

WENGE

WENGE 温格

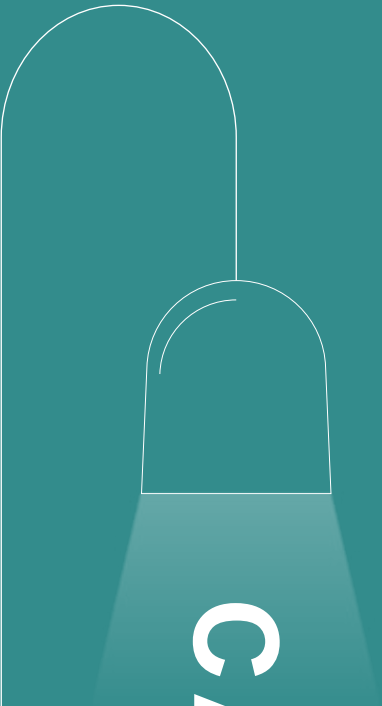
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Copper-nickel stainless steel refrigerant pipe system

product application technical manual



Green-Smart Living, Elevated Comfort



CATALOGUE

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Chapter 1: Using steel pipes as a Replacement for copper

PIPES IS FEASIBLE

The Challenges Facing Copper Pipes, Copper, the material widely used in the HVAC industry, is facing serious challenges.

Steel not only serves as a substitute for copper but also helps to reduce waste.



Dr. Copper



1、Copper Price Breaks Record High, Material Substitution Becomes a Necessity

Copper prices have surged past the historic peak of ¥ 110,000RMB per ton, with each¥ 1,000 RMB increase in copper prices raising the average production and installation costs of household central air conditioning indoor units by approximately . ¥5 RMB.

The annual increase in 2025 is 37.64%, with the installation cost of each indoor unit rising by approximately ¥ 150RMB .

2、High on-site material loss rate increases management costs

Industry research data indicates that copper pipes in large-scale, long-cycle installation projects incur significant waste due to cutting processes.

The average rate of abnormal loss caused by theft and other reasons is 2% -3%, and the rate of loss in some loose management project sites is even more than 5%.

3、Strategic resources are dependent on imports, posing supply chain risks

According to data from the China Nonferrous Metals Industry Association, China's dependence on foreign copper resources has long been higher than 70%. This "bottleneck" risk compels the entire air conditioning industry to seek more autonomous and stable alternative material

Cu

PIPES IS FEASIBLE

From the rocket engine compartment piercing the clouds to the skeleton of the maglev train speeding by; from the glass curtain wall framework of skyscrapers suspended in mid-air to the implanted joints sustaining life within the human body—stainless steel embodies humanity's exploration of extremes and pursuit of refined living.

1、Cutting-edge fields: the "essential materials" for aerospace and transportation

In aerospace engineering, the new-generation spacecraft like SpaceX's Starship demand propulsion pipelines with exceptional strength, thermal fatigue resistance, and lightweight properties. Austenitic stainless steel and its advanced variants are among the core materials that fulfill these stringent requirements.



In the automotive industry, following the implementation of China VI emission standards, the temperature of the hot end of the engine exhaust system (e.g., the manifold) can be maintained above 900°C for extended periods. Stainless steel has become the standard material for manufacturing turbocharger return oil pipes, exhaust manifolds, and catalytic converter housings, accounting for over 95% of such components.



2.Industry Standard Process: Accelerating the Construction of Stainless Steel Pipe Parts Air Conditioning Application Standard

To promote the standardized application of stainless steel piping components in the air conditioning industry, the development of relevant National Standards and Industry Standards has been fully initiated. The standards recommend the use of stainless steel pipes and specify the minimum wall thickness. (See table for details)

Nominal Minimum Wall Thickness of Connecting Pipes for Multi-Split Systems

external diameter of pipe ()	minimum wall thickness of copper tubeof stainless steel	minimum wall thickness of stainless steel
5≤φ<12	0.62	0.6
12≤φ<16	0.80	
16≤φ<29	1.0	
29≤φ<33	1.1	0.8
33≤φ<37	1.3	
37≤φ<40	1.4	
40≤φ<45	1.5	1.2
45≤φ<50	1.6	
50≤φ<64	2.0	

National Standard (Draft Revision): "Requirements for Application Design and Installation of Multi-Connected Air-Conditioning (Heat Pump) Units"

It is expected that from the first quarter of 2026, national and industry standards regulating the application of standardized stainless steel pipe fittings in the air conditioning field will be successively issued.

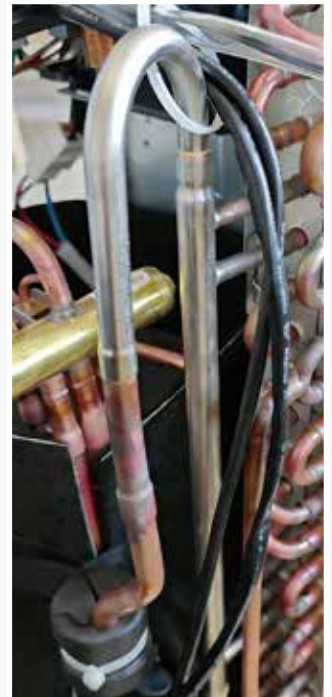
Common Specification Table for Stainless Steel Pipe Fittings

Caliber	minimum wall thickness
6.35	0.5
8	0.6
9.52	0.6
12.7	0.6
15.88	0.7
19.05	0.8
22.22	0.9
25.4	1.0
28.6	1.0
31.75	1.1
38.1	1.2
42	1.2

Industry Standard (Proposed New Edition) "Refrigerant Pipe Fittings for Stainless Steel in Refrigeration Systems and Heat Pumps"

3、Nominal Minimum Wall Thickness of Connecting Pipes for Multi-Split Systems

Currently, leading global air conditioning brands are replacing copper with stainless steel in both high-performance models and core system components. With outstanding properties including high-pressure resistance, corrosion resistance, and long service life, stainless steel pipes have progressed from initial technical research and experimental prototypes to large-scale commercial applications.



The penetration of stainless steel pipe fittings in air conditioning systems is being deepened in critical areas such as four-way valve connection pipes, air collection pipes (distributors), and compressor suction/exhaust pipes, which are subjected to high-pressure, high-frequency vibrations and fluid flow.

Stainless steel pipe fittings, with their superior pressure resistance and corrosion resistance, effectively reduce refrigerant leakage risks caused by pipeline rusting, cracking, or seal failure, thereby extending the service life of the entire system.

As the industry raises requirements for product lifecycle costs and sustainability
The application of high-grade stainless steel in critical pressure-bearing components has evolved beyond mere material substitution, representing a systematic

Stainless



Chapter 2: Technical Exploration

1. Copper-Nickel Stainless Steel Refrigerant Pipes /30AS Stainless Steel Pipes (New Stainless Steel Grade Designed by Wenge Technology)

- High Pressure Resistance
- Superior Corrosion Resistance
- Strong Performance
- Low Thermal Conductivity

30AS stainless steel pipe: 30-series austenitic steel, A (antibacterial/anticorrosion)
S- (soft/Supor corrosion-resistant/SUS, soft/ultra corrosion-resistant/stainless steel), stainless steel pipe material.

After seven years of research, born at the Wenge 2028 Research Institute, the metal genetic sequence was reconstructed at the molecular level, pioneering the industry's first "flexible stainless steel pipe."

It has passed a 1680-hour neutral salt spray test and a 1000-hour temperature-varying salt spray test. Depending on the pipe model, the system burst pressure is ≥ 290 kg, and its strength can withstand extreme pressures equivalent to those found at depths of over ten thousand meters in the ocean.

*Every 24 hours of salt spray testing is equivalent to one year in natural conditions. $1680/24 = 70$ years.
*Cyclic salt spray conditions: Spray for 2h (Temperature: $35^{\circ}\text{C}\pm 2\text{K}$), Dry for 4h (Temperature: $60^{\circ}\text{C}\pm 2\text{K}$, $\text{RH}\leq 30\%$), Damp for 2h (Temperature: $50^{\circ}\text{C}\pm 2\text{K}$, $\text{RH}\geq 95\%$), Number of cycles: 125 times.

Patent number: ZL202411830394.3



Chapter 3: Product System

Wenge innovatively introduced a copper-nickel stainless steel refrigerant tube system, specifically designed for air conditioning fluorine systems, using copper-nickel stainless steel as the carrier material.

The design achieves the unity of high performance of stainless steel and the convenience of field construction, which is a system solution under the trend of "steel replacing copper".



chemical properties

Passed 1680-hour salt spray test (partner completed 2400-hour salt spray test), 1000-hour temperature variation salt spray test, Same service life as the building.

Cost-saving

Free from fluctuations in copper prices; weighing only 90% of copper, it uses less material for the same pipe diameter.

Physical property

Depending on the pipe size, the system burst pressure ranges from 290 to 680 kg.

Ease of installatio

No annealing required; bendable, flarable, and weldable. The installation process is identical to copper piping, so no retraining is needed for installers.

Thermal performance

The thermal conductivity is only 1/20 that of copper pipes; flow efficiency is increased by nearly 20%, delivering 4.2% energy savings compared with copper piping systems.

Environmentally friendly with carbon-reduction benefits

During production, stainless steel reduces carbon emissions by at least 0.6-1.0 tons per ton compared with copper. It is 100% recyclable and aligned with green and sustainable development trends.

Copper-nickel stainless steel refrigerant pipe

Chapter 4: Performance Comparison

Compared with traditional copper pipes

1. Chemical properties:

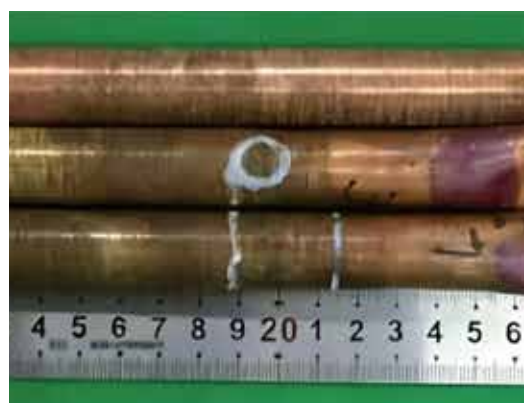
Copper-nickel stainless steel refrigerant pipes: Exhibiting exceptional corrosion resistance, acid/alkali resistance, and oxidation resistance, they are suitable for harsh environments such as humid or coastal areas. The pipes have passed a 1680-hour salt spray test, equivalent to a service life of 70 years (24-hour salt spray tests simulate 1 year of natural exposure, thus $1680/24=70$ years).

Copper pipes: In coastal salt spray areas, chemical industrial zones, and humid environments, they are prone to forming green corrosion, which accelerates the corrosion rate and shortens the service life.

Nickel-copper stainless steel refrigerant pipe



Copper pipe



2. Physical properties:

Copper-nickel stainless steel refrigerant pipes: High strength, excellent impact and deformation resistance, and less prone to damage during transportation and installation. The burst pressure can exceed 290KG, with wall thickness reduced by 20%-30% compared to copper pipes, yet still meeting usage requirements.

Copper tubes: Also possess high strength, with a burst pressure lower than that of copper-nickel stainless steel refrigerant tubes.

Nickel-copper stainless steel refrigerant pipe



Copper pipe



The bursting pressure of copper-nickel stainless steel refrigerant pipes ranges from 290 to 680 kg, which is 1.5 times that of copper pipes with the same specifications.

3. Thermal performance:

Copper-nickel stainless steel refrigerant pipes: With a thermal conductivity only 1/20th that of copper, these pipes can increase refrigerant flow by nearly 20% compared to copper pipes of the same specifications, thus optimizing air conditioning heat exchange efficiency.

Copper pipes: Copper has a thermal conductivity of approximately 400 W/(m·K). When refrigerant pipelines are made of copper, their high thermal conductivity accelerates heat exchange between the refrigerant and the external environment.

Nickel-copper stainless steel refrigerant pipe



VS

Copper pipe



When the stainless steel pipe is used as the connecting pipe of air conditioner, it can save 4.2% energy than the copper pipe without heat exchange.

4. Bending performance:

Copper-nickel stainless steel refrigerant pipe: slightly harder than copper pipe, but does not affect construction.

Nickel-copper stainless steel refrigerant pipe



≈

Copper pipe



5. Expansion performance:

Copper-nickel stainless steel refrigerant pipes: easy to expand, high quality, meet the standards for air conditioning applications.

Nickel-copper stainless steel refrigerant pipe



≈

Copper pipe



Compared with 304 stainless steel.

1. Corrosion resistance comparison:

Copper-nickel stainless steel refrigerant pipes: With a 1680-hour salt spray test, they achieve a service life of 70 years (equivalent to 1 natural year, $1680/24=70$ years).

304 stainless steel pipes: After over 500 hours of salt spray testing, localized corrosion typically develops on the surface of 304 stainless steel, particularly at cutting edges and welding heat-affected zones.

Neutral salt spray test

Nickel-copper stainless
steel refrigerant pipe

1680-hour salt spray test



304 stainless steel

500-hour salt spray test



>
Triple

304 Stainless Steel Does Not Meet the Minimum Corrosion Resistance Requirements for
Air Conditioning Pipelines in Coastal Salt Spray Zones and Chemical Zones

2. Comparison of metal ductility:

Copper-nickel stainless steel refrigerant pipes: featuring high copper content, excellent metal ductility, easy expansion, and superior quality.

304 stainless steel pipe: cannot be expanded.

Nickel-copper stainless
steel refrigerant pipe



304 stainless steel



>

3. Comparison of tube expansion effects:

Nickel-copper stainless
steel refrigerant pipe



304 stainless steel



4. Comparison of internal welds:

Copper-nickel stainless steel refrigerant tubes: The inner wall welds are leveled and polished to reduce stress concentration and enhance fatigue strength. The smooth surface minimizes flow resistance, eliminates impurity residues, and ensures sealing integrity and system cleanliness.

Nickel-copper stainless
steel refrigerant pipe



304 stainless steel



5. Comparison of processing techniques:

Online process

Welded pipe

Online leveling

Online diameter reduction

Online annealing

VS

Traditional process

Raw Material Smelting and Hot Rolling/Cold Rolling

Offline annealing (high energy consumption)

cold drawing/cold rolling forming (process dispersion)

acid passivation (environmental pollution)

Higher dimensional accuracy:

Outer diameter tolerance up to ± 0.1 mm with excellent roundness.

Superior surface quality:

Smooth inner wall with $R_a < 0.8 \mu\text{m}$ and no weld bead reinforcement.

More uniform mechanical properties:

Refined grain structure, with yield strength increased by 15%–20%.

Enhanced corrosion resistance:

Weld seam corrosion resistance equivalent to the base material, ensuring a longer service life.



Guangdong Pipeline Production Base

Comparison of 30AS Stainless Steel and 304 Stainless Steel

class		chemical element	碳 (C)	硅 (Si)	锰 (Mn)	磷 (P)	硫 (S)	铬 (Cr)	镍 (Ni)	铜 (Cu)	钼 (Mo)	氮 (N)
chemical composition (mass fraction) /%	30AS stainless steel	≤ 0.016 ✓	≤ 0.4	≤ 1.4	≤ 0.04 ✓	≤ 0.003 ✓	16~18	7~9	≥ 2.5 ✓	≥ 0.25 ✓	≤ 0.016	
	304L stainless stee	≤ 0.03	≤ 0.75	≤ 2	≤ 0.045	≤ 0.03	17.5 ~ 19.05	8.0 ~ 12	-	-	≤ 0.1	
key role		Determining the intergranular corrosion resistance Lower is better	Refining improvement liquidity, enhancing antioxidant capacity	Enhance strength, replace part of nickel (control content to avoid embrittlement)	Harmful elements, Controlled (lower toughness is better)	Harmful elements, must be controlled (lower value indicates better corrosion resistance)	Primary corrosion resistant elements, forming a passivation film	Enhance toughness and low-temperature resistance, and support corrosion resistance	Improving material properties and reducing cold working degree of difficulty	Enhance high-temperature and corrosion resistance	Assist in enhancing strength without significant impact corrosion resistance	

Performance Parameters of Copper Nickel Stainless Steel Refrigerant Pipe

Mechanical Properties

Specifications and models	Post fracture elongation EL(%)	Yield strength YS (MPa)	Tensile strength TS (MPa)	Surface hardness HV	Bending test 180°d=t
6.35 ~ 19.05	> 55	150 ~ 220	≤550	≤140	Pass

Physical Properties

Specifications and models	Flaring test % (Refer to GB/T17791 standard)	Cleanliness mg/m ² (Refer to GB/T17791 standard)	Flaring test (Refer to GB/T17791 standard)	Compressibility test (Refer to GB/T17791 standard)	Grain size mm (Refer to GB/T17791 standard)
6.35 ~ 19.05	> 60	< 25	Pass	Pass	≤0.045

Pressure Resistance and Burst Performance

Specification item	6.35*0.6	9.52*0.6	12.7*0.7	15.88*0.8	19.05*0.8
Pressure resistance m\	10.5 MPa pressure maintained for 60 seconds without leakage				
Blasting performance (MPa)	92.7	55.4	41.7	32.5	35.5

Extreme Condition: A Dual Test of Temperature and Pressure

The Real Environment of Multi-Online Connection Pipe System



Intense temperature fluctuations

From summer cooling (-5°C) to winter heating (80°C+), the pipes undergo repeated thermal expansion and contraction.



Significant fluctuations in pressure

Operating from low-frequency (10+ kg) to high-frequency full load (40+ kg), it withstands tremendous pressure shocks.

The Inevitable Failure of 304/316 Stainless Steel

Fatigue of metal

Decreased toughness, such as that of a wire bent repeatedly.

Stress cracking

The weak links are the first to crack and eventually leak.

failure risk visualization

temperature cycle shock

Scope: -5°C to 80°C+, resulting in thermal expansion and contraction

system pressure fluctuation

Range: 10+ kg to 40+ kg, weak point of the impact system



Final result

metal fatigue cracking, Freon leakage

Hidden Killer: Installation Stress and Building Settlement

The Unresistable Settlement of Buildings

The building will produce continuous settlement in the use, and the rigid pipe system will be subjected to continuous and dynamic stress.

Wenger copper nickel stainless steel

It has good flexibility and can absorb stress through its own deformation to protect the system effectively.

Neglected installation stress

The pipeline hoisting cannot be absolutely level, resulting in initial stress; the connection points bear continuous tensile forces due to installation deviations.

304/316 stainless steel

The high rigidity prevents stress absorption, which may eventually cause pipeline or weld fracture.

Flexibility is the key to coping with system stress and ensuring long-term stable operation.

The fatal weakness of welding: intergranular corrosion.

The Nightmare of On-Site Flame Welding



High temperature fracture

The chrome passivation film of stainless steel is destroyed by high temperature.



Intercrystalline corrosion

The chromium is poor in the heat affected zone, and the internal corrosion is brittle.

The Nightmare of Field Welding: Wenger's Systematic Solution



Copper-containing formulation

The welding performance is improved and the corrosion sensitivity is reduced.



Special Excipients

The matching welding rod and flux ensure consistent weld performance.

Do not mix!



Any mixing of ordinary stainless steel straight pipe or joint may become a "time bomb" of the system.



Short-term cost savings will result in frequent system leaks and repairs over the next 3-5 years, severely damaging the brand reputation!



Not all stainless steel deserves the name Wenge Copper-Nickel Stainless Steel.

- Proven in performance;
- proven in installation;
- proven in quality;
- proven in cost;
- proven in low-carbon;
- proven in energy efficiency.



Chapter 5: Installation Guide

High frequency welding



Step 1. Apply flux evenly



Step 2. Welding the matching ring

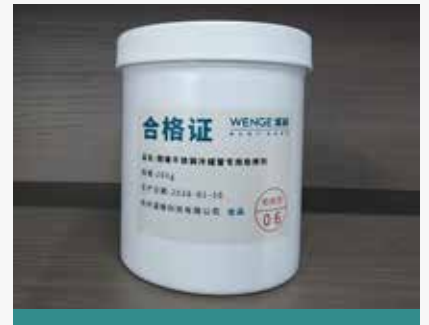
High frequency welding tool



Bonding machine



Welding ring-belt electrode



Self-developed flux

Precautions for High-Frequency Welding

1. Before welding, thoroughly clean the oil residue and oxide scale from the ends of the copper-nickel stainless steel refrigerant pipes, joints, and welding rings.
2. The welding power should not be excessive; the temperature rise must be rapid and uniform, and the welding ring should be fully melted.
3. After welding, allow sufficient cooling to ensure complete material solidification. Avoid contact during this period to prevent hand burns.
4. Welding shall be performed using welding rings (with welding rods) and Wenge's proprietary flux.

Precautions for flame



Step 1. Apply flux evenly

Step 2. Weld with special welding rod

火焰焊接工具



Special welding rod



Flame welding gun

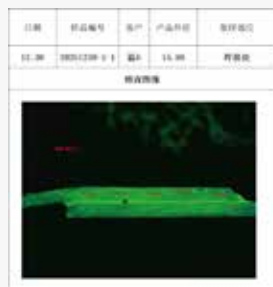


Self-developed flux

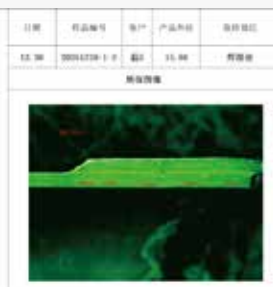
Precautions for flame welding

1. Heat the copper-nickel stainless steel refrigerant pipe joints evenly until the pipes turn slightly red (welding material melting point), then insert the dedicated welding rod.
2. After welding, verify that the weld seam is full, free of porosity and cracks, and remove any residual flux after cooling.
3. Welding shall be performed using dedicated welding rods and Wenge's proprietary flux.

Welding Test of Copper-nickel Stainless Steel Refrigerant Pipe



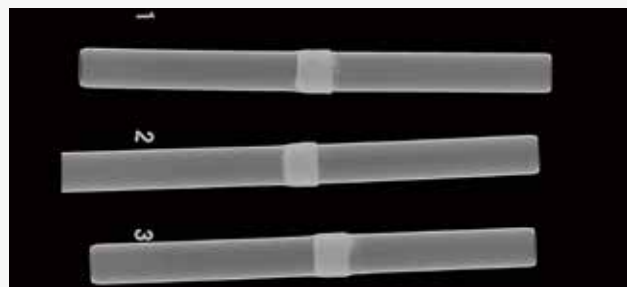
Penetration Test



Pull-Out Test



Welding Test





Mach-Ring Press-Connection Technology

zero ignition

zero glue

zero blockage

zero leakage

zero discharge

- A decade of honing, hundreds of trials and errors, and millions in investment.
- Wenger's sole objective in overcoming challenges was to claim the crown jewel of pipeline connection technology.
- With 1 international invention patent, 4 domestic invention patents and 8 utility model patents, we defined a new era of safe connection with zero fire, zero solder and zero adhesive.

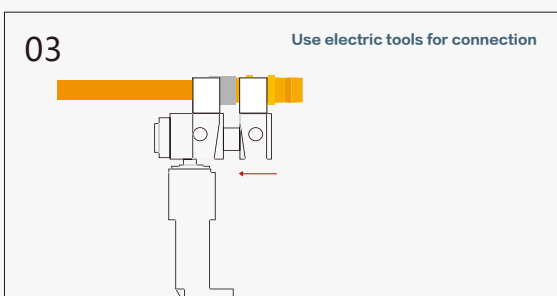
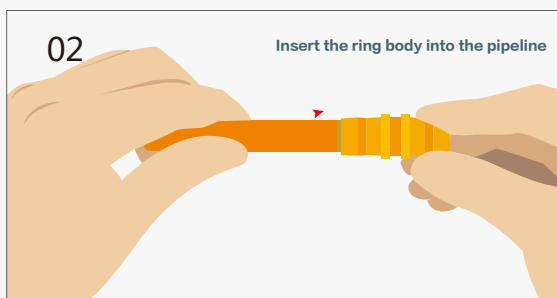
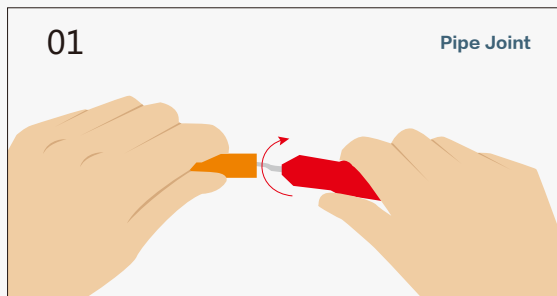


patent number: ZL201610876439.X

German patent



Mach-Ring Installation Steps



Three-step standardization for easy connection

Mach-Ring Connection Tools



Electric clamp



Electric clamp

Precautions for Mach ring connection:

1. Use a clamping tool with the appropriate pipe diameter, ensuring the jaws are perpendicular to the copper-nickel stainless steel refrigerant pipe and aligned with the clamping area of the Mach ring.
2. Maintain tool stability during clamping, complete each clamping operation in one pass, and confirm that the ring body aligns with the marking line after clamping.

Step-by-step guide for pipe expansion



Step 1: Cut



Step 2: Trim



Step 3: Fix



Step 4: Necking



Step 5: Completed

Built-for purpose tools

Edger



Cutting knife



Expander



Scissors blade



Precautions for Flaring

1. The nut must be threaded onto the copper-nickel stainless steel refrigerant pipe before the expansion process.
2. Insert the pipe into the expansion tool's clamp, ensuring the exposed pipe length matches the expansion depth, then tighten the clamp to secure the copper-nickel stainless steel refrigerant pipe.
3. Remove metal debris from the expanded area to ensure proper sealing for subsequent connections.

Steps for Pipe Bending Operation



Hand bending pipe



Bend the pipe with a pipe bender

■ Bend pipe tool:



Precautions for Pipe Bending

hand bending pipe

1. When bending, keep both hands as close to the pipe as possible to avoid excessive localized stress that may cause deformation of the copper-nickel stainless steel refrigerant pipe wall.

Use a pipe bender for bending.

1. Clearly define the starting point, angle, and dimensions of the bend to avoid incorrect positioning;
2. Rotate the elbow handle slowly and evenly, avoiding excessive force.

Sealing Gasket of the Bell Mouth for the Refrigerant Pipe System of the Copper-Nickel Stainless Steel

To fully leverage the excellent ductility and high-standard expansion quality of copper-nickel stainless steel refrigerant tubes, and to further eliminate system leakage risks, Wengge has specifically developed and equipped a proprietary bell-mouth sealing gasket. This ensures that system leakage risks are controlled below 0.1%.

Through three rigorous tests:

1. During static pressure testing, over a thousand expansion and pressure maintenance tests were conducted to verify the sealing stability.
2. Simulated real-world usage scenarios with over 2,000 hours of continuous operation.
3. High-frequency vibration testing is conducted to comprehensively evaluate gasket quality.

Patent No: ZL 2019 2 1191421.1



System-related accessories



Stainless steel Branch
(U-shaped)



Stainless steel Branch
(Y-type)



Stainless steel flare nut



Stainless Steel Welded
Fittings



Stainless steel welded
elbow



Mach ring

See the following table for the
product catalog of the system

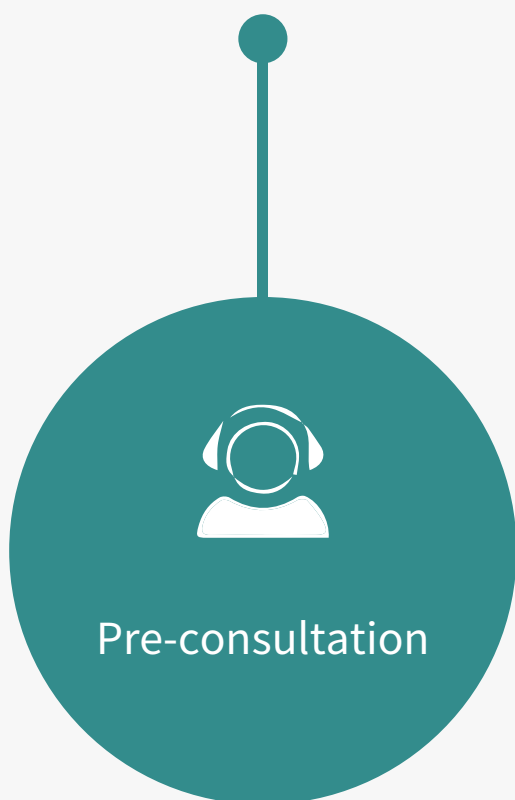
Chapter 6: Service Guarantee

Technical advisory services

Pre-consultation: We provide one-on-one professional advisory services tailored to your project selection needs, with customized solutions based on your specific air conditioning requirements.

For installation environments (e.g., coastal salt spray zones or chemical industrial zones) and system pressure parameters, we recommend suitable pipeline specifications and installation plans, and provide a Project Selection Proposal.

Technical Training: We provide complimentary online and offline training for contractors and installation teams, covering pipeline welding, cutting, and bending techniques to ensure construction personnel master standard procedures.



1:1 Service



Online + Offline

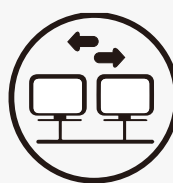
Installation Guide

On-site guidance: For large-scale projects (e.g., commercial complexes or industrial plant HVAC systems), technical engineers may be deployed to conduct on-site installation demonstrations, with focused guidance on critical aspects including complex piping layouts, vibration-resistant mounting methods, and low-temperature sealing procedures. Ensure installation quality;

Remote support: Provides real-time remote guidance through "text and images + video". The installation team can upload photos or videos of the site when encountering issues.



On-site Guidance



Remote Support



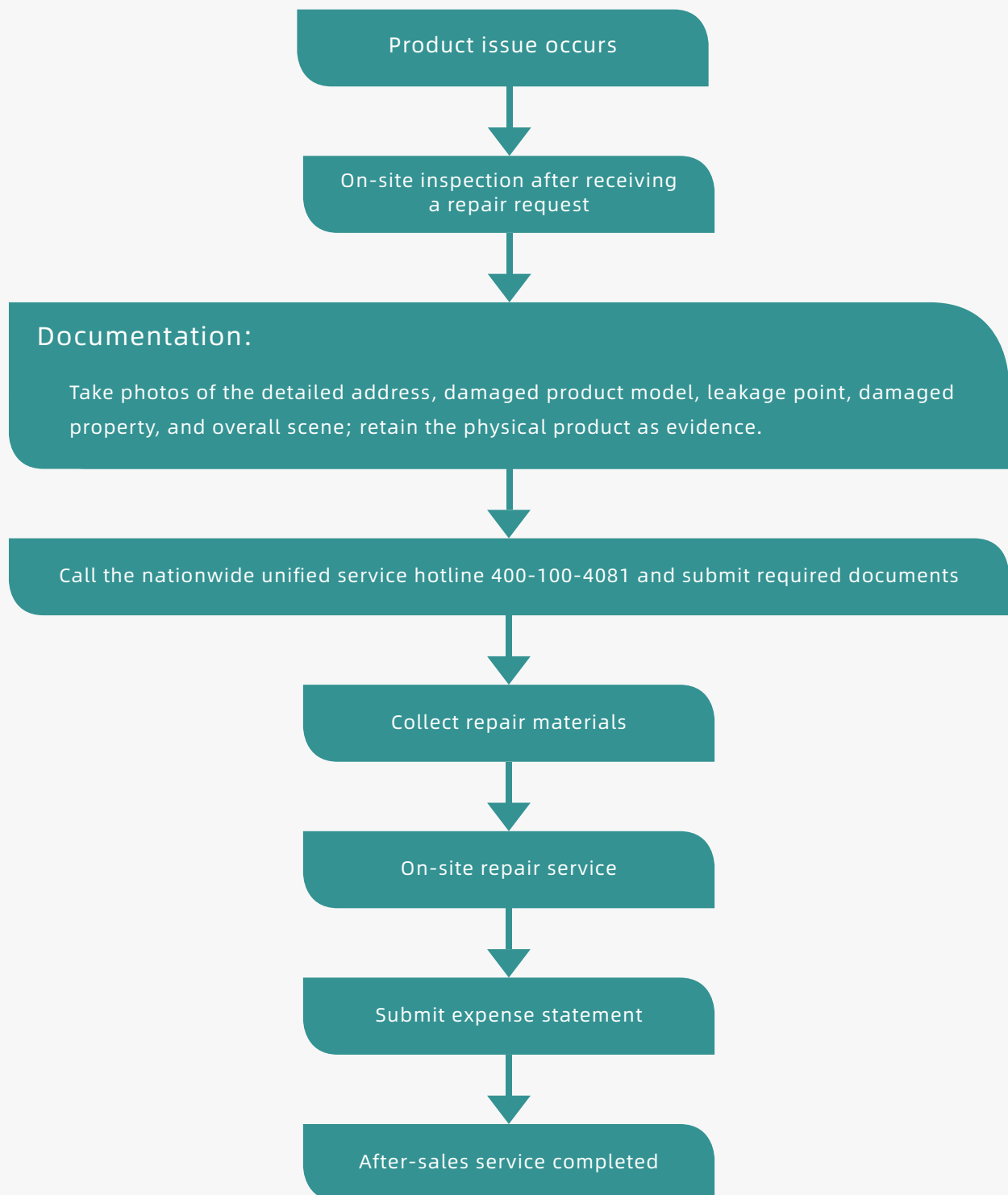
After-sales service response

Rapid Response Mechanism: A nationwide unified after-sales hotline and online service platform will be established to provide 24/7 support. For product issues during the warranty period, upon receiving feedback:

initial assessment of the problem should be completed within 12 hours;

Provide solutions within 24 hours (if product replacement is required, deliver a backup pipeline within 48 hours to ensure uninterrupted project progress); for complex issues, arrange on-site technical personnel to resolve the problem within 48 hours (no more than 72 hours in remote areas).

After-sales Service Process (China)



Jointly underwritten by Wenge Technology and Ping An Insurance (China) Company Limited.

Wenge commits that during the warranty period, any product failure caused by quality issues will be replaced rather than repaired, delivering truly dedicated and customer-focused service.

中国平安 PINGAN 产品责任险

中国平安财产保险股份有限公司

保险单号: 验证码:

鉴于投保人向中国平安财产保险股份有限公司浙江分公司(以下简称“本公司”)提交书面投保申请和相关资料(该投保申请及资料被视作本保险单的有效组成部分),并同意向本公司缴付本保险单明细表中列明的保险费,本公司同意在本保单条款规定的保险责任范围内,对保险期限内被保险人的损失承担赔偿责任,特立本保险单为凭。

被保险人 杭州温格科技有限公司

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SPECIFIC SEAL FOR POLICY

本保单信息来源于投保人的投保申请,是为提供理赔服务而制作的单据,如收到电子保单后可通过点云电子数据,或登陆
中国平安官方网站 <http://www.pingan.com> 或 <http://www.pingan.com/question/index/> 上查询电子保单投保信息,也可拨打95511。
个人网络查询: 请访问 <http://www.pingan.com> 并输入保单号查询。
企业网络查询: 请访问 <http://www.pingan.com> 并输入保单号查询,或拨打95511,下载企业宝APP在线查询保单。

Insured by PICC Ping An Insurance

System-wide warranty for 12 years

We will cover any economic losses caused by quality issues during the warranty period!

The system must strictly adhere to construction requirements. The above warranty is valid only when installation is performed by Wenge-trained and certified personnel using Wenge-exclusive welding rods and flux.

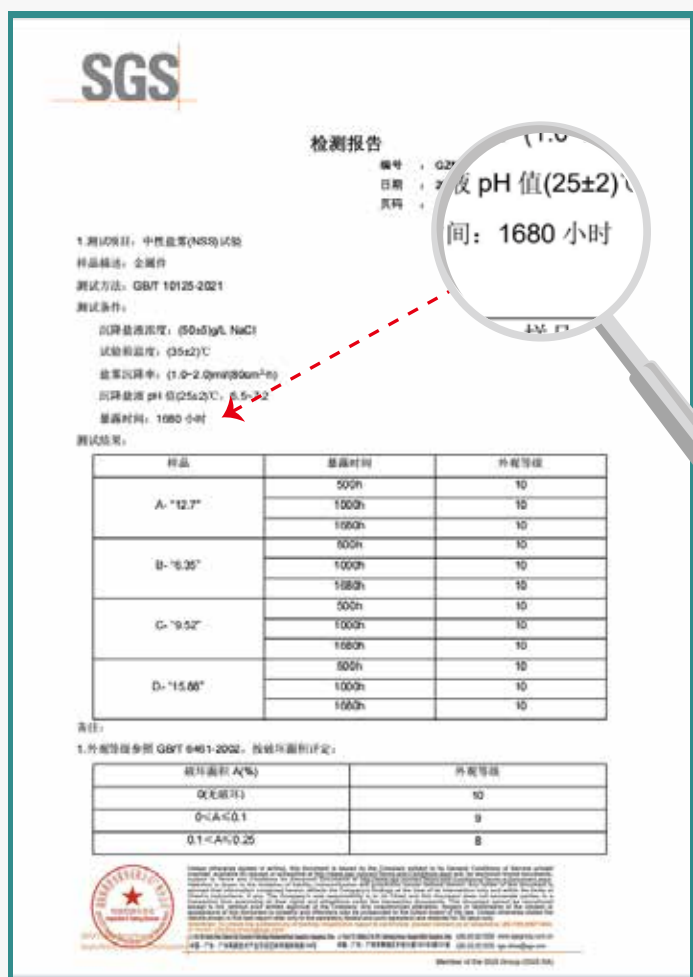


Question 2:

Q: What is the corrosion resistance of copper-nickel stainless steel refrigerant pipes? How does the welded joint perform in corrosion resistance? Are there any authoritative test reports available?

A: The copper-nickel stainless steel refrigerant tubes have passed the 1680-hour salt spray test, far exceeding the industry's standard requirements of 240/480/720 hours.

1000-hour temperature variation salt spray test (including high-silver soldering and TIG welding tests). Based on the 1680-hour salt spray test, this equates to a service life of 70 years (each 24-hour salt spray test corresponds to 1 year of natural exposure, $1680/24=70$ year).



Corrosion Performance of SGS-1680h Neutral Salt Spray



Wenbian Salt Spray Test Report and High Silver Welding of Stainless Steel Pipe



Wenbian Salt Spray Test Report and High Silver Welding of Copper Tube



Academician of Chinese Academy of Sciences-Report on Temperature-variation Salt Spray Test Tubular Tungsten Inert Gas Welding

Question 3:

Q: What are the thermal performance characteristics of copper-nickel stainless steel refrigerant pipes? How does their refrigerant flow rate compare to copper pipes?

A: Copper-nickel stainless steel refrigerant pipes have a thermal conductivity only 1/20 that of copper. As connecting pipes for air conditioning equipment, they demonstrate exceptional energy efficiency under heating conditions, saving approximately 4.2% energy compared to copper pipes. Moreover, their high pressure resistance allows for reduced wall thickness, thereby increasing refrigerant flow rate and velocity by nearly 20%.

合肥通用机电产品检测院有限公司

Hefei General Machinery & Electrical Products Inspection Institute

国家压缩机制冷设备质量检验检测中心

National Quality Inspection Center of Compressor and Refrigerator Products

检 验 报 告

Inspection Report

No. 2024LK4369

共 3 页 第 3 页 Page 3 of 3 pages

检验结果 (附表)

检验日期: 2024 年 12 月 25 日

至: 2024 年 12 月 26 日

Date of Test: Dec.25, 2024

To: Dec.26, 2024

序号 No.	检验项目 Inspection item	技术要求 Technical requirements	检验数据 Inspected data	评价 Evaluation
1	制热性能系数 (铜管)	/	1.89W/W	/
2	制热性能系数 (柔性不锈钢节能冷媒管)	/		/
3	节能百分比	/		

备注:

1. 制热性能系数 (铜管) 实测工况:
室内侧 干球温度 19.89℃
出风静压 30Pa
热源侧 干球温度 7.00℃; 湿球温度 5.94℃

2. 制热性能系数 (柔性不锈钢节能冷媒管) 实测工况:
室内侧 干球温度 19.99℃
出风静压 30Pa
热源侧 干球温度 7.03℃; 湿球温度 6.00℃

3. 制热性能系数为制热量除以制热消耗功率, 要求来源于 2024LK4369 《检验委托书》。

4. 节能百分比=(柔性不锈钢节能冷媒管制热性能系数-铜管制热性能系数)/铜管性能系数*100%, 计算方法来源于 2024LK4369 《检验委托书》。

4.2%

TR01-7080-00-2019

Question 4:

Q: Are there any authoritative reports on the physical properties of copper-nickel stainless steel refrigerant tubes?

A: The cold medium tubes made of copper-nickel stainless steel have passed authoritative testing by Hefei General Electromechanical Product Testing Institute, covering tensile strength, cleanliness, pressure resistance and flattening, grain size, and evaporation tests.

合肥通用机电产品检测院有限公司
Hefei General Machinery & Electrical Products Inspection Institute
检 验 报 告
Inspection Report

No. 2024LK3265 共3页 第3页 Page 3 of 3 pages
检验结果 (附表) 检验日期: 2024年11月11日
至: 2024年12月18日
Inspection results Date of Test: Nov.11, 2024
To: Dec.18, 2024

序号 No.	检验项目 Inspection item	技术要求 Technical requirements	检验数据 Inspected data	评价 Evaluation
1	延伸强度	管材的室温力学性能应符合表8的规定; 延伸强度 $R_{m,RT} \geq 120MPa$	202MPa	合格
2	清洁度	软化退火 (O60) 和轻退火 (O50) 的管材内表面残留物 (总型) 应符合表11的规定; 外径: 6.35mm; $\leq 25mg/m^2$	17mg/m ²	合格
3	压扁试验	轻退火 (O50) 和软化退火 (O60) 状态管材应进行压扁试验, 压至两壁间距离等于壁厚, 试样不应产生肉眼可见的裂纹或裂口。	未见裂纹或裂口	合格
4	晶粒度	管材的平均晶粒度应符合表10的规定; 平均晶粒度: 0.015~0.060mm	0.031mm	合格

备注:
1. 报告中的检验项目的技术要求是依据标准 GB/T 17791-2017 和 2024LK3265《检验委托书》及附件的要求。

合格

TR01-708B-00-2019

合肥通用机电产品检测院有限公司
Hefei General Machinery & Electrical Products Inspection Institute
国家泵阀产品质量检验检测中心
National Quality Inspection Center of Pump and Valve Products
检 验 报 告
Inspection Report

No. 2025FM061 共3页 第3页 Page 3 of 3 pages
检验结果 (附表) 检验日期: 2025年01月24日
Inspection results Date of test:

序号 No.	检验项目 Inspection item	技术要求 Technical requirements	检验数据 Inspected data	评价 Evaluation
1	逸散性试验	试验压力 4.0MPa, 结果要求: 连接处泄漏率应 $\leq 3.46 \times 10^{-10} Pa \cdot m^3/s$	灵敏度 $2.0 \times 10^{-10} Pa \cdot m^3/s$ 未检测到泄漏	合格

备注: 1. 委托书要求试验压力 4.0MPa。
2. 试验环境温度 3℃~10℃。

合格

TR01-708B-00-2019

Test Report on Extension, Compression Flatness, Cleanliness, and Grain Size;

Test Report on Dispersion

Question 5:

Q: How does a copper-nickel stainless steel refrigerant pipe reduce costs compared to copper pipes?

A: Saving logic:

Price saving of unit price is lower
than copper price

+

Low-density weight saving — 13% lower
density than copper

+

Material savings with the same specifications—higher pressure
resistance, 20% thinner pipe wall thickness than copper



For instance, a project originally requiring 1 ton of copper could be reduced to just 0.75 tons by switching to stainless steel. Assuming stainless steel costs are comparable to copper, this would theoretically cut material expenses by 25%.

Material saving calculation details

Order number	Nickel-copper stainless steel refrigerant pipe			Copper pipe			Weight per meter comparison
	External diameter	Wall thickness	Weight per meter (kg/m)	External diameter	Wall thickness	Weight per meter (kg/m)	Stainless steel/copper
1	6.35	0.6	0.086	6.35	0.8	0.124	69%
2	9.52	0.6	0.133	9.52	0.8	0.195	68%
3	12.7	0.7	0.209	12.7	0.8	0.267	78%
4	15.88	0.8	0.301	15.88	1	0.417	72%
5	19.05	0.8	0.364	19.05	1	0.505	72%
6	22.2	0.8	0.426	22.2	1	0.594	72%
7	25.4	0.8	0.490	25.4	1	0.683	72%
8	28.6	0.8	0.554	28.6	1.1	0.847	65%
9	31.8	1.0	0.767	31.8	1.2	1.028	75%
10	34.9	1.0	0.844	34.9	1.3	1.223	69%
11	38.1	1.2	1.103	38.1	1.4	1.439	77%
12	41.3	1.2	1.199	41.3	1.4	1.564	77%
13	44.5	1.2	1.294	44.5	1.4	1.690	77%

Question 6:

Q: Are the prices of copper-nickel stainless steel refrigerant pipes stable?

A: Domestic stainless steel resources are abundant, eliminating the need for large-scale imports and resulting in minimal price fluctuations. During production, stainless steel reduces carbon emissions by at least 0.6-1.0 tons per ton compared to copper. It is 100% recyclable, with stable recycling value, aligning with green development trends.



Question 7:

Q: What are the specifications and compatibility of copper-nickel stainless steel refrigerant pipes?
Can existing copper pipe tools be used?

A: The copper-nickel stainless steel refrigerant pipes come in specifications ranging from 6.35 to 44.5mm, with coils featuring flexible bell-shaped expansion. Complete sets include straight pipes, direct connections, elbows, and divergers.

Perfectly compatible with all fluorine-based air conditioning systems, including household split units, commercial multi-split units, and ducted units. No modifications to existing installations required—workers can operate them immediately.

Question 8:

Q: How do you ensure consistent quality in your copper-nickel stainless steel refrigerant pipes?
What after-sales services do you provide?

A: All copper-nickel stainless steel refrigerant pipes manufactured by Wengge undergo rigorous performance testing, with all specifications meeting or exceeding traditional copper pipe standards. We provide comprehensive pre-sales technical support, on-site installation guidance, and post-sales quality warranty services, ensuring hassle-free replacements and win-win cooperation for our clients.



Project Case

• Yangtze River Delta New Consumption Headquarters Base



The Yangtze River Delta New Consumption Headquarters Base, located in Linping District, Hangzhou City, Zhejiang Province, serves as the core platform for Linping New City to establish a highland of new consumption industries in the Yangtze River Delta. It focuses on the incubation of new consumption brands, industrial integration, and regional coordinated development. The base features over 2,000 square meters of commercial office space equipped with copper-nickel stainless steel refrigerant pipes.

• Jindu Xia Palace



Hangzhou Jindu Xiangong is a large-scale mixed-use residential community developed by Jindu Real Estate Group Co., Ltd., located at the intersection of Beisha West Road and Xinghe Road in Linping District, Hangzhou. The residential units within the community cover nearly 1,000 square meters, featuring household air conditioning systems with copper-nickel stainless steel refrigerant pipes.

Product Catalogue of Copper Nickel Stainless Steel Refrigerant Pipe System





Copper-nickel stainless steel refrigerant pipe Split air conditioner **wenge**

Specification/Model	Technical parameter
H 6*0.5mm-C	Pipe diameter 6mm-Wall thickness 0.5mm-Coiled pipe
H 9*0.5mm-C	Pipe diameter 9mm-Wall thickness 0.5mm-Coiled pipe
H 12*0.6mm-C	Pipe diameter 12mm-Wall thickness 0.6mm-Coiled pipe



Copper-nickel stainless steel refrigerant pipe(PE-Insulated) Split air conditioner **wenge**

Specification/Model	Technical parameter
H 6*0.5*3000mm-C	Pipe diameter 6mm-Wall thickness 0.5mm-Length 3000mm-Coiled
H 6*0.5*5000mm-C	Pipe diameter 6mm-Wall thickness 0.5mm-Length 5000mm-Coiled
H 9*0.5*3000mm-C	Pipe diameter 9mm-Wall thickness 0.5mm-Length 3000mm-Coiled
H 9*0.5*5000mm-C	Pipe diameter 9mm-Wall thickness 0.5mm-Length 5000mm-Coiled
H 12*0.6*3000mm-C	Pipe diameter 12mm-Wall thickness 0.6mm-Length 3000mm-Coiled
H 12*0.6*5000mm-C	Pipe diameter 12mm-Wall thickness 0.6mm-Length 5000mm-Coiled
H 15.88*0.8*3000mm-C	Pipe diameter 15.88mm-Wall thickness 0.8mm-Length 3000mm-Coiled
H 15.88*0.8*5000mm-C	Pipe diameter 15.88mm-Wall thickness 0.8mm-Length 5000mm-Coiled



Copper-nickel stainless steel refrigerant pipe(Rubber-Insulated) Split air conditioner **wenge**

Specification/Model	Technical parameter
H 6*0.5*3000mm-C	Pipe diameter 6mm-Wall thickness 0.5mm-Length 3000mm-Coiled
H 6*0.5*5000mm-C	Pipe diameter 6mm-Wall thickness 0.5mm-Length 5000mm-Coiled
H 9*0.5*3000mm-C	Pipe diameter 9mm-Wall thickness 0.5mm-Length 3000mm-Coiled
H 9*0.5*5000mm-C	Pipe diameter 9mm-Wall thickness 0.5mm-Length 5000mm-Coiled
H 12*0.6*3000mm-C	Pipe diameter 12mm-Wall thickness 0.6mm-Length 3000mm-Coiled
H 12*0.6*5000mm-C	Pipe diameter 12mm-Wall thickness 0.6mm-Length 5000mm-Coiled
H 15.88*0.8*3000mm-C	Pipe diameter 6mm-Wall thickness 0.8mm-Length 3000mm-Coiled
H 15.88*0.8*5000mm-C	Pipe diameter 15.88mm-Wall thickness 0.8mm-Length 5000mm-Coiled



Copper-nickel stainless steel refrigerant pipe

Multi-split air conditioner /VRF

wenge

Specification/Model	Technical parameter
H 6.35*0.6mm-C	Pipe diameter 6.35mm-Wall thickness 0.6mm-Coiled pipe
H 9.52*0.6mm-C	Pipe diameter 9.52mm-Wall thickness 0.6mm-Coiled pipe
H 12.7*0.7mm-C	Pipe diameter 12.7mm-Wall thickness 0.7mm-Coiled pipe
H 15.88*0.8mm-C	Pipe diameter 15.88mm-Wall thickness 0.8mm-Coiled pipe
H 19.05*0.8mm-C	Pipe diameter 19.05mm-Wall thickness 0.9mm-Coiled pipe



Copper-nickel stainless steel refrigerant pipe

Multi-split air conditioner /VRF

wenge

Specification/Model	Technical parameter
H 22.2*0.8*3000mm-S	Pipe diameter 22.2 mm, wall thickness 0.8 mm, length 3000 mm, straight pipe
H 25.4*0.8*3000mm-S	Pipe diameter 25.4 mm, wall thickness 0.8 mm, length 3000 mm, straight pipe
H 28.6*0.8*3000mm-S	Pipe diameter 28.6 mm, wall thickness 0.8 mm, length 3000 mm, straight pipe
H 31.8*1.0*3000mm-S	Pipe diameter 31.8 mm, wall thickness 1.0 mm, length 3000 mm, straight pipe
H 34.9*1.0*3000mm-S	Pipe diameter 34.9 mm, wall thickness 1.0 mm, length 3000 mm, straight pipe
H 38.1*1.2*3000mm-S	Pipe diameter 38.1 mm, wall thickness 1.2 mm, length 3000 mm, straight pipe
H 41.3*1.2*3000mm-S	Pipe diameter 41.3 mm, wall thickness 1.2 mm, length 3000 mm, straight pipe
H 44.5*1.2*3000mm-S	Pipe diameter 44.5 mm, wall thickness 1.2 mm, length 3000 mm, straight pipe



Stainless steel branch pipe (U shaped)

Multi-split air conditioner /VRF

wenge

Specification/Model
F1ZHN-01F
F1ZHN-02F
F1ZHN-03F
F1ZHN-04F
F1ZHN-05F



Stainless steel branch pipe (Y shaped)

Multi-split air conditioner /VRF

wenge

Specification/Model
22T
33T
72T
73T
75T



Stainless steel welded straight connector

Multi-split air conditioner /VRF

wenge

Specification/Model	Technical parameter
φ6.35	Wall thickness 0.6mm
φ9.52	Wall thickness 0.6mm
φ12.7	Wall thickness 0.7mm
φ15.88	Wall thickness 0.8mm
φ19.05	Wall thickness 0.8mm
φ22.2	Wall thickness 0.8mm
φ25.4	Wall thickness 0.8mm
φ28.6	Wall thickness 0.8mm
φ31.8	Wall thickness 1.0mm
φ34.9	Wall thickness 1.0mm
φ38.1	Wall thickness 1.2mm
φ41.3	Wall thickness 1.2mm
φ44.5	Wall thickness 1.2mm



Stainless steel welded elbow

Multi-split air conditioner /VRF

wenge

Specification/Model	Technical parameter
φ15.88	Wall thickness 0.8mm
φ19.05	Wall thickness 0.8mm
φ22.2	Wall thickness 0.8mm
φ25.4	Wall thickness 0.8mm
φ28.6	Wall thickness 0.8mm
φ31.8	Wall thickness 1.0mm
φ34.9	Wall thickness 1.0mm
φ38.1	Wall thickness 1.2mm
φ41.3	Wall thickness 1.2mm
φ44.5	Wall thickness 1.2mm



Mach ring Multi-split air conditioner /VRF

wenge

Specification/Model	Technical parameter
φ6.35	Isometric
φ9.52	Isometric
φ12.7	Isometric
φ15.88	Isometric
φ19.05	Isometric
φ22.2	Isometric
φ25.4	Isometric
φ28.6	Isometric
φ31.8	Isometric
φ34.9	Isometric
φ38.1	Isometric
φ41.3	Isometric
φ44.5	Isometric
φ6.35- φ9.52	Reducing
φ9.52- φ12.7	Reducing
φ12.7- φ15.88	Reducing
φ15.88- φ19.05	Reducing
φ19.05- φ22.2	Reducing
φ22.2- φ25.4	Reducing
φ25.4- φ28.6	Reducing
φ28.6- φ31.8	Reducing
φ31.8- φ34.9	Reducing
φ34.9- φ38.1	Reducing
φ38.1- φ41.3	Reducing
φ41.3- φ44.5	Reducing



Flare-fitting seals

wenge

Specification/Model	Packaging/Quantity
φ6.35	50pieces per box
φ9.52	45pieces per box
φ12.7	24pieces per box
φ15.88	15pieces per box
φ19.05	12pieces per box



Stainless steel flare nut

wenge

Specification/Model
φ6.35
φ9.52
φ12.7
φ15.88

H — Represents suitability for air conditioning pipelines in fluorine-based systems.



About Wenge

Since its founding in 2012, Hangzhou Wenge Technology Co., Ltd. has been committed to its corporate mission of 'Green and Intelligent Solutions for Comfortable Living,' upholding the principle of 'User-Centricity.'

Service philosophy, adhering to the core values of "diligence and perseverance".

The company has been awarded titles including "National Science and Technology SME" and "Zhejiang Province Specialized, Refined, Distinctive and Innovative SME", and has actively participated in multiple national standards and industry

The development of industry standards. To date, the company has obtained a total of 170 patent authorizations, including 10 invention patents, with the 2028 Research Institute as the primary entity.

The core platform establishes a closed-loop business model powered by four key drivers: R&D, production, sales, and service.

As an innovative technology enterprise integrating R&D, production, sales, and service, the company collaborates with industry leaders including Daikin, York, Hisense Hitachi, and Kaijin in the HVAC sector.

Strategic partnerships have been established with leading enterprises such as Li. Currently, the company focuses on smart accessories, smart tools, smart terminals, and new materials, and has built a nationwide sales network.

We will actively expand overseas markets and build a global service system.

To ensure production capacity and quality, the company has established comprehensive production bases in Anhui, HVAC cable production bases in Fujian, and new-type pipeline material production bases in Guangdong.

In alignment with national strategies and corporate development, the company promptly implemented the green, intelligent, and high-quality industrial development path outlined in the 15th Five-Year Plan.

Building on Wenger's decades of technical expertise and innovative pipe materials and connection technologies, the company is strategically expanding into the smart home terminal sector.

In November 2025, the company will officially launch its first product under the "Blue Core" brand—the Whole-House Health Water System. Moving forward, the company will remain true to its original vision and advance the development of modern industrial solutions.

With four core missions—sustainer of the system, practitioner of green and intelligent development, pioneer of high-level development, and promoter of common prosperity—we are steadfastly advancing.

Honors and Certifications



Patent



Strength in R&D and Manufacturing



Hangzhou Headquarters



Production Workshop



Anhui Comprehensive Production Base



Guangdong Pipeline Production Base



Fujian Cable Production Base



2028 Research Institute Laboratory

Steel Replaces Copper



Performance
Feasible



Installation
Feasible



Quality
Feasible



Cost
Feasible



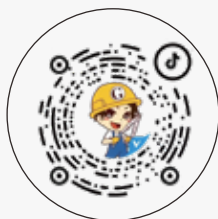
Low-Carbon
Feasible



Energy Efficiency
Feasible



Green-Smart Living, Elevated Comfort



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