




EISENBAU  
KRÄMER

# Product Information

Quality pipes   
for highest requirements  
from Eisenbau Krämer



## Eisenbau Krämer: A world market leader in special large diameter steel pipe production.

Founded in 1921, the quality and reliability of EBK's longitudinally submerged arc welded steel pipes has enabled the company to become a truly global supplier to the oil, gas and power industries, to the offshore and onshore construction sectors as well as machinery equipment pipes.

Operating from three production bases in Germany, with a combined yearly capacity of 100,000 tonnes, EBK's range of carbon and alloy pipes meet and surpass the most stringent national and international quality standards.

Additionally, EBK's commitment to research and development has resulted in the availability of revolutionary new products.

Leading edge welding techniques and production know how, combined with the most modern production equipment in the world enable EBK pipes to meet the highest quality requirements.

For state of the art technology in pipe production, there is only one choice – EBK.



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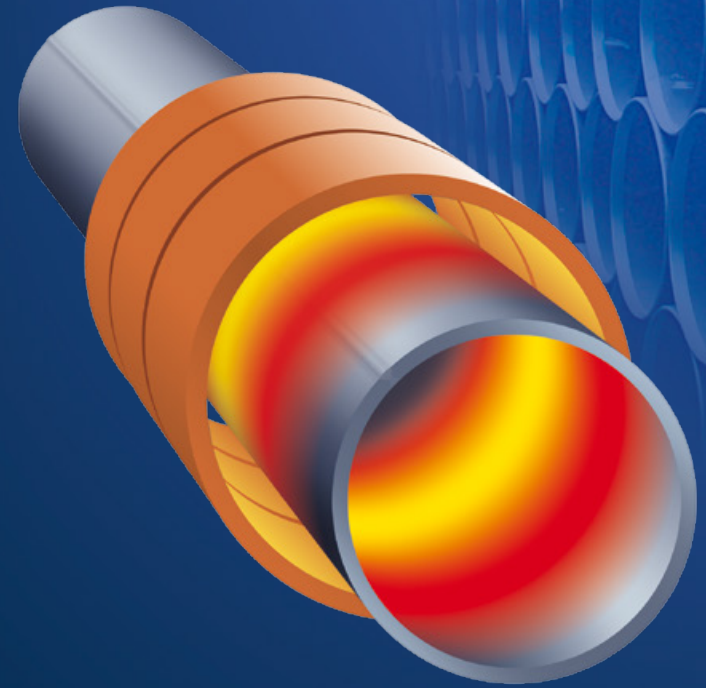
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**EBK** *power*<sup>®</sup>



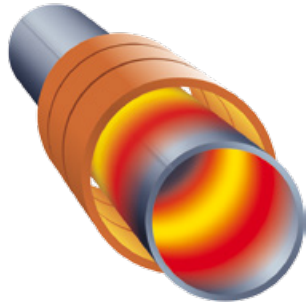
**GRADE 91**  
**GRADE 92**

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Heat resistant pipes

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## Products: GRADE 91, GRADE 92



The dual goals of the process engineering and energy generation industries of decreasing costs by increasing production efficiency, and of reducing environmental impact, has driven the operating temperatures of production facilities to ever higher levels. As a direct result the technical requirements for steel pipes have similarly been increased to new levels. Research and development undertaken by Eisenbau Krämer resulted in the company being the first in the world to produce longitudinally welded large diameter steel pipes in the normalised and tempered condition, industry approved as an alternative to seamless pipes. Also suitable for use as mother pipes for bends, EBK is able to offer the following steel grades:

**ASTM A387 - Grade 91 (X10CrMoVNb 9-1)**  
**ASTM A387 - Grade 92 (X10CrWMoVNb 9-2)**

Eisenbau Krämer offers pipes suitable for high temperature service within the following dimension range:

**Diameter:** 16" - 60" (406 mm - 1.500 mm)  
**Thickness:** 0.375" - 1.4" (9,52 mm - 35 mm)\*  
**Length max:** 42' 6" (13.200 mm)

**\*note:** thickness requirements outside this range have to be discussed individually

A critically important property of high temperature steels is a high resistance to creep rupture. Long term creep testing continues, however, test results from more than 15,000 hours already demonstrates the products suitability, and results from shorter term tests at higher temperatures is available upon request.

Good test results demonstrated the pipes comfortably passed the industry requirements. Eisenbau Krämer's investment in new heat treatment systems which enable pipes to be annealed above 1,040 °C (1,904 °F), results in materials that are fully austenized and tempered after the longitudinal welding is completed. This heat treatment guarantees the high creep rupture resistance, while simultaneously maintaining high dimensional tolerances.

Additionally, Eisenbau Krämer has exceeded the requirements of ASTM A691 with testing programmes to investigate and document the notch impact toughness, hot tensile strength, hardness etc. of the material, including testing after simulated post weld heat treatment as well as in the 'as delivered' (normalised and tempered) supply condition.

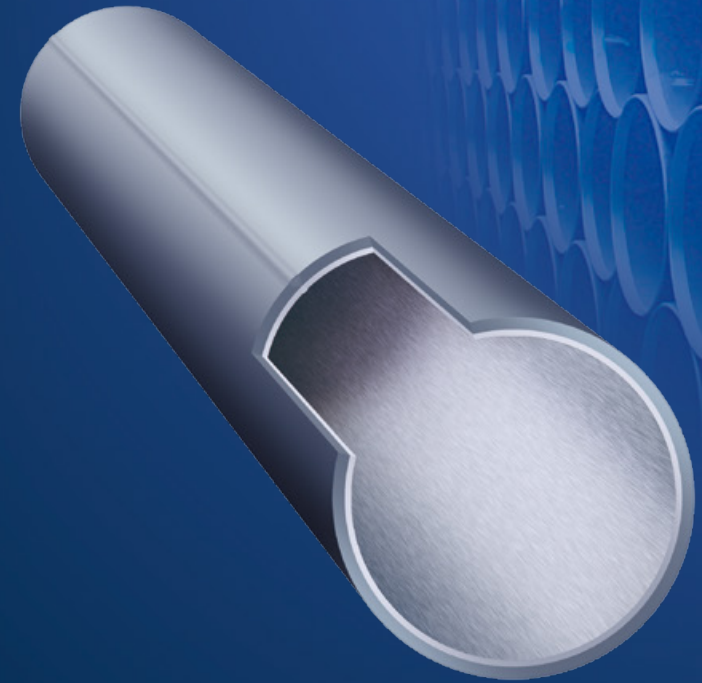
Eisenbau Krämer sets a new milestone based on many years of experience in manufacturing pipes made of high temperature steels such as Grade 22, Grade 5 or Grade 9.

**EBK** *power*®





**EBK** *clad*<sup>®</sup>



## **CLAD Steel Pipes**

High corrosion resistance to aggressive fluids and gases



## CLAD Steel Pipes



The oil & gas, chemical and mechanical engineering industries are increasingly turning to materials possessing high corrosion and wear resistance properties. Clad materials combine corrosion and wear resistance properties with high strength carbon manganese steels. To satisfy these requirements Eisenbau Krämer manufactures longitudinally welded clad pipes for applications including:

**Gathering Lines**  
**Components in Refineries**  
**Storage Tanks**  
**Chemical Plants**  
**Offshore-Pipelines**

As a standard, Clad Steel Pipes are manufactured in the following dimensions:

<b>Length:</b>	up to 42' 6" (13.200 mm)
<b>Diameter:</b>	14"- 56" (355 - 1.422 mm)
<b>Wall thickness of the base material:</b>	0.375" - 2.5" (9,5 - 63,5 mm)
<b>Thickness of cladding:</b>	0.06" - 0.16" (1,5 - 4,0 mm)

Pipes are manufactured from metallurgically roll-bonded plates. This metallurgical bond guarantees the integrity of the clad pipes throughout subsequent fabrication processes, including the production of bends and other fittings.

A full range of carbon steel grades is available, including the commonly used API 5L and ASTM A516 range, which may also be offered as compliant with sour service requirements. The CRA layer can be produced to a wide range of specifications, including:

**Type 304L, 316L, 904L, Alloy 825, Alloy 625**

In addition to extensive production test results, the intensive research and development programme undertaken by Eisenbau Krämer has resulted in a remarkably extensive data bank covering the corrosion properties, mechanical values and welding results, which can be made available to clients to assist in developing thoroughly engineered solutions to their project requirements.

The Electro-Slag Welding (ESW) process used by Eisenbau Krämer not only provides homogeneous welding structures with excellent mechanical and corrosion properties, but additionally guarantees low dilution between CRA and base metal, even at high output rates.

**EBK** clad®



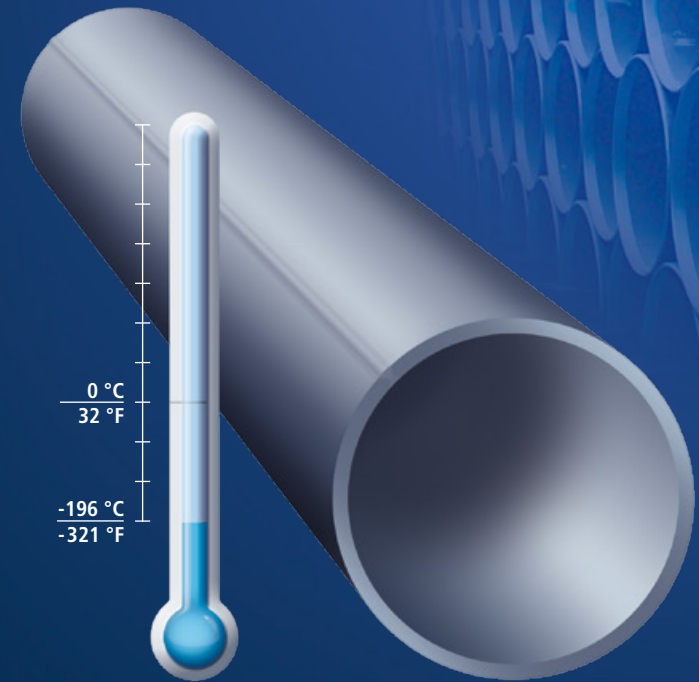




**EBK** *cryo*®

EBK<sub>cryo</sub>9

EBK<sub>cryo</sub>36

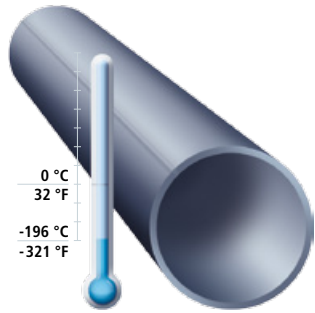


## Low Temperature and Cryogenic Steel Pipes

For low temperature applications

Up to 36 % Nickel

## Low Temperature and Cryogenic Steel Pipes



As the worldwide demand for energy resources change, so do the requirements of the chemical, LNG and oil & gas industries as related to steel pipes. Recognising these developments, Eisenbau Krämer has continued to develop its range of low temperature and cryogenic steel pipes to include:

<b>ASTM</b>	<b>A203, Grades A – F (3.5% Nickel)</b>
<b>ASTM</b>	<b>A353 (NN+T) &amp;</b>
<b>A553</b>	<b>(Q&amp;T) (8% &amp; 9% Nickel steels)</b>
<b>Alloy 36</b>	<b>(36% Nickel)</b>

Longitudinally welded steel pipes are manufactured by EBK to these and additional specifications for use in applications including:

**LNG Storage Tanks**  
**LNG Carriers**  
**Jetty Lines**  
**Sub-sea Pipelines**  
**Pipe-in-Pipe Cryogenic Transmission Lines**



Advanced manufacturing and welding techniques allow high quality, close tolerance pipes to be produced in EBK's German based pipe mills in the size range:

<b>Length:</b>	up to 42' 6" (13.200 mm)* without circumferential weld.
<b>Diameter:</b>	14" to 60" (355 mm - 1.524 mm)*
<b>Wall thickness:</b>	1/4" to 2" (6 mm - 50 mm)*

**\*note:** please ask for further dimensions

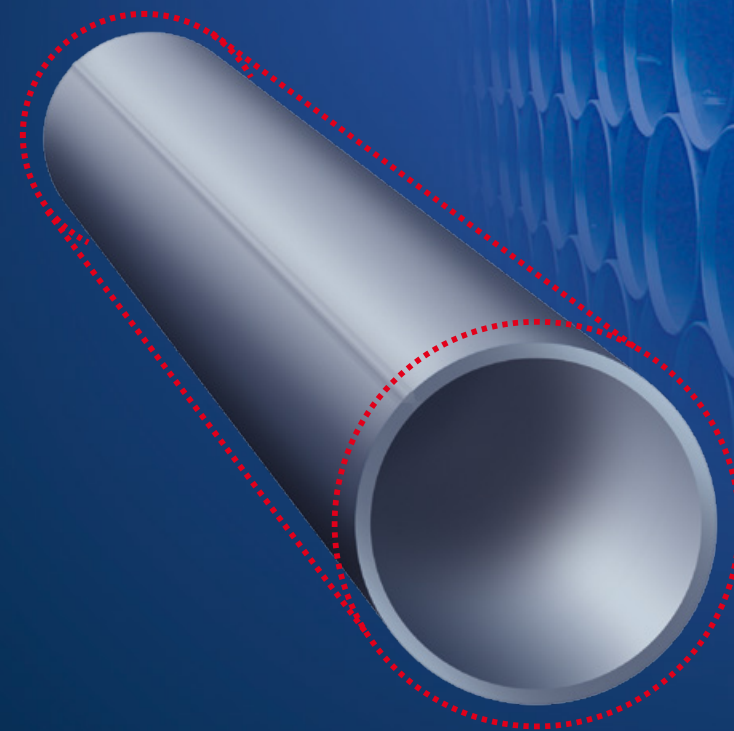
State of the art manufacturing and welding processes permit EBK to offer mechanical properties in the weld to match those of the parent plate.

Additionally, Eisenbau Krämer can at their Recklinghausen mill offer fabrication, including close tolerance machining and bulkhead installation, to produce complete products, including Pipe-in-Pipe solutions.

**EBK** cryo®







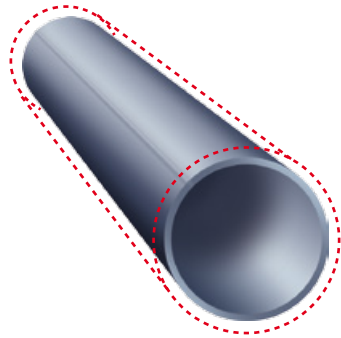
## Offshore Structurals **X80 (NACE) up to X120**

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High strength steel pipes

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# High Strength Steel Pipes



The offshore oil & gas industry continually looks to reduce the weight of its installations by increasing the strength of materials used. As a world class supplier of steel pipes, Eisenbau Krämer responded to these challenges by developing and now supplying longitudinally welded steel pipes produced from the latest generation of high strength steels, such as API 5L X80, X80 NACE, X100 and X120, produced in both the TMCP and Q&T supply condition. These products find service in applications including:

**Drilling Riser, Riser Pipes, Gathering Lines, Wellhead Houses, Line Pipes, Mother Pipes for Bend**

To be successfully implemented into a design, these products need to combine low levels of hardness with reliable and consistent yield strength in both the longitudinal and transverse directions. Additionally, mechanical properties must remain within specification during further fabrication of the finished pipes, including stress relieving heat treatment.



© Foto: Jan Oelker / Servion



Typical mechanical values taken from EBK pipes are given below:

## X80

<b>Tensile Strength Rm:</b>	621 - 827 MPa (in transverse direction)
<b>Yield Strength Rt0.5:</b>	552 - 690 MPa (in transverse direction)
<b>Elongation A 2":</b>	min. 30%
<b>CVN Energy Value:</b>	42/34J at -20 °C (-4 °F)
<b>Hardness:</b>	max. 248 HV10

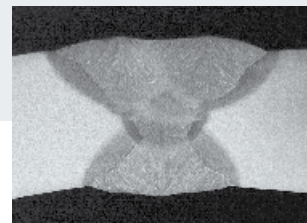
## X100

<b>Tensile Strength Rm:</b>	min. 770 MPa (in transverse direction)
<b>Yield Strength Rt0.5:</b>	min. 690 MPa (in transverse direction)
<b>Elongation A 2":</b>	min. 25%
<b>Hardness:</b>	max. 300 HV10

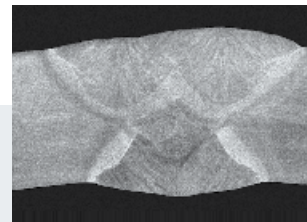
Low levels of hardness are particularly important to guarantee good toughness properties, while maintaining weight saving mechanical strength.

The table below shows the wide range of dimensions Eisenbau Krämer offers to the market:

<b>Outside diameter:</b>	16" - 48" (406 - 1.219 mm)
<b>Length:</b>	max. 42' 6" (13.200 mm)*
<b>*note:</b> please ask for further dimensions	



Micrograph of steel X80, weld



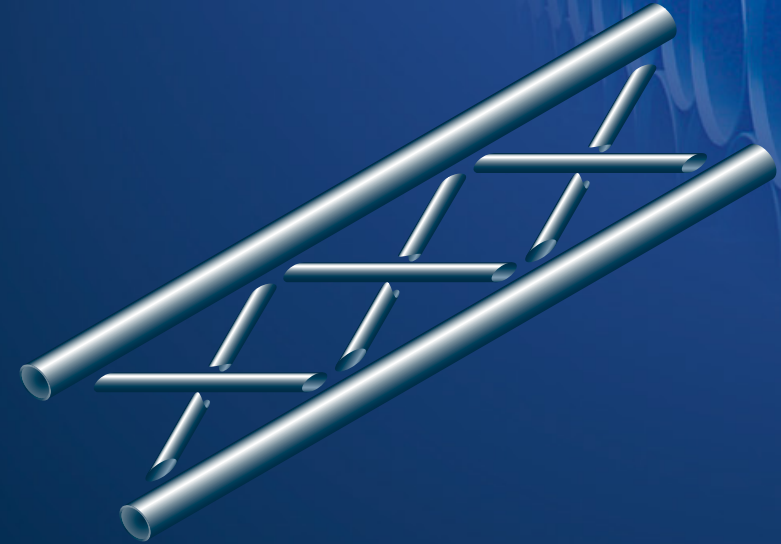
Micrograph of steel X100, weld





**EBK** *renewables*

**EBK** *offshore*



## Jacket-Foundations

Steel pipes and prefabricated steel pipe components  
for the renewables and offshore industry

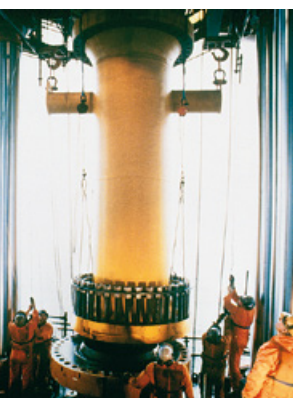
# Steel Pipes and Prefabricated Steel Pipe Components for the Renewables and Offshore Industry



Since the time when the first oil exploration in the North Sea took place in the middle of the sixties, EBK were specialising in the manufacture of large steel pipes for offshore applications.

With this experience we provide a one-stop solution in the field of jacket fabrication by supplying complete kits of pipes and prefabricated pipe components to simplify further processing.

All of our steel tubulars can be manufactured from plate to EN 10225, EN 10025 or other alternative European and International standards at customers' request. We offer a comprehensive size range covering all products within both primary and secondary structures including **tubulars, stubs, cans, legs, bracings, piles, pile sleeves and j-tubes.**



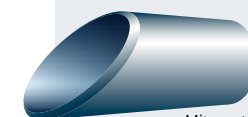
## Our service capability includes:

- Supply of complete package of materials for jacket construction (single pipes and/or point-to-point components)
- Project Management and single point of contact directly with the pipe manufacturer
- Cutting tubes to specified lengths
- Typical transition weld preparation (taper)
- Accurate profiling according to AWS D1.1
- Build sequence deliveries to the point of final assembly
- Complete components of leg/pile sleeve. Piles inclusive weld beads, stiffeners, marking, etc.

Furthermore, we also provide solutions for tidal, wave and floating wind devices.

## Dimensions:

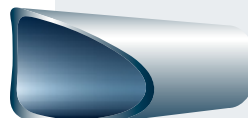
<b>Length:</b>	up to 43' 6" (13.200 mm)* without circumferential weld. up to 137' (42.000 mm)* with circumferential weld.
<b>Outside diameter:</b>	14" - 180" (355 mm - 4.500 mm)*
<b>Wall thickness:</b>	up to 10" (250 mm)*
<b>*note:</b> please ask for further dimensions	



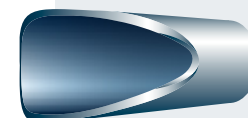
Mitre cut



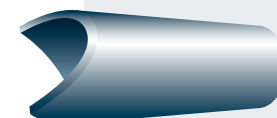
Straight cut



Saddle cut  
inclusive weld preparation



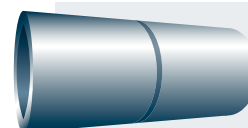
Offshore cut  
inclusive weld preparation



Double mitred cut



Straight slot  
with external bevel

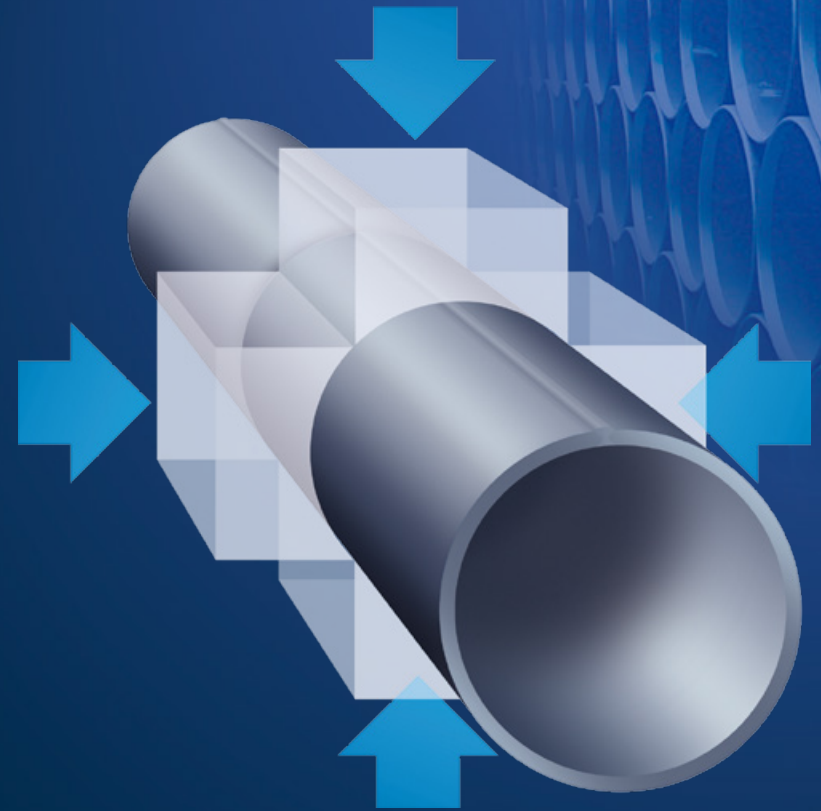


Circumferential  
Welding





**EBK** *impanded pipe*®



## Impander Technique

Innovative calibration for closer pipe tolerances  
and reduced stresses

## Impander® Technique

Longitudinally welded large diameter steel pipes are calibrated during the production process in order to meet the pipe tolerances required by the specifications. The higher quality of base materials and the increasing thickness of pipe walls has meant that pipe calibration using standard equipment has become ever more difficult. Furthermore, new pipe material and pipes with high technical requirements such as clad and riser pipes need a production process designed to produce more precise pipe tolerances to ensure accurate orbital welding on site. In addition, the new orbital welding techniques only achieve satisfying results if limited pipe tolerances are applied.

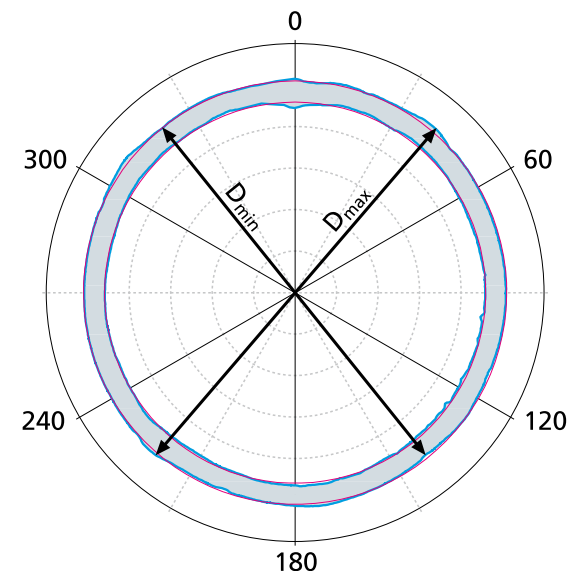
In order to meet the new requirements of the pipe market, the traditional pipe calibration technique for large diameter steel pipes had to be modified to allow limited pipe tolerances to be produced. The main principle of the Impander® technique is to plasticize the pipe body by regularly upsetting the material until the pipe circumference becomes ideal. In contrast to standard pipe calibration, the Impander® technique produces a constant circumferential pressure, plasticizing the base material and thus making the pipe the optimum circular shape required. Furthermore, residual stress to the pipe is reduced by the Impander® technique. In order to realize this technique, a new machine was developed, patented and named Impander®.

The 4-tool Impander® installed at EBK site Dahlbruch is designed for the following application:

<b>Force:</b>	4 x 40.000 kN
<b>Pipe length:</b>	20' - 44' (6.000 - 13.500 mm)
<b>Pipe diameter:</b>	14" - 63" (355 - 1.600 mm)
<b>Pipe wall thickness:</b>	0.75" - 3.15" (19 - 80 mm)

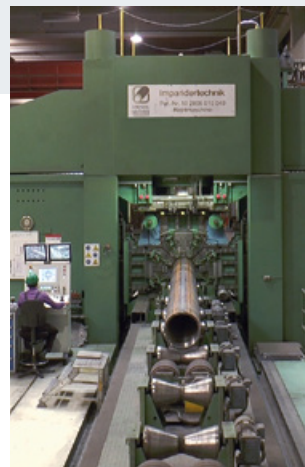
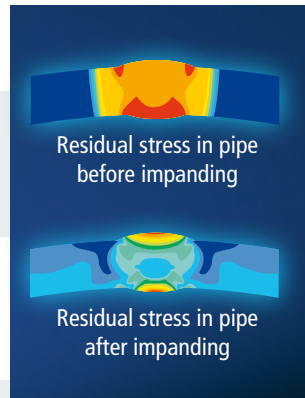
Longitudinal welded pipes produced applying the Impander® technique (impanded pipe®) have the following advantages compared with conventionally calibrated pipes:

1. Tighter tolerances over the whole pipe length even after cutting
2. Reduced pipe stress
3. Higher pipe collapse resistance

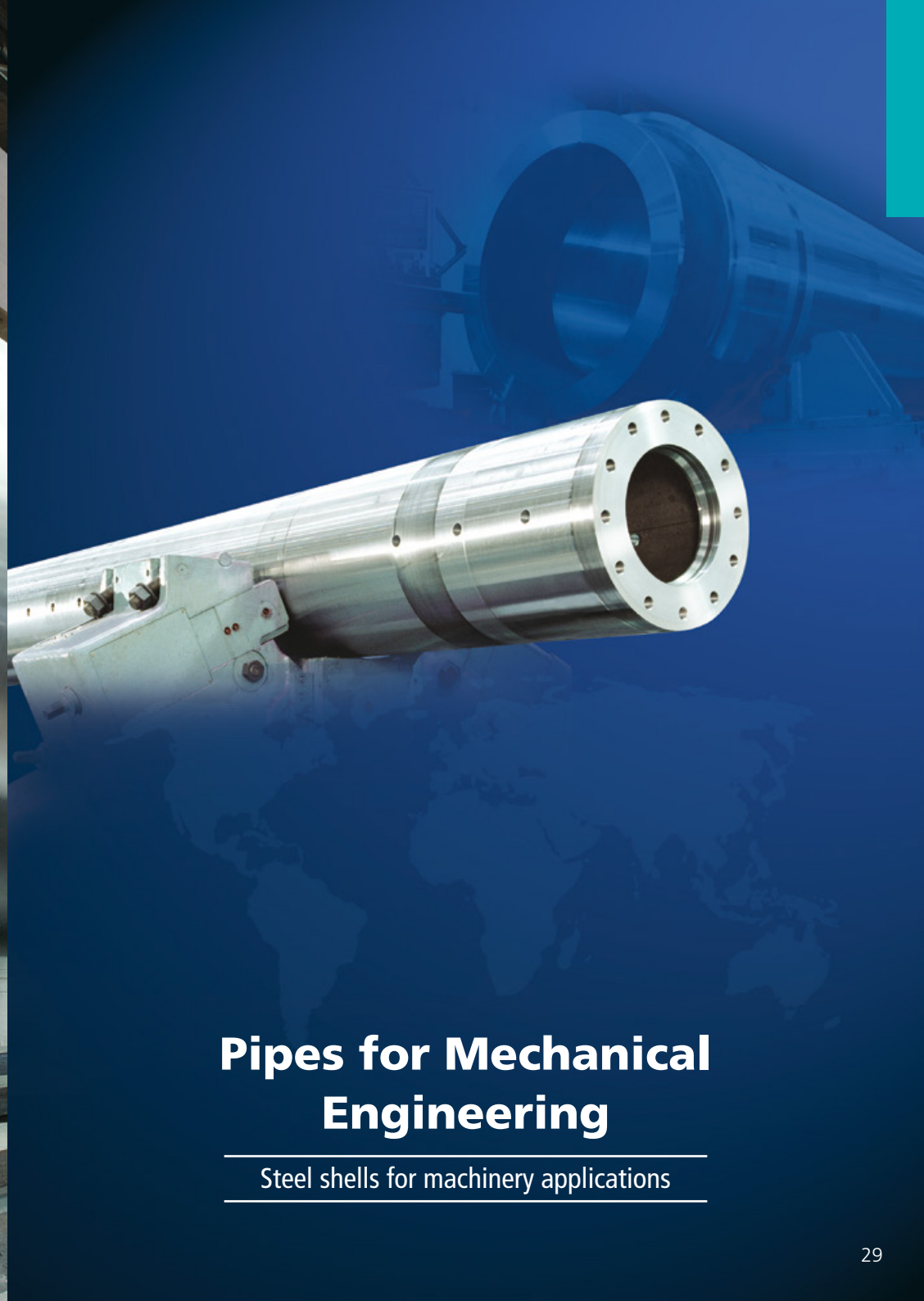


**Laser measurement of pipe shape**

X65, OD=508 mm, WT=25,4 mm  
Ovality ( $D_{max}-D_{min}$ )=2,1 mm







## Pipes for Mechanical Engineering

Steel shells for machinery applications



## Pipes for Mechanical Engineering

We supply pipes for various mechanical engineering applications to customers all over the world in many industries. Mechanical engineering applications usually involve the tightest tolerances. Especially in the field of paper mills, our pipes are used not only as roll barrels but also as complete rolls in certain applications. Our extensively equipped machining centre provides the means by which we satisfy the high demands of our customers.



### Non alloy and low alloy steel

Longitudinally welded steel pipes are manufactured by EBK to these and additional specifications for use in applications including:

#### General mechanical engineering:

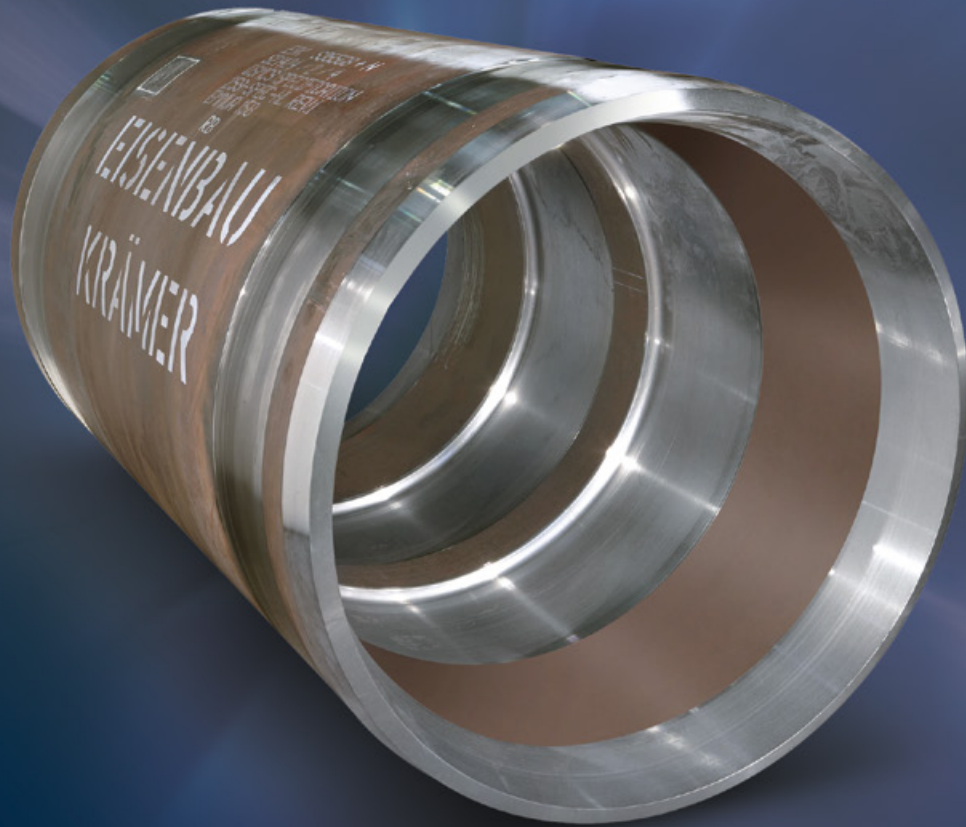
Hydraulic cylinders · Rope drums · Yarn · Windlass  
Beams · Loom rolls · Winders

#### Paper machines:

Felt guide rolls · Dandy rollers · Press rollers · Rewinders ·  
Yankee cylinders







## Pipes for Mechanical Engineering

Advanced manufacturing and welding techniques allow high quality, close tolerance pipes to be produced in EBK's German based pipe mills in the size range:

<b>Length:</b>	up to 44' (13.400 mm)* without circumferential weld.
<b>Diameter:</b>	20" - 158" (508 mm - 4.000 mm)*
<b>Wall thickness:</b>	1" - 8" (30 mm - 220 mm)*

**\*note:** please ask for further dimensions

State of the art manufacturing and welding processes permit EBK to offer mechanical properties in the weld to match those of the parent plate. All roll shells for machinery application are being stress relieved to achieve lowest level of residual stresses. According to customers requirements we provide procedures from standard to special long term heat treatment processes. They form an integral part of our „state of the art“ product.





## Machining of bore/turning:

<b>Dimensions:</b>	O.D.:	500-2.000 mm
	Bore tube 260 mm ø: I.D.:	370-700 mm
	Length: bored from one end only	max. 7.000 mm
	bored from both ends	max. 16.000 mm
	Bore tube: 600 mm ø: I.D.:	700-1.800 mm
	Length: bored from one end only	max. 11.000 mm
	bored from both ends	max. 16.000 mm

### Tolerances (when bored from both ends):

I.D. 370-700 mm:	Concentricity Diameter	max. 0,5 mm +/- 0,5 mm
I.D. 700-1.800 mm:	1. Step: Concentricity Diameter	max. 0,5 mm +/- 0,35 mm
	2. Step: Concentricity Diameter	max. 0,3 mm +/- 0,25 mm

**Surface finish:** Ra 12,5 µm / RMS 500 µ"

**Optional Machining Operations:** Bore finish up to: Ra 1,6 µm (N7) / RMS 70 µ"

## O.D. machining/turning:

<b>Dimensions:</b>	O.D. (above slide rest):	500-2.000 mm
	Length:	max. 18.000 mm
<b>Tolerances:</b>	Counterbore/O.D. shoulder:	IT 6 acc. ISO 286
<b>Surface finish:</b>		Ra 0,8 µm (N6) / RMS 35 µ"

## Vertical turning machine:

<b>Dimensions:</b>	O.D.:	max. 5.700 mm
<b>Height / Weight:</b>		max. 4.300 mm / max. 70 tons





## Pipes for Shell and Boiler Construction

Applications for pipes in shell and boiler construction

## Pipes for Shell and Boiler Construction



Eisenbau Krämer is worldwide a supplier of pipes for a variety of applications in shell and boiler construction. The wide range of our manufacturing capabilities and our experience over many years enable us to offer our customers extensive technical support, especially for individual requirements.

Products for which EBK has already supplied as an approved manufacturer:

**Heat exchanger shells for cooling equipment**  
**Steam drums for the petrochemical industry**  
**Absorbers for gas cleaning facilities**  
**Reactors for various chemical processes.**

Our broad range of machinery allows us to manufacture products meeting the high quality requirements of our customers. The approvals listed below certify our high quality standard:

**ISO 9001**  
**ASME U-, U2- und S-Stamp**  
**Europäische Druckgeräterichtlinie (PED)**  
**AD HP 0, EN 729, TRD 201**

Boiler tube processors are manufactured in accordance with **DIN EN 12952, DIN EN 13445, AD HP 2000 ASME, Indian Boiler Regulations (IBR)**, additional project specifications and customers' requirements.

We use materials with a yield strength of up to 690 MPa. Some examples of materials used:

<b>P355</b>	<b>P460</b>
<b>13 CrMo 4-5</b>	<b>10 CrMo 9-1015</b>
<b>NiCuMoNb 5-6-4</b>	<b>12 CrMoV12-10</b>
<b>SA 302 Gr. B</b>	<b>SA 516 Gr. 50 - 70</b>
<b>SA 533 Gr. B</b>	<b>SA 387 Gr. 11 + 22</b>

In addition to the above range, we manufacture shells with internal cladding materials such as SA 316, 904 L, alloy 625 + 825 and LC Ni 99 (other materials on request).

Our production programme includes the manufacture of cold and hot formed shells with the following dimensions:

<b>Diameter:</b>	16" - 14' 9" (406 - 4.500 mm)
<b>Wall thickness:</b>	0.315" - 9.84" (8 - 250 mm)
<b>Length:</b>	6' 7" - 138' (2.000 - 42.000 mm)

The maximum unit weight is approx. 100 t.

Normalizing, stress relief annealing and tempering can be carried out in our annealing furnace on pipes having a diameter of up to 4.500 mm and a length of up to 14.500 mm.

On request, we will be pleased to offer you further processing options, e.g. burning of openings for connecting pieces on our profiling machine (up to max. 2.000 mm diameter and 80 mm wall thickness) or welding of tank bottoms and sockets.





Your contacts for further details in regard to our delivery program and special applications are:

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