Mining Wear-Resistant Composite Pipe

Prepreg Tape Reinforced High-Pressure Wear-Resistant Composite Pipe

Mining wear-resistant composite pipe is a pressure-rated pipeline designed for transporting abrasive slurry, mineral concentrates, mine tailings, paste backfill and other solid-bearing fluids.

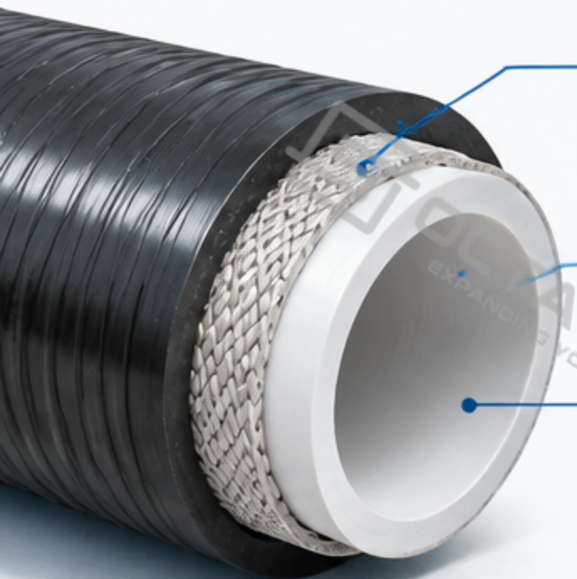
The pipe adopts a three-layer composite structure, combining a wear-resistant polymer inner layer, a continuous prepreg tape reinforcement layer and an external protective layer to withstand internal pressure, particle abrasion and harsh mine-site conditions.



Abrasion Resistance

High Pressure

Mining Applications



External Protective Layer
Resists environmental exposure and mechanical damage.

Prepreg Tape Reinforcement Layer
Provides high strength and pressure-bearing capacity.

Wear-Resistant Inner Layer
Directly contacts slurry and resists abrasion and particle impact.

Main Applications



Three-Layer Construction and Functional Design



Three-Layer Composite Structure

A multi-layer, integral and pressure-rated structure for abrasive slurry service.



External Protective Layer

Polyethylene outer layer that protects the reinforcement structure from environmental exposure, mechanical contact and installation damage.

Prepreg Tape Reinforcement Layer

Continuous prepreg tape (steel wire, steel cord, glass fiber or polyester fiber) cross-wound to provide high strength and pressure-bearing capacity.

Wear-Resistant Inner Layer

Abrasion-resistant polymer layer (e.g., POE-modified polyolefin), in direct contact with the slurry to resist particle abrasion and impact.

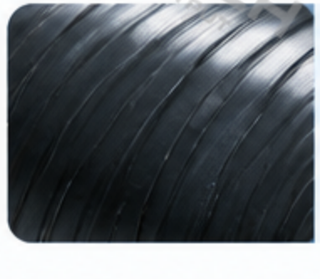
Layer Functions



Inner Layer
Abrasion resistance and slurry contact.



Reinforcement Layer
Structural strength and pressure-bearing performance.



Outer Layer
Environmental protection and mechanical durability.

Wear-Resistant Mining Composite Pipe vs. Conventional RTP



Wear-Resistant Mining Composite Pipe

VS

Conventional RTP (for general fluid service)

Item	Wear-Resistant Mining Composite Pipe	Conventional RTP
Inner Liner	Abrasion-resistant liner (e.g., POE-modified polyolefin)	Standard PE liner (mainly for clean water or general fluids)
Reinforcement	Prepreg tape, cross-wound structure (steel wire/cord, glass fiber or polyester)	Wound or braided reinforcement (general service design)
Layer Bonding	Integral bonded or fused multi-layer wall (high structural reliability)	Typically layered construction, primarily for pressure service
Service Focus	High pressure + abrasion + solid-bearing fluids (e.g., slurry, tailings, backfill)	Pressure conveyance of clean or low-abrasion fluids

Technical Specifications and Supply Range



General Technical Specifications

Product type	Prepreg Tape Reinforced High-Pressure Wear-Resistant Composite Pipe
Nominal size	DN / ID 80 – 900 mm
Nominal pressure	1.0 – 32.0 MPa, depending on diameter and construction
Inner wear layer thickness	2.0 – 5.0 mm
Total inner-layer minimum thickness	7.0 – 29.0 mm
Outer protective layer thickness	3.0 – 6.0 mm
Long-term operating temperature	≤ 55 °C
Reinforcement materials	Steel wire, steel cord, glass fiber or polyester fiber
Pipe supply	Spoolable or fixed-length configurations
Main connection types	Flanged threaded, flanged and reinforced electrofusion sleeve

Nominal Pressure Classes by Pipe Diameter

Nominal Size DN / ID (mm)	Reference Pressure Classes (MPa) Pipe Diameter (MPa)
80	2.5 – 32
100 – 150	2.5 – 25
175 – 200	2.5 – 20
225	2.5 – 16
250	2.5 – 12
300 – 350	1.6 – 10
400 – 450	1.6 – 8
500	1.6 – 6
600 – 700	1.0 – 5
800 – 900	1.0 – 4



These are available pressure classes across the relevant diameter groups, not a statement that every intermediate pressure rating is available for every size.

Pipe Supply and Length



Spoolable Pipe

- Suitable for applications where continuous pipe sections are beneficial.
- Standard spoolable pipe length: **≥ 100 m.**



Fixed-Length Pipe

- Standard reference lengths:

6 m | **9 m** | **12 m** | **18 m** | **22 m**

- Length tolerance: 0 to **+50 mm.**

Pressure Resistance and Abrasion Performance



Main Inspection and Test Requirements

Test Item	Reference Requirement
Short-term Hydrostatic Pressure	2 × PN for 1 hour
Long-term Hydrostatic Pressure	1.5 × PN for 165 hours
Short-term Burst Pressure	≥ 3.0 × PN
Cyclic Pressure Resistance	≥ 7,000 cycles
Tensile Performance	Maximum tensile failure load ≥ 3.0 × TLR
Slurry Abrasion Rate	≤ 0.20%
Full-length or Full-coil Pressure Test	1.3 × PN for 1 hour, where applicable

Typical Test Setup

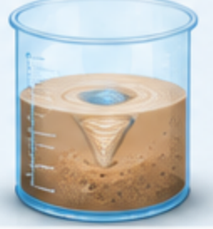


Hydrostatic Pressure Test



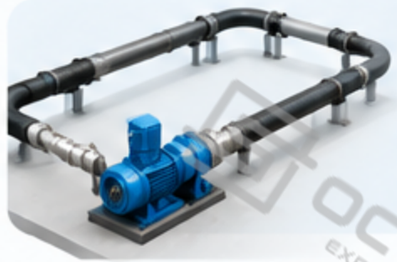
Quartz Sand Slurry Abrasion Test

Abrasion Testing: Method and Difference



Quartz Sand Slurry Abrasion Test

A laboratory test that circulates a quartz sand slurry with specified concentration and particle size through a test section to evaluate the abrasion loss of the inner wear-resistant layer (expressed as mass loss rate).



Pipeline Loop Testing

A system-level test that operates a closed-loop pipeline under actual or simulated service conditions (pressure, flow and solids) to verify the overall wear resistance and long-term operating performance of the pipe.

The above test requirements are based on the product framework of T/GRM 123—2025. The specific test parameters and acceptance criteria shall be confirmed in accordance with the applicable product standard, technical documents and project requirements.

Manufacturing Process and Quality Control



Manufacturing Process

Continuous multi-layer composite manufacturing for high pressure and abrasion service.



1 Raw Material Preparation

Wear-resistant polymer, base resin and reinforcement materials.



2 Inner Layer Extrusion

Form the wear-resistant inner layer with controlled thickness and uniformity.



3 Prepreg Tape Preparation

Impregnate reinforcement elements (steel wire/cord, glass fiber or polyester fiber) with modified polyethylene.



4 Cross-Winding Reinforcement

Cross-wind prepreg tape in specified angle and layers to form the pressure-bearing reinforcement structure.



5 Outer Layer Extrusion

Extrude the external protective layer (typically polyethylene) for environmental and mechanical protection.



6 Finished Pipe Inspection

Conduct dimensional, structural and performance inspections before delivery.

Quality Control and Inspection

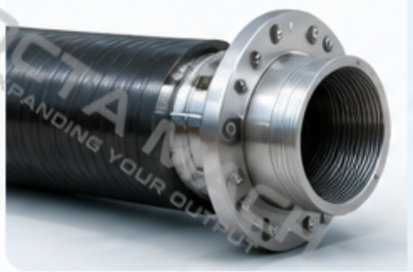
Control Item	Main Inspection and Testing Items	Purpose
Raw Material Inspection	Material type, key properties (e.g., density, melt flow rate, tensile and wear resistance), reinforcement material specifications.	Ensure raw materials meet the design and standard requirements.
Visual and Dimensional Inspection	Appearance (surface, defects), inner diameter, wall thickness, layer thickness and length tolorance.	Verify product integrity and dimensional compliance.
Structural Stability	Layer structure, bonding condition between layers (e.g., peel or shear test, as applicable).	Confirm integral bonding and structural stability of the multi-layer pipe wall.
Pressure Performance	Short-term hydrostatic pressure, long-term hydrostatic pressure, burst pressure, cyclic pressure resistance, full-length (or full-coil) pressure test.	Verify the pipe's pressure-bearing capability and sealing reliability under service conditions.
Mechanical Performance	Tensile performance (maximum tensile failure load), hoop strength (as applicable), elongation at break.	Ensure adequate overall mechanical strength and deformation resistance.
Wear Performance	Quartz sand slurry abrasion test (mass loss rate) or pipeline loop testing (under simulated slurry conditions).	Evaluate the abrasion resistance of the wear-resistant inner layer under solid-bearing flow.
Finished Pipe Inspection	Final visual and dimensional check, marking and traceability, test records and related documentation (e.g., per T/GRM 123—2025).	Confirm that the finished product meets the specified requirements and is ready for delivery.

Connections, Installation and Mining Applications



Main Connection Types

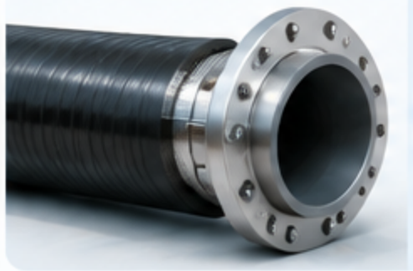
Crimped Flanged Threaded Joint





A threaded connection with a crimped flange, providing reliable sealing and high strength.

Crimped Flanged Joint





A flanged connection suitable for high-pressure slurry pipelines and system integration.

Reinforced Electrofusion Sleeve





A reinforced electrofusion connection that forms an integral, leak-tight joint with high reliability.

Installation Key Points

Bending Radius

Follow the specified minimum bending radius to avoid excessive bending stress.



Pipe Handling

Use slings or lifting belts with adequate width; avoid concentrated lifting or local loading.



Protecting Pipe Ends

Keep pipe ends sealed during transportation, storage and installation to prevent contamination or damage.



Avoiding Dragging

Do not drag the pipe on the ground or over sharp objects to prevent outer layer damage.



Pipeline Support

Provide adequate and properly spaced supports during transportation and installation to maintain alignment and stability.



Mining Applications



Mine Tailings Transportation

Long-distance, high-solids tailings slurry transportation.



Mineral Concentrate Slurry

Transport of high-density mineral concentrate slurry.



Mine Backfill Transportation

Slurry and paste backfill delivery in underground or surface systiems.



Mineral Processing Slurry Transfer

Pipeline connection between crushing, grinding and separation processes.



Abrasive Process Water

Transportation of process water containing suspended solids.

OctaMach Support

Technical Requirement Review

Evaluate the application conditions and key pipeline requirements.

Product Configuration

Recommend suitable pipe diameter, pressure class, reinforcement structure and connection options.

Quotation and Supply Coordination

Confirm available specifications, supply lengths, accessories and delivery arrangements.

Technical Documentation

Provide product datasheets, applicable inspection records and reliated technical documents.