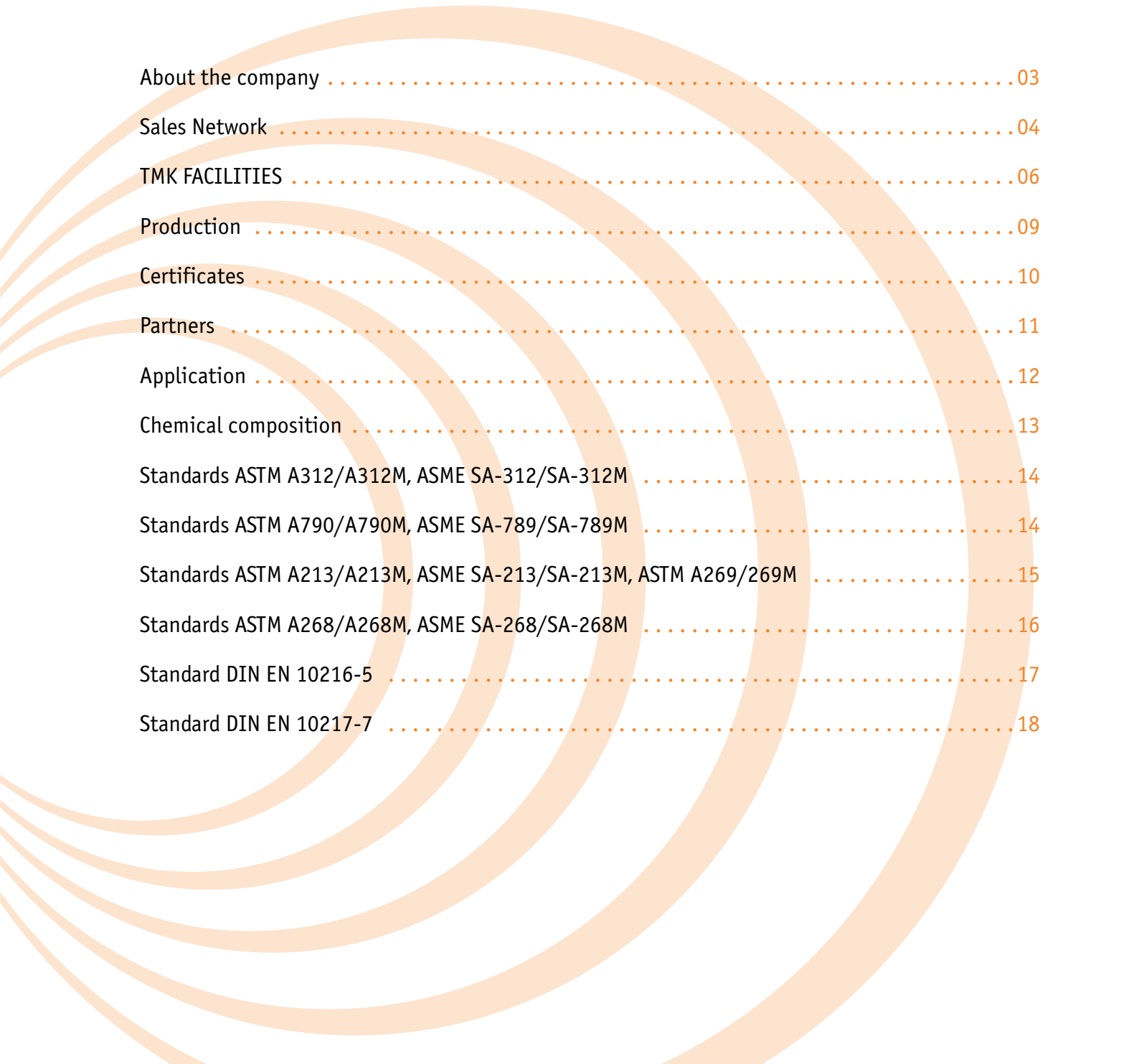




Stainless steel pipes
Technical Catalog



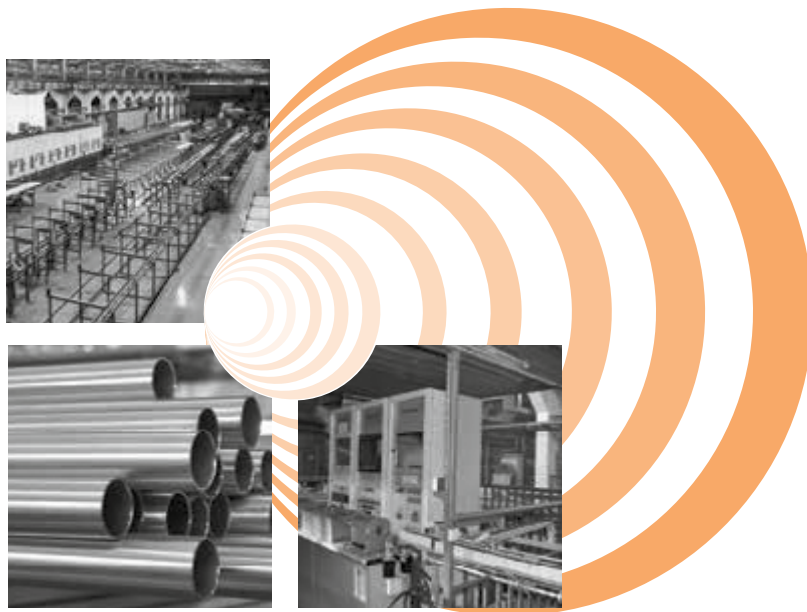


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The information presented herein is intended for use by industry professionals, using their own knowledge, experience and expertise. Although we have endeavored to provide accurate information and calculations, such information may be subject to change or correction, and TMK INOX and its affiliates take no responsibility for the reliance on or use of any information contained herein.

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The Company was founded in 2001 and currently operates more than 20 production sites in Russia, the United States, Canada, Romania, and Kazakhstan. TMK's core business is the production and sales of seamless and welded pipe, including large diameter pipe, pipe with premium connections, combined with an extensive range of heat treatment services, protective coating, premium connections threading, pipe storage and repair.

TMK-INOX, LLC was established in 2009 as a professional stainless steel tubes and pipes manufacturer in Russia. The company is a joint venture of OJSC TMK.

TMK modernized equipment of Sinarsky Pipe Plant, which has been producing stainless steel pipes since 1973.

TMK-INOX has more than 500 professional employees. The annual output exceeds 8000 tons of seamless stainless steel pipes. In 2013 we launched new facility for production of electric welded stainless steel pipes with slitting machine and 8 production lines. Raw materials for our tubular products are supplied by the top leading domestic and foreign steel manufacturers.

Our Traditional goods are austenitic and ferritic stainless steel pipes with size range 2.0–273.0 mm for seamless and 8.0–114.3 mm for welded pipes according to international standards ISO, DIN EN, ASTM, ASME, GOST. Currently TMK INOX products are widely applied in nuclear power stations, petroleum, petrochemical, natural gas, shipbuilding, aviation and spacecraft, automotive, pharmaceutical, food, decoration, and others industries.

Currently TMK INOX products are widely applied in nuclear power stations, petroleum, petrochemical, natural gas, shipbuilding, aviation and spacecraft, automotive, pharmaceutical, food, decoration, and others industries.

TMK supply chain lets us deliver tubular products to Russia, Poland, Germany, Italy, Switzerland, China, Singapore, USA, Canada, South Africa, UAE, Kazakhstan, Uzbekistan, Azerbaijan, Turkmenistan and other areas by agents. For a long time

TMK-INOX has been a leading supplier of seamless stainless steel pipes for nuclear power plants and thermal power plants in Russia and the CIS.

Corporate system of quality management has passed the ISO 9001:2015 certification by Lloyd's and production certified PED 2014/68/EU authorized by T V Rheinland.

Moreover, TMK-INOX also has national Federal Environmental, Industrial and Nuclear Supervision Service certificates and licenses as producer products for power plants and nuclear stations.

The Company has made a significant step forward in supplies welded pipes for well-known European automotive brands. Driven by idea of cooperation, using well-testing equipment and providing on site safety policy and best quality control make us valuable company for working with.

For more information on TMK, please visit our web sites at www.tmk-group.com

TMK IPSCO, U.S Sales Office

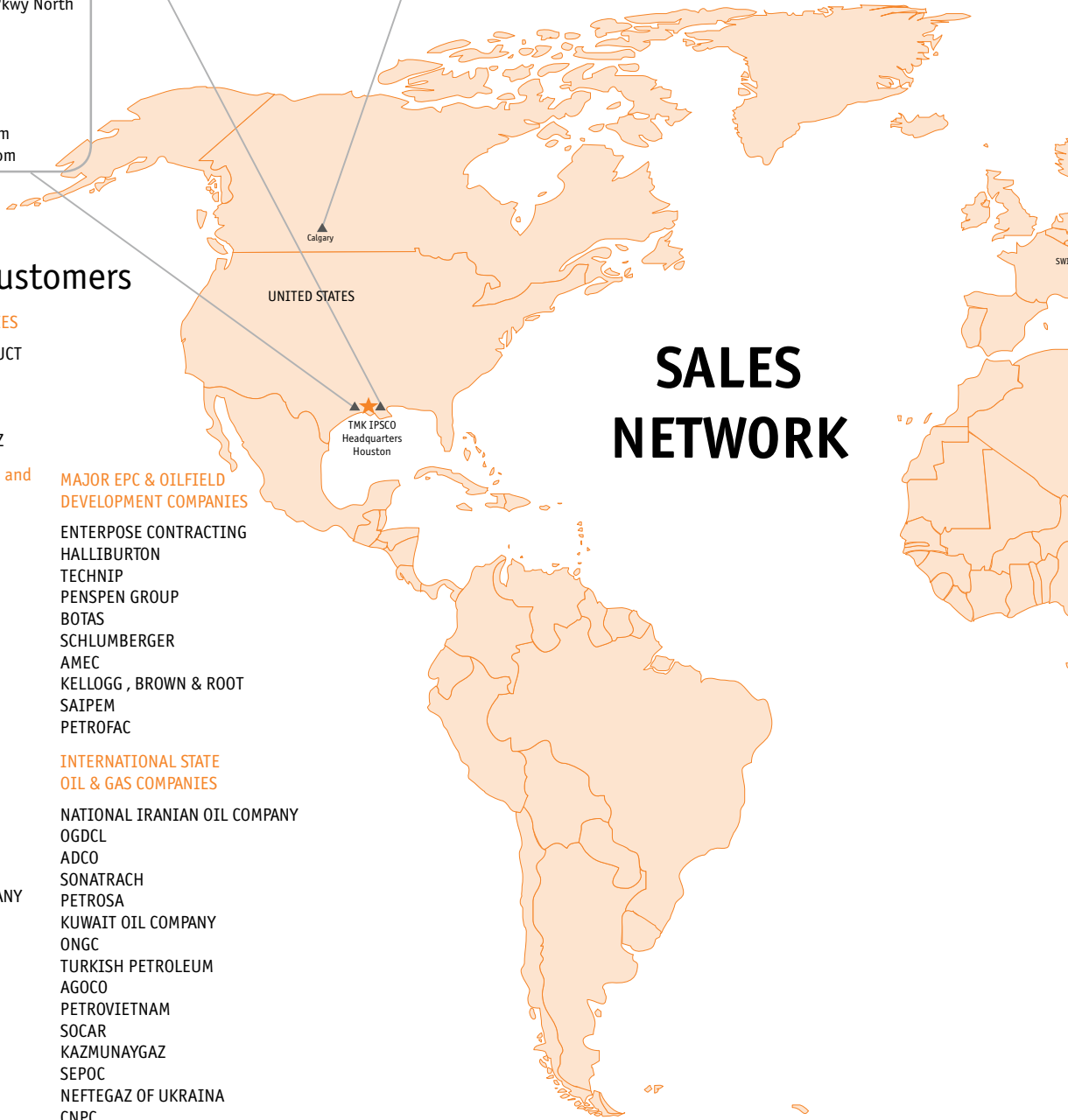
10120 Houston Oaks Dr.
Houston, TX 77064 USA
Tel + 1 (281) 949-10-23
Fax + 1 (281) 949-10-65

TMK IPSCO, Canada Sales Office

150 6th Avenue SW #5100
Calgary, AB T2P 3Y7, Canada
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TMK Industrial Solutions LLC

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10940 West Sam Houston Pkwy North
Suite 325,
Houston, TX 77064
Phone: 346-206-3790
Toll Free: 844-878-4530
Fax: 832-688-8801
E-mail: info@tmk-is.com
sales@tmk-is.com



TMK's Major Customers

RUSSIAN OIL & GAS COMPANIES

- SIBNEFT TRANSNEFTPRODUCT
- TATNEFT TRANSNEFT
- LUKOIL RUSSNEFT
- ROSNEFT GAZPROM
- SURGUTNEFTEGAZ

MAJOR CIS Machine Building and Energy Companies

- KRASNY KOTELSHIK
- KAMAZ
- GAZ
- BELENERGOMASH
- BELAZ
- VAZ
- ZIO-PODOLSK
- UALAZ
- MAZ
- PENZAHHIMMASH
- UAZ
- EPK
- SIBENERGOMASH

MAJOR INTERNATIONAL INDEPENDENT OIL & GAS COMPANIES

- AL-FURAT PETROLEUM COMPANY
- ENCANA
- PDO
- ESHPETCO
- WOODSIDE PETROLEUM
- REPSOL
- PETRO-CANADA
- SHELL
- ANADARKO PETROLEUM
- TOTAL
- MARATHON OIL
- CHESAPEAKE
- OMV
- XTO ENERGY
- AMERADA HESS
- STATOIL
- EXXONMOBIL
- WINTERSHALL
- CHEVRON TEXACO
- AGIP
- OCCIDENTAL PETROLEUM
- MAERSK OIL
- BURLINGTON RESOURCES

MAJOR EPC & OILFIELD DEVELOPMENT COMPANIES

- ENTERPOSE CONTRACTING
- HALLIBURTON
- TECHNIP
- PENSPEN GROUP
- BOTAS
- SCHLUMBERGER
- AMEC
- KELLOGG , BROWN & ROOT
- SAIPEM
- PETROFAC

INTERNATIONAL STATE OIL & GAS COMPANIES

- NATIONAL IRANIAN OIL COMPANY
- OGDCL
- ADCO
- SONATRACH
- PETROSA
- KUWAIT OIL COMPANY
- ONGC
- TURKISH PETROLEUM
- AGOCO
- PETROVIETNAM
- SOCAR
- KAZMUNAYGAZ
- SEPOC
- NEFTEGAZ OF UKRAINA
- CNPC
- SAUDI ARAMCO
- GROUPEMENT BERKINE
- UZBEKNEFTEGAZ
- EGPC
- TURKMENNEFTEGAZ
- SYRIAN PETROLEUM COMPANY
- ORPIC
- OMANA GAS CO
- DALLEL PERTROLEUM
- OOCEP

★ Headquarters
▲ TMK sales offices

SALES NETWORK

TMK Europe

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40210 Dusseldorf , Germany
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Fax: +49 0 211 159-838-82
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Fax +41 22 818-64-60
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TMK

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tmk@tmk-group.com

Representative office in Kazakhstan

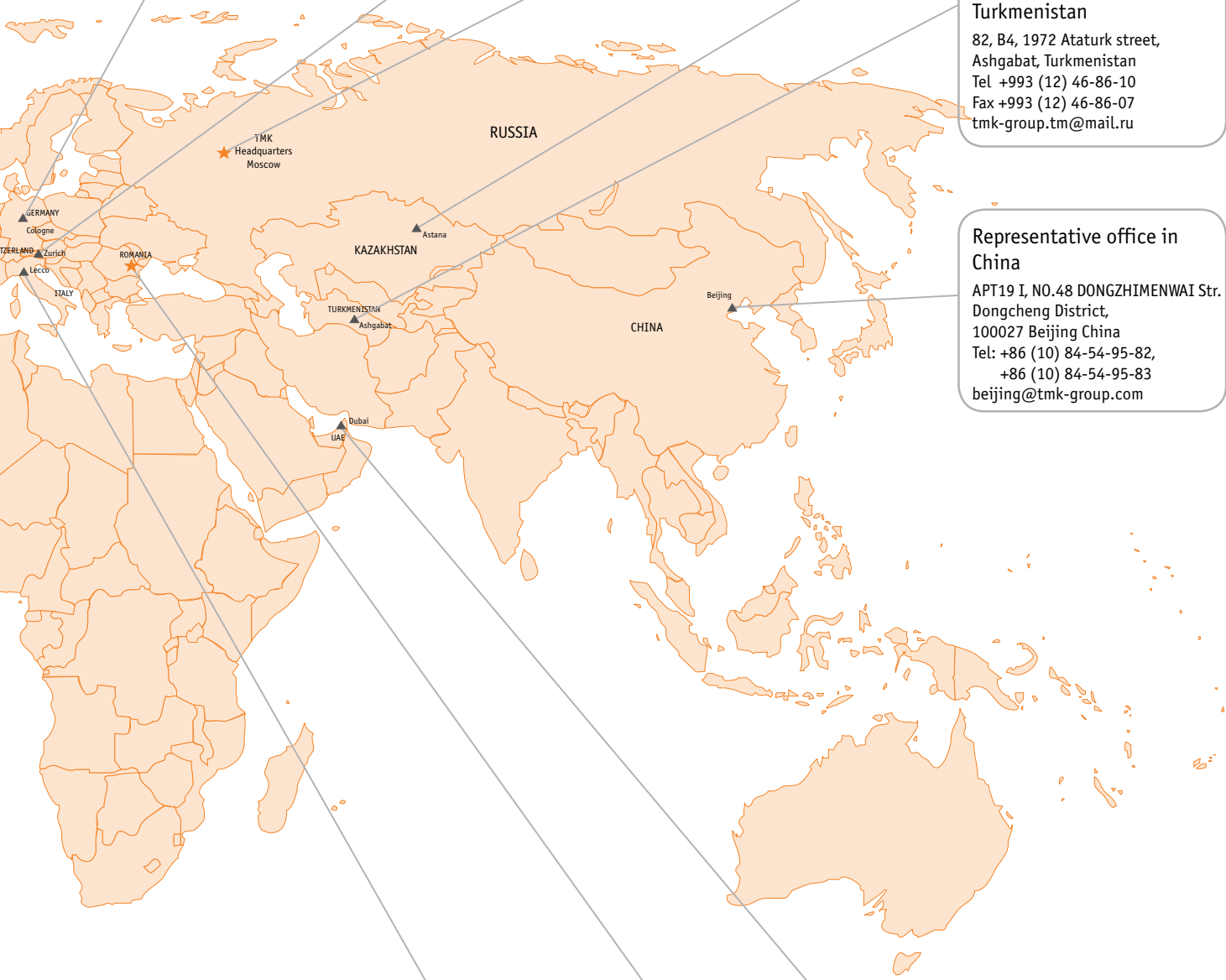
NP-19,8, Mangilik El ave.,
010000 Astana, Kazakhstan
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Representative office in Turkmenistan

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Tel +993 (12) 46-86-10
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TMK Italia

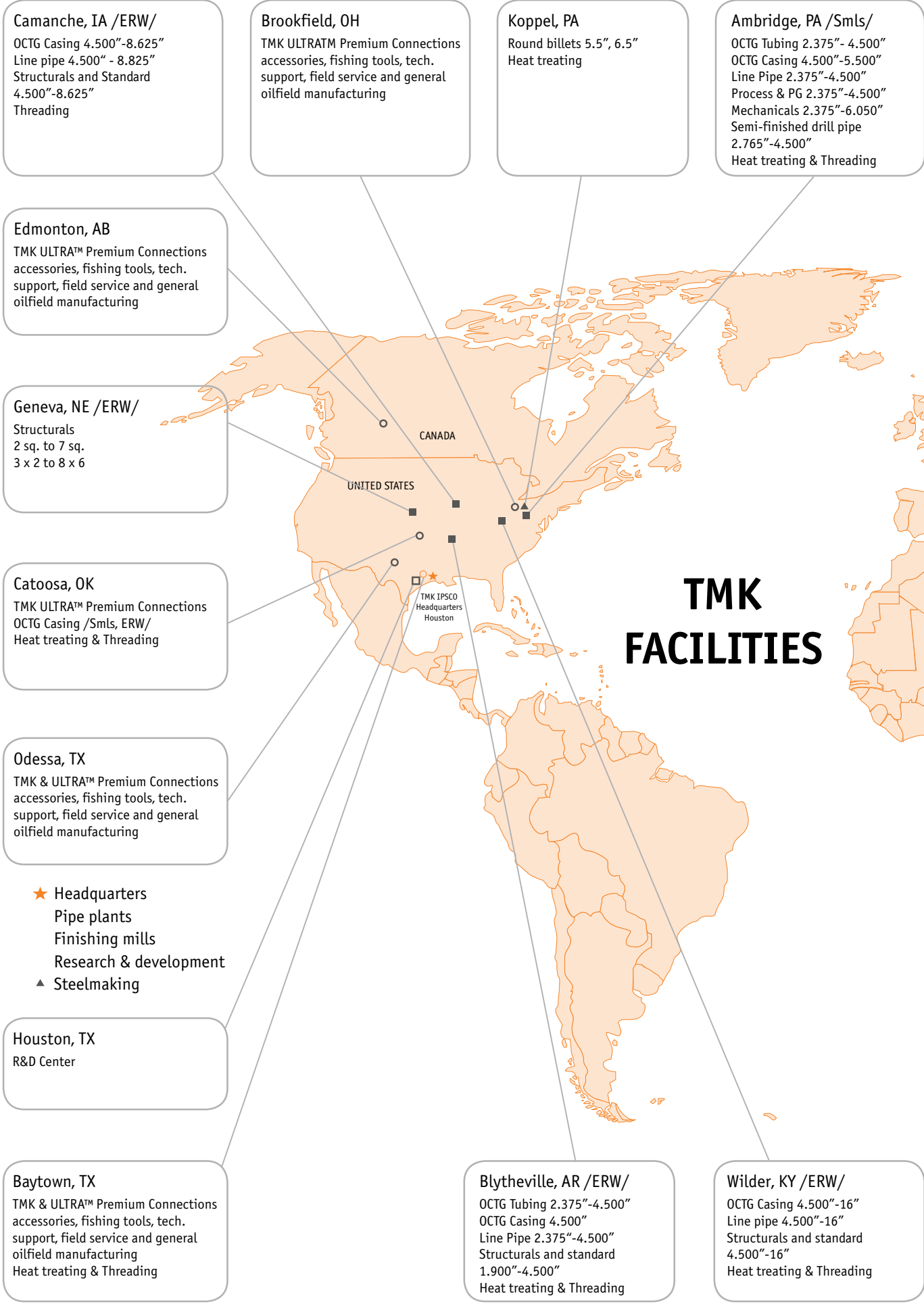
Piazza degli Affari, 12
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info@tmk-italia.eu

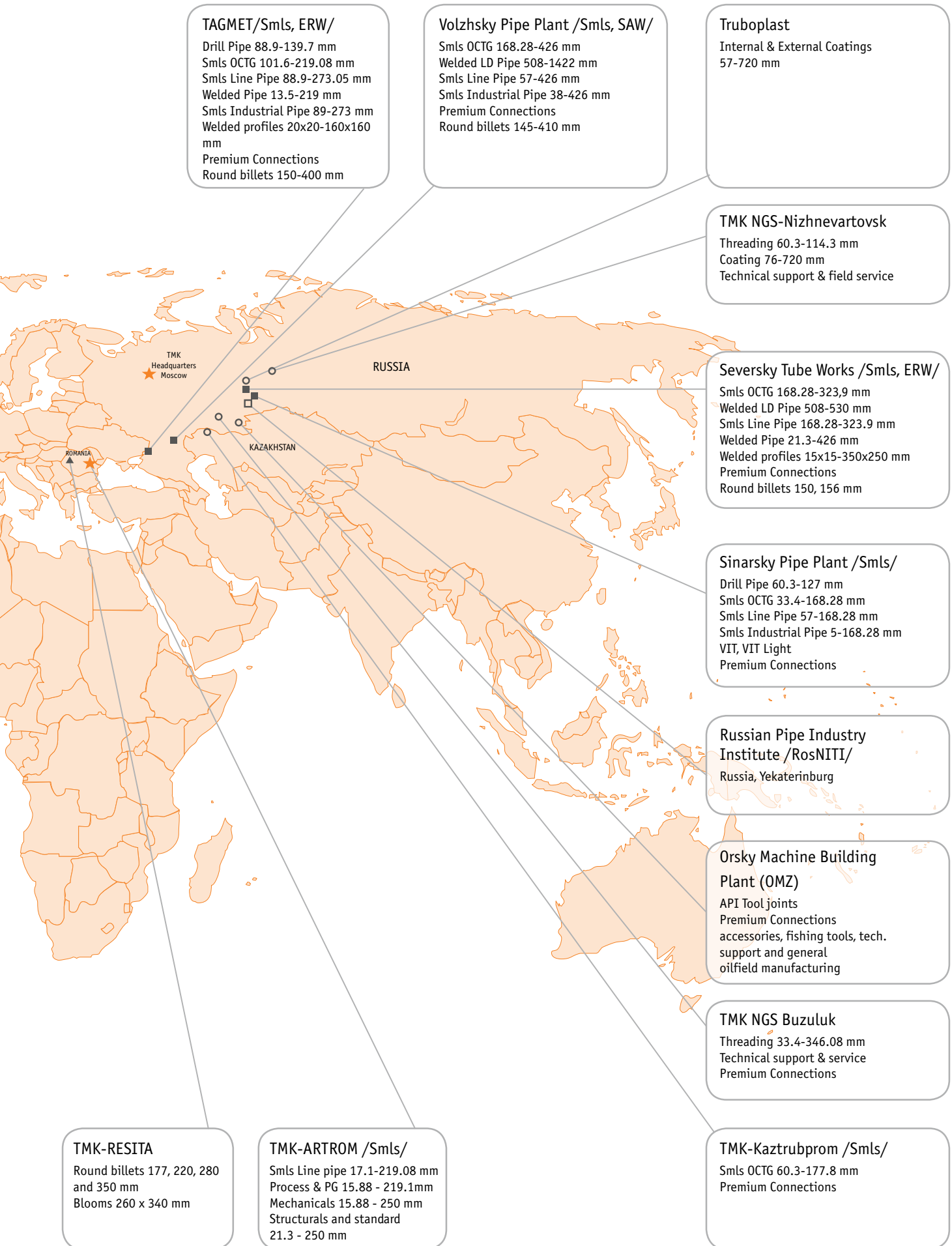
TMK ARTROM

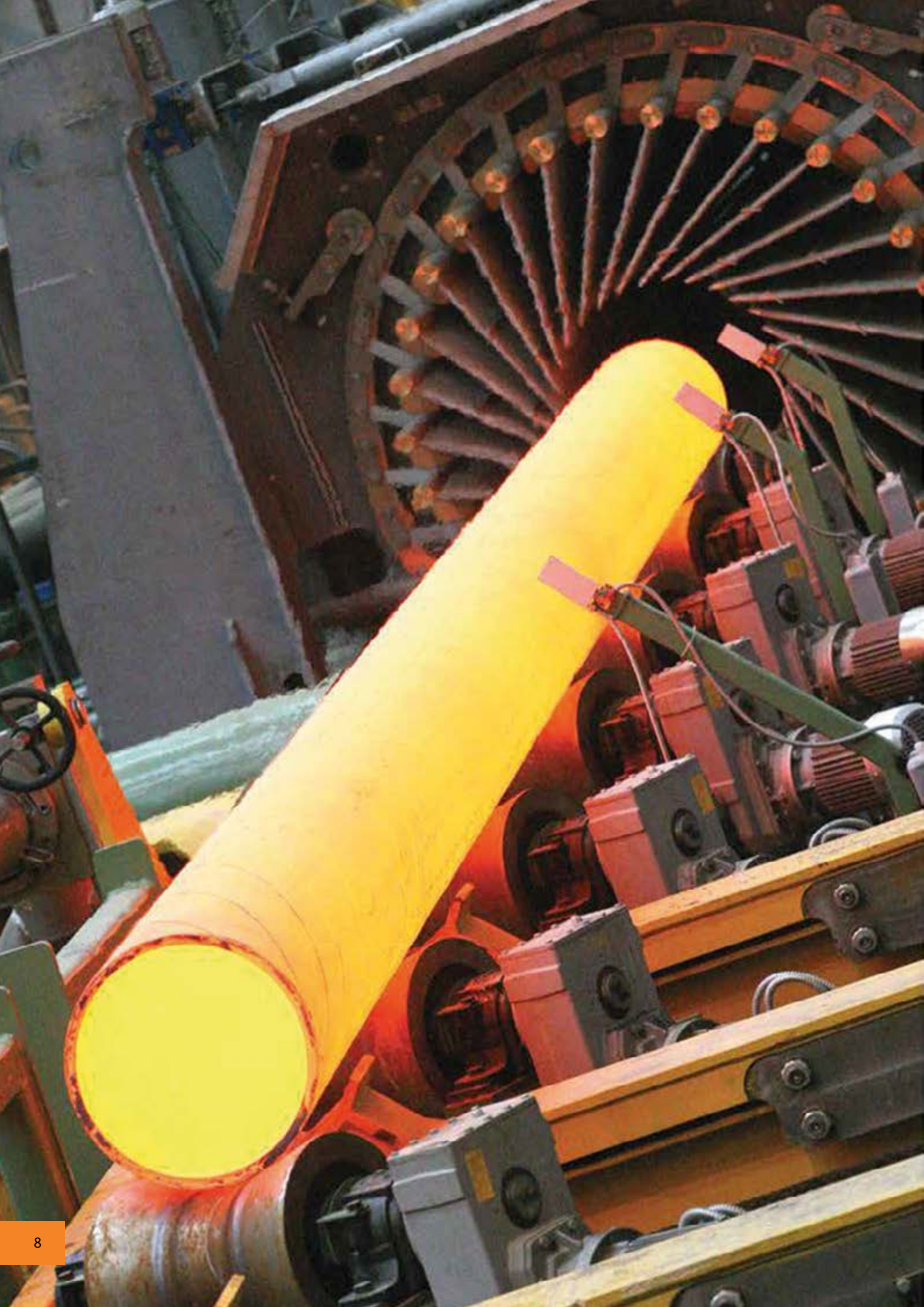
str. Draganesti 30,
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office.slatina@tmk-artrom.eu

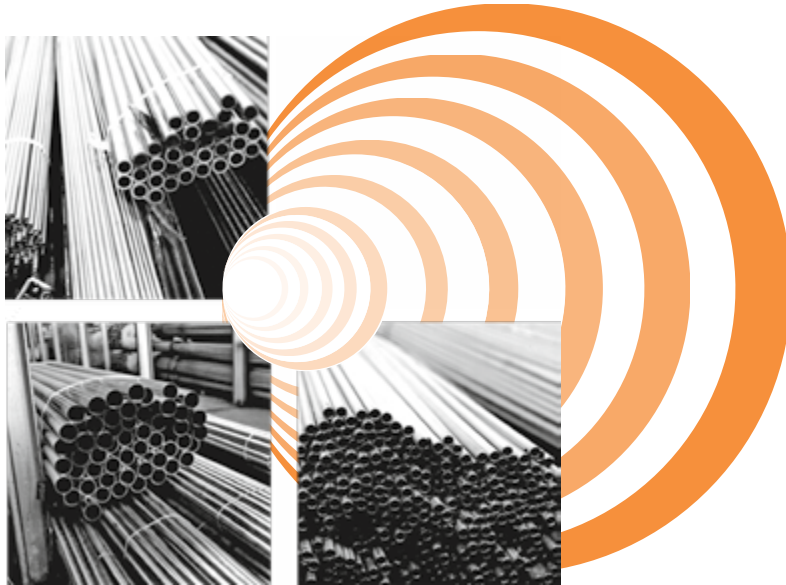
TMK Middle East

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293534 Dubai, United Arab Emirates
Tel: +971 (4) 609-11-30
Fax: +971(4) 609-11-40
sales@tmkme.ae









Production

Main equipment for production hot rolled tubes:

- . Pressing line with horizontal press with power 2000 tons (manufacturer – Clesim, France) for production tubes from 42 mm to 114 mm
- . Pressing line with horizontal press with power 5500 tons (manufacturer – Mannesmann-Demag, Germany) for production tubes from 114 mm to 273 mm
- . Chemical treatment line
- . Roller-hearth furnace for heat treatment
- . Ultra-sonic and eddy-current nondestructive testing equipment
- . equipment for testing on tensile strength, yield, elongation, hardness, impact hardness, corrosion resistance, beveling machine

Main equipment for production cold rolled tubes:

- . 9 Cold-rolling mills, OD from 20 till 90 mm, max length of final pipe – 9 meters
- . 5 Cold-rolling mills, OD from 10 till 133 mm, max length of final pipe – 30 meters
The mill is of the new type; they use the conical and curved mandrels with liquid lubricant
- . 4 drawing benches for the small dimensions
- . 2 new system of the chemical preparation, max length – 25 meters
- . Furnace for bright annealed, vacuum furnaces
- . Equipment for electro chemical polishing surface
- . High-production grinding-machine
- . 9 system for Ultra-Sonic and Eddy-Current control, max length 31 m
- . equipment for testing on tensile strength, yield, elongation, hardness, impact hardness, corrosion resistance

Main equipment for production welded tubes:

- . 10 welding lines with TIG, Laser and TIG+Plasma welding.
- . Slitting machine up to 4 mm thickness.
- . Polishing up to 1400 grit.
- . 3 bright anneal furnaces.

Certificate

Quality-Assurance System for Manufacturer of Materials acc. to Directive 2014/68/EU

Certificate no.: 01 202 CZ/Q-12 1286

Name and address of the manufacturer: LLC "TMK-INOX", 623401, Russia, Sverdlovsk reg., Kamensk Uralsky, Zavodskoy pr. 1

Herewith we certify that the material manufacturer has established and applies a Quality Management System. The system was audited according to the European Directive 2014/68/EU, Annex I, Par. 4.3, with regard to the materials as listed in the scope of approval.

Tested acc. to Directive 2014/68/EU: QA System acc. to EN 764-5, article 4.2 and AD 2000-Merkblatt W0

Audit report no.: CZ/Q-12 1286

Area of validity: Design and manufacture of seamless cold-worked pipes from stainless steels and alloys, see annex to certificate

Manufacturing plant: LLC "TMK-INOX", 623401, Russia, Sverdlovsk reg., Kamensk Uralsky, Zavodskoy pr. 1

Valid until: February 19, 2022

Cologne, February 18, 2019 I.V. Dipl.-Ing. Oliver Theisen

TÜV Rheinland Industrie Service GmbH
Notifiziert Stelle für Druckgeräte, Kennnummer: 0035
Am Grauen Stein, D-51105 Köln

E-008-D-Rev 02

www.tuv.com



CERTIFICATE

Quality-Assurance System for material manufacturer according to directive 2014/68/EU

Certificate no.: 037203/9190/WZ/9903/17

Name and address of the manufacturer: «Volzhsky Pipe Plants JSC
7th Avtodonoga str., 6
404119, Volzhsky, Volgograd region
Russian Federation

Herewith we certify that the manufacturer has established and applies a quality-assurance system related to the material. This QA System has been subjected to a specific assessment acc. to directive 2014/68/EU, annex I, point 4.3 with regard to the materials mentioned in the scope of approval.

Approved acc. to directive 2014/68/EU:

QA-System in relation to materials,
EN 764-5, section 4.2

Certification file no.:

4317076/91

Audit report file no.:

9190/WF/0003/17

Scope of approval:
(product / material)

Seamless and welded tubes and pipes
Ferritic and austenitic material

Production site:

«Volzhsky Pipe Plants JSC
7th Avtodonoga str., 6
404119, Volzhsky, Volgograd region
Russian Federation

The certificate is valid until:

May 2020

Only valid in conjunction with a valid certificate acc. to EN ISO 9001.

Prague, 15.05.2017



Notified Body (0045)
for Pressure Equipment

Mojmír Štrnc
Member of

TUV NORD Systeme GmbH & Co. KG
Grote Dohlestraße 31, D-22525 Hamburg

Annex: scope of approval

Tel: +43 1 366 387 311
Fax: +43 1 366 387 340
e-mail: tuv-nord@tuv-nord.at

Member of



Certificate QA material manufacturer_PED eng_Rus_V01.17



CERTIFICATE OF APPROVAL

This is to certify that the Management System of:

TMK Group
40/2A, Pokrovka Street, Moscow, 105062
Russian Federation

has been approved by Lloyd's Register Quality Assurance
to the following Quality Management System Standards:

ISO 9001:2015
EN ISO 9001:2015
BS EN ISO 9001:2015

The Management System is applicable to:

Design, manufacture, sales and shipment of steel tube product, including Premium connections, coated and non-coated, tool joints, tubing couplings, accessories, steel gas cylinders. Manufacture, sales and shipment of steel ingots and billets. In-field services of Premium products. After-sales technical services, repair and storage of tubular products. Granting licenses for the right to use intellectual property objects (Premium connections).

This certificate is valid only in association with the certificate schedule bearing the same number on which the locations applicable to this approval are listed.

Approval Certificate No: SP80006337

Original Approval: 30 December 2008

Current Certificate: 19 December 2017

Certificate Expiry: 18 December 2020

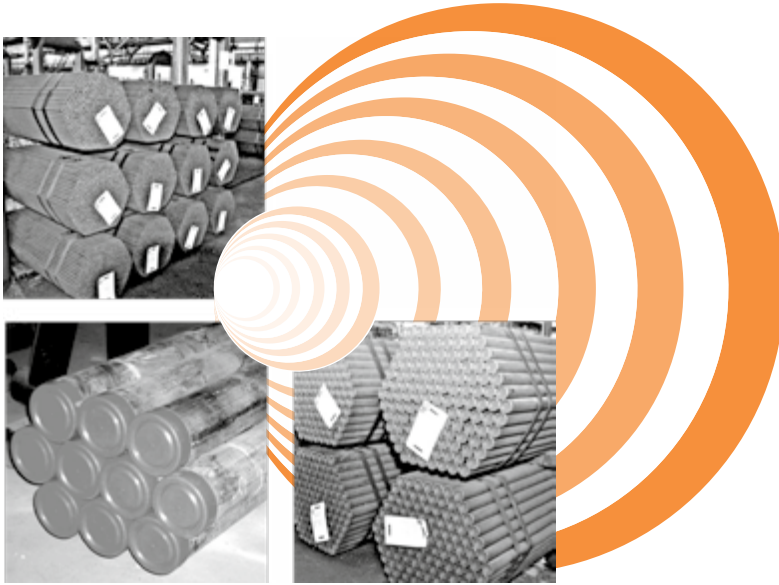
[Signature]

Issued by: Lloyd's Register TMA Saint-Petersburg for and on behalf of Lloyd's Register Quality Assurance Limited



404, G. D., Pulkovskaya street, St. Petersburg, 190106, Russia
For and on behalf of 1 Trinity Park, Boulevard Lane, Birmingham, B27 7JL, United Kingdom

Herewith we certify that the manufacturer has established and applies a quality-assurance system related to the material. This QA System has been subjected to a specific assessment acc. to directive 2014/68/EU, annex I, point 4.3 with regard to the materials mentioned in the scope of approval. Only valid in conjunction with a valid certificate acc. to EN ISO 9001.



Partners

The State Atomic Energy Corporation ROSATOM

Gazprom

United Aircraft Corporation

United Shipbuilding Corporation

Rosneft

Surgutneftegaz

Tatneft

Gazpromneft

Taneco

Lukoil

Atomenergomash

Machine-Building Plant ZiO-Podolsk

Energomash (Belgorod)-BZEM

Fuel Company of ROSATOM TVEL

Red Kotelschik

Power Machines

Cryogenmash

EuroChem

SibUr

Severstal

MMC Norilsk Nickel

Application range of stainless steel tubes

Austenitic steel

TP304	General-purpose stainless steel with good corrosion resistance for most applications. Used for: Bar rails, Boat railings, Canopy supports, Chemical processing equipment, Chemical tubing, Column covers, Duct works, Feed-water tubes, Food preparation equipment, Food processing equipment, Heat exchanger tubes, Hypodermic needles, Ladders, Mechanical & structural components, Pharmaceutical processing equipment, Piping systems, Railings (architectural), Traffic barriers, Water pipes.
TP304H	Higher carbon content than 304L, for increased strength, particularly at elevated temperatures.
TP304L	Chemical plant and food processing equipment, where freedom from sensitization is required in plate thicknesses
TP316/316L	Used where higher corrosion resistance is required. Boat railings, Canopy supports, Chemical tubing, Column covers, Duct works, Feed-water tubes, Food preparation equipment, Food processing equipment, Heat exchanger tubes, Hypodermic needles, Ladders, Mechanical & structural components, Pharmaceutical processing equipment, Piping systems, Railings, Street (urban) furniture, Textile tubing, Traffic barriers, Water pipes.
TP316H	Similar oxidation resistance to TP 316. Main areas of application: Heat exchangers, furnaces, chemical and petrochemical plant.
TP321	Heat exchanger tubing, Chemical processing tubing, Pressure tank tubing. Suitable for heat resisting applications to 800°C.
TP321H	This is the high carbon version of TP 321 which ensures greater creep resistance. Behaves much the same as TP 321 in oxidation resistance. Main applications: Heat exchangers, furnaces, boilers in chemical and petrochemical plant.
TP316Ti	A titanium stabilized version of 316 used where good resistance to intergranular corrosion and high temperature strength is required.
TP317	Chemical processing tubing, Dyeing equipment, Ink manufacturing equipment, Pulp & paper manufacturing equipment
1.4828	It is high-temperature steel for service at temperatures of up to 950-1000°C in dry air.
1.4841	It is high-temperature steel with wide application in chemical & petrochemical industries, mechanical engineering. Also widely used in furnace
TP347HFG	Mainly used for boilers in the thermal power plant, reheaters and superheaters

Super-Austenitic steel

TP904L	High resistance to general corrosion in e.g. sulphuric and acetic acids, crevice corrosion, stress corrosion cracking, pitting in chloride bearing solutions.
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Ferritic and Martensitic Steel

TP405	Used for applications where hardening upon cooling from high temperatures must be avoided. Has excellent long-time stability up to 1200°F.
TP410	General purpose grade for use in mildly corrosive environments
TP430	Mechanical & structural tubing, Architectural tubing, Heat exchanger tubing, Condensers, Re-heaters, Evaporators.

Duplex

S31803	Typically used in heat exchangers, gas scrubbers, fans, chemical tanks, flowlines, marine and refinery applications.
S32750	Used in oil & gas, chemical process, power industries. At that heat-exchangers are main application
S31254	With high levels of chromium, molybdenum, and nitrogen is especially suited for high-chloride environments such as brackish water, seawater and other high-chloride process streams.

Chemical Composition

Grade	Tube Standard	C	Si	Mn	P	S	Ni	Cr	Mo	Others
Austenitic stainless steels										
TP 304	A269, A213, A312	≤ 0.08	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	8.00-11.00	18.00-20.00	-	-
TP 304L	A269, A213, A312	≤ 0.035	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	8.00-13.00	18.00-20.00	-	-
TP 304N	A213, A312	≤ 0.08	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	8.00-11.00	18.00-20.00	-	N 0.10-0.16
TP 304LN	A269, A213, A312	≤ 0.035	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	8.00-11.00	18.00-20.00	-	N 0.10-0.16
TP 304H	A213, A312	0.04-0.10	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	8.00-11.00	18.00-20.00	-	-
TP 316	A269, A213, A312	≤ 0.08	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	11.00-14.00	16.00-18.00	2.00-3.00	-
TP 316L	A269, A213, A312	≤ 0.035	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	10.00-15.00	16.00-18.00	2.00-3.00	-
TP 316N	A213, A312	≤ 0.08	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	11.00-14.00	16.00-18.00	2.00-3.00	N 0.10-0.16
TP 316 LN	A269, A213, A312	≤ 0.035	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	11.00-14.00	16.00-18.00	2.00-3.00	N 0.10-0.16
TP 316Ti	A213, A312	≤ 0.08	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	10.00-14.00	16.00-18.00	2.00-3.00	Ti 5(C+N)-0.70
TP 316H	A213, A312	0.04-0.10	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	11.00-14.00	16.00-18.00	2.00-3.00	-
TP 321	A269, A213, A312	≤ 0.08	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	9.00-13.00	17.00-20.00	-	Ti > 5xC, max 0.60%
TP 321H	A213, A312	0.04-0.10	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	9.00-13.00	17.00-20.00	-	Ti > 5xC, max 0.60%
TP 317	A213, A312	≤ 0.08	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	11.00-14.00	18.00-20.00	3.00-4.00	-
TP 317L	A213, A312	≤ 0.035	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	11.00-15.00	18.00-20.00	3.00-4.00	-
TP 310S	A213, A312	≤ 0.08	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	19.00-22.00	24.00-26.00	0.75 max	-
TP 310H	A213, A312	≤ 0.10	≤ 1.0	≤ 2.00	≤ 0.040	≤ 0.030	19.00-22.00	24.00-26.00	-	-
TP 347	A269, A213, A312	≤ 0.08	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	9.00-13.00	17.00-20.00	...	Co + Ta > 10xC, max 1.00%
TP 347H	A213, A312	0.04-0.10	≤ 0.75	≤ 2.00	≤ 0.040	≤ 0.030	9.00-13.00	17.00-20.00	-	Co + Ta > 8xC, max 1.00%
TP 904L	A269, A312	≤ 0.02	≤ 1.0	≤ 2.00	≤ 0.040	≤ 0.030	23.00-28.00	19.00-23.00	4.00-5.00	N 0.10, Cu 1.0-2.0
1.4301	EN 10216-5	≤ 0.07	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.030	8.0-10.5	17.0-19.5	-	0.11
1.4306	EN 10216-5	≤ 0.03	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.030	10.0-12.0	18.0-20.0	-	0.11
1.4307	EN 10216-5	≤ 0.03	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.030	8.0-10.0	17.5-19.5	-	0.11
1.4311	EN 10216-5	≤ 0.03	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.030	8.5-11.5	17.0-19.5	-	0.12-0.22
1.4401	EN 10216-5	≤ 0.07	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.030	10.0-13.0	16.5-18.5	2.0-2.5	0.11
1.4404	EN 10216-5	≤ 0.03	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.030	10.0-13.0	16.5-18.5	2.0-2.5	0.11
1.4435	EN 10216-5	≤ 0.03	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.030	12.5-15.0	17.0-19.0	2.5-3.0	-
1.4429	EN 10216-5	≤ 0.03	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.015	11.0-14.0	16.5-18.5	2.5-3.0	0.12-0.22
1.4436	EN 10216-5	≤ 0.05	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.030	10.5-13.0	16.5-18.5	2.5-3.0	-
1.4541	EN 10216-5	≤ 0.08	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.015	9.0-12.0	17.0-19.0	-	5*C-0.70
1.4571	EN 10216-5	≤ 0.08	≤ 1.00	≤ 2.00	≤ 0.040	≤ 0.030	10.5-13.5	16.5-18.5	2.0-2.5	5*C-0.70
1.4828	SEW 470	≤ 0.20	1.5-2.5	≤ 2.00	≤ 0.045	≤ 0.030	11.0-13.0	19.0-21.0	-	-
1.4845	SEW 470	≤ 0.15	≤ 0.75	≤ 2.00	≤ 0.045	≤ 0.030	19.0-22.0	24.0-26.0	-	-
1.4878	SEW 470	≤ 0.12	≤ 1.00	≤ 2.00	≤ 0.045	≤ 0.030	9.0-12.0	17.0-19.0	-	4*C-0.80
Ferritic stainless steel										
TP 405	A268	≤ 0.08	≤ 0.75	≤ 1.00	≤ 0.040	≤ 0.030	≤ 0.50	11.50-13.50	-	Al 0.10-0.30
TP 410	A268	≤ 0.15	≤ 0.75	≤ 1.00	≤ 0.040	≤ 0.030	≤ 0.50	11.50-13.50	-	-
TP 430	A268	≤ 0.12	≤ 0.75	≤ 1.00	≤ 0.040	≤ 0.030	≤ 0.50	16.00-18.00	-	-
TP 430Ti	A268	≤ 0.10	≤ 1.00	≤ 1.00	≤ 0.040	≤ 0.030	≤ 0.75	16.00-19.50	-	Ti 5xC min; 0.75 max
1.4002	EN 10297-2	≤ 0.08	≤ 1.0	≤ 1.00	≤ 0.040	≤ 0.030	-	12.0-14.0	-	Al 0.10-0.30
1.4006	EN 10297-2	0.08-0.15	≤ 1.0	≤ 1.50	≤ 0.040	≤ 0.030	≤ 0.75	11.5-13.5	-	-
1.4016	EN 10297-2	≤ 0.08	≤ 1.0	≤ 1.00	≤ 0.040	≤ 0.030	-	16.0-18.0	-	Al 0.10-0.30
1.4510	EN 10297-2	≤ 0.05	≤ 1.0	≤ 1.00	≤ 0.040	≤ 0.030	-	16.0-18.0	-	(4(C+N)+0.15) - 0.80
Duplex stainless steel										
S31803	A790	≤ 0.03	≤ 1.0	≤ 2.00	≤ 0.030	≤ 0.020	4.50-6.50	21.0-23.0	2.50-3.50	N 0.08-0.20
S32205	A790	≤ 0.03	≤ 1.0	≤ 2.00	≤ 0.030	≤ 0.020	4.50-6.50	22.00-23.00	3.00-3.50	N 0.14-0.20
1.4462	10216-5	≤ 0.03	≤ 1.0	≤ 2.00	≤ 0.035	≤ 0.020	4.50-6.50	21.0-23.0	2.50-3.50	-
Superduplex stainless steel										
S32750	A790	≤ 0.03	≤ 1.0	≤ 2.00	≤ 0.030	≤ 0.020	4.50-6.50	21.0-23.0	2.50-3.50	N 0.08-0.20
S32760	A790	≤ 0.03	≤ 1.0	≤ 2.00	≤ 0.030	≤ 0.020	4.50-6.50	22.00-23.00	3.00-3.50	N 0.14-0.20

Seamless tubes

Standards: ASTM A312/A312M, ASME SA-312/SA-312M

Steel grades: TP304/304L/304H, TP321/321H, TP316/316L, TP316Ti, TP347/347H, TP310S*, other grades on agreement

Outside diameter			Wall thickness													
			SCH 5S		SCH 10S		SCH 40S		SCH 80S		SCH 120		SCH 160		SCH XXS	
NPS	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
1/8	0,405	10,3			0,049	1,24	0,068	1,73	0,095	2,41						
1/4	0,540	13,72			0,065	1,65	0,088	2,24	0,119	3,02						
3/8	0,675	17,15			0,065	1,65	0,091	2,31	0,126	3,20						
1/2	0,840	21,34	0,065	1,65	0,083	2,11	0,109	2,77	0,147	3,73			0,188	4,78		
3/4	1,050	26,67	0,065	1,65	0,083	2,11	0,113	2,87	0,154	3,91			0,219	5,56		
1	1,315	33,4	0,065	1,65	0,109	2,77	0,133	3,38	0,179	4,55			0,250	6,35	0,358	9,09
1 1/4	1,660	42,2	0,065	1,65	0,109	2,77	0,140	3,56	0,191	4,85			0,250	6,35	0,382	9,7
1 1/2	1,900	48,3	0,065	1,65	0,109	2,77	0,145	3,68	0,200	5,08			0,281	7,14	0,400	10,2
2	2,375	60,3	0,065	1,65	0,109	2,77	0,154	3,91	0,218	5,54			0,344	8,74	0,436	11,1
2 1/2	2,875	73,0	0,083	2,11	0,120	3,05	0,203	5,16	0,276	7,01			0,375	9,53	0,552	14
3	3,5	88,9	0,083	2,11	0,120	3,05	0,216	5,49	0,3	7,62			0,438	11,1	0,6	15,2
3 1/2	4	101,6			0,120	3,05	0,226	5,74	0,318	8,08			0,5	12,7	0,636	16,2
4	4,5	114,3			0,120	3,05	0,237	6,02	0,337	8,56	0,38	11,1	0,531	13,5	0,674	17,1
5	5,563	141,3					0,258	6,55	0,375	9,52	0,5	12,7	0,625	15,9	0,75	19,1
6	6,625	168,3					0,28	7,11	0,432	10,97	0,562	14,3	0,719	18,3	0,864	22
8	8,625	219,1					0,322	8,18	0,5	12,7	0,719	18,3	0,906	21	0,875	22,2
10	10,75	273,0					0,365	9,27	0,5	12,7						

Permissible Variations in Outside Diameter

NPS Designator	Over		Under	
	inch	mm	inch	mm
1/8 – 1 , incl	0,015	0,4	0,031	0,8
Over 1 to 4, incl	0,031	0,8	0,031	0,8
Over 4 to 8, incl	0,062	1,6	0,031	0,8
Over 8 to 18, incl	0,093	2,4	0,031	0,8

Permitted Variations in Wall Thickness

NPS Designator	Over, %	Under, %
1/8 to 2 .	20,0	12,5
3 to 18 incl., t/D up to 5% incl.	22,5	12,5
3 to 18 incl., t/D > 5% incl.	15,0	12,5

Standards: ASTM A790/A790M; ASME SA-790/SA-790M, ASTM A789/A789M, ASME SA-789/SA-789M

Steel grades: S31803, S32205*, S32750*, S32760* other grades upon agreement

Outside diameter			Wall thickness															
			SCH 5S		SCH 10S		SCH 30S		SCH 40S		SCH 80S		SCH 120		SCH 160		SCH XXS	
NPS	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm		
1/8	0,405	10,29			0,049	1,24	0,057	1,45	0,068	1,73	0,095	2,41						
1/4	0,54	13,72			0,065	1,65	0,073	1,85	0,088	2,24	0,119	3,02						
3/8	0,675	17,15			0,065	1,65	0,073	1,85	0,091	2,31	0,126	3,20						
1/2	0,84	21,34	0,065	1,65	0,083	2,11	0,095	2,41	0,109	2,77	0,147	3,73						
3/4	1,05	26,67	0,065	1,65	0,083	2,11	0,095	2,41	0,113	2,87	0,154	3,91						
1	1,315	33,4	0,065	1,65	0,109	2,77	0,114	2,90	0,133	3,38	0,179	4,55						
1 1/4	1,660	42,2	0,065	1,65	0,109	2,77	0,117	2,97	0,140	3,56	0,191	4,85			0,250	6,35	0,382	9,7
1 1/2	1,900	48,3	0,065	1,65	0,109	2,77	0,125	3,18	0,145	3,68	0,200	5,08			0,281	7,14	0,400	10,15
2	2,375	60,3	0,065	1,65	0,109	2,77	0,125	3,18	0,154	3,91	0,218	5,54			0,344	8,74	0,436	11,07
2 1/2	2,875	73,0	0,083	2,11	0,120	3,05	0,188	4,78	0,203	5,16	0,276	7,01			0,375	9,53	0,552	14,02
3	3,5	88,9	0,083	2,11	0,120	3,05	0,188	4,78	0,216	5,49	0,3	7,62			0,438	11,13	0,6	15,24
3 1/2	4	101,6			0,120	3,05	0,188	4,78	0,226	5,74	0,318	8,08			0,5	12,7	0,636	16,15
4	4,5	114,3							0,237	6,02	0,337	8,56	0,38	11,13	0,531	13,49	0,674	17,12
5	5,563	141,3							0,258	6,55	0,375	9,52	0,5	12,7	0,625	15,88	0,75	19,05
6	6,625	168,3							0,28	7,11	0,432	10,97	0,562	14,27	0,719	18,26	0,864	21,95
8	8,625	219,1									0,5	12,7	0,719	18,26	0,906	21,01	0,875	22,23
10	10,75	273,0									0,50	12,7						

COLD

HOT

COLD&HOT

* production after trial lot

Standards: ASTM A213/A213M, ASME SA-213/SA-213M, ASTM A269/269M
Steel grades: TP304/304L/304H, TP321/321H, TP316/316L, TP316Ti, TP347/347H, TP310S*, other grades upon agreement

Outside diameter		Wall thickness, mm																							
		0,4	0,5	0,6	0,71	0,89-0,91	1,0	1,2	1,4-1,5	1,6	1,83-1,9	2,0-2,03	2,11	2,2-2,3	2,4-2,5	2,6-2,64	2,7-2,77-2,88	3,0-3,05	3,18-3,2	3,5-3,6	4	4,4-4,5	5	5,5	6
in	mm																								
	4,00																								
	6,00																								
1/4	6,35																								
	7,00																								
5/16	7,94																								
	8,00																								
	9,00																								
3/8	9,53																								
	10,00																								
	10,2																								
7/16	11,11																								
	12,00																								
1/2	12,7																								
	13,00																								
	13,50																								
9/16	14,0-14,3																								
	15,0																								
5/8	15,88																								
	16,00																								
11/16	17,2-17,5																								
	18,00																								
3/4	19,0-19,05																								
	20,00																								
13/16	20,6-21,34																								
	22,00																								
7/8	22,23																								
15/16	23,81																								
	25,00																								
1	25,40																								
	26,70																								
	26,9																								
	28,00																								
	30,00																								
1 1/4	31,75																								
	32,00																								
	33,40																								
	33,70																								
	35,00																								
	36,00																								
1 1/2	38,10																								
	40,00																								
	42,0-42,4																								
1 3/4	44,45																								
	48,0-48,3																								
2	50,8																								
	54																								
	57																								
2 3/8	60,3-60,33																								
2 1/2	63,5																								
2 3/4	69,85																								
3	76,1-76,2																								

Dimensional tolerances for ASTM A213/A213M, ASME SA-213/SA-213M

Outside diameter, mm	Wall thickness, mm	Tolerance limits of		
		OD, mm	MW WT, %	AW WT, %
< 25,4	0,4-4,5	+0,10mm/-0,10mm	+20%/-0%	+10%/-10%
25,4-38,10	1,0-6,0	+0,15mm/-0,15mm	+20%/-0%	+10%/-10%
38,2-50,80	1,2-7,0	+0,20mm/-0,20mm	+22%/-0%	+10%/-10%
50,90-63,50	1,8-8,0	+0,25mm/-0,25mm	+22%/-0%	+10%/-10%
63,60-76,20	2,0-8,5	+0,30mm/-0,30mm	+22%/-0%	+10%/-10%

* production after trial lot

Standards: ASTM A268/A268M, ASME SA-268/SA-268M

Steel grades: TP405*, TP410, TP430, TP430Ti*, TP446-1*, TP446-2* other grades upon agreement

Outside diameter		Wall thickness, mm																										
		0,4	0,5	0,6	0,71	0,89-0,91	1,0	1,2	1,4-1,5	1,6	1,83-1,9	2,0-2,03	2,11	2,2-2,3	2,4-2,5	2,6-2,64	2,7-2,77-2,88	3,0-3,05	3,18-3,2	3,5-3,6	4	4,4-4,5	5	5,5	6			
in	mm																											
1/2	12,7																											
	13,00																											
9/16	13,50																											
	14,0-14,3																											
5/8	15,0																											
	15,88																											
11/16	16,00																											
	17,2-17,5																											
3/4	18,00																											
	19,0-19,05																											
13/16	20,00																											
	20,6-21,34																											
7/8	22,23																											
	23,81																											
1	25,00																											
	25,40																											
1 1/4	26,70																											
	26,9																											
1 1/2	31,75																											
	33,40																											
1 3/4	38,10																											
	40,00																											
2	42,0-42,4																											
	44,45																											
2 1/2	48,0-48,3																											
	50,8																											
2 3/4	54																											
	57																											
3	60,3-60,33																											
	63,5																											
	69,85																											
	76,1-76,2																											

Dimensional tolerances for ASTM A213/A213M, ASME SA-213/SA-213M

Outside diameter, inch (mm)	Admissible outside diameter tolerance, inch (mm)	Admissible wall thickness tolerance, %	Length tolerance, inch (mm)		Thin-wall tubes
			more	less	
up to 1/2 (D<12,7)	±0,005 (±0,13)	+0,10mm/-0,10mm	1/8 (3,2)	0	-
"1/2 up to 1 1/2 excl. (12,7 D<38,1)"	±0,005 (±0,13)	+0,15mm/-0,15mm	1/8 (3,2)	0	under 0,065" (1,65mm) nominal
"1 1/2 up to 3 1/2 excl. (38,1 D<88,9)"	±0,010 (±0,25)	+0,20mm/-0,20mm	3/16 (4,8)	0	under 0,095" (2,41mm) nominal

* production after trial lot

Welded tubes

Standards: DIN EN 10217-7, EN 10296, ASTM A 554, GOST 11068

Steel grades: 1.4541, 1.4878, 1.4301, 1.4306, 1.4307, 1.4401, 1.4435*, 1.4571, 1.4404, 1.4436*, 1.4462, 1.4512*, 1.4510*, 1.4509*, AISI 310S* and other

Outside mm	Wall thickness, mm																			
	0,5	0,6	0,8	1	1,2	1,5	1,6	1,8	2	2,1	2,3	2,5	2,6	2,9	3	3,2	3,6	3,7	4	
8,0																				
9,0																				
10,0																				
12,0																				
14,0																				
16,0																				
18,0																				
20,0																				
21,3																				
22,0																				
25,0																				
26,9																				
28,0																				
29,0																				
30,0																				
32,0																				
33,0																				
33,7																				
35,0																				
38,0																				
40,0																				
41,0																				
42,4																				
43,0																				
45,0																				
48,3																				
50,8																				
51,0																				
52,0																				
53,0																				
57,0																				
60,3																				
63,5																				
70,0																				
76,1																				
85,0																				
88,9																				
101,6																				
108,0																				
114,3																				

* production after trial lot

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