



Line pipe for oil and gas



**SALZGITTER
MANNESMANN
LINE PIPE**
A Member of the Salzgitter Group

With oil and gas, quality counts

Salzgitter Mannesmann Line Pipe has a long tradition in the production of longitudinally HFI-welded steel tube and pipe and a wealth of experience in correctly balancing all the decisive quality parameters.

Our customers can depend on our seven core competencies.



A wide product range

A comprehensive supply range for gas, oil, water, construction, heat transport, and mechanical engineering - and all of it in steel grades to German and international standards, with a variety of joining techniques. Rounded off with a broad range of accessories.

Expertise and experience

Modern manufacturing processes based on a century of experience in pipe production, high investments in research and development, coverage of all related fields, close cooperation with research institutes and professional bodies, and vast experience of national and international projects.

Quality deliveries

Short delivery times through optimized production programs, extensive stock on hand for all kinds of replacement pipes and small orders, and punctual deliveries and deadline compliance to keep our customers on schedule with their projects.

Quality products

Full control of our entire production chain, strictest quality management at all stages of manufacture, from hot wide strip to shipment of the finished products, all embedded in a state-of-the-art inspection and testing regime.

Customer orientation

A worldwide distribution network, a can-do approach to special application requirements, and an ongoing exchange of insights and experience with customers around the globe.

Quality advice

Specialists for pipeline planning, pipe specification, transport, storage and laying, experience gained in numerous challenging projects, from planning through to implementation.

Flexibility

Two locations for the parallel production of orders of all sizes and degrees of specialization, and production control geared to customer needs.



Securing energy for the future

Pipelines are the safest and most cost-effective way of transporting mineral oil, natural gas and refinery products as well as other flammable liquids or solids over long distances.

Transport means and route in one, pipelines will become even more important in the future. For the resources indispensable for human survival are found in increasingly remote regions, far away from the centres of consumption. At the same time, ever greater volumes of industrial raw materials and fuels for the energy industry, heating systems and vehicles are being transported to the world's conurbations faster and at ever higher pressures. This places high demands on the pipelines used.

Pipe networks and long-distance transmission lines are continuously growing. These arteries of our modern industrial society are already criss-crossing vast regions of our planet. As a leading specialist in HFI-welded pipe, Salzgitter Mannesmann Line Pipe is a reliable partner to the oil and gas industry around the globe.

That's why we compare ourselves and our work to Nature and the processes in an eco-system. Just like Nature, we produce within a system, where the one process leads smoothly and precisely into the next. This approach brings us closest to our ideal: pipes our customers can rely on, absolutely.

This brochure will tell you more about the line pipe we produce for flammable liquids and gases. For all their diversity, there is one decisive feature that the products in our range have in common: **top quality**.

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Standardized diversity

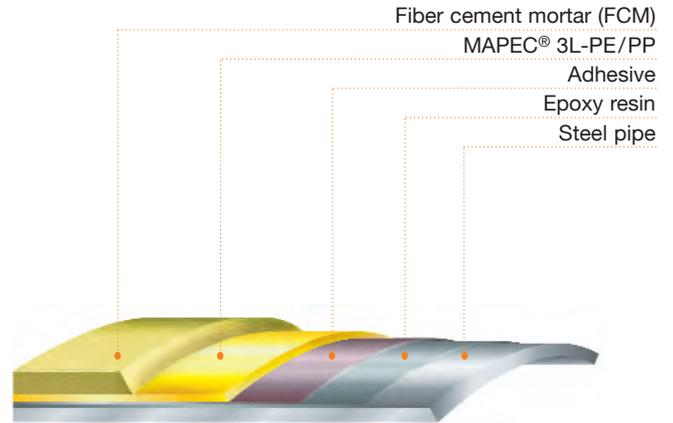
Salzgitter Mannesmann Line Pipe is your technologically leading partner for longitudinally HFI (high frequency induction) welded steel line pipe worldwide*). Our state-of-the-art production equipment and processes, a wide range of coating and lining systems, plus top-quality service all along fulfill our customers' individual needs and wishes in terms of safety, environmental protection and project-specific demands.

With a weld efficiency factor of $v = 1.0$, our products meet the highest requirements of international standards such as EN, API, ISO, GOST, and DNV Rules, in conjunction with the most demanding specifications from renowned national and international oil and gas companies.

Our customers profit from our long-standing expertise and experience and our close links to the ultra-modern steelworks, rolling mills and research activities within our Group.

*) Definition according to technical rules and regulations:

HFW (high-frequency welded); EW (electrically welded); ERW (electric resistance welded).



Standards	Codes of practice	Materials
EN 10217-1	AD 2000 W4 - DGRL 97/23/EG	P235TR1 - P265TR2
EN 10217-2	AD 2000 W4 - DGRL 97/23/EG	P235GH - 16Mo3
EN 10217-3	AD 2000 W4 - DGRL 97/23/EG	P275NL1 - P460NL2
EN 10217-4	AD 2000 W4 - DGRL 97/23/EG	P265NL
ISO 3183	DVGW G 463, TRFL, DIN EN 1594	L245N - L555M, L245NE - L555ME
API 5L		Grade B - X80M
DNV-OS-F101		Grade 245 - 555

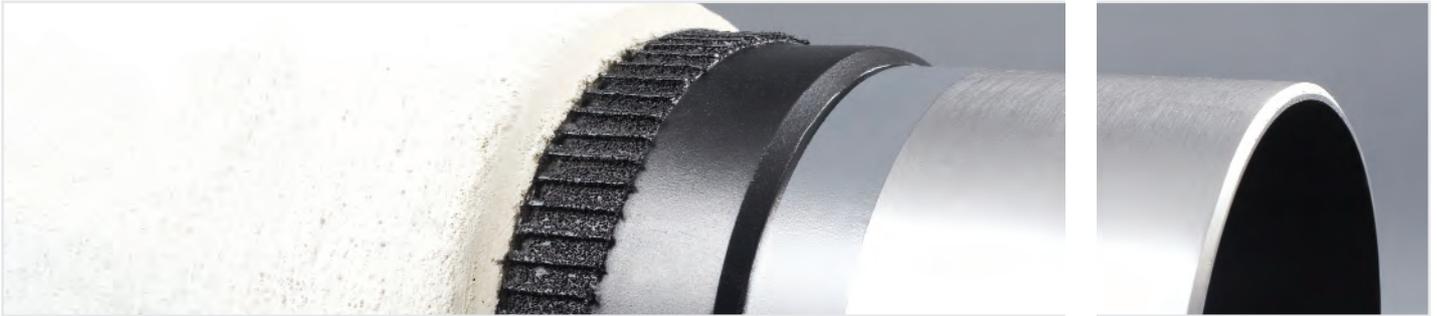
Other standards/codes of practice and specifications on request

Line pipe for flammable liquids and gases

Steel pipe outside diameter in mm	Steel pipe outside diameter in inches	Nominal width DN	Steel pipe wall thickness in mm	Producible pipe lengths* in m
114.3	4 1/2	100	3.2 - 7.1	8 - 16
168.3	6 5/8	150	3.0 - 10.0	8 - 16
219.1	8 5/8	200	3.2 - 12.7	8 - 18
244.5	9 5/8		3.6 - 14.3	8 - 18
273.0	10 3/4	250	3.6 - 16.1	8 - 18
323.9	12 3/4	300	4.0 - 20.6	8 - 18
355.6	14	350	4.0 - 25.4	8 - 18
406.4	16	400	5.0 - 25.4	8 - 18
457.2	18	450	5.6 - 25.4	8 - 18
508.0	20	500	5.6 - 25.4	8 - 18
530.0	20 7/8	530	6.3 - 25.4	8 - 18
559.0	22	550	6.3 - 25.4	8 - 18
610.0	24	600	6.3 - 25.4	8 - 18

* Pipe length depending on wall thickness and design.

Other special dimensions and special requirements on request.



MAPEC® – the safe coating

MAPEC® is the registered trade mark for plastic coating systems consisting of polyethylene, polypropylene (PE/PP) or polyamide (VESTAMID®). These coatings are made exclusively of proven and approved materials and applied using the blown film extrusion process. It meets all the applicable national and international standards (e.g. EN, ISO, NFA, CANCSA) and, of course, the most exacting customer specifications.

There are various types of MAPEC® coating available to suit all types of terrain and service conditions up to operating temperatures of 85 °C (PE)/110 °C (PP).

MAPEC® coating (HDPE)

For a long service life under normal to medium thermal, mechanical, or chemical loads; also suitable for severely aggressive soils.

MAPEC® coating (PP)

For applications beyond the loadability of polyethylene, e.g. higher temperatures or hardness requirements.

MAPEC® multi-layer coating systems

For increased mechanical protection, we also supply pipe with a multi-layer coating system, e.g. polyethylene/polyamide (PE/VESTAMID®) or polyethylene/polypropylene (PE/PP) coating.

MAPEC® coating with integrated ribbing (protection against stones)

For special protection requirements, e.g. trenchless pipeline revamps using the pulling technique. The ribbing protects the pipe against damage and ensures a uniform spacing between the old and the new pipe.

MAPEC® RC – the special rough coat

For special requirements on the surface roughness of plastic coating:

- Onshore pipe-laying: anti-skid property when pipelines or pipe racks have to be walked on
- Offshore pipe-laying: increased pipe-laying safety due to higher sliding friction (prevention of pipe slide-off)
- Offshore/heavy coat: higher shear resistance between concrete and plastic coating

Fiber cement mortar coating - mechanical protection at its best

MAPEC® coating with additional FCM-N top coat

MAPEC® can be complemented with a fiber cement top coat to DVGW worksheet GW 340. Various types are available to match the soil conditions of the project in hand: the standard type FCM-N, FCM-S on a profiled surface, and a special rough coating. For pipelines subject to extremely high mechanical loads in stony or rocky terrain, or in subsidence regions.

Additional benefits include:

- no sand cushioning required (no dumping charges)
- spoil can be used as backfill
- field bending possible

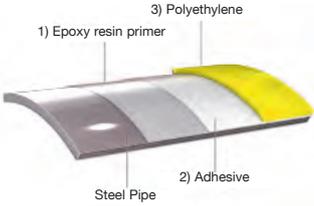
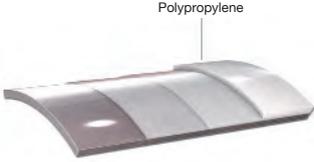
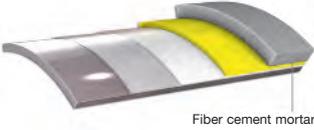
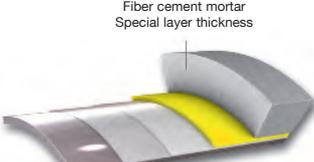
Coating thicknesses for special applications such as offshore pipe-laying are available on request.

MAPEC® coating with interlocking (T-rib) profile and additional FCM coat (FCM-S)

The interlocking T-ribbing with an additional rough coat ensures a firm bond between the PE/PP coating and the FCM coat.

Additional benefits:

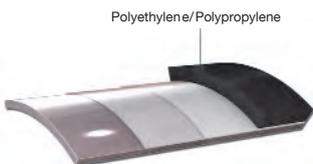
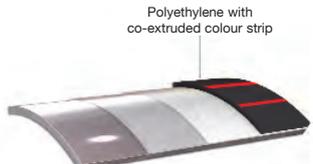
- no excessive stresses between the PE/PP coating and the FCM top coat
- fractures and cracks in the FCM coat are reduced to a minimum
- ideal for trenchless pipe-laying
- increased shear resistance between concrete and plastic coating

<p>MAPEC®</p>  <p>1) Epoxy resin primer 2) Adhesive 3) Polyethylene Steel Pipe</p>	<p>Type</p> <p>MAPEC® polyethylene (HDPE) coating Service temperatures up to 85 °C</p> <p>Description</p> <p>3-layer coating, consisting of 1) Epoxy resin primer, 2) Adhesive and 3) Polyethylene</p> <p>Product properties</p> <p>Standard corrosion protection for line pipe, also in aggressive soils</p> <p>Range of applications</p> <p>Pipelines buried in rock-free soils</p>	
<p>MAPEC® Polypropylene</p>  <p>Polypropylene</p>	<p>Type</p> <p>MAPEC® polypropylene(PP) coating Increased service temperatures up to 110 °C; coatings for higher temperatures on request.</p> <p>Description</p> <p>3-layer coating, consisting of 1) Epoxy resin primer, 2) Adhesive and 3) Polypropylene.</p> <p>Product properties</p> <p>Efficient corrosion protection. Also available for pipe with an epoxy resin flow coat lining for significantly reduced friction losses.</p> <p>Range of applications</p> <p>Increased (external or internal) thermal loads on the pipe coating. General conditions in pipe-laying, transportation and storage must be observed.</p>	
<p>MAPEC® with FZM-N</p>  <p>Fiber cement mortar</p>	<p>Type</p> <p>MAPEC® plastic coating with FCM-N fiber cement mortar top coat</p> <p>Description</p> <p>3-layer coating (PE or PP) consisting of 1) Epoxy resin primer, 2) Adhesive and 3) PE/PP, plus FCM-N top coat to DVGW Worksheet GW 340.</p> <p>Product properties</p> <p>The FCM-N top coat provides for very high mechanical strength and integrated protection against buoyancy.</p> <p>Range of applications</p> <p>Pipe-laying in stony or rocky terrain.</p>	
<p>MAPEC® with T-ribbing and FCM-S</p>  <p>T-ribbing</p>	<p>Type</p> <p>MAPEC® plastic coating with T-ribbing and FCM-S fiber cement mortar top coat</p> <p>Description</p> <p>3-layer coating (PE or PP), consisting of 1) Epoxy resin primer, 2) Adhesive and 3) PE/PP with co-extruded T-ribbing plus fused-on PE particles (rough coat) and FCM-S top coat to DVGW Worksheet GW 340.</p> <p>Product properties</p> <p>The interlocking effect between the 3-layer coating and the integrated T-ribbing with rough-coat surface on the one hand and the FCM-S top coat on the other generates an extremely strong adhesive bond.</p> <p>Range of applications</p> <p>The combination of mechanical protection and shear force transmission makes this coating type specially suitable for trenchless pipe-laying projects.</p>	
<p>MAPEC® with axial ribbing</p>  <p>Axial ribbing</p>	<p>Type</p> <p>MAPEC® plastic coating with integrated axial ribbing</p> <p>Description</p> <p>3-layer coating (PE or PP) consisting of 1) Epoxy resin primer, 2) Adhesive and 3) Special MAPEC® layer with axial ribbing.</p> <p>Product properties</p> <p>Pipe coating with increased resistance to mechanical impact and abrasion.</p> <p>Range of applications</p> <p>Buried pipe-laying and pipe relining projects, due to the increased abrasion protection provided by the coating.</p>	
<p>MAPEC® with FCM top coat</p>  <p>Fiber cement mortar Special layer thickness</p>	<p>Type</p> <p>MAPEC® plastic coating with thick-layer FCM top coat (FCM-N / FCM-S)</p> <p>Description</p> <p>3-layer coating (PE or PP), consisting of 1) Epoxy resin primer, 2) Adhesive and 3) PE/PP layer, plus FCM top coat to customer specifications.</p> <p>Product properties</p> <p>The thick-layer FCM top coat generates high mechanical strength and integrated protection against buoyancy.</p> <p>Range of applications</p> <p>The MAPEC® + FCM coating system is particularly well suited as a heavy coat against buoyancy.</p>	

MAPEC® advanced solutions for complex challenges in pipe-line construction

For particularly challenging and complex pipe-laying projects, other than fiber cement mortar coats are available as top coats on plastic coatings. Besides a variety of options regarding the plastic coating's

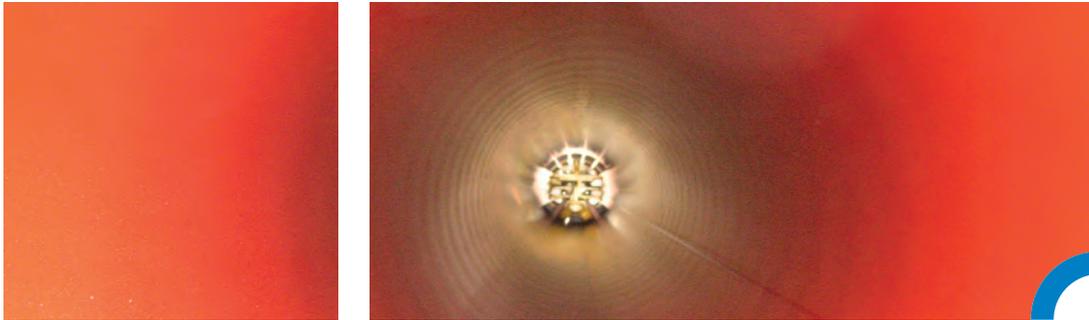
thickness and surface condition we also offer a plastic multi-layer system that meets the most exacting demands on mechanical strength.

<p>MAPEC® with Rough Coating</p>  <p>Rough Coating</p>	<p>Type</p> <p>MAPEC® plastic coating with Rough Coating (RC) surface</p> <p>Description</p> <p>Product properties</p> <p>Range of applications</p>	<p>PP corrosion protection coating for higher service temperatures up to 110 °C; coatings for higher temperatures on request.</p> <p>3-layer plastic coating (PE or PP) consisting of 1) Epoxy resin primer, 2) Adhesive and 3) PE/PP top layer with fused-on PE particles for a rough surface structure.</p> <p>Pipe coating system with high friction resistance.</p> <p>Recommended where high friction resistance of the coating surface is a criterion.</p>
<p>MAPEC® with special layer thicknesses</p>  <p>Polyethylene/Polypropylene</p>	<p>Type</p> <p>MAPEC® plastic coating with special layer thicknesses and as an ideal basis for additional coatings (RC, FRP, heavy concrete)</p> <p>Description</p> <p>Product properties</p> <p>Range of applications</p>	<p>(HDPE) for a max. service temperature of 85 °C, or polypropylene for up to 110 °C</p> <p>MAPEC® 3-layer coating with special layer thicknesses (PE) or with layer thicknesses increased to customer specifications (PP), consisting of 1) Epoxy resin primer, 2) Adhesive and 3) Polyethylene/polypropylene.</p> <p>Special corrosion protection for line pipe (gas/oil, drinking water/waste water/brines, etc.)</p> <p>Buried pipe-laying in rock-free terrain.</p>
<p>MAPEC® with color strip marking</p>  <p>Polyethylene with co-extruded colour strip</p>	<p>Type</p> <p>MAPEC® with color strip marking, for all PE coatings and coating thicknesses (standard, increased, special)</p> <p>Description</p> <p>Product properties</p> <p>Range of applications</p>	<p>3-layer coating consisting of 1) Epoxy resin primer, 2) Adhesive and 3) Polyethylene with 4 or 8 (> DN 355.6 mm) longitudinal strips in the following colors: blue (compressed air), yellow (gas), red (cable), green (water) and brown (flammable liquids); other colors on request.</p> <p>Durable continuous marking according to the intended pipeline medium.</p> <p>In line with customer specifications.</p>
<p>MAPEC® multi-layer system</p>  <p>Polypropylene or polyamide</p>	<p>Type</p> <p>MAPEC® multi-layer plastic coating system</p> <p>Description</p> <p>Product properties</p> <p>Range of applications</p>	<p>4-layer coating, consisting of 1) Epoxy resin primer, 2) Adhesive and 3) Polyethylene layer with 4) polypropylene or polyamide (VESTAMID®) top coat</p> <p>The polypropylene or polyamide (VESTAMID®) top coat serves for mechanical protection. The roughened PE surface provides for increased shear strength.</p> <p>Projects with increased requirements on the coating's mechanical strength, e.g. trenchless pipe-laying.</p>

- All variants are also available in combination with a flow coat lining (epoxy resin) which significantly reduces friction losses.
- On request, all coatings can be supplied to other international standards and customer specifications.

Standard thicknesses are in accordance with DIN 30670, DIN 30678 or ISO 21809-1. Greater thicknesses or special thicknesses to customer specifications are available on request. In addition, our plastic coatings can be made to all applicable international standards and individual customer specifications.

The plastic-coated pipes are marked in line with the relevant standard. If required, additional markings can be applied to customer specifications. This also includes colored paint markings. After coating, the pipe ends are usually provided with temporary corrosion protection.



The right protection for all conditions

Salzgitter Mannesmann Line Pipe offers a wide range of coatings, e.g. single- and double-layer FBE coating to ISO 21809 and epoxy resin lining to API RP 5L2 to ensure frictionless medium flow.

Fusion-bonded epoxy (FBE)

One of the coating variants we produce for line pipe is the FBE coating. It has proven itself as an efficient corrosion protection coating in both on- and offshore applications. In the offshore sector it is frequently combined with a cement-mortar top coat.

FBE coatings can be applied in thicknesses of 14 to 40 mils and are suitable for constant service temperatures of up to 90 °C. Single- and double-layer FBE coatings are made exclusively of proven and approved materials and are applied by electrostatic spraying.

Single-layer FBE coating

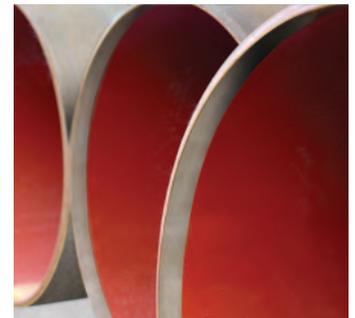
- One epoxy primer coat is applied by electrostatic spraying in an average thickness of min. 14 mils.

Double-layer FBE coating

- The first epoxy layer is typically also applied in an average thickness of min. 14 mils.
- Using the same method (wet on wet), the second epoxy layer is applied in an average thickness of min. 20 mils.

The single-layer FBE coating protects the underlying steel surface against corrosion and mechanical damage. In the case of the FBE double-layer coating, the first layer acts as an adhesion promoter between the steel and the second epoxy layer. The second layer provides efficient abrasion resistance.

FBE-coated pipes can be fitted with the same linings as MAPEC® coated pipes.



Epoxy resin linings

To reduce friction resistance, steel pipes can be fitted with a lining, and usually an epoxy resin flow coat lining. These linings meet the internationally recognized requirements of API RP 5L2 or EN 10311. The standard coating thickness is about 2.4 mils (0.06 mm). Other coatings, including metallic ones, and linings are available on request.



Why you always get the quality you expect from us

We are your partner - leading the field for decades in terms of innovative powers, production and service.

Uncompromising quality across the board

The first precondition for pipe longevity is continuous high quality in production right through to application. That is why the quality philosophy of Salzgitter Mannesmann Line Pipe covers the entire process - from the production of the hot wide strip as the starting material for our pipes through all the various stages of production right up to the technical support we provide to the completion of pipeline projects.

Technology leader

We are experts in all the technologies used in steel pipe production. In the 1950s, we were the first manufacturer anywhere to produce plastic coating for pipe. And we know that ongoing improvement of the materials and processes we use is essential if we are to maintain and build on our leading position in the industry.

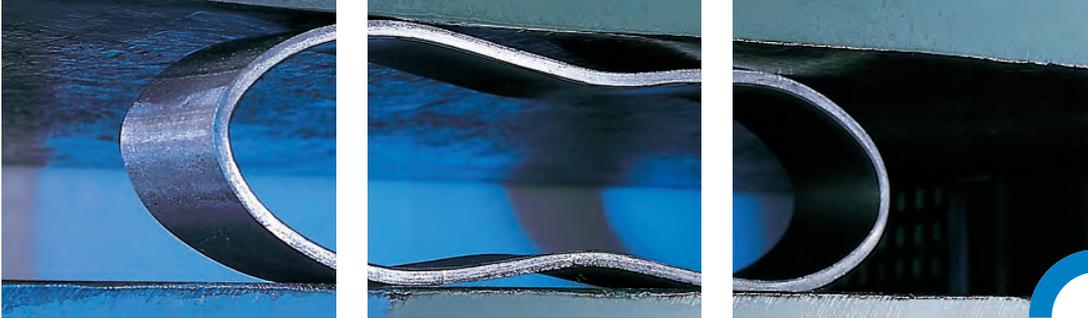
Seamless quality management

Each pipe is manufactured with the same care and passes through the same quality management system from the starting material to final inspection. Our quality assurance is an integral part of all aspects of the process flow, governing our daily work to an extent far beyond the requirements laid down in the applicable standards.



Tested safety

Start-to-finish monitoring gives our customers the assurance that every single pipe complies with the applicable specifications and maintains its outstanding properties for a long service life. Each pipe is given its unique quality seal: the pipe number, which is stamped on the pipe outside surface and also applied to the pipe inside surface as well as included in the barcode label. This means the entire manufacturing process can be traced back, right through to the steel mill. With the pipe number, the digitally stored test data can be called up for each pipe and the precise status before and after each production step can be ascertained.

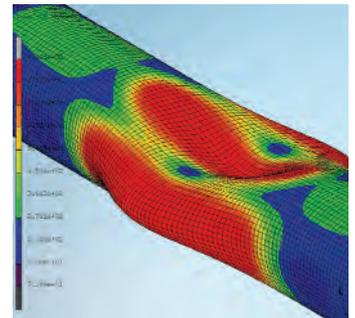
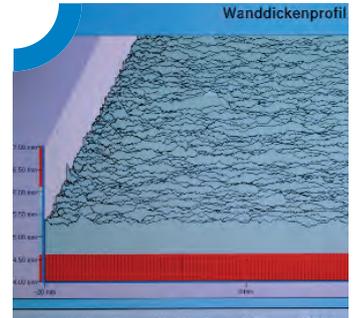


Monitoring fosters confidence

Tests and checks at Salzgitter Mannesmann Line Pipe are not restricted to those prescribed by the various standards. We carry out a large number of additional internal in-process checks and tests in order to ensure the compliance of the processes with our own much higher standards.

Both our locations are fully equipped with state-of-the-art measuring and testing facilities. It's almost like in a modern diagnosis clinic, the way the pipes are subjected to a thorough-going "check-up": they're measured, weighed, and subjected to ultrasonic testing and visual inspection, followed by microscopic and macroscopic evaluation of the results. They also undergo destructive testing, so nothing at all is left to chance.

In very complex diagnosis cases, we have the full backing of our Group's own research institute with its specialists in every area of pipe science and technology.



Heat analysis

Ultramodern equipment and facilities in conjunction with mature technologies and strict process monitoring ensure chemical analyses to the closest tolerances. Steel produced in this way is extremely homogeneous and offers all that is required for the production of tube and pipe to customer specifications.

In-process checks

At every stage of the production process, checks are performed to verify a pipe's compliance "in all its essential characteristics" with the applicable specifications. This includes dimensional checks (length, diameter, wall thickness), mechanical-technological tests, hydrostatic testing for leaks, and measuring the layer thicknesses both of the MAPEC® PE coating and the cement mortar lining. Statistical evaluation of the results forms the basis for any necessary preventive measures to ensure the continuous high quality of the processes.

Peel resistance of plastics

Plastic coatings have to protect the steel body in particular against corrosion, so they must be very tough in their resistance to external influences (pressure, impact, etc.). They must adhere firmly to the steel structure and not peel off or come loose at all. This is verified by testing according to DIN 30670/DIN 30678 or ISO 21809-1. In addition, all our coatings have been approved for the given application by external laboratories.



Talk to us directly if you have any questions

Outstanding expert advice is something we also supply. It is also a central element of our quality philosophy. And we are happy to share our knowledge and experience with our partners.

Consulting and advice

The quality of our advice is based on a broad foundation:

- our own pool of competencies
- close cooperation with R & D scientists and engineers
- hundreds of projects at all levels of difficulty
- an ongoing exchange of ideas and experience with our customers.

As your project partner we provide you with comprehensive advice and support - from the definition of the best-suited pipes and joining techniques, exact planning and best practices in pipe-laying through to commissioning and start-up. We have demonstrated our all-round competence in infrastructure projects of every size countless times in the energy sector.

We look forward to doing business with you

You can best turn our skill and experience to account if you contact us at the early stages of your project. If you wish, we would be happy to let you have details of our technical capabilities, quality assurance and reference projects. Get in touch with us.

You will find your contact for oil & gas line pipe on the Internet at www.smlp.eu



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