces the joint sleeve to shrink or the core pipe to expand, forming a reliable seal and secure fixation between the joint and the pipe, ensuring the sealing and stability of the connection.

Metal joints can typically be pre-installed in the factory or installed on-site. Depending on working conditions, RTP pipe joints can be made of materials such as carbon steel, stainless steel, duplex stainless steel, and nickel-based alloys. Carbon steel joints can undergo surface treatments like galvanizing, nickel plating, passivation, or coating with FBE or PTFE for corrosion resistance.

Connection forms between RTP include threaded connections, flange connections, pipe-to-pipe connections, clamp connections and welding connections.

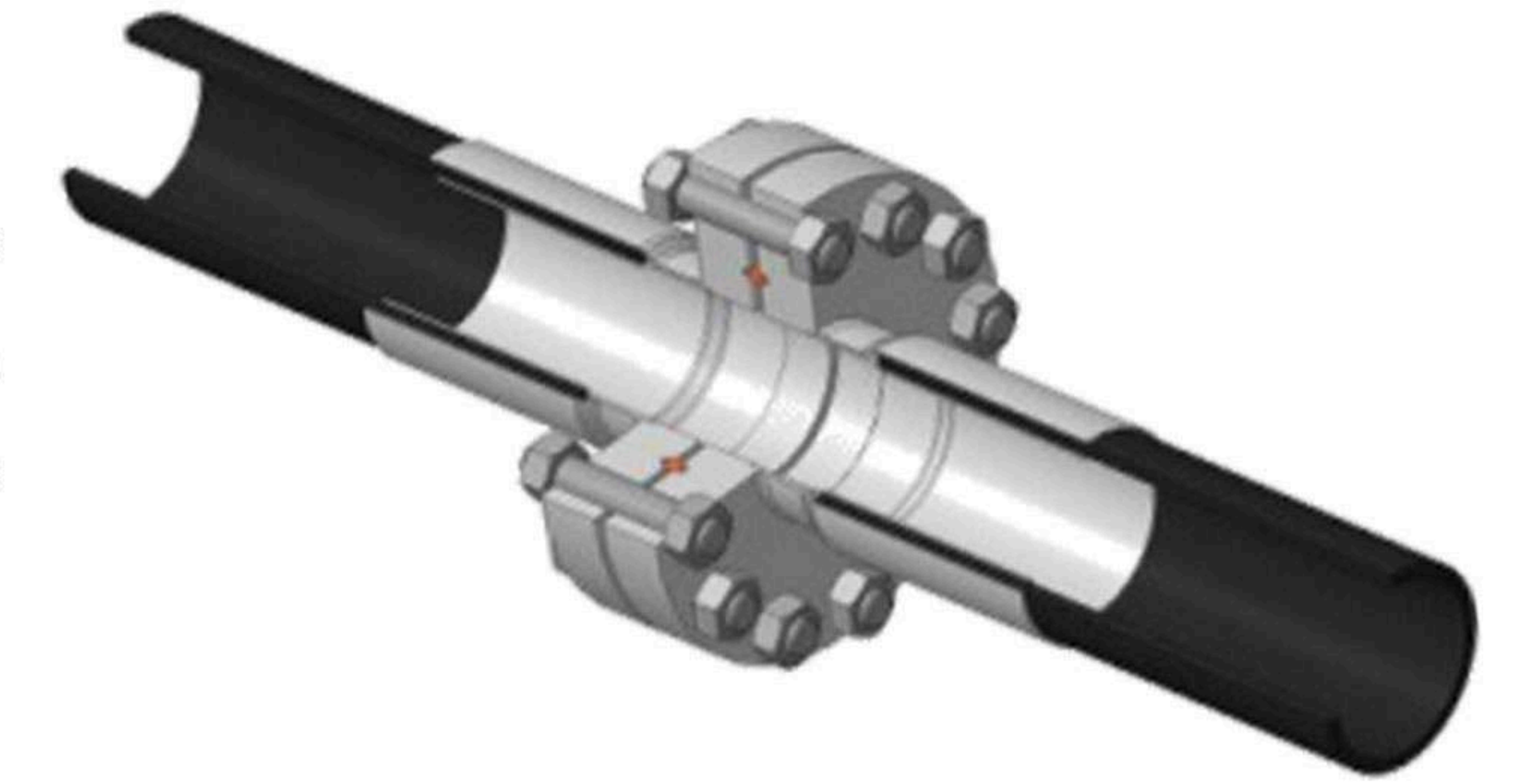
### 5.1 Threaded connections

One end is an external threaded connector with a sealing groove on the end face, and the other end is a flat-faced connector equipped with a swivel nut. The two ends are joined via the threaded nut, where the sealing ring at the end face deforms under the tightening force of the threads to achieve medium sealing.



### 5.2 Flange connections

Flange connections are commonly used for end fittings at both ends of pipelines to interface with flanges on valves, equipment, pipe fittings, etc., and can also be employed for direct pipe-to-pipe connections.



### 5.3 Pipe-to-pipe connections

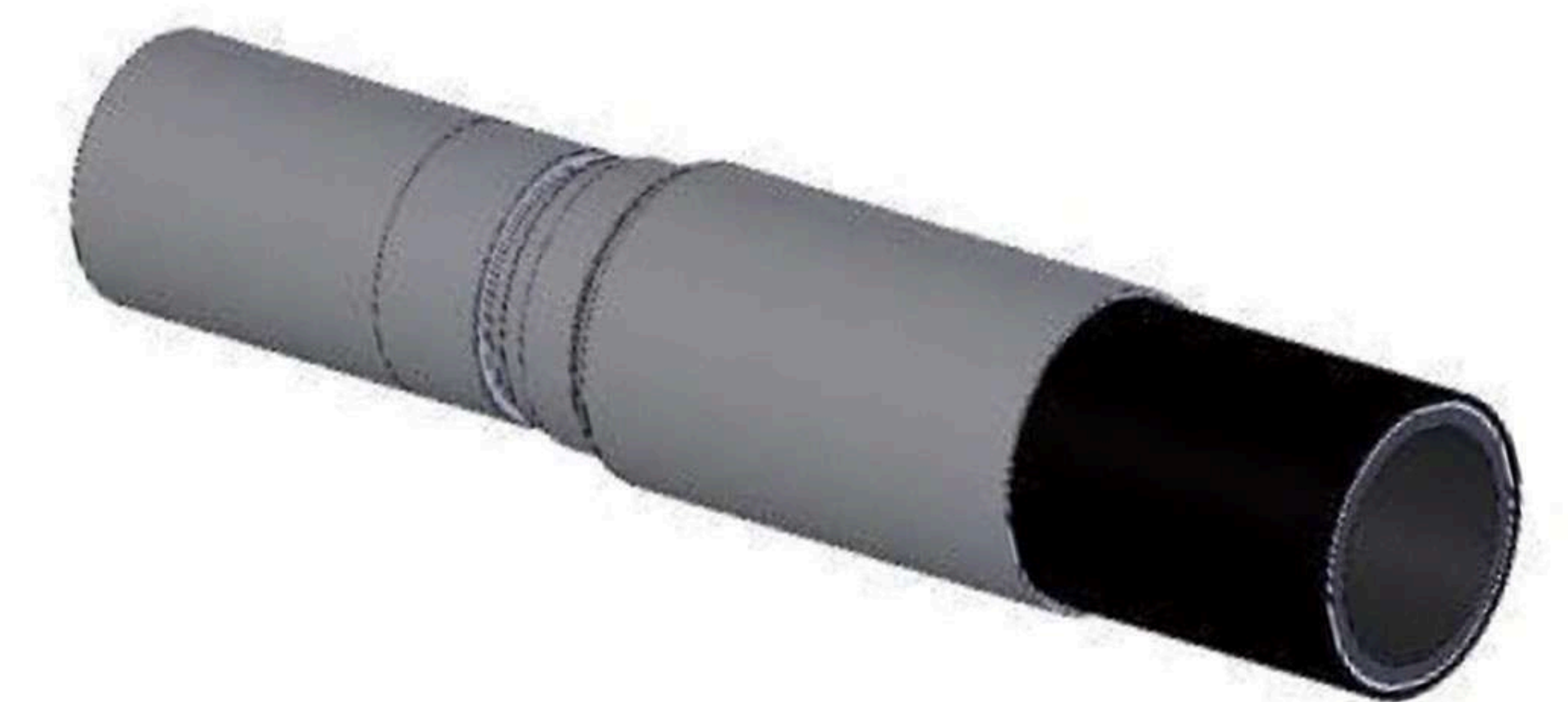
This connection can be referred to as a pipe-to-pipe or mid-line connection, primarily used for joining RTP (Reinforced Thermoplastic Pipe) to RTP in pipelines. The fitting features a seamless metal tube as its inner core, delivering enhanced sealing performance.

Note: This connection method shall be exclusively performed at the construction site.

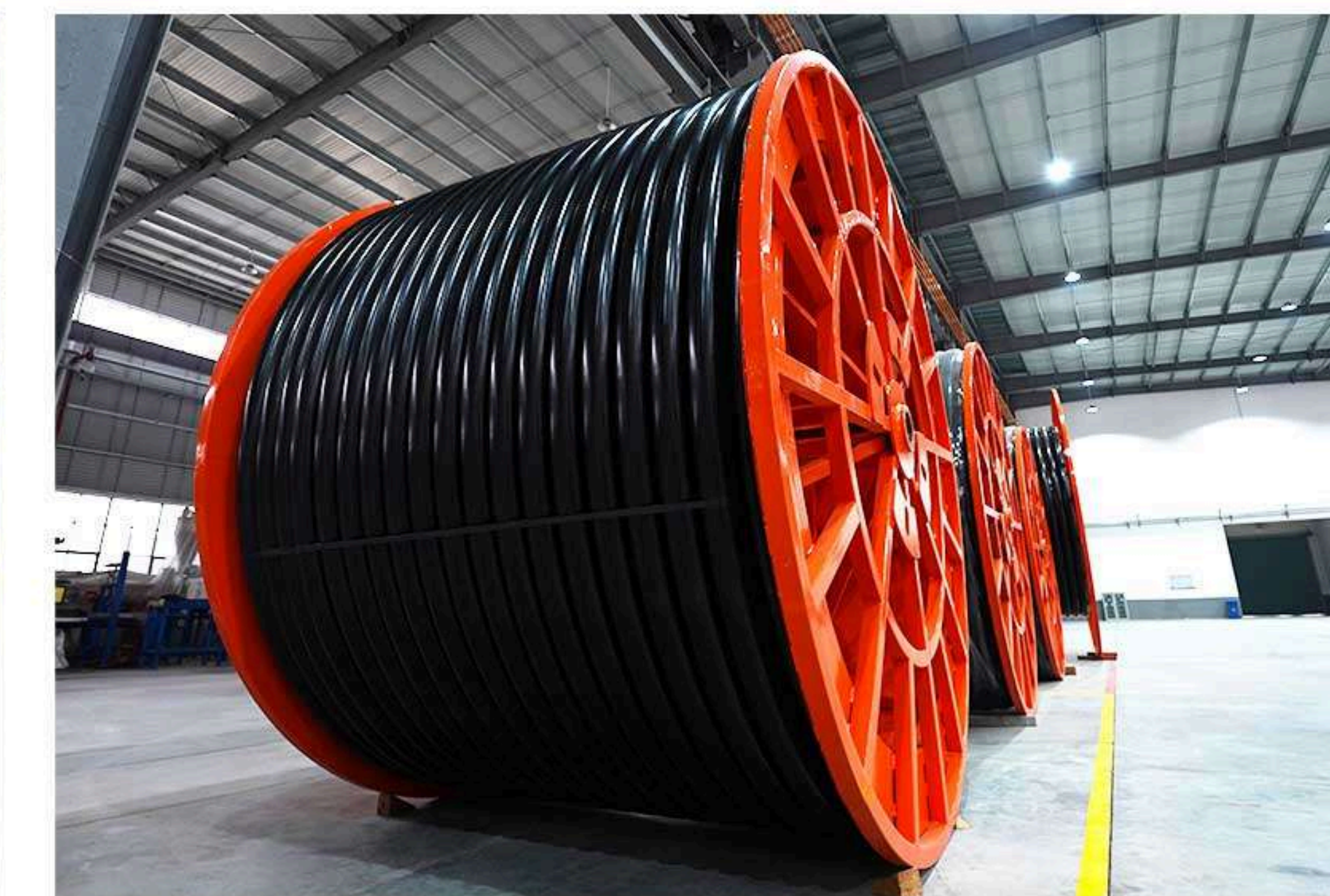


### 5.4 Welding connections

Transition fittings for connecting RTP pipes to steel or other material pipelines.



## 6. Quality control



### Top Technology, Top Quality, Top Service

Our company strictly complies with API 15S requirements and conducts full certification tests for special conditions such as gas transportation.

Material tests cover physical properties, mechanical properties, thermal properties, and chemical resistance.

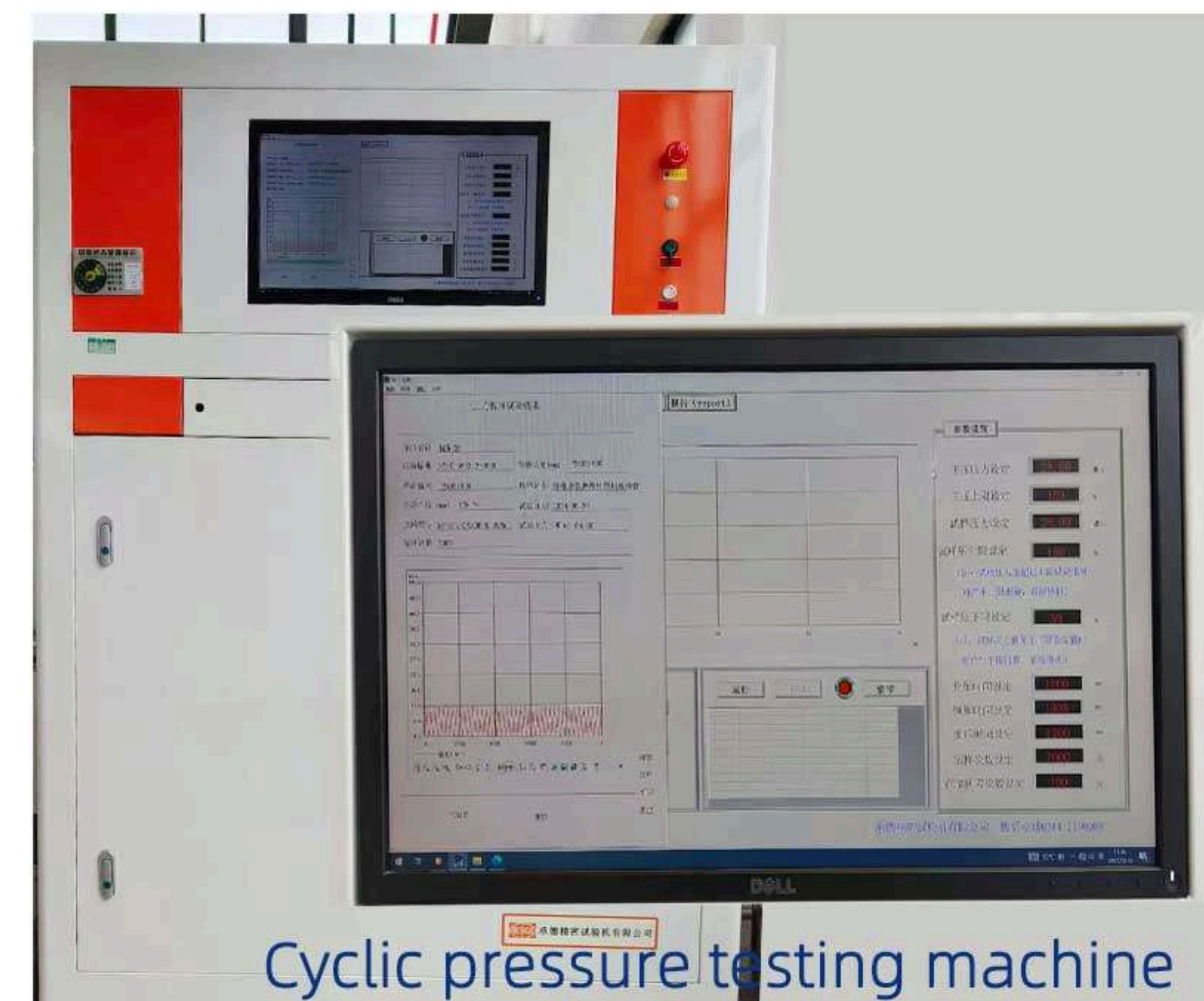
RTP tests include short-term burst, tensile strength, bending, impact, stretching, high-temperature testing, long-term hydrostatic regression testing, vacuum & external pressure, permeability, torsion resistance, and corrosion resistance and abrasion resistance.

Strictly enforces inspection of all incoming materials and conducts process inspections according to regulations.

Standard factory tests include batch testing and full-pipe hydrostatic testing.



Min bending test



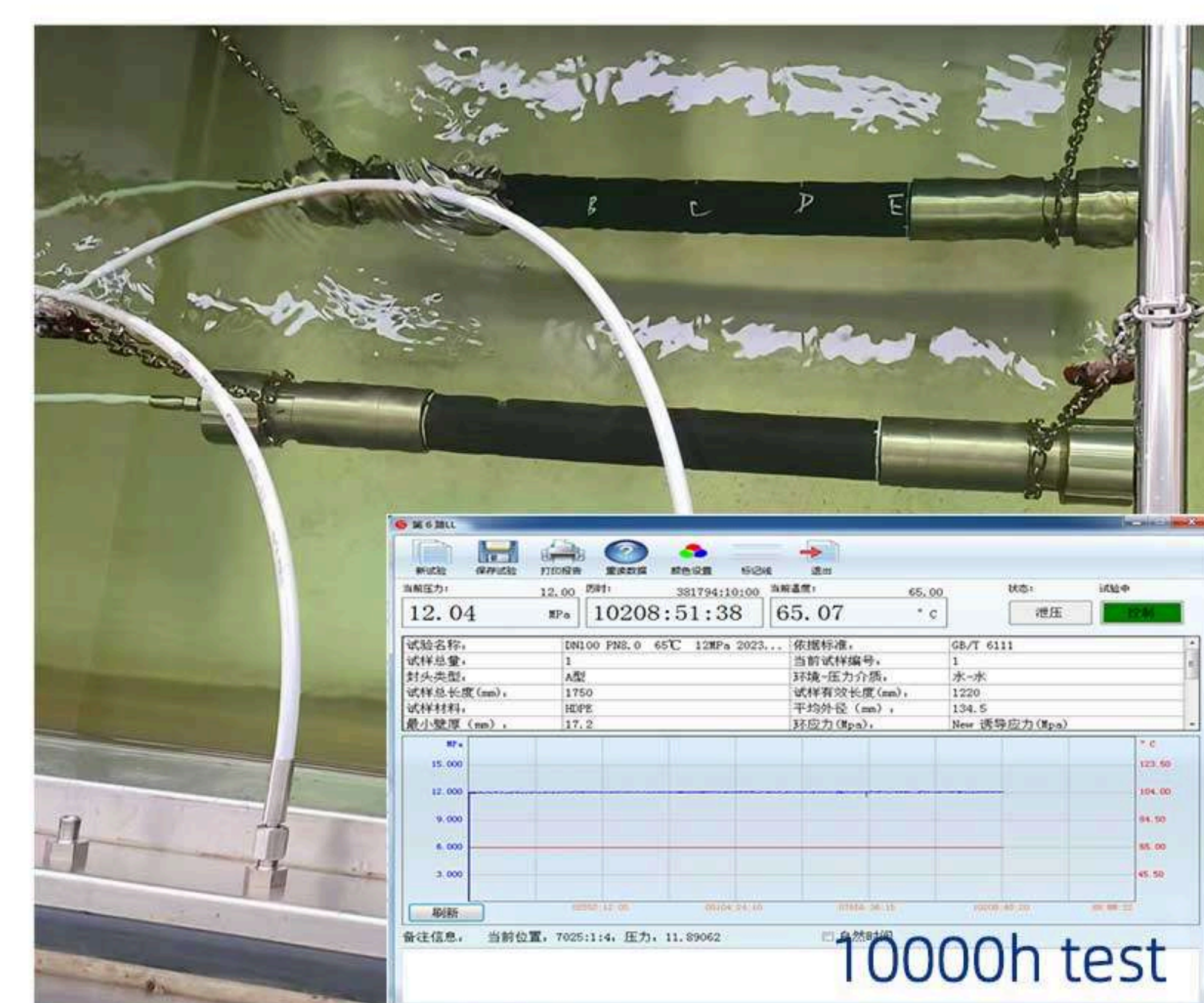
Cyclic pressure testing machine



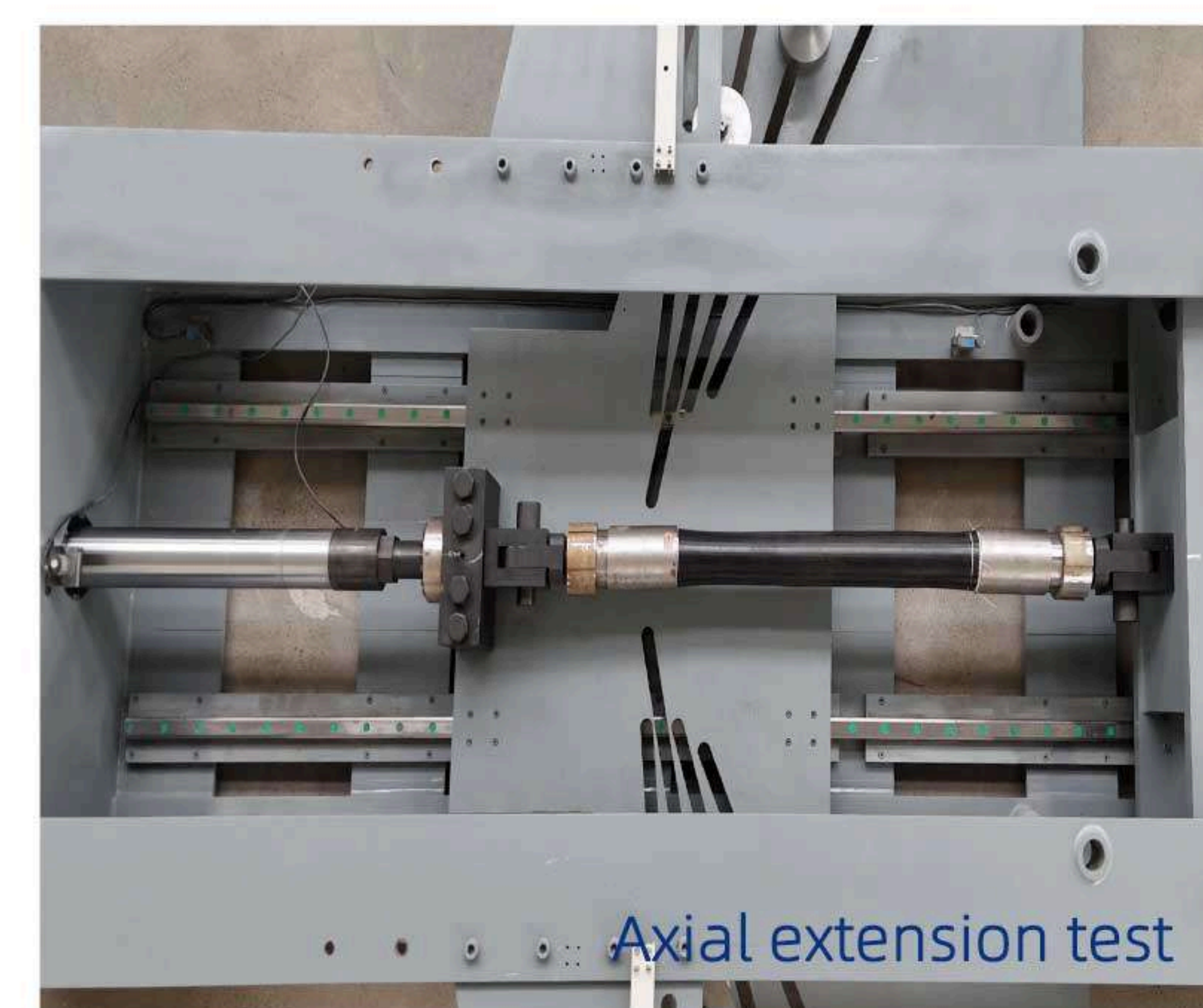
Thermostatic control watertank  
≤95°C



Burst test



10000h test



Axial extension test



## 7.Global Layout

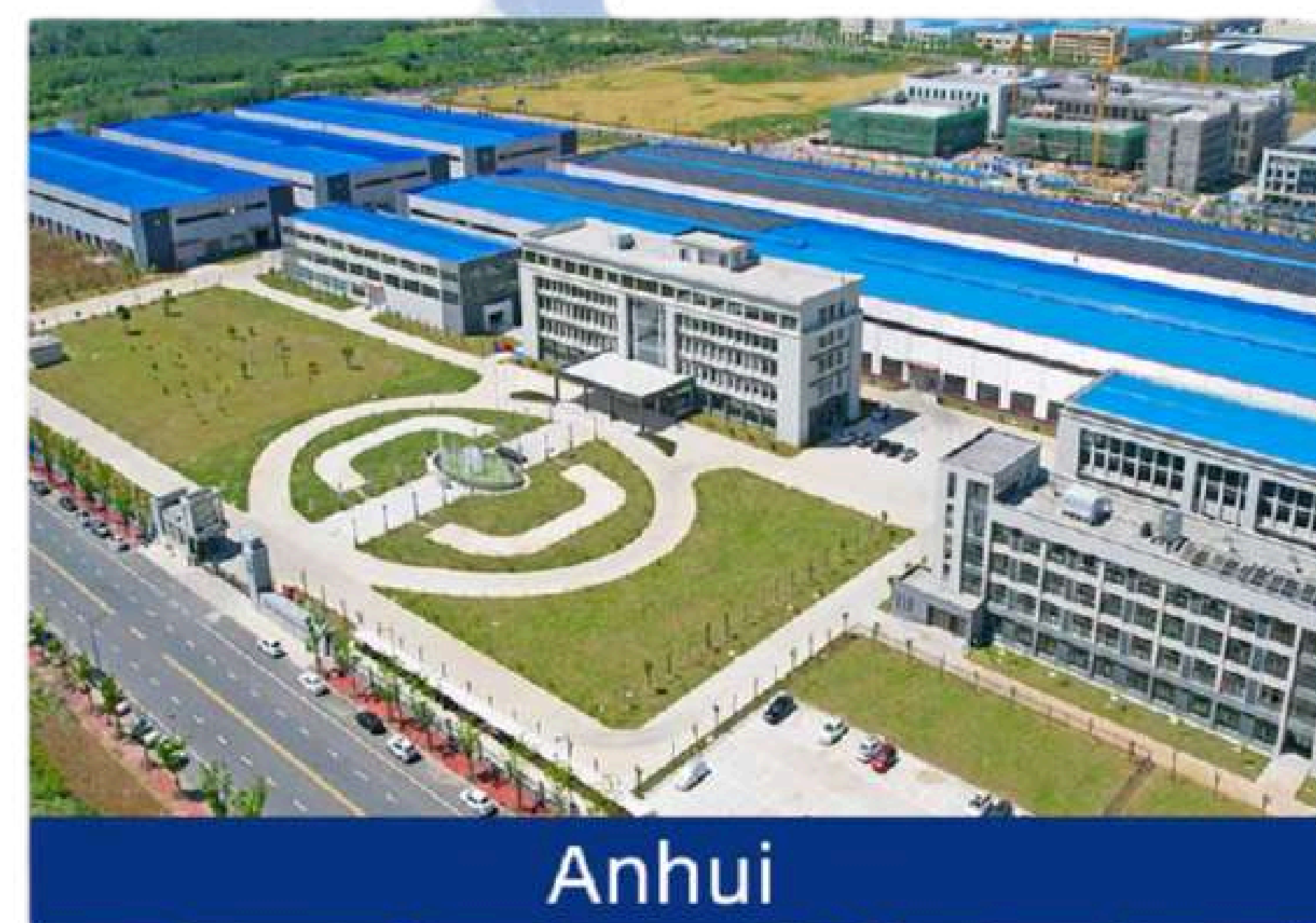


### Becoming world leading high-tech pipeline company

At present, the company is implementing the global strategy layout, the global production base, research and development centers and logistics warehouses are located in the United States, Saudi Arabia, the United Arab Emirates, China (Nanjing Jiangsu, Taizhou Jiangsu, Chuzhou Anhui) and other countries and regions.



Taizhou



Anhui



Nanjing



UAE



KSA



USA