Flexible
High Pressure Pipelines

RÄDLINGER PRIMUS LINE

RÄDLINGER GROUP

Raedlinger Primus Line® – The Flexible System for the Transport of Different Media

Raedlinger Primus Line® is a trenchless technology for the rehabilitation of pressure pipelines for different media such as water, gas and oil. The process is based on a flexible high-pressure hose which is specially developed for the connection technique of the system.

Due to its multi-layered structure and very small wall-thickness, the Raedlinger Primus Line hose provides both flexibility and ultra high material strength.

The inner layer of the hose can be selected for the specific media. The outer layer - regardless of medium - is made of wear-resistant PE. Seamless aramid fabric is between the inner and outer layers, functioning as a static load-bearing layer.

Raedlinger Primus Line® is produced in nominal diameters from 6 inch to 20 inch.

The hose is inserted into the host pipe from small construction pits - thus avoiding large roadworks. Raedlinger Primus Line® is not attached to the host pipe and is self-supporting. An annulus remains between Raedlinger Primus Line® and the host pipe.

Via a specially developed high-pressure connector on each end, the Raedlinger Primus Line hose is connected to the host pipe (steel, iron cast, PE or other materials), and thus to the pipe network.

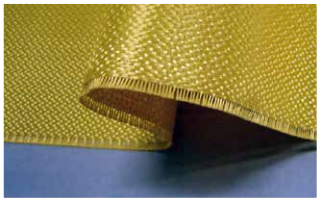
Raedlinger Primus Line® has short rehabilitation times and rapid recommissioning, and thus represents not only an inexpensive alternative to open rehabilitation, but also a high-quality method for the renewal of pressure pipes.

Raedlinger Primus Line Hose

Outer Layer

Abrasion-resistant PE sheath

Kevlar®-Fabric

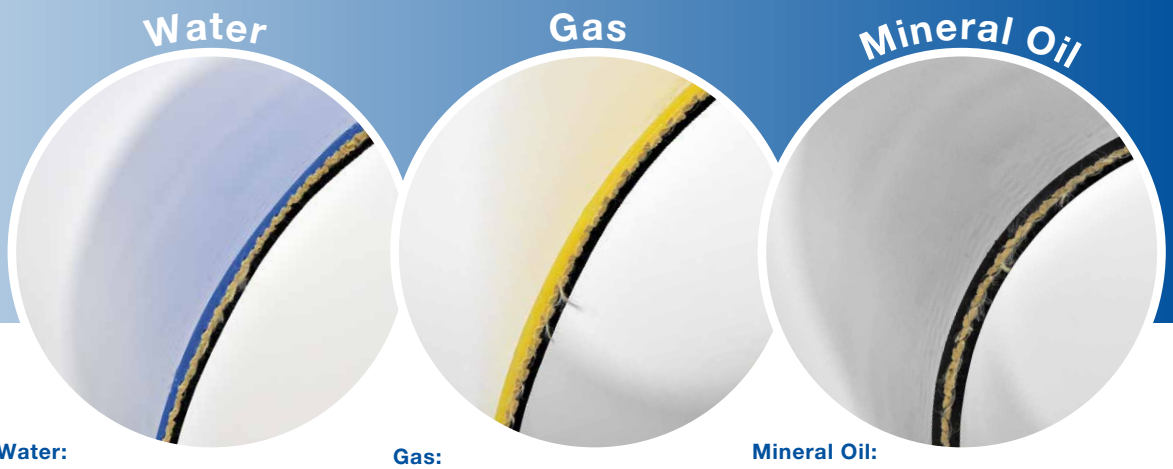


DUPONT Kevlar®

Seamless, woven aramid fibres
(single-layer or double-layer fabric design)

Inner Layer

Media-specific
based on PE or TPU



Water:
Drinking water, hot water, industrial water, waste water and sea water

Gas:
Natural gas, sweet gases, sour gases, gas mixtures

Mineral Oil:
Crude oil, refined oils, fuel oil, fuels, oil sludge

Other Media: Chemicals, abrasive media

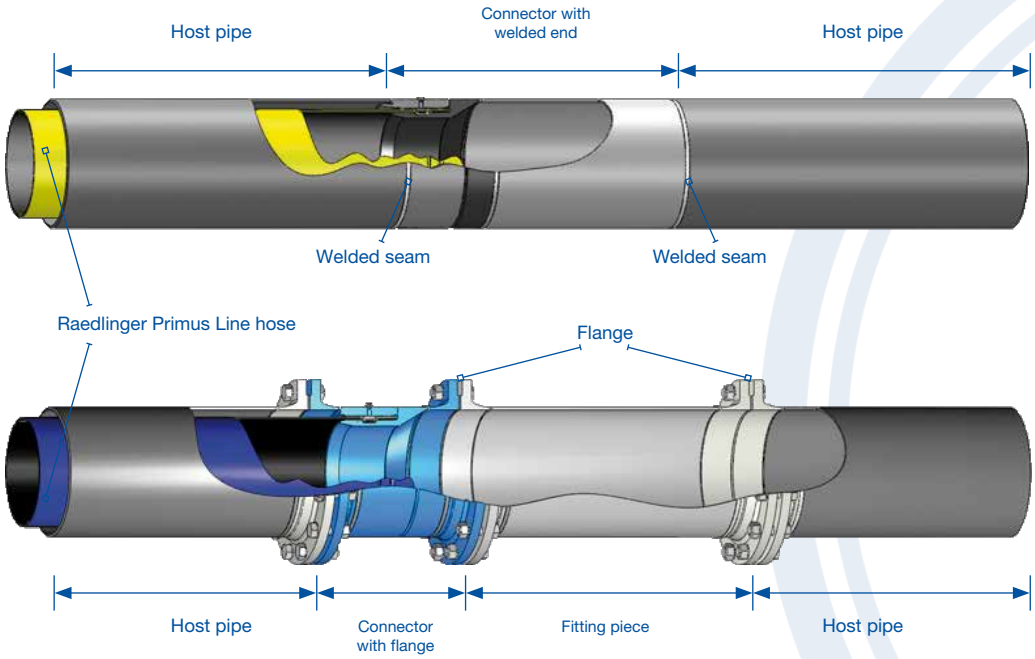
Raedlinger Primus Line Connector

At the ends, the Raedlinger Primus Line hose is connected to the existing pipe using Raedlinger Primus Line connectors. The high-pressure connector consists of a contoured internal core and external sleeve. The external sleeve has a malleable steel jacket on the inside. A resin, which is injected through a valve on the external sleeve, forces the steel sleeve and Raedlinger Primus Line® into the contours of the internal core. So we obtain a durable, pull-proof connection.

After pressure-resistant sealing of the connector on the rehabilitated pipe section, a leak test is performed.

Depending on requirements, the Raedlinger Primus Line can be fitted either with a flange or welded ends. This way, it is also possible to join bends, tees or other fittings and fixtures (made of different materials).

Connector with Flange or Welded End

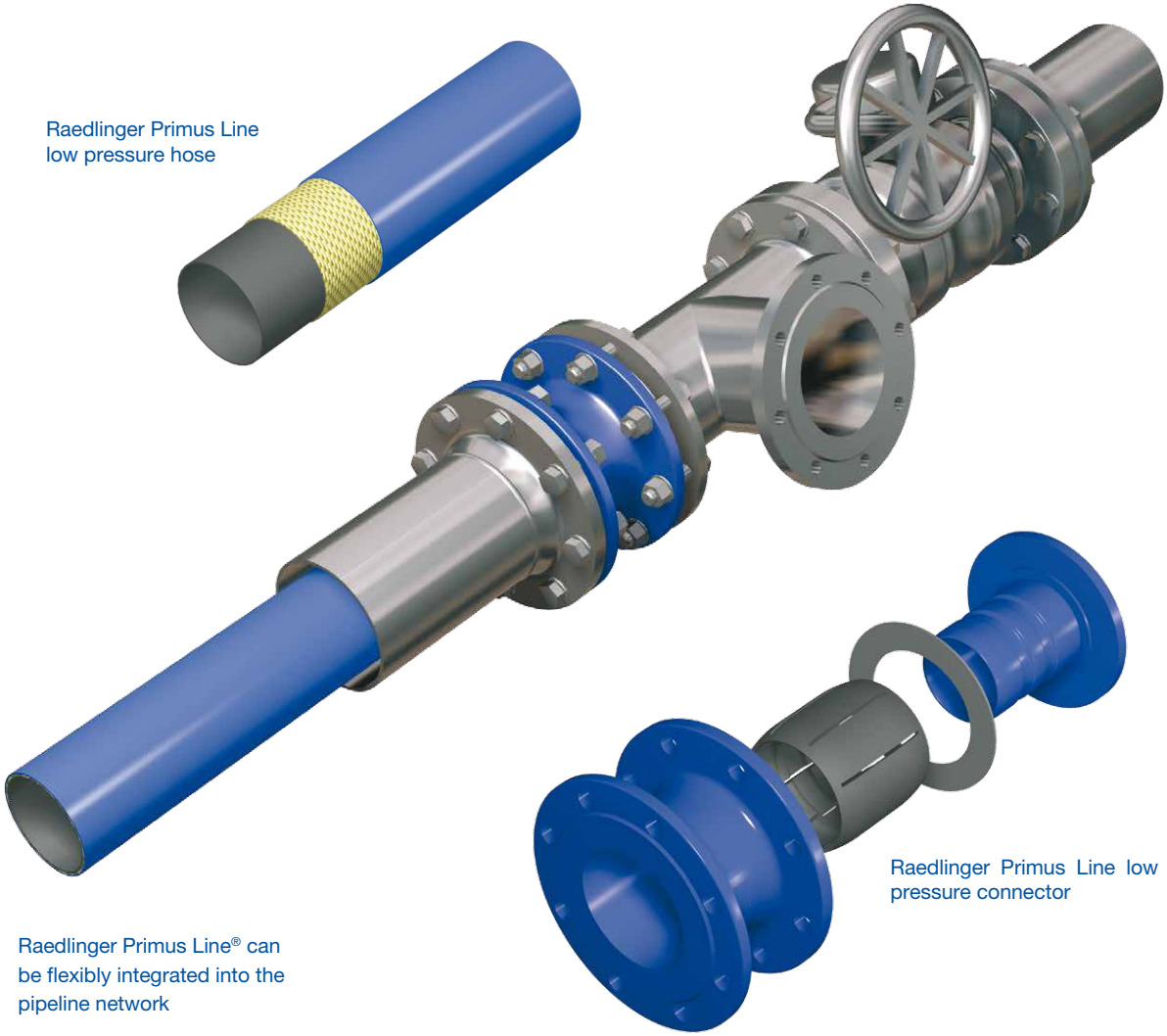


Raedlinger Primus Line® – Low Pressure System

A New Development for the Drinking Water Sector

In order to maximize the use of products for you, we are constantly improving and refining them. For this reason we have optimized our system for drinking water and developed Raedlinger Primus Line® low pressure system. Raedlinger Primus Line® was originally developed for the high-pressure gas sector.

The advantages of the Raedlinger Primus Line® system have been found useful in other forms of media as well; therefore the new Raedlinger Primus Line® system has been adapted especially for these areas of application. The new alternative has been designed for applications for which Raedlinger Primus Line® has, up to now, been too large. The aramid fabric for the new system has been modified and the connector technology has been revised to adapt it to the operating pressure of the media.



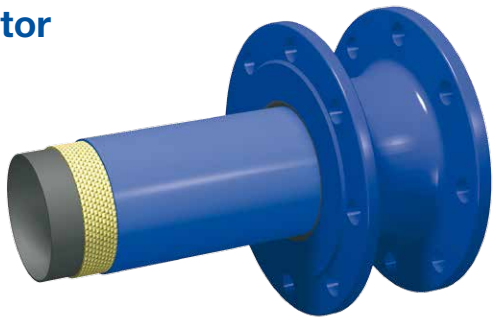
Raedlinger Primus Line low pressure hose

Raedlinger Primus Line® can be flexibly integrated into the pipeline network

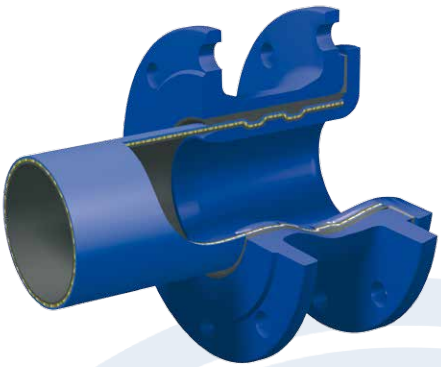
Raedlinger Primus Line low pressure connector

The Raedlinger Primus Line Low Pressure Connector

- Compact construction with double-sided ANSI flange
- High-quality epoxy powder coating
- Immediately ready for operation after installation
- Can be removed and is therefore reusable
- Light weight
- Short delivery times due to modular construction
- Cost-optimised solution



Nominal Size	Burst Pressure [psi]	Operating Pressure [psi]
6“	1,073	406
8“	768	290
10“	580	217
12“	478	174



Commonalities with the High Pressure System

- Same insertion technology
- Easy connector installation; no complex special tools required
- Connector technology has been subjected to long-term testing and is resistant to burst pressure
- Suitable for drinking water, approved acc. to NSF / ANSI 61
- Operating temperature up to 122 °F

Drinking Water
NSF/ANSI 61

Raedlinger Primus Line® – Installation

1 Shutdown of host pipe, estabilish construction pit, cut and drain pipe

2 Sectional pipe inspection with a mobile TV camera and subsequent analysis of video recordings

3 Insertion of an auxiliary rope via TV camera

4 Mechanical coarse cleaning of the pipe interior using scraper pigs and pull through pigs

5 Positioning of the Raedlinger Primus Line coiled hose at the start pit and the pulling winch at the destination pit

6 Installation of pulling head, hose guides and feeder cable

7 Insertion of the Raedlinger Primus Line hose (folded or unfolded)

8 Assembly of the connector fixed to the host pipe

9 Running of pressure tests

10 Integration of the renewed pipe in the pipeline network and commissioning

11 Pit closure

Technical Details

Nominal Sizes	6 - 20	inch	
Operating pressure max. (water) depends on diameter	797 1.102	psi psi	Single-layer fabric Double-layer fabric
Operating pressure max. (gas) depends on diameter	493 667	psi psi	Single-layer fabric Double-layer fabric
Bursting pressure max. depends on diameter	1,986 2,755	psi psi	Single-layer fabric Double-layer fabric
Wall thickness	0.236 0.315	inch inch	Single-layer fabric Double-layer fabric
Weight (from / to) depends on diameter	1.34 - 5.70 2.68 - 5.83	lbs/ft lbs/ft	Single-layer fabric Double-layer fabric
Insertion length max.	8,200	ft.	
Hose length per drum max. depends on diameter	up to 19,000	ft.	
Bendability	up to 45	degree	
Bend radii	5	D	
Continuous operating temperature	up to 122	°F	
Service life duration	50	years	

Raedlinger Primus Line® – Projects, References, Partners

Water Project: Drinking Water Pipeline in Sao Paulo, Brasilia, Sanit Engenharia Sao Paulo

The renewed cast iron drinking water pipeline 20“ runs in Sao Paulo along a main traffic road.

Laying of Raedlinger Primus Line 20“, operating pressure 232 psi, mop 145 psi

Total length: 754 ft., 1 installation section

Water Project: Drinking Water Pipeline in Grums, Sweden, Scandinavia VA-Teknik

The drinking water pipeline runs between a railroad and a motorway, crosses under the railroad and passes through a bridge. Raedlinger Primus Line® was inserted from already existing concrete chambers and from chambers in the bridge abutment.

Laying of Raedlinger Primus Line 10“, operating pressure 435 psi, mop 145 psi

Total length: 1,082 ft., 5 installation sections

Oil Project: Crude Oil Line in the Ruehlermoor Oil Field, Germany, ExxonMobil Production

The oil pipeline renewed runs crossways through the Ruehlermoor oil field in the administrative district of Meppen. ExxonMobil Production Deutschland GmbH was convinced of the concept and technology of Raedlinger Primus line and achieved enormous cost savings versus conventional pipe construction in stainless steel.

Laying of Raedlinger Primus Line 10‘‘, operating pressure 551 psi and Raedlinger Primus Line 8‘‘, operating pressure 565 psi, mop 464 psi

Total length: 7,217 ft.

Water Project: Parallel Drinking Water Pipelines in Dresden, Germany, DREWAG Stadtwerke

Renewal of parallel drinking water pipelines under the Elbe River. DREWAG Stadtwerke Dresden GMBH supplies approx. 500,000 residents with drinking water. The parallel drinking water pipelines constructed in 1929 using the open construction method represents a major part of the supply network. The client and the engineering consultant have decided on Raedlinger Primus Line® technology for economic and time-related reasons.

Laying of Raedlinger Primus Line 20“, operating pressure 232 psi, mop 145 psi

Total length: 2 x 721 ft.

Water Project: Drinking Water Pipeline in Telfs, Austria, Swietelsky-Faber Kanalsanierung GmbH

The renewed drinking water pipeline 6“, operating pressure 362 psi runs with a length of 574 ft. along a steep hillside through a wooded area and above a waste deposit in the town of Telfs.

Laying of Raedlinger Primus Line 6“, operating pressure 797 psi, mop 362 psi

Total length: 574 ft.

Gas Project: Gas Pipeline in Braunschweig, Germany, E.ON Avacon AG

The renewed gas pipe runs through the city of Braunschweig. The first section runs along a residential area. The second section passes under a driving practice ground and a federal road. A new high pressure gas pipeline was established in the existing pipe and the planned reduction of the host pipe diameter was achieved.

Laying of Raedlinger Primus Line 16“, operating pressure 362 psi, mop 362 psi

Total length: 2 x 1,181 ft.

Water Project: Drinking Water Pipeline in Kornwestheim, Germany, Zweckverband Landeswasserversorgung Stuttgart

The renovated drinking water pipe runs in Kornwestheim along busy roads. The supply of drinking water could be restarted after a short time and without any interference with the traffic. The security of supply is ensured for the next decades.

Laying of Raedlinger Primus Line 12“, operating pressure 377 psi, mop 232 psi

Installation: 984 ft. and 3,608 ft.

Gas Project: Gas Siphon Pipeline in Sibiria, Russia, E.On Ruhrgas Ag and OAO Gazprom

Gas transportation siphon pipeline under the Ob River in the Siberian taiga, OAO Gazprom, OAO Tomsktransgaz.

Within the scope of the technical co-operation with E.ON Ruhrgas AG, OAO Gazprom was looking for suitable technical solutions for the sustainable renewal of the gas pipeline, which has laid under the Ob River for 40 years. The solution was Raedlinger Primus Line® technology.

Due to the successful implementation of the Raedlinger Primus Line® system the gas and heat supply of the city is assured on a long-term basis with far more favourable cost conditions for the households connected.

Laying of Raedlinger Primus Line 6“, operating pressure 652 psi, mop 362 psi

Total length: 8,202 ft.

Raedlinger Primus Line® – Benefits

Benefits of Trenchless Pipe Rehabilitation Technology

Compared to open construction, trenchless construction methods have environmental and economic benefits.

In terms of environmental protection and constant increasing traffic density laying pipes without damaging the surface makes economic sense. Because of the expense of road surfaces, soil replacement and high groundwater levels, trenchless design can be more economical than conventional construction even at relatively shallow depths.

In addition, there are also considerable economic savings such as the avoidance of congestion, environmental protection and the elimination of weather-related downtime.

Benefits at a Glance

- Low intervention in landscapes and protected areas
- No disruption to road, rail and shipping traffic
- Reduction of noise and emissions
- Low interference with existing structures
- Protection of vegetation and species due to small construction sites
- Sustainability due to the use of existing infrastructure (host pipes)

Specific Benefits of Raedlinger Primus Line

Easy to Use

- Reduced use of machinery
- Up to 19,000 ft. at a time can be delivered on a transport drum
- Short construction period due to long insertion lengths
- Small pits and reduction of roadworks
- Elimination of digging and transportating large soil masses
- Omission or limitation of groundwater treatment
- Coarse cleaning of the host pipe only, as no adhesive is required
- Fast recommissioning
- Full piggability, also during operation

High Strength and Quality

- Pipe renovation with a lifetime of at least 50 years
- High abrasion and cut resistance of the outer coating
- No corrosion of Raedlinger Primus Line

High Flexibility

- Fewer construction pits due to bendability
- Insertion through bends of up to 45°

High Performance

- Minimal cross-section loss due to low wall thickness of 0.236“ and 0.315“
- Improved flow properties of the pipe

History

Raedlinger Primus line GmbH is part of the Raedlinger Group which has been active in the construction sector for over 40 years. Today, the company is one of the most successful construction companies in Germany whose expertise mainly lies in road construction, civil engineering and asphalt construction.

From the Idea to Success

Raedlinger Primus Line® was developed to solve the recurring, time-consuming and costly problem of run-down pipelines in existing buildings.

Josef Raedlinger already had the idea of using a hose for civil engineering 20 years ago. The hose was to be characterised by flexibility, portability, light weight and low wall thickness, while having the material strength of a steel pipe.

Ten years later, with being open to new ideas, the know-how from the fields of construction, mechanical engineering and web technology were combined to find a creative and efficient solution. Together with research and industry partners, Raedlinger experts developed the Raedlinger Primus Line® technology. This technology now sets new standards in gas and liquid transportation.

Milestones

1963	Establishment of Josef Raedlinger Kiesbaggerei und Fuhrunternehmen e.K in Cham
1971	Establishment of Josef Raedlinger Bauunternehmen GmbH in Cham
1988	Establishment of Raedlinger Maschinen- und Anlagenbau in Cham - Production of circular looms for fabric hoses - Production of construction equipment
1995	Opening of the new ready-mixed concrete mixing plant in Weiding
1996	Establishment of Raedlinger Straßen- und Tiefbau GmbH in Selbitz / Frankenwald
1996	Development of a high-pressure hose for pipe rehabilitation
2000	Establishment of Raedlinger Asphaltbau GmbH
2001	Establishment of Raedlinger Primus Line GmbH - Production and distribution of the flexible, high-pressure pipe Raedlinger Primus Line®
2002	Establishment of Josef Raedlinger Ingenieurbau GmbH in Vilshofen
2004	Establishment of Raedlinger Bauunternehmen Ges.m.b.H. in St. Pölten Austria
2005	Establishment of S.C. Trust Constructii Raedlinger S.R.L. in Romania
2006	Establishment of RWenergy GmbH in Schwandorf
2006	Takeover of the Berufsbildungszentrum in Schwandorf (BBZ)
2008	New construction of the production plant for Raedlinger Primus Line® in Weiding