



TECHNICAL GUIDE:

REINFORCED THERMOPLASTIC PIPES (RTP) WITH ADVANCED REINFORCEMENTS



1. INTRODUCTION

Reinforced Thermoplastic Pipes (RTP) are a high-performance solution for the transport of hydrocarbons, industrial fluids, and chemicals under demanding conditions. This guide focuses specifically on RTP pipes reinforced with aramid, steel, carbon fiber, and polyester, each offering distinct advantages in pressure handling, durability, corrosion resistance, and installation efficiency.



2. TYPICAL STRUCTURE OF RTP PIPE

An RTP pipe consists of three main layers:

- Inner thermoplastic liner: Conveys the fluid. Typically manufactured by extrusion using polyethylene (PE), polypropylene (PP), or polyamide (PA).
- Reinforcement layer (helically wound): Provides the pipe’s structural strength. Options include:
 - Aramid fibers: Outstanding strength-to-weight ratio, excellent for dynamic environments.
 - Steel wires or tapes: Superior pressure containment and mechanical durability.
 - Carbon fiber: High strength with ultra-low weight and thermal stability.
 - Polyester fibers: Balanced option with good mechanical and chemical resistance.
- Outer thermoplastic jacket: Shields the reinforcement against UV, impact, chemicals, and external damage. Usually made of PE, PP, or PU via extrusion.

3. TYPICAL APPLICATIONS OF RTP WITH ADVANCED REINFORCEMENT

- Oil and gas flowlines
- Water and chemical injection lines
- Multi-phase gathering systems
- Offshore and dynamic risers
- Remote or hard-to-access terrain

4. KEY BENEFITS BY REINFORCEMENT TYPE

Feature	Aramid	Steel	Polyester
Pressure capacity	High	Very High	Moderate
Weight	Very low	High	Low
Flexibility	High	Medium	High
Fatigue resistance	Excellent	Good	Good
Conductivity	Non-conductive	Conductive	Non-conductive
Relative cost	Medium-high	Medium	Low

5. GENERAL ADVANTAGES OF RTP WITH ANY REINFORCEMENT:

- Corrosion-free
- Rapid deployment (up to 2,000 meters/day)
- Minimal welding or jointing
- Reduced manpower requirements
- Service life up to 50 years
- Excellent for tight bends and complex installations

6. TECHNICAL CONSIDERATIONS WHEN SELECTING REINFORCEMENT TYPE

REINFORCEMENT TYPE	BEST USED WHEN...
Aramid	High pressure is needed with minimal weight, excellent for dynamic risers and mobile systems
Steel	Maximum internal pressure and crush resistance are required (e.g., buried high-pressure lines)
Polyester	Cost-effective solution for moderate pressure and chemical resistance in short/medium pipelines



SUMMARY AND RECOMMENDATIONS

RTP with advanced reinforcements provides a durable, flexible, and high-performance alternative to traditional pipelines. Selecting the appropriate reinforcement depends on the specific project requirements — pressure, temperature, terrain accessibility, installation timeline, and cost constraints. Imantt offers engineering support and tailored design for RTP systems, ensuring optimal configuration and field performance.

7. OPERATIONAL BENEFITS IN THE FIELD

- Faster installation compared to metallic systems
- Supplied in reels for minimal site preparation
- Excellent fatigue performance in cyclic loading
- Adaptability in complex and uneven terrains
- No hot works required during installation (no welding)

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