



# Line pipe for oil and gas



## With oil and gas, quality counts

Salzgitter Mannesmann Line Pipe has a long tradition in the production of longitudinally HFI-welded steel pipe and a wealth of experience in the correct coordination of all the decisive quality dimensions.

Our customers find seven core competencies that they can depend on. They converge in the one objective: **perfect pipe for every application.**



### Wide product range

A comprehensive manufacturing programme for gas, oil, water, construction, heat transport, and mechanical engineering – and all of it in steel grades to German and worldwide international standards, with various different 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, valuable investments in research and development, close cooperation with research institutes and professional bodies, national and international projects.

### Quality deliveries

Short delivery times through optimised production programmes, extensive stock on hand for all kinds of replacement pipes and small orders, schedule reliability for optimum project time performance.

### Quality products

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

### Customer proximity

A worldwide marketing 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 specialisation, 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 over long distances. Transport means and route in one, pipelines will become even more important in the future, given that the resources indispensable for human survival are found in increasingly remote regions, far away from the centres of consumption. 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.

Pipe networks and long-distance transmission lines are the arteries of our modern industrial society, criss-crossing vast regions of our planet.

As a leading specialist in HFI pipe, Salzgitter Mannesmann Line Pipe is on site around the globe, wherever new pipelines have to be laid.

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.

Unlike Nature, though, we tolerate no nonconformities in our products. From the base material, steel, through to the finished pipe, everything at Salzgitter Mannesmann Line Pipe must adhere to our fixed "genetic code", which ensures that each individual pipe is a model of perfection.

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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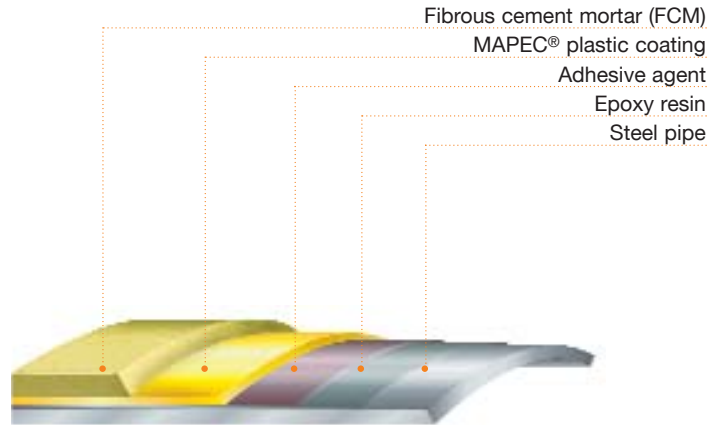
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# Product overview

## Standardized diversity

Salzgitter Mannesmann Line Pipe is your worldwide partner for longitudinally HFI (high frequency induction) welded steel line pipe. Our expertise and experience takes advantage of our close links to the ultra-modern steelworks and rolling mills within our Group. With a weld efficiency factor of  $v=1.0$ , our products meet the highest requirements of international standards such as DIN EN, API, ISO, GOST, and DNV Rules, in conjunction with project specific demands from our customers in the international oil and gas industry.

We offer you a one-stop service, complete with a wide range of coatings and linings for all application profiles in both onshore and offshore projects.



Our MAPEC® 3-layer polyethylene or polypropylene coating is made of proven and approved materials and applied using the blown film extrusion process. Its quality and efficiency satisfy all the relevant national and international standards (e.g. DIN, NFA, CAN-CSA) and customer specifications.

MAPEC® can be supplemented with a fibrous cement mortar (FCM) coating according to DVGW GW 340. To suit specific soil conditions, FCM coating is available in different varieties, including FCM-N, FCM-S with T-profile, or even on our new rough plastic coating, the most recent addition to the range.

The frictionless flow of media through the pipe is ensured by our epoxy resin linings, e.g. according to API RP 5L2, which round off our product portfolio.

Standards
DIN EN 10208-1
DIN EN 10208-2
ISO 3183 Teil 1
ISO 3183 Teil 2
ISO 3183 Teil 3
API 5L
DIN EN 10217-1
DIN EN 10217-2
DIN EN 10217-3
DIN EN 10217-4
Former standards:
DIN 1626
DIN 1628
DIN 17172

Customer specifications

Standards of application
DIN 2470-1
DVGW-AB G 463, TRbF, TRFL
AD 2000 W4 - EG-RL 97/23/EC
AD 2000 W4 - EG-RL 97/23/EC
AD 2000 W4 - EG-RL 97/23/EC
AD 2000 W4 - EG-RL 97/23/EC
DIN 2470-1
DIN 2470-1
DIN 2470-2

Materials
L235GA L360GA
L245NB - L555MB
L245 - L485
L245NB - L555MB
L245NC - L555MC
Grade B - X80
P235TR1 - P265TR2
P235GH - 16Mo3
P275NL1 - P460NL2
P265NL
St 37.0 - St 52.0
St.37.4 - St 52.4
StE 210.7 - StE 480.7TM

## Line pipe for flammable liquids and gases

Outside-diameter in mm	Outside-diameter in inch	Nominal width DN	Wall thickness		Length in mm
			in mm		
114.3	4 1/2	100	2.9-6.3		12-16
168.3	6 5/8	150	2.9-10.0		12-16
219.1	8 5/8	200	3.2-12.7		12-18
273.0	10 3/4	250	3.6-16.1		12-18
323.9	12 3/4	300	4.0-20.6		12-18
355.6	14	350	4.0-20.6		12-18
406.4	16	400	5.0-20.6		12-18
457.2	18	450	5.6-20.6		12-18
508.0	20	500	5.6-20.6		12-18
533.4*	21	525			
558.8*	22	550			
610.0	24	600	6.3-20.6		12-18

\* on request

<p>1</p> 	<p><b>Type</b></p> <p>Description</p> <p>Properties</p> <p>Application example</p>	<p><b>MAPEC® polyethylene (PE) coating</b>  <b>N (LD-PE), maximum operating temperature <math>T_{max}</math> 60 °C,</b>  <b>S (MD-PE) for <math>T_{max}</math> 80 °C or S (HD-PE) for <math>T_{max}</math> 85 °C</b>            3-layer coating to DIN 30670: epoxy resin primer, adhesive and polyethylene</p> <p>Standard corrosion protection for line pipe</p> <p>Pipelines buried in rock-free soils</p>
<p>2</p> 	<p><b>Type</b></p> <p>Description</p> <p>Properties</p> <p>Application example</p>	<p><b>MAPEC® ribbed polyethylene coating</b></p> <p>As under item 1, polyethylene, but increased thickness with integrated longitudinal ribbing</p> <p>Pipe coating with increased impact resistance</p> <p>Buried pipelines and relining (protection against abrasion)</p>
<p>3</p> 	<p><b>Type</b></p> <p>Description</p> <p>Properties</p> <p>Application example</p>	<p><b>MAPEC® polyethylene coating with rough coat (RC) surface</b></p> <p>As under item 1, polyethylene, but with rough surface layer</p> <p>Pipe coating with high friction resistance</p> <p>Applications requiring high friction resistance, e.g. offshore pipe-laying</p>
<p>4</p> 	<p><b>Type</b></p> <p>Description</p> <p>Properties</p> <p>Application example</p>	<p><b>MAPEC® polypropylene (PP) coating (combined with epoxy resin lining)</b>  <b><math>T_{max}</math> 110 °C</b>            3-layer coating to DIN 30678: epoxy resin primer, adhesive, polypropylene</p> <p>Corrosion protection coating for operating temperatures up to 110 °C, coatings for higher temperatures on request. Also available in combination with flow coat lining (epoxy) for significantly reduced friction resistance</p> <p>Increased thermal loads on the pipe coating (external or internal)</p>
<p>5</p> 	<p><b>Type</b></p> <p>Description</p> <p>Properties</p> <p>Application example</p>	<p><b>MAPEC® polyethylene coating with FCM-N fibrous cement mortar top coat</b></p> <p>As under item 1, but with additional FCM coating (standard type) to DVGW Worksheet GW 340</p> <p>Increased mechanical protection for pipe and PE coating</p> <p>Pipe-laying in rocky terrain            Greater thicknesses as heavy coat against buoyancy</p>
<p>6</p> 	<p><b>Type</b></p> <p>Description</p> <p>Properties</p> <p>Application example</p>	<p><b>MAPEC® polyethylene coating with FCM-S fibrous cement mortar top coat</b></p> <p>As under item 5, but with additional adhesive layer between the PE coating and the FCM coat or with interlocking (T-rib) profile</p> <p>The bond between the PE coating and the FCM coat withstands high shear forces on the pipe</p> <p>The combination of mechanical protection and shear force transmission makes this coating type specially suited to trenchless pipe-laying</p>



### **MAPEC® coating – efficient protection for your pipe**

MAPEC® is the registered trade mark for a 3-layer plastic coating which offers maximum protective efficiency. There are various types of MAPEC® coating available to suit all types of terrain and service conditions up to operating temperatures of 85°C.

#### **MAPEC® coating (LDPE/MDPE/HDPE)**

For a long service life under high thermal, mechanical, or chemical loads; suitable for severely aggressive soils.

#### **MAPEC® coating (PP)**

For applications beyond the loadability of polyethylene and increased requirements on thermal and mechanical stability.

#### **MAPEC® coating with integrated ribbing**

For special protection requirements, e.g. trenchless pipeline re-ramps using the pulling technique. The ribbing protects the pipe against damage and provides for a uniform space between the outer pipe and the new liner.

#### **MAPEC® RC – special rough coating (PP)**

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:
  - a) increased pipe-laying safety due to higher sliding friction
  - b) heavy coat: higher interlocking effect between concrete and pipe surface

### **Fibrous cement mortar coating – top-level mechanical protection for your pipe**

#### **MAPEC® coating with additional FCM top coat – standard system (FCM-N)**

Especially for pipe-laying in rocky soils with extremely high mechanical loads and in subsidence regions.

Additional benefits through major savings potential, e.g.:

- no sand cushioning required
- spoil can be used as backfill
- no sand transports
- no dumping charges for spoil

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, special system (FCM-S)**

A further developed variety of the standard MAPEC® coating with FCM-N top coat. The interlocking T-rib profile ensures a firm bond between the PE coating and the FCM coat.

Additional benefits:

- no excessive stresses between the PE and cement mortar coatings
- no spalling of FCM over large areas



**The right protection in all conditions**

**Plastic coating thickness**

DIN 30670 / DIN 30678 specify the following minimum values for the coating layer thicknesses:

Pipe size	Normal coating (n) Minimum thickness in mm	Increased coating (v) Minimum thickness in mm	Special coating thickness in mm
= DN 100	1.8	subject to spezial 2.5	agreement
> DN 100			subject to spezial
= DN 250	2.0	2.7	agreement
> DN 250			subject to spezial
< DN 500	2.2	2.9	agreement
= DN 500			subject to spezial
< DN 800	2.5	3.2	agreement



For higher mechanical loads the minimum coating thickness can be increased by 0.7 mm (reinforced (in German: verstärkte) variety, type "v"). Depending on the pipe diameter, wall thickness and coating type, the coating increases the pipe weight by between 1% and 8%.

For special project requirements, the coating thickness can be increased beyond the standardized values. Our plastic coatings are manufactured to a wide range of international standards and customer specifications.

Each pipe is subjected to coating holiday detection at 25kV over the entire surface. The marking is applied in accordance with the applicable standard. If required by the customer, we can also include additional information, e.g. related to the order, or use a customer-specific colour code. The finish-coated pipes can be given a temporary corrosion protection.

All the required tests and inspections are carried out in our own works laboratories. Depending on the customer's wishes, we issue a 3.1 or a 3.2 acceptance certificate for the coating.

**Epoxy resin linings**

Steel pipes can be lined to reduce the friction resistance on their inside surface. Epoxy resin flow-coat linings have established themselves as standard practice in this application. These linings meet all the applicable requirements, including API RP 5L2 and DIN EN 10311.

Other linings, coatings or metallic claddings can also be supplied on request.



### Why you always get the quality you expect from us

The energy industry needs a partner who has been constantly out in front, for decades now, when it comes to innovation, production and service.

### Uncompromising quality in every aspect of our work

The first precondition for pipe longevity is continuous high quality in the manufacture, right through to the point of application. That's why the quality philosophy at 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 in the completion of pipeline projects.

### Technology leader

We are experts in all the technologies used in steel pipe production. Back in the 1950s we introduced plastic coating for steel pipe. And we know that ongoing improvement of the materials and processes we use is essential if we are to maintain and expand our leading position in the industry.

### Comprehensive quality management

Each pipe is manufactured with the same care and passes through the same quality management from the starting material to the 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.

### We spend millions on getting everything right

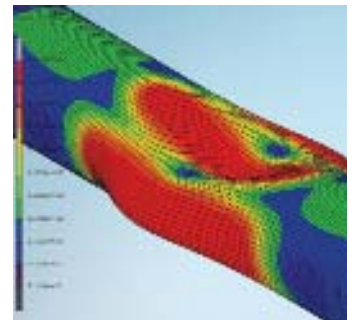
Our ultra-efficient pipe mills in Siegen and Hamm leave nothing to chance. Meticulous inspection of the incoming starting material and of the entire pipe production process ensures that only products of perfect quality reach our customers.



### Tested safety

Such start-to-finish monitoring guarantees to our customers that each individual pipe complies with the applicable specifications and maintains its outstanding properties for a long service life. Each pipe is marked with its unique Q ID-number as a "quality seal" both on the outside and inside surface and on the pipe's barcode label. This means the entire manufacturing process can be traced back, right through to the steel mill. With the pipe Q ID, 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. Just in case any doubts should ever arise.





### 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 that the finished products more than meet the customers' specifications. We inspect and check just about everything that's checkable.

#### Heat analysis

The steel we work with is extremely homogeneous and is made with the utmost exactness to meet particular requirements. Each heat is subjected to analysis ISO/DIS 14284 to check whether its chemical composition is in keeping with the applicable tolerances. This is re-checked at our mill in the form of one product analysis per heat.

#### 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. In addition, all the coatings must be approved for the given application by external laboratories.

#### 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 PE coating and the cement mortar lining. Statistic evaluation of the results forms the basis for any necessary preventive measures to ensure the continuous high quality of the processes.

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 have to pass 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 sphere of pipe science and technology.

## Transport and storage



### The safe way to the site

Our work doesn't stop once the pipe passes its final works inspection. Storage and logistics are part of our service, too.

The pipes are shipped, stored and stacked according to strict regulations. Safe transport, without damage to the valuable cargo, is also a quality feature of Salzgitter Mannesmann Line Pipe.

We regularly stock several thousand tonnes of gas line pipes for high- and low-pressure applications. This stock is designed for quick delivery in emergencies as well as for medium-sized construction projects. So we can ease the load on your own storage capacities while you continue to maintain and expand your supply system safely and flexibly.

Our logistics experts can take over all your inventory management and the subsequent on-time delivery of the pipes to the construction site. Our service package is rounded off by express and emergency deliveries, overhead unloading, trucks – even for long lengths, stacking, transferring to storage, routing and aggregated shipments.

Ship, rail or truck – we find the best form of transport for you so you can rely on having your pipes delivered safely and punctually, to the furthest corner of the world.





**Questions are best discussed directly with us**

Outstanding and specialist advice is part of our supply programme. It is also a central element of our quality philosophy. And we're 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

We can advise you in every aspect, from the definition of the pipe you need and joining techniques through detailed project planning and right on to the pipe-laying operations and startup of the pipeline.

**Partnering the oil & gas industry**

We have proved our all-round competence for infrastructure projects of every size in countless projects in the energy sector. With Salzgitter Mannesmann Line Pipe, you have a pipe producer by your side whose role is a partnering one. Our aim is to do everything in our power to ensure the success of your undertaking.

**We look forward to contact with you**

You can best turn our competencies and experience to account if you contact us at the early stages of projects. If you wish, we'll be happy to let you have detailed particulars of our technical capabilities, our quality assurance and our references.

**You'll find your contact for oil & gas line pipe in the Internet at [www.smlp.eu](http://www.smlp.eu)**

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