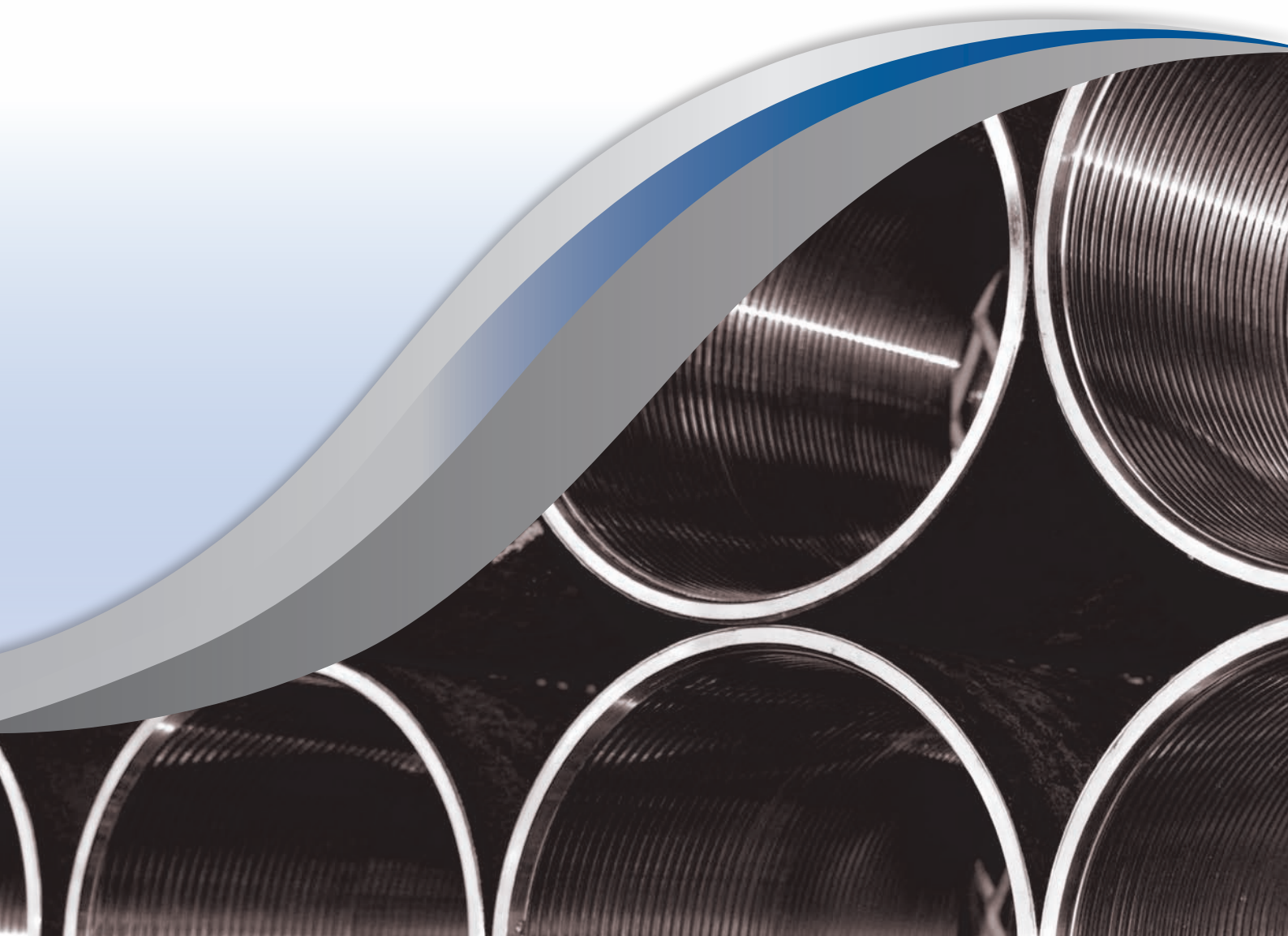




# Product catalogue

Seamless  
steel pipes and tubes

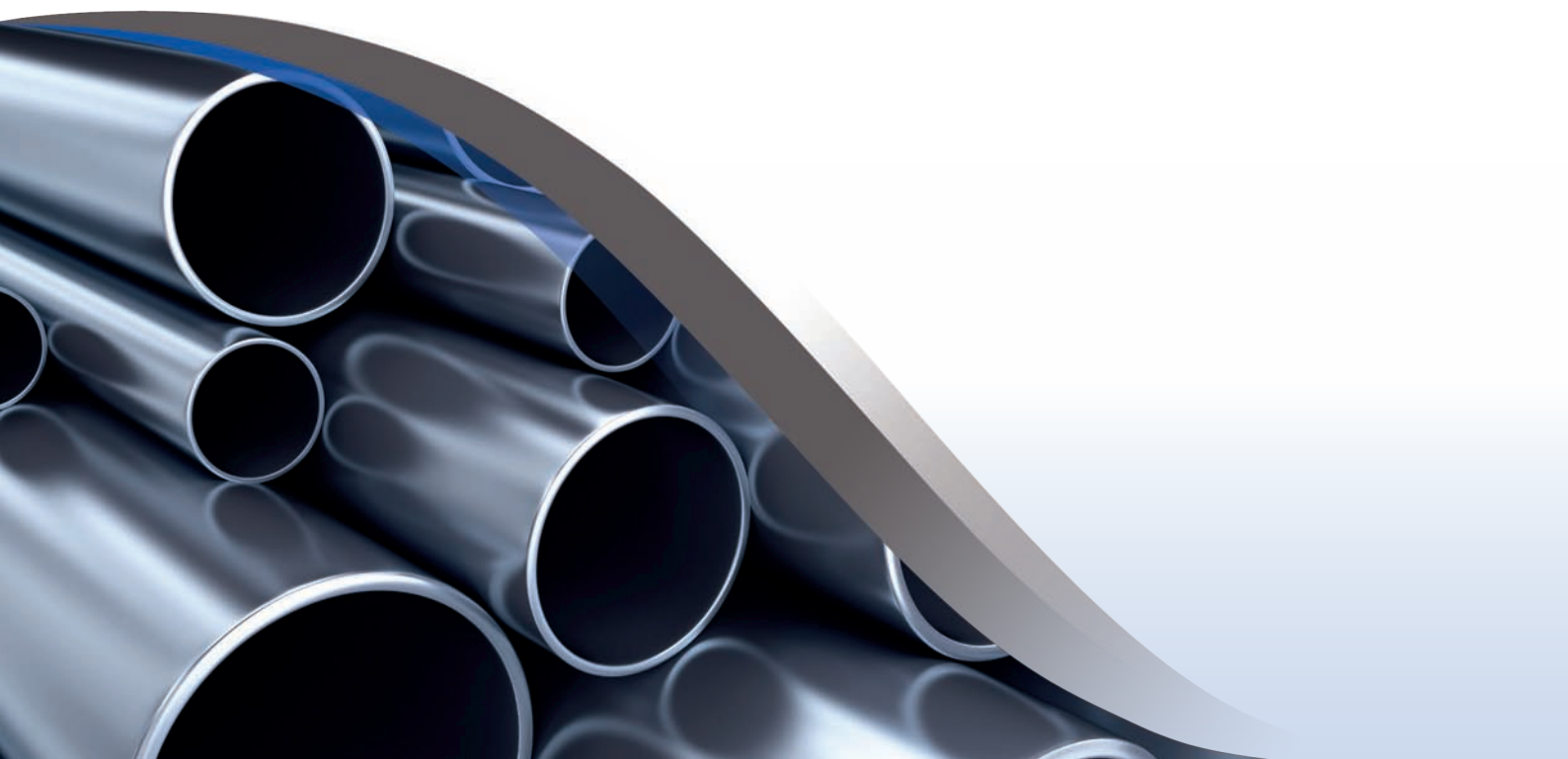


## ***A wide range of products is our asset***

*The rolling mills of **Huta Batory** and **Rurexpol** use the same pilger process and have a very similar assortment of products (especially when it comes to structural tubes and line pipes), but a different dimension range. Alchemia Capital Group's whole range of seamless tubes is 121-508mm, which enables our Clients to complete the order for the seamless tubes of various dimensions.*

## **Rurexpol**

***Rurexpol** has got 60 years of tradition and experience as a major producer of seamless pipes (basic range: 121-273 mm). The pipe mill products are used in the oil sector, gas transport and exploring drills. Rurexpol also produces boiler and alloyed pipes for energy sector. Rurexpol supplies e.g. Polskie Górnictwo Naftowe i Gazownictwo (PGNiG). Rurexpol's merchandise includes construction pipes for further machining, e.g. hydraulic cylinders for the mining industry and hall construction elements. Rurexpol's products have been used for the construction of such buildings as Legia Stadium in Warsaw, intersections and highway overpasses. Up to 60% of the merchandise is exported, e.g. to Germany, Italy, the USA and the United Arab Emirates.*



# Huta Batory

*Huta Batory is one of Europe's major producers of top quality large diameter seamless steel pipes (range: from 219 mm to 508 mm). The largest Clients are from the energy, chemistry as well as oil and gas sectors. The steelworks has supplied pipes for the construction of power plants in Madagascar and Tusimice in the Czech Republic, energy facilities in India and Russia as well as solar power plants in Spain.*

*Huta Batory's steel pipes are a key construction element in many stadiums, including the ones built for the European Football Championship EURO 2012. They were used in Arena Gdańsk, the buildings designed for football clubs in Warsaw and Cracow as well as Stade de France in Paris and Westfalenstadion for Borussia Dortmund.*

*Huta Batory is one of few mills in the world manufacturing special purpose steel in P91 type used in energy sector. We use a complex technology of rolling in a few month long production cycle in order to comply with the most stringent requirements. Before the final product is allowed on the market, it has to undergo thorough laboratory tests that exclude the possibility of potential faults.*

*70% of the products is exported. The major markets are: Germany, Italy, Holland, Spain and the USA.*

*In Poland Huta Batory's pipes are a key element in modernization of the infrastructure, such as chemical installations in Zakłady Azotowe Tarnów and Zakłady Chemiczne Police. Another market for Huta Batory's heavy wall pipes is the mining sector (the producers of mine roof supports), which requires pipes for hydraulic cylinders.*

*Huta Batory's pipes have been also used in the construction of airports in Bangkok, Madrid, Bratislava and Moscow.*

*Thanks to VAD (an appliance used in vacuum degassing of steel) Huta Batory is the producer of over 600 kinds of high quality steel, which are used in energy, machining, tool and defense industry.*

*Huta Batory specializes in hot and cold work tool steel, spring steels, heat-resistant steels, stainless steels, high speed steels, bearing steels.*

*Our priority is to satisfy demanding requirements of our Clients, which is why our pipes conform to international norms, while their production complies with standards of OHS and environment protection. Both Huta Batory and Rurexpol have implemented and certified an integrated management system of quality – ISO 9001, environment – ISO 14001 and occupational health and safety – PN-N 18001.*

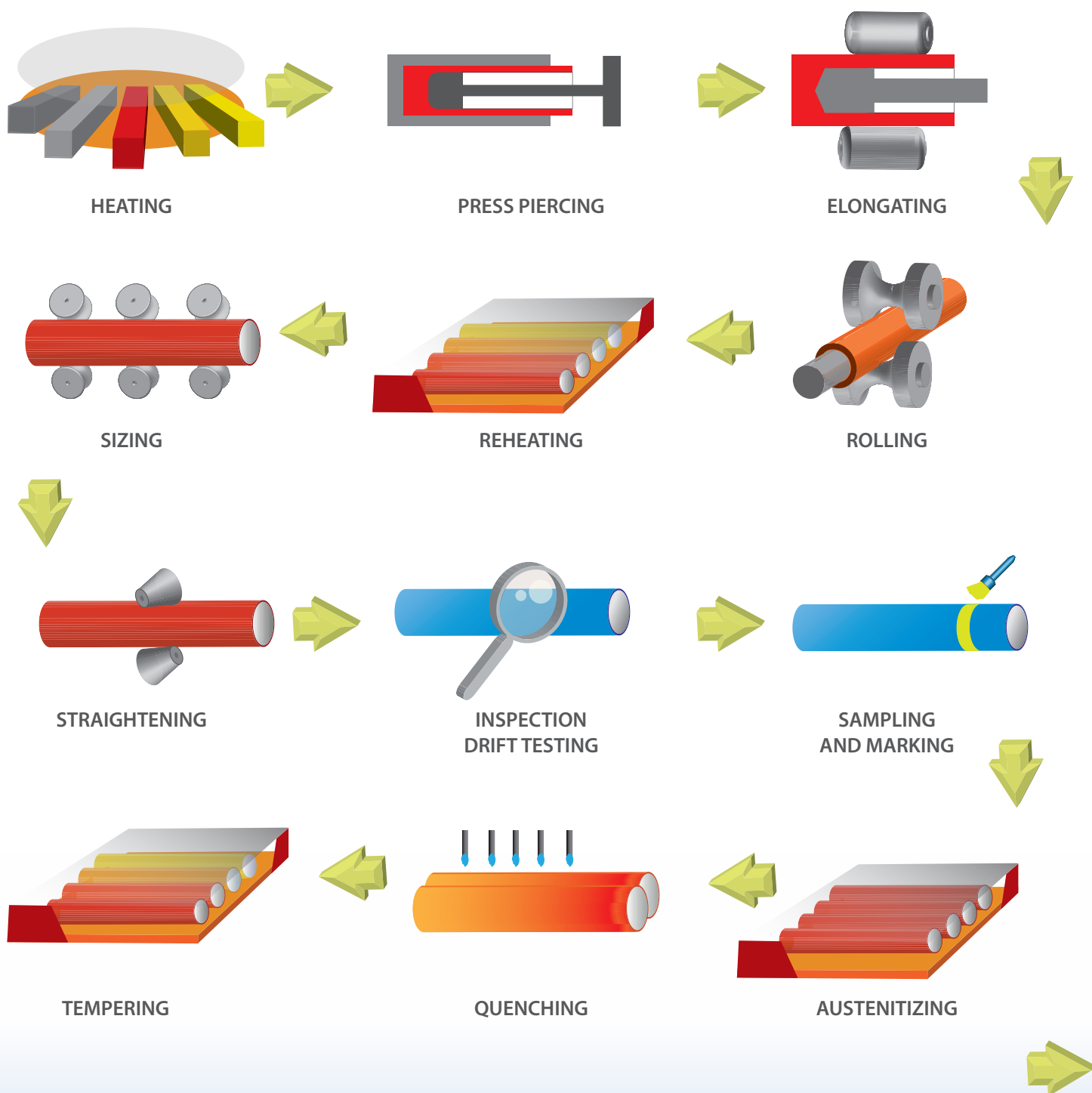
## Laboratoria Badań "Batory"

### **Top quality**

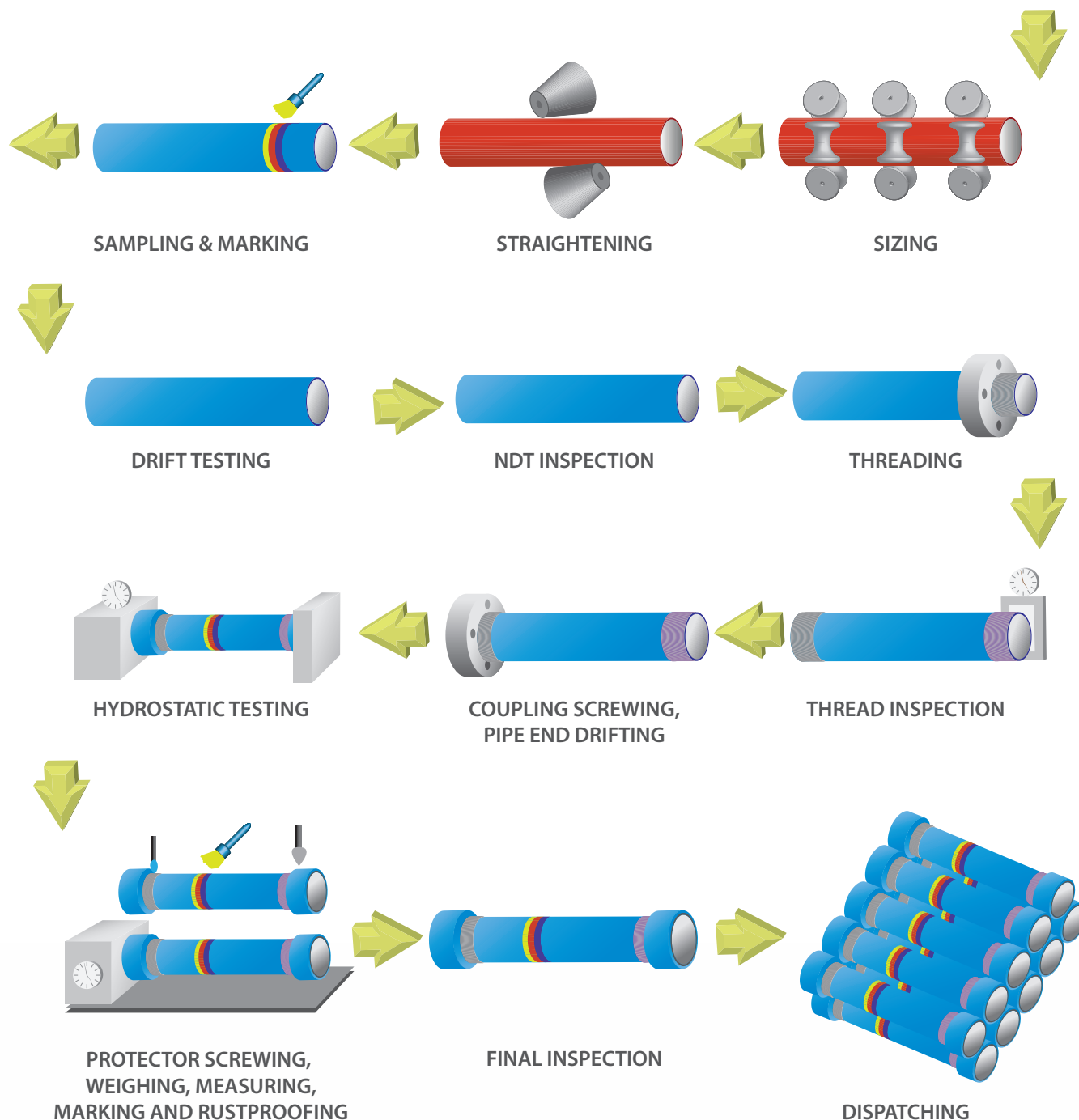
*Alchemia Capital Group's R&D centre employs several dozen of top specialists in metallurgy and chemistry. It has got a high tech analytical and measurement equipment. The lab specializes in research concerning metallurgy, mechanical properties, chemical composition, ultrasonic testing of pipes, metal plates, rods, forgings and weld joints. Products that have undergone tests in Laboratoria Badań "Batory" conform to all the quality norms, including standards imposed by regulations of the European Union. The company has also been certified by the Polish Register of Shipping and is a member of POLLAB.*



# Pipe production process



# Pipe production process



Pipes produced by Huta Batory and Rurexpol have certificates of international certification agencies, such as: **API – American Petroleum Institute, BV– Bureau Veritas, DNV – Det Norske Veritas, GL – Germanischer Lloyd, LR – Lloyd’s Register, TÜV – Technischer Überwachungs-Verein, UDT – Urząd Dozoru Technicznego (Office of Technical Inspection), ZETOM**. Manufactured products can be also subject to technical inspection of the above-mentioned certification agencies.

# Oil country tubular goods

## Casing pipes for deep well applications

Pipes are subjected to non-destructive ultrasonic and electromagnetic testing. Pipes and couplings are supplied with the following API Std threads:

STC – 60" short  
LC – 60" long  
BC – buttress thread  
HC Polseal-I – Premium connection

## Line pipes for oil and gas transportation

With plain or bevelled ends to API 5L  
External surfaces may be protected by the environment-friendly paint coatings.

### We offer:

- Casing for deep-well applications according to API 5CT with gastight connections
- Line pipes for oil and gas transportation according to API 5L
- Couplings according to API 5CT

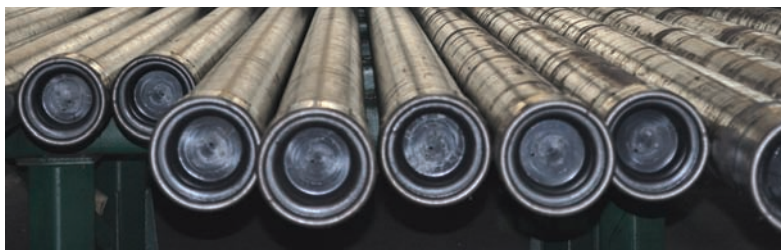
### GASTIGHT CONNECTION Outside Diameter Range:

| in. | 5"     | 5 1/2" | 6 5/8" | 7"     | 7 5/8" | 8 5/8" | 9 5/8" |
|-----|--------|--------|--------|--------|--------|--------|--------|
| mm. | 127.00 | 139.70 | 168.28 | 177.80 | 193.68 | 219.08 | 244.48 |

### Steel grades:

| H40 | J55 | K55 | N80-I | N80-Q | L80-1 | C95 | P110 |
|-----|-----|-----|-------|-------|-------|-----|------|
|-----|-----|-----|-------|-------|-------|-----|------|

Gastight connections may also be supplied with teflon seal rings according to API 5CT



### Outside Diameter Range:

| in. | 6 5/8" | 8 5/8" | 10 3/4" |
|-----|--------|--------|---------|
| mm. | 168.3  | 219.1  | 273.1   |

### Steel grades:

| A | B | X42 | X46 | X52 | X60 |
|---|---|-----|-----|-----|-----|
|---|---|-----|-----|-----|-----|

# Casing pipes

We produce pipes according to each customer's individual requirements

## Outside Diameter:

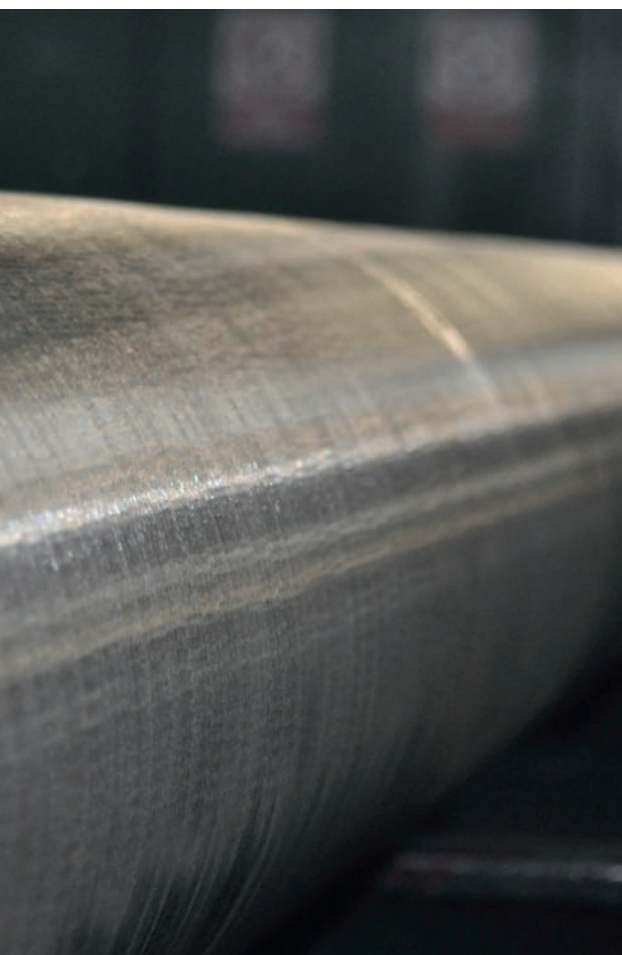
| in. | 5"     | 5 1/2" | 6 5/8" | 7"     | 7 5/8" | 8 5/8" | 9 5/8" |
|-----|--------|--------|--------|--------|--------|--------|--------|
| mm. | 127.00 | 139.70 | 168.28 | 177.80 | 193.68 | 219.08 | 244.48 |

## Grades:

| H40 | J55 | K55 | N80-I | N80-Q | L80-1 | C95 | P110 |
|-----|-----|-----|-------|-------|-------|-----|------|
|-----|-----|-----|-------|-------|-------|-----|------|

Other grades available upon request

# COUPLINGS



We produce two types of gastight connections and couplings manufactured in accordance with API 5CT:

- REGULAR – standard OD couplings
- SC Special Clearance – standard OD couplings

## COUPLING OUTSIDE DIAMETER

|                     | in. | 5"     | 5 1/2" | 6 5/8" | 7"     | 7 5/8" | 8 5/8" | 9 5/8" |
|---------------------|-----|--------|--------|--------|--------|--------|--------|--------|
| Reg. OD             | mm  | 141.30 | 153.67 | 187.71 | 194.46 | 215.90 | 244.48 | 269.88 |
| SCC                 | mm  | 136.52 | 149.22 | 177.80 | 187.32 | 206.38 | 231.78 | 257.18 |
| Gastight Connection | mm  | 141.90 | 154.30 | 188.30 | 165.10 | 216.60 | 245.10 | 270.50 |

## Grades:

| H40 | J55 | K55 | N80-I | N80-Q | L80 - 1 | C95 | P110 |
|-----|-----|-----|-------|-------|---------|-----|------|
|-----|-----|-----|-------|-------|---------|-----|------|

Paint markings on the outside surface correspond to a specific grade. Although coupling threads are phosphated additional protection against corrosion is provided by an appropriate thread compound.

**Couplings are supplied with the following API and Std 5B threads:**  
**STC – 60" short**  
**LC – 60" long**  
**BC – buttress thread**  
**HC Polseal-1 – Premium connection**

# PIPES FOR GAS AND OIL PIPELINES

according  
to the American  
specification  
API 5L

HUTA BATORY produces line pipes acc. to API 5L PSL 1 level of requirements – grade B, X42, X52 and low alloyed high strength grades X60, X65. These pipes are characterized by narrowed outside diameter tolerances appropriate for pipeline welding. Pipes are delivered with varnish for temporary corrosion protection and optionally with bevelled ends protectors.

PSL2 pipes are available in BN, X42N, X52N, X42N, X52N grades and wall thickness range 12,7–28,6mm.

## A. Grades of steel and mechanical properties:

|               | B   | X42 | X46 | X52 | X60 | X65 |
|---------------|-----|-----|-----|-----|-----|-----|
| Re min. [MPa] | 245 | 290 | 320 | 360 | 415 | 450 |
| Rm min. [MPa] | 415 | 415 | 435 | 460 | 520 | 535 |

## B. Dimensional range and typical pipe length:

| Ø 219,1 |            |            |            |            |            |             |            |            |          |        |          |          |       |       |
|---------|------------|------------|------------|------------|------------|-------------|------------|------------|----------|--------|----------|----------|-------|-------|
| 7,9     | 8,2        | 8,7        | 9,5        | 11,1       | 12,7       | 14,3        | 15,9       | 18,3       | 19,1     | 20,6   | 22,2     | 25,4     |       |       |
| 10-12,5 | 10-12      | 9-11       | 7,5-10     | 6-8,5      | DRL10-13,7 | DRL 10-13,5 | 9-12       | 8-11       | 7,5-10,5 | 7-10   | 6-9      | 6-8      |       |       |
| Ø 273,1 |            |            |            |            |            |             |            |            |          |        |          |          |       |       |
|         | 7,8        | 8,7        | 9,3        | 11,1       | 12,7       | 14,3        | 15,9       | 18,3       | 20,6     | 22,2   | 23,8     | 25,4     |       |       |
|         | 9-11,5     | 9,5-12,5   | 9-11,5     | 7,5-10     | DRL10-13,7 | DRL10-12,7  | DRL10-13,7 | 9,5-12     | 8-11,5   | 8-10,5 | 7,5-10   | 7-9,5    |       |       |
| Ø 323,9 |            |            |            |            |            |             |            |            |          |        |          |          |       |       |
| 7,9     | 8,4        | 8,7        | 9,5        | 10,3       | 11,1       | 12,7        | 14,3       | 15,9       | 17,5     | 19,1   | 20,6     | 22,2     | 23,8  | 25,4  |
| 9-11,5  | 8,5-11     | 8-10,5     | 7,5-10     | 7,5-10     | DRL10-13,7 | 9-12        | DRL10-13,5 | 9-12       | 8-11     | 7,5-10 | 7-9,5    | 6,5-9    | 6-8,5 | 6-7,7 |
| Ø 355,6 |            |            |            |            |            |             |            |            |          |        |          |          |       |       |
| 8,7     | 9,5        | 10,3       | 11,1       | 11,9       | 12,7       | 14,3        | 15,9       | 17,5       | 19,1     | 20,6   | 22,2     | 23,8     | 25,4  | 27,0  |
| 9-12    | 10-13      | 9-12       | 8-11       | 7,5-10,5   | 7,5-10     | DRL10-13,7  | DRL10-13   | DRL10-13,7 | 9-12,7   | 9-12   | 8,5-11,5 | 7,5-10,5 | 7-9,8 | 6,5-9 |
| Ø 406,4 |            |            |            |            |            |             |            |            |          |        |          |          |       |       |
| 9,5     | 10,3       | 11,1       | 11,9       | 12,7       | 14,3       | 15,9        | 17,5       | 9,1        | 20,6     | 22,2   | 23,8     | 25,4     | 27,0  | 28,6  |
| 8-11    | 7,5-10,5   | 7-10       | DRL10-13,5 | DRL10-13,7 | 9-12,5     | DRL10-13,2  | 9,5-12,5   | 8,3-11,3   | 7,7-10,7 | 7-10   | 6,2-9,2  | 6-8,5    | 6-8   | 6-7,7 |
| Ø 457,0 |            |            |            |            |            |             |            |            |          |        |          |          |       |       |
| 9,5     | 10,3       | 11,1       | 11,9       | 12,7       | 14,3       | 15,9        | 17,5       | 19,1       | 20,6     | 22,2   | 23,8     | 25,4     | 27,0  | 28,6  |
| 8-10    | DRL10-13,7 | DRL10-13,7 | DRL10-13   | DRL10-13,7 | DRL10-13   | 9-12        | 8-11       | 7-10       | 8-10,8   | 7-10   | 7-9,2    | 7-8,7    | 6-8,4 | 6-8   |
| Ø 508,0 |            |            |            |            |            |             |            |            |          |        |          |          |       |       |
| 11,1    | 11,9       | 12,7       | 14,3       | 15,9       | 17,9       | 19,1        | 20,6       | 22,2       | 23,8     | 25,4   |          |          |       |       |
| 10-12   | DRL10-13,7 | DRL10-13   | 9-12       | 7,5-10,5   | 6-9        | 5,5-8,5     | 6,6-9,6    | 6-9        | 6-8,3    | 6-7,7  |          |          |       |       |

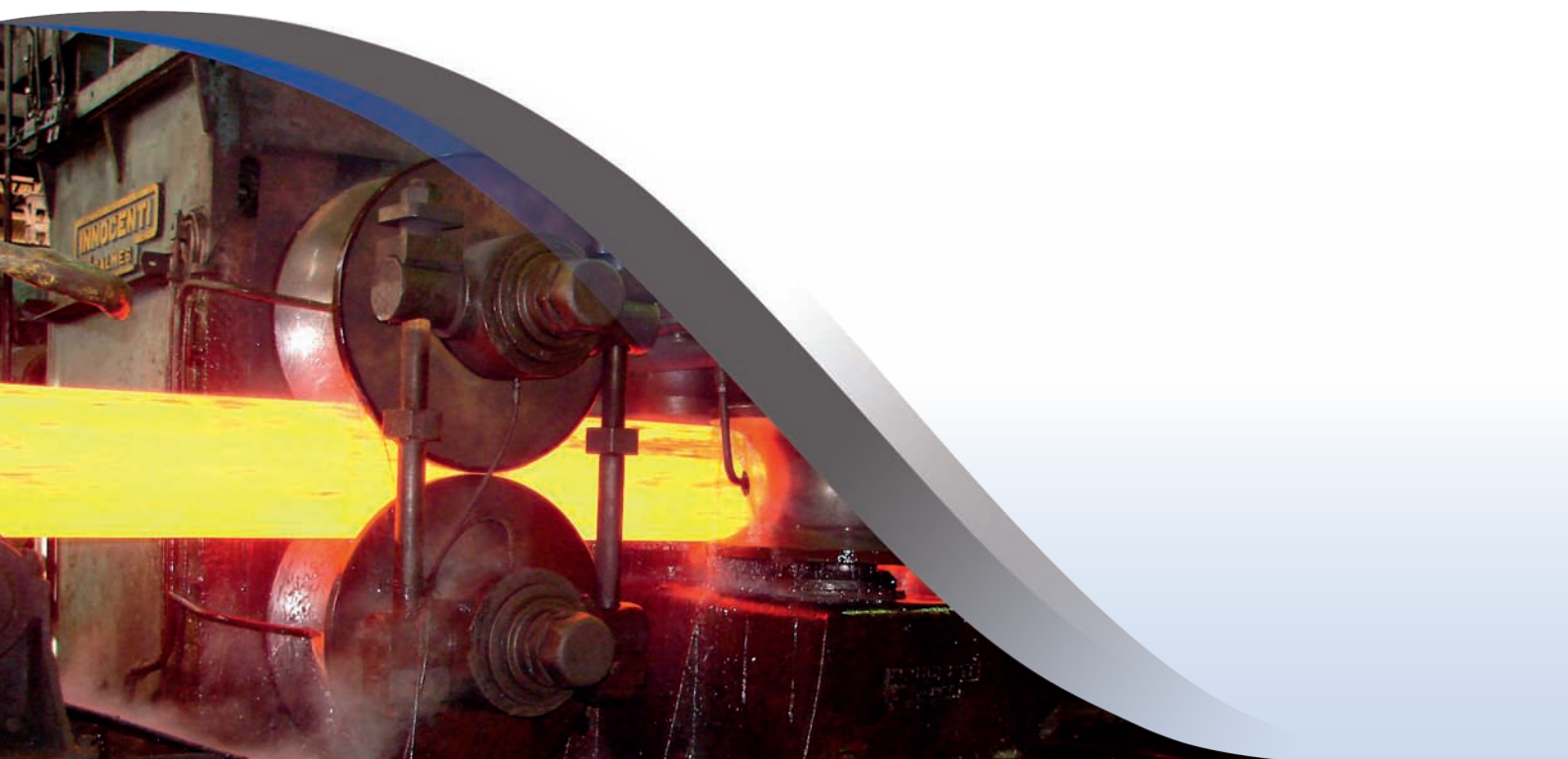
DRL – average length: min. 10,67m  
max. 13,72m

# Plain-ends casing pipes according to API 5CT with API monogram

## A. PRODUCTION PROGRAM OF PLAIN-ENDS CASING PIPES

| STEEL GRADES – GROUP 1 |     |     |
|------------------------|-----|-----|
| H40                    | J55 | K55 |

| DIMENSIONS        |                                |               |                     |                          |
|-------------------|--------------------------------|---------------|---------------------|--------------------------|
| Labels            |                                | Diameter (mm) | Wall thickness (mm) | Typical length range (m) |
| Diameter (inches) | Weight per meter (pounds/foot) |               |                     |                          |
| 20"               | 94.00                          | 508,0         | 11,13               | 10–12,5                  |
|                   | 106.5                          |               | 12,70               | 10–12,5                  |
|                   | 133.0                          |               | 16,13               | 10–11,8                  |
| 18-5/8"           | 87.5                           | 473,1         | 11,05               | 10–12,5                  |
| 16"               | 75.0                           | 406,4         | 11,13               | 7–9,5                    |
|                   | 84.0                           |               | 12,57               | 10–12,5                  |
|                   | 109.0                          |               | 16,66               | 10–12,5                  |



# Plain end coupling stock acc. to API 5CT

## A. PRODUCTION PROGRAM OF PLAIN-END COUPLING STOCK

| STEEL GRADES – GROUP 1 |     |     |
|------------------------|-----|-----|
| H40                    | J55 | K55 |

| DIMENSIONS                 |        |                  |                |       |
|----------------------------|--------|------------------|----------------|-------|
| Labels                     |        | Diameter<br>(mm) | Wall thickness |       |
| Coupling stock<br>diameter | lbs    |                  | inches         | mm    |
| 20"                        | 206.57 | 508,0            | 1.018          | 25.8  |
|                            | 212.32 |                  | 1.048          | 26.6  |
|                            | 100.53 | 323,85           | 0.786          | 19.96 |
|                            | 97.77  |                  | 0.763          | 19.38 |
|                            | 92.12  | 298,45           | 0.786          | 19.96 |
|                            | 89.18  |                  | 0.759          | 19.27 |



# Structural tubes

Structural tubes are used in such structures as: buildings, bridges, breezeways, roofs, stadiums, steel constructions, as well as in the machining sector, e.g. as machined elements, including hydraulic cylinders for the mining industry and hydraulic slave servo. Our structural tubes conform to PN-EN 10210-1,2 norm which is marked by CE.

## **Modern Technologies**

We offer:

- Seamless pipelines for hydraulic lines
- Ship piping

Based on proprietary or ordered design, we also offer the following:

- Supporting structures
- Roof structures
- Tubular supports



# Structural tubes and line pipes

We have been audited and certified by API, TUV, ZETOM, and we organize third party inspections per Customer, request performed by GL, DNV, LRS, UDT.

If required by the Customer, we offer:

- End bevelling
- Cutting to requested lengths
- Grinding or shot-blasting of external tube surfaces
- Outside surface painting using environment-friendly paints
- Ultrasonic testing
- Impact resistance testing at +20°C to – 60°C
- Hydrostatic testing at pressure of up to 130 MPa depending on customer requirements

## We offer:

- Tubes for shipbuilding
- Tubes for support structures
- Pipes for air and gas system
- Pipes for water supply and central heating system
- Construction pipes

## Measurements:

Outside diameter range: 121-273mm

Wall thickness: 4,5-40mm

Length according to standard or to individual requirements.

## We offer steel qualities acc. to the following standards:

| Standard                    | Steel grade       | Material number | Description                                                                                                  |
|-----------------------------|-------------------|-----------------|--------------------------------------------------------------------------------------------------------------|
| PN-EN 10210-1<br>(DIN 1629) | S235JRH (St 37.0) | 1.0039          | Hot finished structural hollow sections of non-alloy and fine grain structural steel                         |
|                             | S275J0H           | 1.0149          |                                                                                                              |
|                             | S275J2H           | 1.0138          |                                                                                                              |
|                             | S355J0H           | 1.0547          |                                                                                                              |
|                             | S355J2H           | 1.0576          |                                                                                                              |
|                             | S355NH            | 1.0539          |                                                                                                              |
| PN-EN 10216-1<br>(DIN 1629) | S355NLH           | 1.0549          |                                                                                                              |
|                             | P235TR1 (St 37.0) | 1.0254          | Seamless steel tubes for pressure purposes non-alloy steel tubes with specified room temperatures properties |
|                             | P235TR2 (St 37.0) | 1.0255          |                                                                                                              |
|                             | P265TR1           | 1.0258          |                                                                                                              |
|                             | P265TR2           | 1.0259          |                                                                                                              |
| PN-EN 10216-3<br>(DIN 1629) | P275NL1           | 1.0488          | Seamless steel tubes for pressure – alloy fine grain tubes                                                   |
|                             | P275NL2           | 1.1104          |                                                                                                              |
|                             | P355N (St 52.0)   | 1.0532          |                                                                                                              |
|                             | P355NH            | 1.0565          |                                                                                                              |
|                             | P355NL1           | 1.1106          |                                                                                                              |
|                             | P355NL2           | 1.0566          |                                                                                                              |

# Structural tubes and line pipes

| Assortment/standard specification                       | Steel grades                                                        |
|---------------------------------------------------------|---------------------------------------------------------------------|
| General purpose line and structural tubes PN-80/H-74219 | R35, R45, R55, R65, 18G2A, 22G2A, 10, 20, 35, 45                    |
| Pipes for shipbuilding BN-85/0648-62                    | R35, R45, A, E                                                      |
| Structural tubes acc. to DIN/ EN 10210-1                | S235JRH, S275J0H, S275NH, S355J0H, S355J2H, S355K2H, S355NH, S460NH |
| Structural tubes acc. to PN-EN 10216-1 (DIN 1629)       | P235TR1 (St 37.0), P235TR2 (St 37.0), P265TR1, P265TR2              |
| Structural tubes acc. to PN-EN 10216-3 (DIN 1629)       | P275NL1, P275NL2, P355N (St 52.0), P355NH, P355NL1, P355NL2         |

| Outside diameter (mm) | Wall thickness (mm) |                     |
|-----------------------|---------------------|---------------------|
|                       | Line pipes          | Tubes for machining |
| 219,1                 | 7,1 – 30            | 10 – 36             |
| 244,5                 | 7,1 – 30            | 10 – 40             |
| 273                   | 7,1 – 30            | 10 – 45             |
| 298,5                 | 7,1 – 30            | 10 – 45             |
| 323,9                 | 7,1 – 30            | 10 – 45             |
| 355,6                 | 8,0 – 30            | 10 – 45             |
| 406,4                 | 8,8 – 30            | 11 – 45             |
| 457                   | 10 – 30             | 12,5 – 45           |
| 508                   | 11 – 30             | 14,2 – 40           |

## Steel grades for pipes for the shipbuilding industry acc. to the specification of Classification Societies

| Specifications | Steel grades                                        |
|----------------|-----------------------------------------------------|
| BV             | 320, 360, 410, 460                                  |
| DNV            | NVA, and grades acc. to the standards EN, ASTM, DIN |
| GL             | GL-A and grades acc. to the standards EN 10216-1-4  |
| LRS            | A, 360, 410,                                        |
| PRS            | A, 410, 360                                         |



# Boiler tubes

Boiler tubes are used in the energy sector, heat and power stations as well as in the industries, in which materials have to undergo high temperatures (300-650°C). They are used for boiler steam superheaters as well as steam tanks and steam pipelines. Alchemia Capital Group offers carbon steel tubes, such as P235GH, P265GH acc. to EN10216-2 or B acc. to ASTM A106, mild-alloy tubes, such as 16Mo3, 13CrMo4-5 acc. to EN 10216-2 or P1.P11.P12 acc. to ASTM A335, as well as tubes intended for operation in the highest temperatures, such as 14MoV6-3, 10CrMo- 910, 15NiCuMoNb5-6-4 and X10CrMoVNb9-1 (P91).

## **Alchemia Capital Group produces:**

- Pipes for heat exchangers
- Pipes intended for operation in high temperature
- Pipes used in the chemical industry

## **Dimensions:**

- Outside diameter: 121-508mm
- Wall thickness: 5-40mm

# Boiler tubes

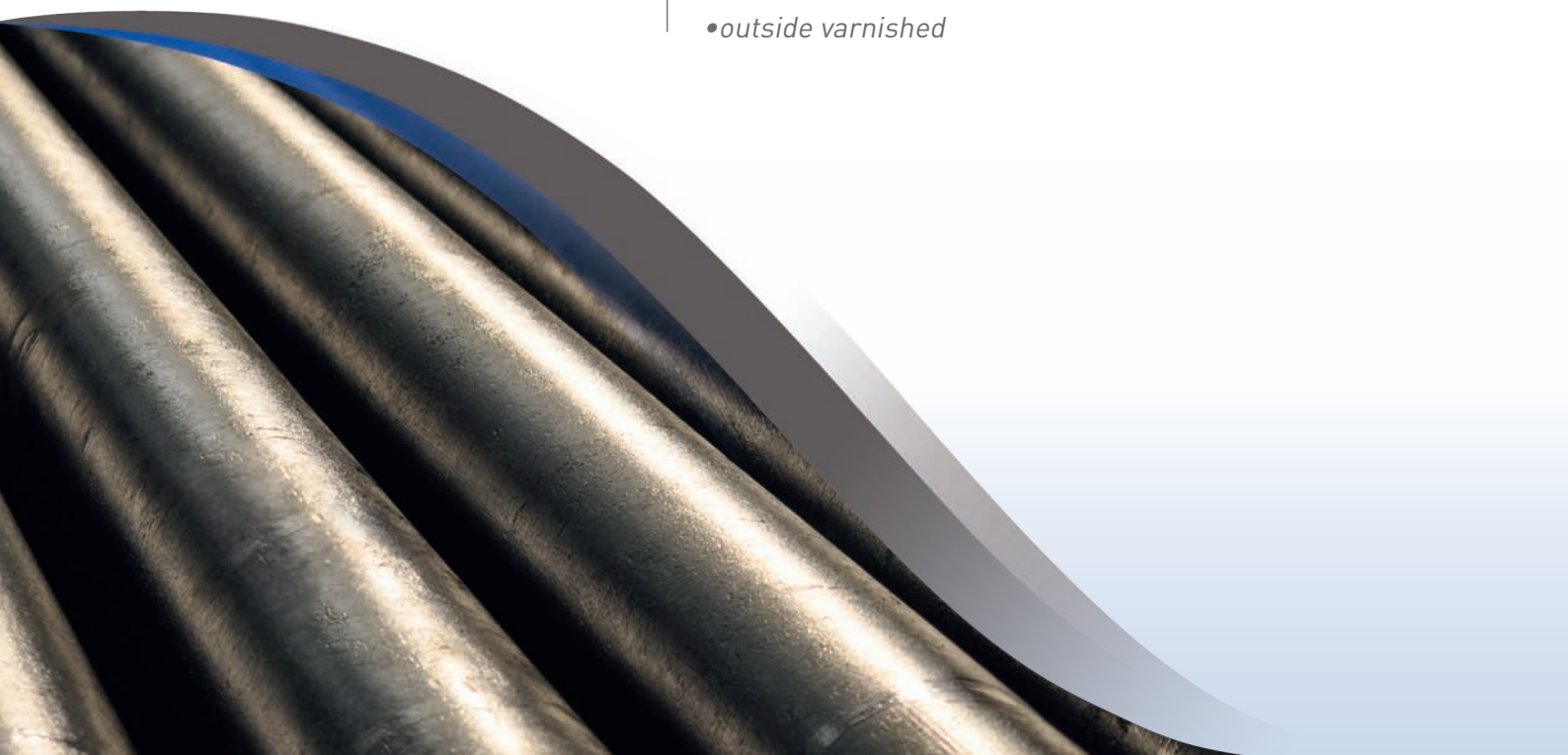
We produce carbon and alloy steel boiler tubes capable of long-term operation in temperatures of up to 600°C according to European Union and world standards.

| Standard      | Steel grade            | Material number |
|---------------|------------------------|-----------------|
| PN-EN 10216-2 | P195GH                 | 1.0348          |
|               | (DIN 17175)            | 1.0345          |
|               | P265GH (St 45.8)       | 1.0425          |
|               | 16Mo3 (15Mo3)          | 1.5415          |
|               | 13CrMo4-5 (13CrMo44)   | 1.7335          |
|               | 10CrMo9-10 (10CrMo910) | 1.7380          |
|               | 14MoV6-3 (14MoV63)     | 1.7715          |

Tubes for heat exchangers and high temperature operations are used for construction boilers, pressure vessels and team/ water pipeworks.

## We supply:

- tubes for corrosion-protected surfaces
- tubes with bevelled ends
- tubes in lenght of 3÷12m
- tubes in fixed lenghts
- tubes in multiple lengths
- outside varnished



# Tubes for cylinders and engineering products

We produce a wide range of heavy wall seamless tubes for mechanical and general engineering applications which include, among others, hydraulic cylinders as well as machine parts and components.

We manufacture heavy wall seamless steel tubes according to the following standards:

PN-80-H-74219

BN-85/0648-83

PN-EN 10297-1

## Steel grades:

|      |        |        |
|------|--------|--------|
| E275 | E355K2 | E420K2 |
|------|--------|--------|

PN-H-74248-96

## Steel grades:

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| C 380 | C 430 | C 550 | C 680 | C 730 |
|-------|-------|-------|-------|-------|

## Dimensions:

- Outside diameter: 121-508mm
- Wall thickness: 4,5-60mm
- Length: 3-12mm

We offer tubes for pistons and cylinders of pit props as well as for building machines, cranes, lifting gears and railway bumpers.

- Tubes for rings and sleeves
- Tubes for machine and device components
- Tubes for heavy-duty supporting structures

# Seamless boiler tubes made of P91 and P92 steel

The modern steels X10CrMoVNb9-1 (P91) and P92 are replacing up to now used steel grades 14MoV63 and 10CrMo9-10. Huta Batory is one of a few manufacturers of pipes of this grade in Europe. Pipes of steel grade P91 and P92 are used for construction of boiler steam superheaters, steam tanks and steam pipelines intended for an operation in the temperature range to 650°C.

## **We offer best quality steels:**

X10CrMoVNb9-1 acc. to PN-EN10216-2 (with UDT admission)

X10CrMoVNb9-1 acc. to Vd TÜV 511/2 and EN10216-2 (with TÜV admission),

P91 and P92 acc. to ASTM A-335

## **Range of dimensions:**

Pipes diameters: 273,0 – 406,4mm

wall thicknesses: 14,2 – 36mm

We offer other wall thicknesses upon agreement.



# Boiler tubes

***We offer seamless boiler tubes according to the following standards:***

| <i>Assortment/ standard specification</i> | <i>Steel grades</i>                                                                                |
|-------------------------------------------|----------------------------------------------------------------------------------------------------|
| Boiler pipes PN-H-74252                   | K10, K18, 16M, 15HM, 10H2M, 13HMF                                                                  |
| Boiler pipes acc. to the DIN 17175        | St35.8, St45.8, 15Mo3, 13CrMo44, 10CrMo910, 14MoV63                                                |
| Boiler pipes PN-EN10216-2                 | P235GH TC2, 16Mo3, 13CrMo4-5, 10CrMo9-10, 14MoV6-3, 15NiCuMoNb5-6-4, X10CrMoVNb9-1, X10CrWMoVNb9-2 |
| Boiler pipes ASTM A335                    | P1, P5, P11, P12, P22, P91, P92                                                                    |

| <i>Outside diameter (mm)</i> | <i>Range of walls thickness (mm)</i>                      |                                                                       |
|------------------------------|-----------------------------------------------------------|-----------------------------------------------------------------------|
|                              | Boiler pipes and low-alloyed TC2 (with NDT inspection) *) | Boiler pipes alloyed grade P22, P91, P92, 14MoV6-3, 15NiCuMoNb5-6-4*) |
| 219,1                        | 14,2-30                                                   | -                                                                     |
| 244,5                        | 14,2-30                                                   | -                                                                     |
| 273                          | 14,2-30                                                   | 14,2-30                                                               |
| 298,5                        | 14,2-30                                                   | 14,2-30                                                               |
| 323,9                        | 14,2-30                                                   | 14,2-30                                                               |
| 355,6                        | 14,2-30                                                   | 14,2-30                                                               |
| 406,4                        | 14,2-30                                                   | 16-30                                                                 |
| 457                          | 14,2-30                                                   | -                                                                     |
| 508                          | 14,2-30                                                   | -                                                                     |

*Notes: \*) there is a possibility of execution of pipes' wall thickness larger than 30mm with an enlarged diameter and wall thickness deviations.*

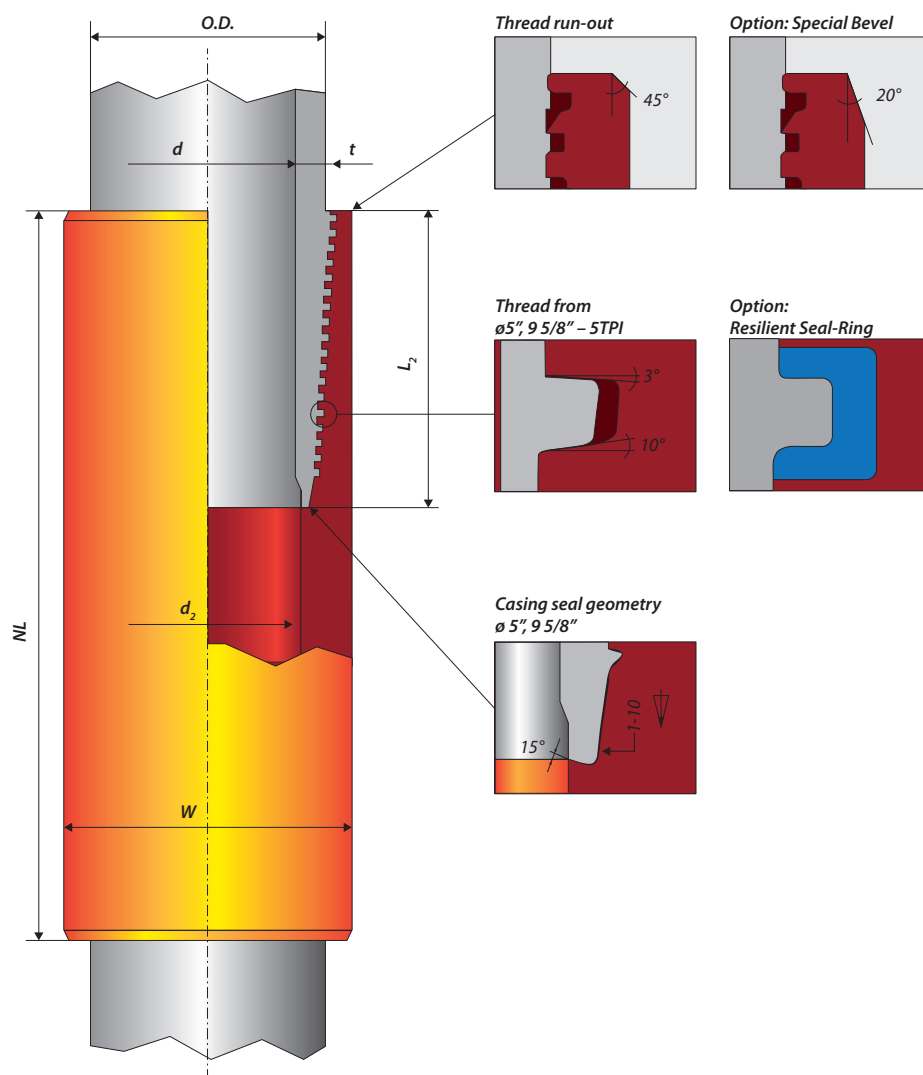
*Manufacturing of a heavy wall pipes with intermediate diameters is possible, on condition that the lot will be minimum of 150 tonnes.*

# Coupling connections

## "HC Polseal-1"

The "HC Polseal-1" casing joint is a versatile high performance non upset premium coupling connection. Suitable for use in a combination of environments and well condition. For example:

- high pressures
- high temperatures
- deviated and horizontal wells
- deep wells
- highly corrosive environments



## "HC Polseal-1"

### **CHARACTERISTICS:**

- metal to metal gas tight seal casing 1:10 taper seal
- improved buttress thread from resistant to galling relief between pin crest and box root assures communication through the joint avoids trapping of compound
- steamlined internal connection profile gives an excellent match between pin bore and coupling centre bore, turbulence, pressure losses and corrosion are reduced to a minimum
- long centre fillet in the coupling for good stress distribution in the joint
- the joint efficiency is 100% with respect to the pipe body
- the stress distribution in the pin of the made up joint greatly reduces the susceptibility to hydrogen embrittlement
- excellent make up properties due to wide and well defined torque values

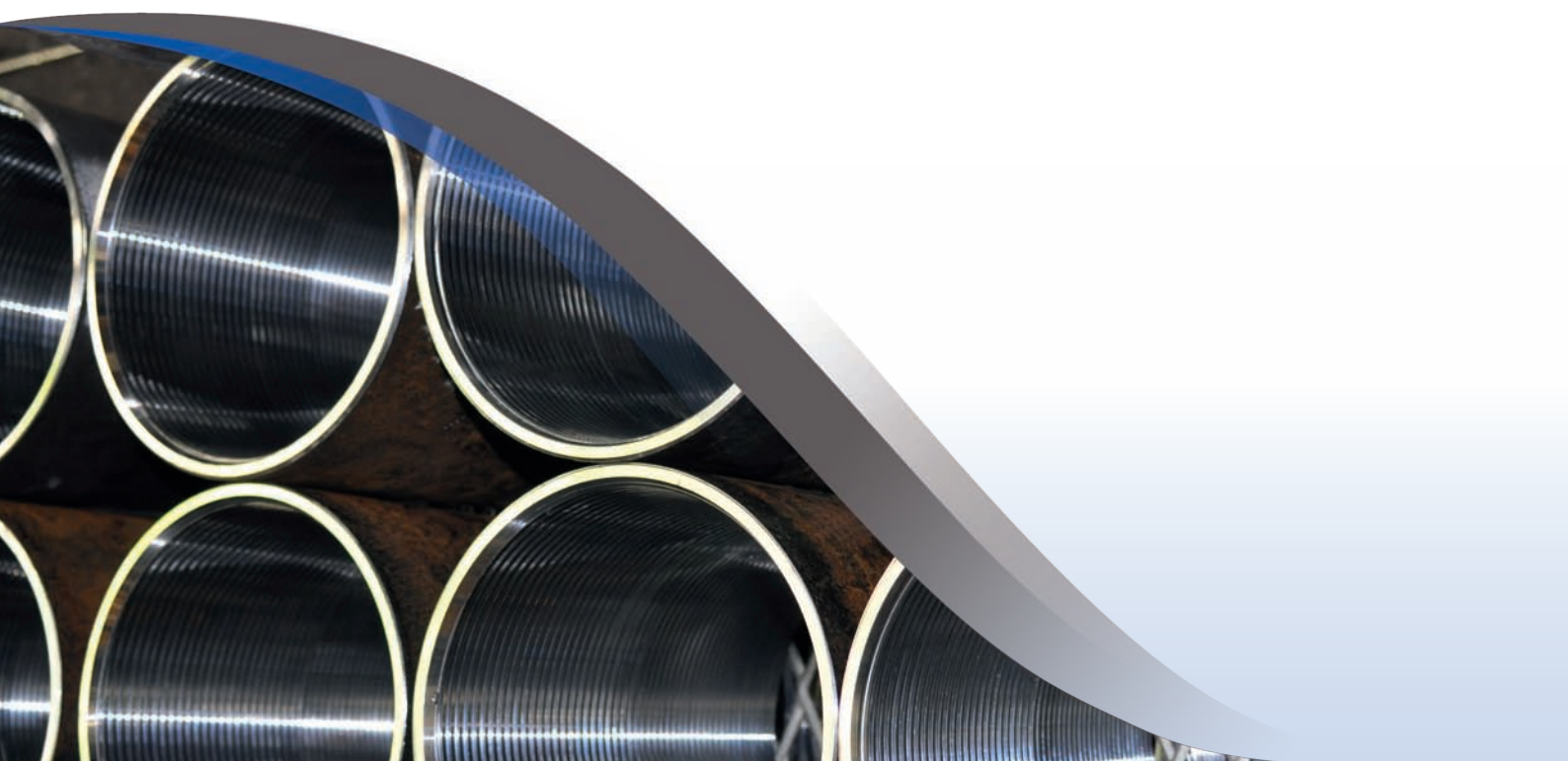
### **For special requirements, technical modifications to the standard requirements are available:**

- matched strength; for 100% tensile efficiency of heavy wall casing
- special clearance; for extra clearance applications
- special bevel; with 20° bevel
- resilient seal; with an extra teflon ring seal

# Performance properties

5"

| Normal weight | FULL DIAMETER OF TUBES IN MM WEIGHT 1 MB |       |                   |        |                |        |          |     | COUPLING           |        |                   |        |           |       |                 |        |
|---------------|------------------------------------------|-------|-------------------|--------|----------------|--------|----------|-----|--------------------|--------|-------------------|--------|-----------|-------|-----------------|--------|
|               | Well Thnickness t                        |       | Inside Diameter d |        | Drift Diameter |        | Size acc |     | Outside Diameter W |        | Inside Diameter d |        | Lenght NL |       | Make-Up Loss La |        |
| lb/ft         | in                                       | mm    | in                | mm     | in             | mm     | API      | RXP | in                 | mm     | in                | mm     | in        | mm    | in              | mm     |
| 13,00         | 0,253                                    | 6,43  | 4,494             | 114,15 | 4,369          | 110,97 | +        | +   | 5,587              | 141,90 | 4,469             | 113,50 | 10,512    | 267,0 | 4,252           | 108,00 |
| 15,00         | 0,296                                    | 7,52  | 4,408             | 111,96 | 4,283          | 108,79 | +        | +   | 5,587              | 141,90 | 4,469             | 113,50 | 10,512    | 267,0 | 4,252           | 108,00 |
| 18,00         | 0,362                                    | 9,19  | 4,276             | 108,61 | 4,151          | 105,44 | +        | +   | 5,587              | 141,90 | 4,429             | 112,50 | 10,512    | 267,0 | 4,252           | 108,00 |
| 20,30         | 0,408                                    | 10,36 | 4,184             | 106,28 | 4,059          | 103,11 | -        | +   | 5,587              | 141,90 | 4,323             | 109,80 | 10,512    | 267,0 | 4,252           | 108,00 |
| 20,80         | 0,422                                    | 10,72 | 4,156             | 105,56 | 4,031          | 102,39 | -        | +   | 5,587              | 141,90 | 4,323             | 109,80 | 10,512    | 267,0 | 4,252           | 108,00 |
| 21,40         | 0,437                                    | 11,10 | 4,126             | 104,80 | 4,001          | 101,63 | +        | +   | 5,587              | 141,90 | 4,323             | 109,80 | 10,512    | 267,0 | 4,252           | 108,00 |
| 23,20         | 0,478                                    | 12,14 | 4,044             | 102,72 | 3,919          | 99,54  | +        | +   | 5,587              | 141,90 | 4,323             | 109,80 | 10,512    | 267,0 | 4,252           | 108,00 |
| 24,10         | 0,500                                    | 12,70 | 4,000             | 101,60 | 3,875          | 98,43  | +        | +   | 5,587              | 141,90 | 4,323             | 109,80 | 10,512    | 267,0 | 4,252           | 108,00 |



# Performance properties

| Normal weight | Calculated weight |       |                         |      |                    |      | Critical cross-section |      |          |      | Pipe body yield strenght |     |     |     |      |
|---------------|-------------------|-------|-------------------------|------|--------------------|------|------------------------|------|----------|------|--------------------------|-----|-----|-----|------|
|               | Plain End Wpe     |       | ew<br>Weight Gain<br>ew |      | Weight<br>Coupling |      | Pipe                   |      | Coupling |      | J/K 55                   | N80 | L80 | C95 | P110 |
| lb/ft         | lb/ft             | kg/m  | lb                      | kg   | lb                 | kg   | sq.in.                 | mm   | sq.in.   | mm   | × 1000 lb                |     |     |     |      |
| 13,00         | 12,84             | 19,11 | 9,13                    | 4,14 | 17,95              | 8,14 | 3,773                  | 2434 | 5,499    | 3548 | 208                      | 302 | 302 | 358 | 415  |
| 15,00         | 14,88             | 22,14 | 8,07                    | 3,66 | 17,95              | 8,14 | 4,374                  | 2822 | 5,499    | 3548 | 241                      | 350 | 350 | 416 | 481  |
| 18,00         | 17,95             | 26,71 | 6,53                    | 2,96 | 18,01              | 8,17 | 5,275                  | 3403 | 5,499    | 3548 | 290                      | 422 | 422 | 501 | 580  |
| 20,30         | 20,01             | 29,78 | 5,67                    | 2,57 | 18,23              | 8,27 | 5,886                  | 3797 | 5,499    | 3548 | 302                      | 440 | 440 | 522 | 605  |
| 20,80         | 20,63             | 30,70 | 5,35                    | 2,43 | 18,23              | 8,27 | 6,069                  | 3915 | 5,499    | 3548 | 302                      | 440 | 440 | 522 | 605  |
| 21,40         | 21,32             | 31,73 | 4,99                    | 2,26 | 18,23              | 8,27 | 6,264                  | 4041 | 5,499    | 3548 | 302                      | 440 | 440 | 522 | 605  |
| 23,20         | 23,11             | 34,39 | 4,05                    | 1,84 | 18,23              | 8,27 | 6,791                  | 4381 | 5,499    | 3548 | 302                      | 440 | 440 | 522 | 605  |
| 24,10         | 24,05             | 35,79 | 3,56                    | 1,61 | 18,23              | 8,27 | 7,069                  | 4560 | 5,499    | 3548 | 302                      | 440 | 440 | 522 | 605  |

| Normal weight | J/K 55 |      |      | N/L80 |      |      | C95   |      |      | P110  |      |       |
|---------------|--------|------|------|-------|------|------|-------|------|------|-------|------|-------|
|               | min.   | opt. | max. | min.  | opt. | max. | min.  | opt. | max. | min.  | opt. | max.  |
| lb/ft         | lb-ft  |      |      | lb-ft |      |      | lb-ft |      |      | lb-ft |      |       |
| 13,00         | 3780   | 4200 | 4620 | 4110  | 4560 | 5010 | 4370  | 4850 | 5330 | 4560  | 5060 | 5560  |
| 15,00         | 4230   | 4700 | 5170 | 4630  | 5140 | 5650 | 4820  | 5350 | 5880 | 5020  | 5570 | 6120  |
| 18,00         | 5140   | 5710 | 6280 | 5540  | 6150 | 6760 | 5800  | 6440 | 7080 | 6060  | 6730 | 7400  |
| 20,30         | 6190   | 6870 | 7550 | 6840  | 7590 | 8340 | 7170  | 7960 | 8750 | 7470  | 8300 | 9130  |
| 20,80         | 6320   | 7020 | 7720 | 6840  | 7590 | 8340 | 7170  | 7960 | 8750 | 7830  | 8700 | 9570  |
| 21,40         | 6450   | 7160 | 7870 | 7170  | 7960 | 8750 | 7470  | 8300 | 9130 | 7830  | 8700 | 9570  |
| 23,20         | 6840   | 7590 | 8340 | 7470  | 8300 | 9130 | 7830  | 8700 | 9570 | 8150  | 9050 | 9950  |
| 24,10         | 6840   | 7590 | 8340 | 7470  | 8300 | 9130 | 7830  | 8700 | 9570 | 8460  | 9400 | 10340 |

# 5 1/2"

| Normal weight | FULL DIAMETER OF TUBES IN MM WEIGHT 1 MB |       |                   |        |                |        |          |     | COUPLING           |        |                    |        |           |       |                 |        |
|---------------|------------------------------------------|-------|-------------------|--------|----------------|--------|----------|-----|--------------------|--------|--------------------|--------|-----------|-------|-----------------|--------|
|               | Well Thickness t                         |       | Inside Diameter d |        | Drift Diameter |        | Size acc |     | Outside Diameter W |        | Inside Diameter d. |        | Lenght NL |       | Make-Up Loss La |        |
| lb/ft         | in                                       | mm    | in                | mm     | in             | mm     | API      | RXP | in                 | mm     | in                 | mm     | in        | mm    | in              | mm     |
| 15,50         | 0,275                                    | 6,98  | 4,950             | 125,73 | 4,825          | 122,56 | +        | +   | 6,075              | 154,30 | 4,961              | 126,00 | 10,669    | 271,0 | 4,331           | 110,00 |
| 17,00         | 0,304                                    | 7,72  | 4,892             | 124,26 | 4,767          | 121,08 | +        | +   | 6,075              | 154,30 | 4,961              | 126,00 | 10,669    | 271,0 | 4,331           | 110,00 |
| 20,00         | 0,361                                    | 9,17  | 4,778             | 121,36 | 4,653          | 118,19 | +        | +   | 6,075              | 154,30 | 4,929              | 125,20 | 10,669    | 271,0 | 4,331           | 110,00 |
| 23,00         | 0,415                                    | 10,54 | 4,670             | 118,62 | 4,545          | 115,44 | +        | +   | 6,075              | 154,30 | 4,843              | 123,00 | 10,669    | 271,0 | 4,331           | 110,00 |
| 26,00         | 0,476                                    | 12,09 | 4,548             | 115,52 | 4,423          | 112,34 | -        | +   | 6,075              | 154,30 | 4,843              | 123,00 | 10,669    | 271,0 | 4,331           | 110,00 |

| Normal weight | calculated weight |       |                |      |                 |      | critical cross-section |      |          |      | pipe body yield strenght |     |     |     |      |
|---------------|-------------------|-------|----------------|------|-----------------|------|------------------------|------|----------|------|--------------------------|-----|-----|-----|------|
|               | Plain End Wpe     |       | Weight Galn ew |      | Weight Coupling |      | Pipe                   |      | Coupling |      | J/K 55                   | N80 | L80 | C95 | P110 |
| lb/ft         | lb/ft             | kg/m  | lb             | kg   | lb              | kg   | sq.in.                 | mm   | sq.in.   | mm   | × 1000 lb                |     |     |     |      |
| 15,50         | 15,36             | 22,86 | 9,05           | 4,10 | 19,62           | 8,90 | 4,514                  | 2912 | 5,977    | 3856 | 248                      | 361 | 361 | 429 | 496  |
| 17,00         | 16,89             | 25,14 | 8,24           | 3,74 | 19,62           | 8,90 | 4,962                  | 3201 | 5,977    | 3856 | 273                      | 397 | 397 | 471 | 546  |
| 20,00         | 19,83             | 29,51 | 6,76           | 3,07 | 19,69           | 8,93 | 5,828                  | 3760 | 5,977    | 3856 | 321                      | 466 | 466 | 554 | 641  |
| 23,00         | 22,56             | 33,57 | 5,48           | 2,49 | 19,86           | 9,01 | 6,630                  | 4277 | 5,977    | 3856 | 329                      | 478 | 478 | 568 | 657  |
| 26,00         | 25,54             | 38,01 | 3,91           | 1,77 | 19,86           | 9,01 | 7,513                  | 4847 | 5,977    | 3856 | 329                      | 478 | 478 | 568 | 657  |

| Normal weight | J/K 55 |      |      | N/L80 |      |      | C95   |      |      | P110  |      |       |
|---------------|--------|------|------|-------|------|------|-------|------|------|-------|------|-------|
|               | min.   | opt. | max. | min.  | opt. | max. | min.  | opt. | max. | min.  | opt. | max.  |
| lb/ft         | lb-ft  |      |      | lb-ft |      |      | lb-ft |      |      | lb-ft |      |       |
| 15,50         | 4230   | 4700 | 5170 | 4630  | 5140 | 5650 | 4880  | 5420 | 5960 | 5140  | 5710 | 6280  |
| 17,00         | 4560   | 5060 | 5560 | 4950  | 5500 | 6050 | 5220  | 5790 | 6360 | 5480  | 6080 | 6680  |
| 20,00         | 5340   | 5930 | 6520 | 5860  | 6510 | 7160 | 6120  | 6800 | 7480 | 6450  | 7160 | 7870  |
| 23,00         | 6390   | 7090 | 7790 | 7170  | 7960 | 8750 | 7470  | 8300 | 9130 | 7830  | 8700 | 9570  |
| 26,00         | 6840   | 7590 | 8340 | 7470  | 8300 | 9130 | 8150  | 9050 | 9950 | 8460  | 9400 | 10340 |

6 5/8"

| Normal weight | FULL DIAMETER OF TUBES IN MM WEIGHT 1 MB |       |                   |        |                |        |          |     | COUPLING           |        |                   |        |           |       |                 |        |
|---------------|------------------------------------------|-------|-------------------|--------|----------------|--------|----------|-----|--------------------|--------|-------------------|--------|-----------|-------|-----------------|--------|
|               | Well Thickness t                         |       | Inside Diameter d |        | Drift Diameter |        | Size acc |     | Outside Diameter W |        | Inside Diameter d |        | Length NL |       | Make-Up Loss La |        |
| lb/ft         | in                                       | mm    | in                | mm     | in             | mm     | API      | RXP | in                 | mm     | in                | mm     | in        | mm    | in              | mm     |
| 20,00         | 0,288                                    | 7,32  | 6,049             | 153,64 | 5,924          | 150,47 | +        | +   | 7,413              | 188,30 | 6,079             | 154,40 | 11,063    | 281,0 | 4,528           | 115,00 |
| 23,20         | 0,296                                    | 7,52  | 4,408             | 111,96 | 4,283          | 108,79 | -        | +   | 7,413              | 188,30 | 6,079             | 154,40 | 11,063    | 281,0 | 4,528           | 115,00 |
| 24,00         | 0,362                                    | 9,19  | 4,276             | 108,61 | 4,151          | 105,44 | +        | +   | 7,413              | 188,30 | 6,039             | 153,40 | 11,063    | 281,0 | 4,528           | 115,00 |
| 28,00         | 0,408                                    | 10,36 | 4,184             | 106,28 | 4,059          | 103,11 | +        | +   | 7,413              | 188,30 | 5,965             | 151,50 | 11,063    | 281,0 | 4,528           | 115,00 |
| 32,00         | 0,422                                    | 10,72 | 4,156             | 105,56 | 4,031          | 102,39 | +        | +   | 7,413              | 188,30 | 5,965             | 151,50 | 11,063    | 281,0 | 4,528           | 115,00 |
| 35,00         | 0,437                                    | 11,10 | 4,126             | 104,80 | 4,001          | 101,63 | -        | +   | 7,413              | 188,30 | 5,965             | 151,50 | 11,063    | 281,0 | 4,528           | 115,00 |

| Normal weight | calculated weight |       |                |      |                 |       | critical cross-section |      |          |      | pipe body yield strenght |     |     |     |      |
|---------------|-------------------|-------|----------------|------|-----------------|-------|------------------------|------|----------|------|--------------------------|-----|-----|-----|------|
|               | Plain End Wpe     |       | Weight Galn ew |      | Weight Coupling |       | Pipe                   |      | Coupling |      | J/K 55                   | N80 | L80 | C95 | P110 |
| lb/ft         | lb/ft             | kg/m  | lb             | kg   | lb              | kg    | sq.in.                 | mm   | sq.in.   | mm   | × 1000 lb                |     |     |     |      |
| 20,00         | 19,51             | 29,03 | 18,52          | 8,41 | 32,32           | 14,66 | 5,732                  | 3699 | 9,669    | 6238 | 315                      | 459 | 459 | 545 | 631  |
| 23,20         | 22,19             | 33,02 | 17,07          | 7,74 | 32,32           | 14,66 | 6,526                  | 4210 | 9,669    | 6238 | 359                      | 522 | 522 | 620 | 718  |
| 24,00         | 23,60             | 35,12 | 16,42          | 7,45 | 32,43           | 14,71 | 6,937                  | 4475 | 9,669    | 6238 | 382                      | 555 | 555 | 659 | 763  |
| 28,00         | 27,67             | 41,18 | 14,44          | 6,55 | 32,67           | 14,82 | 8,133                  | 5247 | 9,669    | 6238 | 447                      | 651 | 651 | 773 | 894  |
| 32,00         | 31,23             | 46,48 | 12,50          | 5,67 | 32,67           | 14,82 | 9,177                  | 5921 | 9,669    | 6238 | 505                      | 734 | 734 | 872 | 1009 |
| 35,00         | 34,20             | 50,90 | 10,88          | 4,94 | 32,67           | 14,82 | 10,061                 | 6491 | 9,669    | 6238 | 532                      | 744 | 744 | 919 | 1064 |

# 6 5/8"

| Normal weight | J/K 55 |      |       | N/L80 |       |       | C95   |       |       | P110  |       |       |
|---------------|--------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|               | min.   | opt. | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  |
| lb/ft         | lb-ft  |      |       | lb-ft |       |       | lb-ft |       |       | lb-ft |       |       |
| 20,00         | 5080   | 5640 | 6200  | 5740  | 6370  | 7000  | 6060  | 6730  | 7400  | 6450  | 7160  | 7870  |
| 23,20         | 5600   | 6220 | 6840  | 6250  | 6940  | 7630  | 6510  | 7230  | 7950  | 7170  | 7960  | 8750  |
| 24,00         | 6250   | 6940 | 7630  | 7140  | 7960  | 7850  | 7470  | 8300  | 9130  | 7830  | 8700  | 9570  |
| 28,00         | 7830   | 8700 | 9570  | 8780  | 9750  | 10720 | 9500  | 10500 | 11500 | 10100 | 11200 | 12300 |
| 32,00         | 8150   | 9050 | 9950  | 9500  | 10500 | 11500 | 10100 | 11200 | 12300 | 10450 | 11550 | 12650 |
| 35,00         | 8780   | 9750 | 10720 | 9850  | 10850 | 11850 | 10450 | 11550 | 12650 | 11100 | 12300 | 13500 |

# 7"

| Normal weight | FULL DIAMETER OF TUBES IN MM WEIGHT 1 MB |       |                   |        |                |        |          |     | COUPLING           |        |                    |        |           |       |                 |        |
|---------------|------------------------------------------|-------|-------------------|--------|----------------|--------|----------|-----|--------------------|--------|--------------------|--------|-----------|-------|-----------------|--------|
|               | Well Thickness t                         |       | Inside Diameter d |        | Drift Diameter |        | Size acc |     | Outside Diameter W |        | Inside Diameter d. |        | Lenght NL |       | Make-Up Loss La |        |
| lb/ft         | in                                       | mm    | in                | mm     | in             | mm     | API      | RXP | in                 | mm     | in                 | mm     | in        | mm    | in              | mm     |
| 23,00         | 0,317                                    | 8,05  | 6,366             | 161,70 | 6,241          | 158,52 | +        | +   | 7,681              | 195,10 | 6,437              | 163,50 | 11,457    | 291,0 | 4,724           | 120,00 |
| 26,00         | 0,362                                    | 9,19  | 6,276             | 159,41 | 6,151          | 156,24 | +        | +   | 7,681              | 195,10 | 6,397              | 162,50 | 11,457    | 291,0 | 4,724           | 120,00 |
| 29,00         | 0,408                                    | 10,36 | 6,184             | 157,10 | 6,059          | 153,90 | +        | +   | 7,681              | 195,10 | 6,350              | 161,30 | 11,457    | 291,0 | 4,724           | 120,00 |
| 32,00         | 0,453                                    | 11,51 | 6,094             | 154,78 | 5,969          | 151,61 | +        | +   | 7,681              | 195,10 | 6,350              | 161,30 | 11,457    | 291,0 | 4,724           | 120,00 |
| 35,00         | 0,498                                    | 12,65 | 6,004             | 152,50 | 5,879          | 149,33 | +        | +   | 7,681              | 195,10 | 6,350              | 161,30 | 11,457    | 291,0 | 4,724           | 120,00 |
| 38,00         | 0,540                                    | 13,72 | 5,920             | 150,37 | 5,795          | 147,19 | +        | +   | 7,681              | 195,10 | 6,350              | 161,30 | 11,457    | 291,0 | 4,724           | 120,00 |
| 41,00         | 0,590                                    | 14,98 | 5,820             | 147,83 | 5,695          | 144,65 | -        | +   | 7,681              | 195,10 | 6,350              | 161,30 | 11,457    | 291,0 | 4,724           | 120,00 |
| 44,00         | 0,640                                    | 16,25 | 5,720             | 145,30 | 5,595          | 142,12 | -        | +   | 7,681              | 195,10 | 6,350              | 161,30 | 11,457    | 291,0 | 4,724           | 120,00 |
| 46,00         | 0,670                                    | 17,02 | 5,660             | 143,76 | 5,535          | 140,58 | -        | +   | 7,681              | 195,10 | 6,350              | 161,30 | 11,457    | 291,0 | 4,724           | 120,00 |

| Normal weight | calculated weight |       |                |      |                 |       | critical cross-section |      |          |      | pipe body yield strenght |     |     |     |      |
|---------------|-------------------|-------|----------------|------|-----------------|-------|------------------------|------|----------|------|--------------------------|-----|-----|-----|------|
|               | Plain End Wpe     |       | Weight Galn ew |      | Weight Coupling |       | Pipe                   |      | Coupling |      | J/K 55                   | N80 | L80 | C95 | P110 |
| lb/ft         | lb/ft             | kg/m  | lb             | kg   | lb              | kg    | sq.in.                 | mm   | sq.in.   | mm   | × 1000 lb                |     |     |     |      |
| 23,00         | 22,65             | 33,71 | 14,66          | 6,65 | 31,13           | 14,12 | 6,655                  | 4294 | 9,066    | 5849 | 366                      | 532 | 532 | 632 | 732  |
| 26,00         | 25,69             | 38,23 | 13,09          | 5,94 | 31,26           | 14,18 | 7,549                  | 4870 | 9,066    | 5849 | 415                      | 604 | 604 | 717 | 830  |
| 29,00         | 28,75             | 42,79 | 11,50          | 5,22 | 31,39           | 14,24 | 8,449                  | 5451 | 9,066    | 5849 | 465                      | 676 | 676 | 803 | 929  |
| 32,00         | 31,70             | 47,18 | 9,85           | 4,47 | 31,39           | 14,24 | 9,317                  | 6011 | 9,066    | 5849 | 499                      | 725 | 725 | 861 | 997  |
| 35,00         | 34,61             | 51,51 | 8,21           | 3,72 | 31,39           | 14,24 | 10,172                 | 6563 | 9,066    | 5849 | 499                      | 725 | 725 | 861 | 997  |
| 38,00         | 37,29             | 55,49 | 6,71           | 3,04 | 31,39           | 14,24 | 10,959                 | 7070 | 9,066    | 5849 | 499                      | 725 | 725 | 861 | 997  |
| 41,00         | 40,39             | 60,11 | 4,97           | 2,25 | 31,39           | 14,24 | 11,881                 | 7665 | 9,066    | 5849 | 499                      | 725 | 725 | 861 | 997  |
| 44,00         | 43,47             | 64,69 | 3,24           | 1,47 | 31,39           | 14,24 | 12,783                 | 8247 | 9,066    | 5849 | 499                      | 725 | 725 | 861 | 997  |
| 46,00         | 45,29             | 67,40 | 2,22           | 1,01 | 31,39           | 14,24 | 13,325                 | 8597 | 9,066    | 5849 | 499                      | 725 | 725 | 861 | 977  |

| Normal weight | J/K 55 |       |       | N/L80 |       |       | C95   |       |       | P110  |       |       |
|---------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|               | min.   | opt.  | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  |
| lb/ft         | lb-ft  |       |       | lb-ft |       |       | lb-ft |       |       | lb-ft |       |       |
| 23,00         | 5600   | 6220  | 6840  | 6320  | 7020  | 7720  | 6840  | 7590  | 8340  | 7170  | 7960  | 8570  |
| 26,00         | 6510   | 7230  | 7950  | 7470  | 8300  | 9130  | 7830  | 8700  | 9570  | 8460  | 9400  | 10340 |
| 29,00         | 7470   | 8300  | 9130  | 8460  | 9400  | 10340 | 9150  | 10150 | 11150 | 9850  | 10850 | 11850 |
| 32,00         | 8150   | 9050  | 9950  | 9150  | 10150 | 11150 | 9850  | 10850 | 11850 | 10450 | 11550 | 12650 |
| 35,00         | 8460   | 9400  | 10340 | 9500  | 10500 | 11500 | 10100 | 11200 | 12300 | 10850 | 11950 | 13050 |
| 38,00         | 8780   | 9750  | 10720 | 10100 | 11200 | 12300 | 10450 | 11550 | 12650 | 11100 | 12300 | 13500 |
| 41,00         | 9500   | 10500 | 11500 | 10450 | 11550 | 12650 | 11100 | 12300 | 13500 | 11700 | 13000 | 14300 |
| 44,00         | 11100  | 12300 | 13500 | 12450 | 13750 | 15050 | 13050 | 14450 | 15850 | 13700 | 15200 | 16700 |
| 46,00         | 11700  | 13000 | 14300 | 12700 | 14100 | 15500 | 13050 | 14450 | 15850 | 13700 | 15200 | 16700 |

7 5/8"

| Normal weight | FULL DIAMETER OF TUBES IN MM WEIGHT 1 MB |       |                   |        |                |        |          |     | COUPLING           |        |                    |        |           |       |                 |        |
|---------------|------------------------------------------|-------|-------------------|--------|----------------|--------|----------|-----|--------------------|--------|--------------------|--------|-----------|-------|-----------------|--------|
|               | Well Thickness t                         |       | Inside Diameter d |        | Drift Diameter |        | Size acc |     | Outside Diameter W |        | Inside Diameter d. |        | Length NL |       | Make-Up Loss La |        |
| lb/ft         | in                                       | mm    | in                | mm     | in             | mm     | API      | RXP | in                 | mm     | in                 | mm     | in        | mm    | in              | mm     |
| 26,40         | 0,328                                    | 8,33  | 6,969             | 177,01 | 6,844          | 173,84 | +        | +   | 8,528              | 216,60 | 7,051              | 179,10 | 11,850    | 301,0 | 4,921           | 125,00 |
| 29,70         | 0,375                                    | 9,52  | 6,875             | 174,63 | 6,750          | 171,45 | +        | +   | 8,528              | 216,60 | 7,012              | 178,10 | 11,850    | 301,0 | 4,921           | 125,00 |
| 33,70         | 0,430                                    | 10,92 | 6,765             | 171,83 | 6,640          | 168,66 | +        | +   | 8,528              | 216,60 | 6,949              | 176,50 | 11,850    | 301,0 | 4,921           | 125,00 |
| 35,80         | 0,453                                    | 11,81 | 6,695             | 170,05 | 6,570          | 166,88 | -        | +   | 8,528              | 216,60 | 6,949              | 176,50 | 11,850    | 301,0 | 4,921           | 125,00 |
| 39,00         | 0,500                                    | 12,70 | 6,625             | 168,28 | 6,500          | 165,10 | +        | +   | 8,528              | 216,60 | 6,949              | 176,50 | 11,850    | 301,0 | 4,921           | 125,00 |
| 42,80         | 0,562                                    | 14,27 | 6,501             | 165,13 | 6,376          | 161,95 | +        | +   | 8,528              | 216,60 | 6,949              | 176,50 | 11,850    | 301,0 | 4,921           | 125,00 |
| 45,30         | 0,595                                    | 15,11 | 6,435             | 163,45 | 6,310          | 160,27 | +        | +   | 8,528              | 216,60 | 6,949              | 176,50 | 11,850    | 301,0 | 4,921           | 125,00 |
| 47,10         | 0,625                                    | 15,88 | 6,375             | 161,92 | 6,250          | 158,75 | +        | +   | 8,528              | 216,60 | 6,949              | 176,50 | 11,850    | 301,0 | 4,921           | 125,00 |

| Normal weight | calculated weight |       |                |       |                 |       | critical cross-section |      |          |      | pipe body yield strenght |      |      |      |      |
|---------------|-------------------|-------|----------------|-------|-----------------|-------|------------------------|------|----------|------|--------------------------|------|------|------|------|
|               | Plain End Wpe     |       | Weight Galn ew |       | Weight Coupling |       | Pipe                   |      | Coupling |      | J/K 55                   | N80  | L80  | C95  | P110 |
| lb/ft         | lb/ft             | kg/m  | lb             | kg    | lb              | kg    | sq.in.                 | mm   | sq.in.   | mm   | × 1000 lb                |      |      |      |      |
| 26,40         | 25,59             | 38,08 | 25,92          | 11,76 | 45,08           | 20,45 | 7,519                  | 4851 | 12,901   | 8323 | 414                      | 602  | 602  | 714  | 827  |
| 29,70         | 29,06             | 43,25 | 24,15          | 10,95 | 45,31           | 20,55 | 8,541                  | 5510 | 12,901   | 8323 | 470                      | 683  | 683  | 811  | 939  |
| 33,70         | 33,07             | 49,21 | 22,28          | 10,11 | 45,75           | 20,75 | 9,720                  | 6271 | 12,901   | 8323 | 535                      | 778  | 778  | 953  | 1069 |
| 35,80         | 34,70             | 51,64 | 21,33          | 9,68  | 45,75           | 20,75 | 10,460                 | 6748 | 12,901   | 8323 | 575                      | 837  | 837  | 994  | 1150 |
| 39,00         | 38,08             | 56,67 | 19,38          | 8,79  | 45,75           | 20,75 | 11,192                 | 7221 | 12,901   | 8323 | 616                      | 895  | 895  | 1063 | 1231 |
| 42,80         | 42,43             | 63,14 | 16,87          | 7,65  | 45,75           | 20,75 | 12,470                 | 8045 | 12,901   | 8323 | 686                      | 998  | 998  | 1185 | 1371 |
| 45,30         | 44,71             | 66,54 | 15,55          | 7,05  | 45,75           | 20,75 | 13,141                 | 8478 | 12,901   | 8323 | 723                      | 1051 | 1051 | 1248 | 1445 |
| 47,10         | 46,77             | 69,77 | 14,36          | 6,51  | 45,75           | 20,75 | 13,745                 | 8868 | 12,901   | 8323 | 756                      | 1100 | 1100 | 1306 | 1512 |

7 5/8"

| Normal weight | J/K 55 |       |       | N/L80 |       |       | C95   |       |       | P110  |       |       |
|---------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|               | min.   | opt.  | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  |
| lb/ft         | lb-ft  |       |       | lb-ft |       |       | lb-ft |       |       | lb-ft |       |       |
| 26,40         | 6450   | 7160  | 7870  | 7170  | 7960  | 8750  | 7830  | 8700  | 9570  | 8150  | 9050  | 9950  |
| 29,70         | 7470   | 8300  | 9130  | 8460  | 9400  | 10340 | 9150  | 10150 | 11150 | 9850  | 10850 | 11850 |
| 33,70         | 9150   | 10150 | 11150 | 10450 | 11550 | 12650 | 11100 | 12300 | 13500 | 12100 | 13400 | 14700 |
| 35,80         | 9500   | 10500 | 11500 | 10850 | 11950 | 13050 | 11700 | 13000 | 14300 | 12450 | 13750 | 15050 |
| 39,00         | 9850   | 10850 | 11850 | 11100 | 12300 | 13500 | 12100 | 13400 | 14700 | 12700 | 14100 | 15500 |
| 42,80         | 10850  | 11950 | 13050 | 12100 | 13400 | 14700 | 12700 | 14100 | 15500 | 13700 | 15200 | 16700 |
| 45,30         | 11100  | 12300 | 13500 | 12450 | 13750 | 15050 | 13050 | 14450 | 15850 | 13700 | 15200 | 16700 |
| 47,10         | 11100  | 12300 | 13500 | 12450 | 13750 | 15050 | 13050 | 14450 | 15850 | 13700 | 15200 | 16700 |

8 5/8"

| Normal weight | FULL DIAMETER OF TUBES IN MM WEIGHT 1 MB |       |                   |        |                |        |          |     | COUPLING           |        |                    |        |           |       |                 |        |
|---------------|------------------------------------------|-------|-------------------|--------|----------------|--------|----------|-----|--------------------|--------|--------------------|--------|-----------|-------|-----------------|--------|
|               | Well Thnckess t                          |       | Inside Diameter d |        | Drift Diameter |        | Size acc |     | Outside Diameter W |        | Inside Diameter d. |        | Lenght NL |       | Make+Up Loss La |        |
| lb/ft         | in                                       | mm    | in                | mm     | in             | mm     | API      | RXP | in                 | mm     | in                 | mm     | in        | mm    | in              | mm     |
| 28,00         | 0,304                                    | 7,72  | 8,017             | 203,63 | 7,892          | 200,46 | +        | +   | 9,650              | 245,10 | 8,047              | 204,40 | 12,087    | 307,0 | 5,039           | 128,00 |
| 32,00         | 0,352                                    | 8,94  | 7,921             | 201,19 | 7,796          | 198,02 | +        | +   | 9,650              | 245,10 | 8,047              | 204,40 | 12,087    | 307,0 | 5,039           | 128,00 |
| 36,00         | 0,400                                    | 10,16 | 7,825             | 198,75 | 7,700          | 195,58 | +        | +   | 9,650              | 245,10 | 7,992              | 203,00 | 12,087    | 307,0 | 5,039           | 128,00 |
| 40,00         | 0,450                                    | 11,43 | 7,725             | 196,21 | 7,600          | 193,04 | +        | +   | 9,650              | 245,10 | 7,992              | 203,00 | 12,087    | 307,0 | 5,039           | 128,00 |
| 44,00         | 0,500                                    | 12,70 | 7,625             | 193,68 | 7,500          | 190,50 | +        | +   | 9,650              | 245,10 | 7,992              | 203,00 | 12,087    | 307,0 | 5,039           | 128,00 |
| 49,00         | 0,557                                    | 14,15 | 7,511             | 190,78 | 7,386          | 187,60 | +        | +   | 9,650              | 245,10 | 7,992              | 203,00 | 12,087    | 307,0 | 5,039           | 128,00 |
| 52,00         | 0,595                                    | 15,11 | 7,435             | 188,85 | 7,310          | 185,67 | -        | +   | 9,650              | 245,10 | 7,992              | 203,00 | 12,087    | 307,0 | 5,039           | 128,00 |

# 8 5/8"

| Normal weight | calculated weight |       |                |       |                 |       | critical cross-section |      |          |       | pipe body yield strenght |      |      |      |      |
|---------------|-------------------|-------|----------------|-------|-----------------|-------|------------------------|------|----------|-------|--------------------------|------|------|------|------|
|               | Plain End Wpe     |       | Weight Galn ew |       | Weight Coupling |       | Pipe                   |      | Coupling |       | J/K 55                   | N80  | L80  | C95  | P110 |
| lb/ft         | lb/ft             | kg/m  | lb             | kg    | lb              | kg    | sq.in.                 | mm   | sq.in.   | mm    | × 1000 lb                |      |      |      |      |
| 28,00         | 27,04             | 40,24 | 36,72          | 16,66 | 57,92           | 26,27 | 7,947                  | 5128 | 16,401   | 10581 | 437                      | 636  | 636  | 755  | 874  |
| 32,00         | 31,13             | 46,33 | 34,32          | 15,57 | 57,92           | 26,27 | 9,149                  | 5903 | 16,401   | 10581 | 503                      | 732  | 732  | 869  | 1005 |
| 36,00         | 35,17             | 52,34 | 32,14          | 14,58 | 58,11           | 26,36 | 10,336                 | 6668 | 16,401   | 10581 | 568                      | 827  | 827  | 982  | 1137 |
| 40,00         | 39,33             | 58,53 | 29,69          | 13,47 | 58,11           | 26,36 | 11,557                 | 7456 | 16,401   | 10581 | 636                      | 925  | 925  | 1098 | 1271 |
| 44,00         | 43,43             | 64,63 | 27,28          | 12,37 | 58,11           | 26,36 | 12,763                 | 8234 | 16,401   | 10581 | 702                      | 1021 | 1021 | 1212 | 1404 |
| 49,00         | 48,04             | 71,49 | 24,58          | 11,15 | 58,11           | 26,36 | 14,118                 | 9108 | 16,401   | 10581 | 776                      | 1129 | 1129 | 1341 | 1553 |
| 52,00         | 51,03             | 75,94 | 22,82          | 10,35 | 58,11           | 26,36 | 15,010                 | 9684 | 16,401   | 10581 | 826                      | 1201 | 1201 | 1426 | 1651 |

| Normal weight | J/K 55 |       |       | N/L80 |       |       | C95   |       |       | P110  |       |       |
|---------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|               | min.   | opt.  | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  |
| lb/ft         | lb-ft  |       |       | lb-ft |       |       | lb-ft |       |       | lb-ft |       |       |
| 28,00         | 6840   | 7590  | 8340  | 7830  | 8700  | 9570  | 8460  | 9400  | 10340 | 9150  | 10150 | 11150 |
| 32,00         | 7470   | 8300  | 9130  | 8460  | 9400  | 10340 | 9150  | 10150 | 11150 | 9850  | 10850 | 11850 |
| 36,00         | 9150   | 10150 | 11150 | 10450 | 11550 | 12650 | 11100 | 12300 | 13500 | 12100 | 13400 | 14700 |
| 40,00         | 9850   | 10850 | 11850 | 11100 | 12300 | 13500 | 12100 | 13400 | 14700 | 12700 | 14100 | 15500 |
| 44,00         | 10450  | 11550 | 12650 | 11700 | 13000 | 14300 | 12700 | 14100 | 15500 | 13700 | 15200 | 16700 |
| 49,00         | 11100  | 12300 | 13500 | 12450 | 13750 | 15050 | 13700 | 15200 | 16700 | 14400 | 15900 | 17400 |
| 52,00         | 11700  | 13000 | 14300 | 13050 | 14450 | 15850 | 13700 | 15200 | 16700 | 14400 | 15900 | 17400 |

9 5/8"

| Normal weight | FULL DIAMETER OF TUBES IN MM WEIGHT 1 MB |       |                   |        |                |        |          |     | COUPLING           |        |                    |        |           |       |                 |        |
|---------------|------------------------------------------|-------|-------------------|--------|----------------|--------|----------|-----|--------------------|--------|--------------------|--------|-----------|-------|-----------------|--------|
|               | Well Thickness t                         |       | Inside Diameter d |        | Drift Diameter |        | Size acc |     | Outside Diameter W |        | Inside Diameter d. |        | Length NL |       | Make-Up Loss La |        |
| lb/ft         | in                                       | mm    | in                | mm     | in             | mm     | API      | RXP | in                 | mm     | in                 | mm     | in        | mm    | in              | mm     |
| 36,00         | 0,352                                    | 8,94  | 8,921             | 226,60 | 8,765          | 222,63 | +        | +   | 10,650             | 270,50 | 9,047              | 229,80 | 12,087    | 307,0 | 5,039           | 128,00 |
| 40,00         | 0,395                                    | 10,03 | 8,825             | 224,41 | 8,679          | 22,45  | +        | +   | 10,650             | 270,50 | 9,000              | 228,60 | 12,087    | 307,0 | 5,039           | 128,00 |
| 43,50         | 0,435                                    | 11,05 | 8,755             | 222,38 | 8,599          | 218,41 | +        | +   | 10,650             | 270,50 | 8,956              | 227,50 | 12,087    | 307,0 | 5,039           | 128,00 |
| 47,00         | 0,472                                    | 11,99 | 8,681             | 220,50 | 8,525          | 216,54 | +        | +   | 10,650             | 270,50 | 8,956              | 227,50 | 12,087    | 307,0 | 5,039           | 128,00 |
| 53,50         | 0,545                                    | 13,84 | 8,535             | 216,79 | 8,379          | 212,83 | +        | +   | 10,650             | 270,50 | 8,956              | 227,50 | 12,087    | 307,0 | 5,039           | 128,00 |
| 58,40         | 0,595                                    | 15,11 | 8,435             | 214,25 | 8,279          | 210,29 | +        | +   | 10,650             | 270,50 | 8,956              | 227,50 | 12,087    | 307,0 | 5,039           | 128,00 |
| 59,40         | 0,609                                    | 15,47 | 8,407             | 213,54 | 8,251          | 209,58 | +        | +   | 10,650             | 270,50 | 8,956              | 227,50 | 12,087    | 307,0 | 5,039           | 128,00 |
| 61,10         | 0,625                                    | 14,88 | 8,375             | 212,73 | 8,219          | 208,76 | -        | +   | 10,650             | 270,50 | 8,956              | 227,50 | 12,087    | 307,0 | 5,039           | 128,00 |

| Normal weight | calculated weight |       |                |       |                 |       | critical cross-section |       |          |       | pipe body yield strenght |      |      |      |      |
|---------------|-------------------|-------|----------------|-------|-----------------|-------|------------------------|-------|----------|-------|--------------------------|------|------|------|------|
|               | Plain End Wpe     |       | Weight Galn ew |       | Weight Coupling |       | Pipe                   |       | Coupling |       | J/K 55                   | N80  | L80  | C95  | P110 |
| lb/ft         | lb/ft             | kg/m  | lb             | kg    | lb              | kg    | sq.in.                 | mm    | sq.in.   | mm    | × 1000 lb                |      |      |      |      |
| 36,00         | 34,89             | 51,92 | 36,65          | 16,62 | 63,98           | 29,02 | 10,254                 | 6615  | 18,208   | 11747 | 564                      | 820  | 820  | 974  | 1128 |
| 40,00         | 38,97             | 58,00 | 34,65          | 15,72 | 64,38           | 29,20 | 11,454                 | 7390  | 18,208   | 11747 | 630                      | 916  | 916  | 1088 | 1260 |
| 43,50         | 42,73             | 63,59 | 32,75          | 14,86 | 64,68           | 29,34 | 12,559                 | 8103  | 18,208   | 11747 | 691                      | 1005 | 1005 | 1193 | 1381 |
| 47,00         | 46,18             | 58,73 | 30,72          | 13,93 | 64,68           | 29,34 | 11,557                 | 8756  | 18,208   | 11747 | 746                      | 1086 | 1086 | 1289 | 1493 |
| 53,50         | 52,90             | 78,73 | 26,77          | 12,14 | 64,68           | 29,34 | 15,546                 | 10030 | 18,208   | 11747 | 855                      | 1244 | 1244 | 1477 | 1710 |
| 58,40         | 57,44             | 85,48 | 24,11          | 10,94 | 64,68           | 29,34 | 16,879                 | 10890 | 18,208   | 11747 | 928                      | 1350 | 1350 | 1604 | 1857 |
| 59,40         | 58,70             | 87,36 | 23,56          | 10,69 | 64,68           | 29,34 | 17,255                 | 11132 | 18,208   | 11747 | 949                      | 1380 | 1380 | 1639 | 1897 |
| 61,10         | 60,08             | 89,41 | 22,56          | 10,23 | 64,68           | 29,34 | 17,675                 | 11403 | 18,208   | 11747 | 972                      | 1414 | 1414 | 1679 | 1944 |

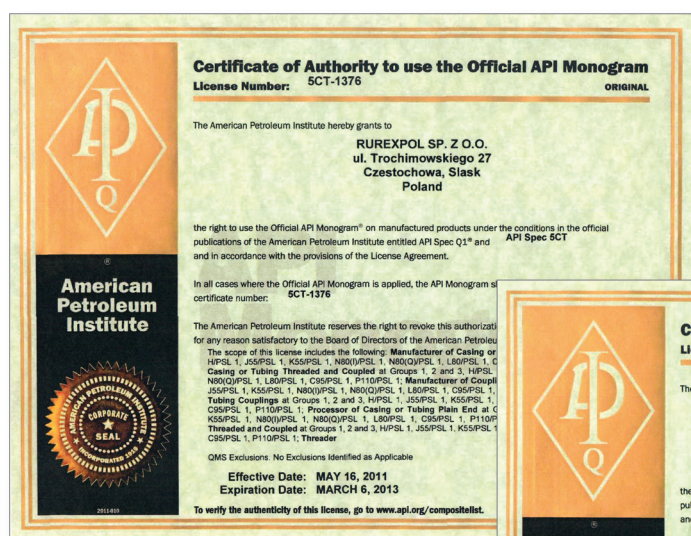
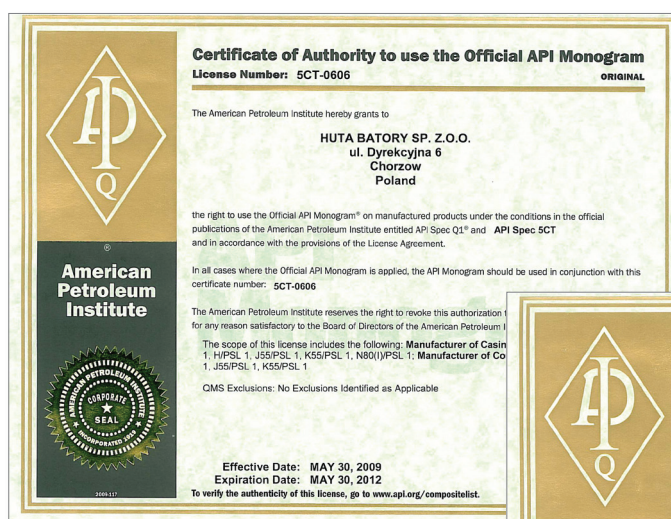
# 9 5/8"

| Normal weight | J/K 55 |       |       | N/L80 |       |       | C95   |       |       | P110  |       |       |
|---------------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|               | min.   | opt.  | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  | min.  | opt.  | max.  |
| lb/ft         | lb-ft  |       |       | lb-ft |       |       | lb-ft |       |       | lb-ft |       |       |
| 36,00         | 7830   | 8700  | 9750  | 9150  | 10150 | 11150 | 10100 | 11200 | 12300 | 10850 | 11950 | 13050 |
| 40,00         | 9500   | 10500 | 11500 | 11100 | 12300 | 13500 | 12100 | 13400 | 14700 | 13050 | 14450 | 15850 |
| 43,50         | 10850  | 11950 | 13050 | 12700 | 14100 | 15500 | 13700 | 15200 | 16700 | 14400 | 15900 | 17400 |
| 47,00         | 11100  | 12300 | 13500 | 13050 | 14450 | 15850 | 14400 | 15900 | 17400 | 14400 | 15900 | 17400 |
| 53,50         | 12100  | 13400 | 14700 | 14400 | 15900 | 17400 | 14400 | 15900 | 17400 | 14400 | 15900 | 17400 |
| 58,40         | 12700  | 14100 | 15500 | 14400 | 15900 | 17400 | 14400 | 15900 | 17400 | 14400 | 15900 | 17400 |
| 59,40         | 13050  | 14450 | 15850 | 14400 | 15900 | 17400 | 14400 | 15900 | 17400 | 14400 | 15900 | 17400 |
| 61,10         | 13050  | 14450 | 15580 | 14400 | 15900 | 17400 | 14400 | 15900 | 17400 | 14400 | 15900 | 17400 |

## Special drift dimensions

| DESIGNATION |        | PIPE             |        |                |       | DRIFT MANDREL DIMMENSIONS |     |                  |        |
|-------------|--------|------------------|--------|----------------|-------|---------------------------|-----|------------------|--------|
| Size        | Weight | Outside diameter |        | Wall thickness |       | Lenght minimum            |     | Diameter minimum |        |
| in          | lb/ft  | in               | mm     | in             | mm    | in                        | mm  | in               | mm     |
| 7"          | 23,00  | 7,000            | 177,80 | 0,317          | 8,05  | 6                         | 152 | 6,250            | 158,75 |
| 7"          | 32,00  | 7,000            | 177,80 | 0,453          | 11,51 | 6                         | 152 | 6,000            | 152,40 |
| 8 5/8"      | 32,00  | 8,625            | 219,08 | 0,352          | 8,94  | 6                         | 152 | 7,875            | 200,02 |
| 8 5/8"      | 40,00  | 8,625            | 219,08 | 0,450          | 11,43 | 6                         | 152 | 7,625            | 193,68 |
| 9 5/8"      | 40,00  | 9,625            | 244,48 | 0,395          | 10,03 | 12                        | 305 | 8,750            | 222,25 |
| 9 5/8"      | 53,50  | 9,625            | 244,48 | 0,545          | 13,84 | 12                        | 305 | 8,500            | 215,90 |
| 9 5/8"      | 58,40  | 9,625            | 244,48 | 0,595          | 15,11 | 12                        | 305 | 8,375            | 212,72 |

## Notes





ALCHEMIA SA

ul. Łucka 7/9

PL 00-842 Warsaw

tel.: +48 22 658 64 52

fax: +48 22 658 64 55

COMMERCIAL OFFICE

tel.: +48 32 77 22 170

tel.: +48 32 77 22 526

fax: +48 32 77 22 880

e-mail: [chorzow@alchemiasa.pl](mailto:chorzow@alchemiasa.pl)

