# Table of contents

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<thead>
<tr>
<th>Page</th>
<th>Section</th>
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<tbody>
<tr>
<td>02</td>
<td>OMK Structure</td>
</tr>
<tr>
<td>04</td>
<td>OMK Geography</td>
</tr>
<tr>
<td>05</td>
<td>OMK Pipe and Steel Rolling Mills</td>
</tr>
<tr>
<td>06</td>
<td>Certificates</td>
</tr>
<tr>
<td>08</td>
<td>Contacts</td>
</tr>
<tr>
<td>09</td>
<td>Pipe Production</td>
</tr>
<tr>
<td>13</td>
<td>General Purpose pipes</td>
</tr>
<tr>
<td>19</td>
<td>Hollow Sections</td>
</tr>
<tr>
<td>23</td>
<td>Oil and Gas Line Pipes</td>
</tr>
<tr>
<td>27</td>
<td>OCTG</td>
</tr>
<tr>
<td>33</td>
<td>Large Diameter Pipes</td>
</tr>
<tr>
<td>39</td>
<td>Anti-corrosive Pipe Coating</td>
</tr>
<tr>
<td>45</td>
<td>Jacketed PU foam thermal insulation of steel line pipes</td>
</tr>
<tr>
<td>51</td>
<td>Fittings</td>
</tr>
<tr>
<td>55</td>
<td>Pipe Valves</td>
</tr>
<tr>
<td>59</td>
<td>Steel Rolling Mills</td>
</tr>
<tr>
<td>61</td>
<td>Casting and Rolling Complex</td>
</tr>
<tr>
<td>65</td>
<td>Heavy Plate Mill-5000</td>
</tr>
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OMK Structure

United Metallurgical Company (OMK) is one of the largest Russian producers of pipes, fittings and other metal products for fuel and energy, transport and industrial enterprises.

OMK unites five large metallurgical enterprises: Vyksa Steel Works (Nizhny Novgorod region), Chusovoy Metallurgical Works (Perm region), Almetyevsk Pipe Plant (Tatarstan), Trubodetal Plant (Chelyabinsk region) and Blagoveshchensk Valve Plant (Bashkortostan).

More than 30 thousand employees work at the enterprises of the Company.

OMK delivers complete solutions for Oil & Gas and Power Industries

Products manufactured in pipe and steel rolling mills make part of the following chain:

PRODUCTION - DEVELOPMENT - PROCESSING - DISTRIBUTION

1. OCTG and tubing pipes
   Diameter — 60 to 426 mm
   Wall thickness — 4.2 to 12.7 mm

2. Large diameter pipes
   Diameter — 508 to 1422 mm
   Wall thickness — 8.0 to 48 mm
   Operating pressure — up to 250 bar

3. Shaped pipes
   Squares — 10×10 to 300×300 mm
   Rectangulars — 15×10 to 300×200 mm

4. Pipes for installation of gas-, oil-, water-, and product pipelines and heating systems
   Diameter — 114 to 530 mm
   Wall thickness — 4.0 to 12.7 mm

5. Water and gas pipes and conventional pipes
   Diameter — 21.3 to 119 mm
   Wall thickness — 1 to 6.3 mm
OMK Geography

OMK Pipe and Steel Rolling Mills

Vyksa Steel Works (VSW)
One of the oldest metallurgical centers in Russia was established in 1757. The facility produces steel pipes with diameter starting from 21.3 up to 1422 and wall thickness 1 to 48 mm. At customer’s request, pipes can be produced with external three-layer polyethylene/polypropylene anticorrosive coating, as well as with external one-/two-layer anticorrosive epoxy coating.

Trubodetal Plant
This is one of largest facilities in Russia and CIS, specializing in production of pipeline fittings made of carbon and low-alloyed steel with diameter 57 to 1420 mm. This facility is one of key suppliers for oil and gas utility systems construction as well as for trunk systems.

Blagoveschensk Valves Plant (BVP)
This plant established in 1756 is one of Russia’s largest valves production facilities. The BVP, JSC primary product is pipeline valves made of carbon, low-alloyed and stainless steel grades with nominal diameter 25 to 800 mm and working pressure 16 to 250 kgf/cm².

Hot Rolled Coils Mill (HRC Mill)
HRC Mill produces hot-rolled coils and flat stock with thickness 1 to 12.7 mm and width 30 to 1750 mm. The mill includes 2 slitting units with the following characteristics:
- Strips with width 30 to 1750 mm.
- Plate with length 1500 to 12200 mm and width 750 to 1800 mm.

Heavy Plate Mill 5000 (Mill 5000)
Heavy plates manufactured at Mill 5000 are designed for production requirements of large diameter pipes used for main oil and gas pipelines. Mill 5000 products can be used in shipbuilding, mechanical engineering, nuclear power industry and other metal-intensive sectors.

OMK major customers include some leading Russian and foreign companies such as: Gazprom, Russian Railways, Lukoil, JSC Transneft, Surgutneftegas, Rosneft, TNK-BP, ExxonMobil, Royal Dutch/Shell, General Electric, Samsung.

OMK exports to over 30 countries worldwide.

Over the recent years OMK supplied piping products for the following projects: South Stream, OML 58 O.U.R. (Obite — Ubeta — Rumuj), the Eastern Siberia – Pacific ocean, Nord Stream, North European Gas Pipeline, Baltic Pipeline System, Vankor Field Pipeline, Central Asia — China, Bovanenkovo — Ukhta, Ozhuga / Lazarevskoye — Sochi, Sakhalin — Khabarovsk — Vladivostok, Ukhta — Torzhok, and others.

Participation in the mentioned major projects is a result of construction of new advanced facilities, complete upgrade of existing capacities and integration of unmatched technologies.
Certification

One OMK’s priority task is to continuously improve products quality, and to meet customers’ requirements and expectations.

OMK plants operate with a quality management system in place which serves as the basis for the global management process and results as a way of achieving performance targets.

VSW’s Quality Management System (QMS) is applied to the design and production of electric-welded pipes with plain ends manufactured. Using the submerged arc welding method; electric-welded pipes with plain ends manufactured using HFC welding method; electric-welded pipes with external anticorrosion coating and with internal anticorrosion or anti-friction coating; HFC-welded OCTG or tubing pipes (with plain ends or with thread and couplings); hot-formed seamless pipes manufactured from round billets; seamless couplings; solid-rolled railway wheels; steel ingots; hot-rolled steel products, and constructed according to the following standards and specifications:

• ISO 9001 (GOST ISO 9001);
• ANSI/ API Q1/ ISO 29001;
• Gazprom company standard 9001;
• 97/23/EC instructions.

The comprehensive management system according to ISO 14001, Environment Management Systems and OHSAS 18001, Occupational Health and Safety Management Systems standards has been in place at the plant since 2009.

Beside QMS certification, VSW applies direct certification of the pipe production. To meet requirements of customers from Russia and near-abroad countries, the Vyksa plant’s pipes are certified in accordance with the GOST R system. And VSW offers its products not only on Russian markets, but on international markets as well.

Starting from 1995 Vyksa Plant has American Petroleum Institute (API) certificates with API 5L and API 5CT specifications.

As requested by Polish customers, certification was carried out for steel longitudinal electric-welded pipes with anti-corrosion coating and uncoated pipes with diameters from 114 to 530mm and wall thicknesses from 4.5 up to 10mm of L245NB, L290NB, L360NB, L415NB, L245MB, L290MB, L360MB, L415MB steel grades, manufactured in accordance with EN 10208-2 with the right to use the W safety sign in marking. The certification was performed by ZETOM Katowice (Poland).

Moreover, Vyksa Steel Works has received a certificate of conformity from TÜV Rheinland for electric-welded steel pipes with diameters from 21.3 to 508mm and hollow sections sized 20x20 to 80x80mm and 30x20 to 100x60mm manufactured from construction steel with the strength level from S235 to S355, produced to EN 10219-1:2006 with the right to use the CE marking, starting from March 2011.

These certificates guarantee that the production process is in accordance with applicable standards, technical regulations and specifications.
Contacts

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FAX. +7 (83177) 3-76-05

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Tel. +7 (351) 2800031, +7 (351) 2800033 Fax: +7 (351) 2800123

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Tel.: +7 (34766) 2-02-04 Fax: +7 (34766) 2-13-78

Almetyevsk Pipe Plant
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E-mail: steel@omk.ru
www.omk.ru
OMK manufactures versatile electric-welded pipes with diameters from 21.3 to 1422mm (0.8”-56”) and wall thicknesses from 1 to 48mm (0.04”-1.9”).

Pipes have two- or three-layer anti-corrosive polyethylene or epoxy coatings. Equipment and production process employed in pipe shops have been designed using advances in pipe welding technology in Russia and worldwide — to meet current requirements.

OMK’s piping products are designed to operate at critical temperatures and in aggressive environments. The Company successfully participates in prestigious international tenders. In 2008 OMK was the only Russian supplier of pipes for the first stage of the Nord Stream project and was among the winners of the tender to supply pipes for the Central Asia-China pipeline, OML 58 O.U.R. gas pipeline in Nigeria, Turk Stream (Line 1 and 2) and Nord Stream (Line 1, 2, 3 and 4).

Diameter: 21.3 to 1422mm
General Purpose pipes
General Purpose pipes

Water and gas pipes with small diameters from 21.3 to 133mm (0.8—5.2”) are produced from carbon steel grades S185, S195T, S235JR, P195TR1, P235TR1 (and other).

Pipes are produced by high-frequency welding with induction current lead.

Pipes are subjected to hydraulic and mechanical tests. Welds undergo non-destructive testing.

Square and rectangular section pipes are shaped from round electric-welded pipes on the line of the electric welding mill.

At the consumer’s request pipes are packed in hexagonal and box bundles. Pipe bundles are provided with removable shipping straps for fixing in trans-shipment points and storage without additional pulling appliances.

Designed capacity: 345 thousand tons

Product range and scope of application

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* Producing mill: Vyksa Steel Works
### General Purpose pipes

#### Product range and scope of application

- Producing mill: Vyksa Steel Works

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**Pipe Production Catalogue**

**General Purpose pipes**

**Pipe Production Catalogue**

**General Purpose pipes**
## General Purpose pipes

**Product range and scope of application**

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*Producing mill: Vyksa Steel Works*

### DIN EN 10219-1

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*Producing mill: Vyksa Steel Works*
General Purpose pipes

ERW water and gas line pipes manufacturing process

1. Coils examination
2. Uncoiling, leveling and shearing
3. Welding
4. Looper
5. Skelp forming
6. HF welding
7. Inside & Outside weld bead removal
8. Cooling
9. Sizing
10. UT of weld
11. Sizing
12. Cutting-to-length
13. Facing and Beveling
14. Hydrostatic test
15. Final inspection
16. Packaging & storage
## Hollow Sections

Square and rectangular section shaped pipes are produced by sectioning circular pipes on the electric-welding mill line. Application: building structures for different applications.

Weld shaped pipes are produced from St 1, St 2, St 3 carbon steel grades, O8, 10 and 20 steel grades, as well as from S235JR, S355J0H, S355J2H, E155, E190, E195, E220, E235, E260 grades.

Pipes are manufactured at the electric-weld pipe units by high-frequency induction welding.

### Product range and scope of application

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* Producing mill: Vyksa Steel Works
Hollow Sections

Hollow sections manufacturing process

1. Coils examination
2. Uncoiling, leveling and shearing
3. Welding
4. Looper
5. Skelp forming
6. HF welding
7. Inside & Outside weld bead removal
8. Cooling
9. Stabilizing stand
10. Pipe sizing, straightening and sectioning
11. Sizing
12. Cutting-to-length
13. Final inspection
14. Packaging & storage
Oil and Gas Line Pipes

ERW pipes are made by Vyksa Steel Works. Pipes fully comply with requirements of international standards.

Oil and gas line pipes are made with diameters from 219.1 to 530mm (8 ⅝ - 20") and wall thicknesses from 4.0 to 12.7mm (0.16-0.5").

Pipes are produced by high-frequency welding from carbon and low-alloy grades: up to X70.

During production pipes undergo multi-stage non-destructive testing, acceptance mechanical tests of base metal and weld and 100% hydraulic pressure test.

All pipes are supplied pre-treated: with local heat treatment of weld or bulk heat treatment.

At customer’s request, the Company can supply pipes with external three-layer polyethylene or polypropylene anticorrosive coating, or with one-/two-layer epoxy coating, with internal flow or anticorrosive coating, as well as with jacketed PU foam thermal insulation.

Pipes undergo multi-stage non-destructive testing using an eddy current flaw detector, automatic and manual ultrasonic flaw detector, mechanical and 100% hydraulic tests.

Designed capacity: 655 thousand tons.

Product mix and scope of application

<table>
<thead>
<tr>
<th>Standard</th>
<th>Outside dia., inch (mm)</th>
<th>Wall thickness, mm</th>
<th>Steel grade</th>
<th>Scope of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;API Spec 5L / ISO 3183:2012&quot;</td>
<td>2 ⅜ (60)</td>
<td>3.0-5.0</td>
<td>up to X70, X52</td>
<td>Oil &amp; Gas and Water transportation</td>
</tr>
<tr>
<td></td>
<td>2 ⅞ (73)</td>
<td>3.0-8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 ½ (89)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 (102)</td>
<td>3.0-9.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 ⅜ (114)</td>
<td>3.0-10.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 ½ (140)</td>
<td>3.0-12.0</td>
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<td></td>
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<tr>
<td></td>
<td>5 ⅜ (146)</td>
<td>3.0-12.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 ⅜ (159)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 ⅞ (168)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8% (219.4)</td>
<td>10% (273.0)</td>
<td>4.8-12.7</td>
<td>up to X70</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12% (323.9)</td>
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</tr>
<tr>
<td></td>
<td>14% (457.0)</td>
<td>5.8-12.7</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>18 (460.4)</td>
<td></td>
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<tr>
<td></td>
<td>18 (457.0)</td>
<td>6.3-12.7</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>20 (508.0)</td>
<td>6.3-12.7</td>
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## Oil and Gas Line Pipes

### Product mix and scope of application

<table>
<thead>
<tr>
<th>Standard</th>
<th>Outside dia., inch (mm)</th>
<th>Wall thickness, mm</th>
<th>Steel grade</th>
<th>Scope of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN EN 10219-1(2)</td>
<td>2 ⅜ (60)</td>
<td>3.0-5.0</td>
<td></td>
<td>up to X70, X52</td>
</tr>
<tr>
<td></td>
<td>2 ⅞ (73)</td>
<td>3.0-8.0</td>
<td></td>
<td>&quot;For multi-purpose structures&quot;</td>
</tr>
<tr>
<td></td>
<td>3 ½ (89)</td>
<td>3.0-8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 (102)</td>
<td>3.0-10.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 ½ (114)</td>
<td>3.0-12.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 ½ (140)</td>
<td>3.0-12.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 ⅛ (159)</td>
<td>3.0-12.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6 ⅛ (168)</td>
<td>3.0-12.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8⅝ (219.1)</td>
<td>4.5–12.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIN EN 10217-1</td>
<td>2 ⅜ (60)</td>
<td>3.0-5.0</td>
<td></td>
<td>up to X70, X52</td>
</tr>
<tr>
<td></td>
<td>3 ⅛ (89)</td>
<td>3.0-8.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 (102)</td>
<td>3.0-9.0</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>4 ½ (114)</td>
<td>3.0-10.0</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>5 ½ (140)</td>
<td>3.0-12.7</td>
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</tr>
<tr>
<td></td>
<td>6 ½ (159)</td>
<td>3.0-12.7</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>6 ⅝ (168)</td>
<td>3.0-12.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>8⅝ (219.1)</td>
<td>4.5–12.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DIN EN 10217-1, 2, 3</td>
<td>8⅝ (219.1)</td>
<td>4.5–12.5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ERW line pipes manufacturing process

1. Coils examination
2. Uncoiling, leveling and shearing
3. Strips slitting
4. Welding
5. Looper
6. Edges preparation
7. Skelp forming
8. HF welding
9. Inside & Outside weld bead removal
10. UT of weld
11. Seam-annealing
12. Sizing
13. Cutting-to-length
14. Marking
15. Entire heat treatment (upon agreement)
16. Facing and beveling
17. Hydrostatic test
18. AUT of body, weld & ends of pipe
19. Final inspection
20. Packaging & storage
Electric-welded OCTG are produced by Vyksa Steel Works and fully comply with API 5CT requirements.

Consistent quality of pipes is ensured by optimised production process. Pipes are high-frequency welded with constant current lead. Pipe quality control is ensured by automatic control of welding, ultrasonic inspection of pipe weld and body, and tracking system.

Electric-welded pipes are supplied with Buttress threads, short (STC) and long (LTC) round threads. To increase tightness of Buttress threads pipes can be supplied with a fluoroplastic sealing ring. Tightness of pipes and threads is tested by means of hydraulic testing of each pipe. According to Customer’s requirements a protective coating can be applied on the external surface of pipes.

Designed capacity: 350 thousand tons.

Electric-welded pipes made by VSW have the following advantages in comparison with seamless pipes:
- Less out-of-roundness that increases pipe collapse resistance from formation pressure in a well.
- Out-of-roundness tolerance limits — by 3 times less than for seamless pipes resulting in increased threshold pressure for pipes in design of OCTG by 15% and more depending on pipe diameter and wall thickness with enhanced performance.
- High-precision tolerance for wall thickness (± 5% from nominal wall thickness) as compared with seamless pipes (±12.5%, positive tolerance is limited by pipe weight that is equal to + 6.5%).
- Better surface quality preventing defects inherent in seamless pipe rolling.
- Pipe lengths - 13 ± 0.2 m (42.64 ft ± 0.66 ft) that improve conditions of OCTG string fit-up and running.

The Mill is a regular supplier of OCTG pipes for Exploreco Energy Inc (USA), TNK-BP, Surgutneftegaz, Lukoil, GazpromNeft, Rosneft, KazMunayGas and other oil producers.

The Mill guarantees supply of OCTG pipes in full conformity with customer’s requirements and on time.

Product range and scope of application

<table>
<thead>
<tr>
<th>Standard</th>
<th>Outside dia., inches (mm)</th>
<th>Nominal linear mass, lb/ft</th>
<th>Wall thickness, mm</th>
<th>Steel grade</th>
<th>Scope of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>API Spec SCT</td>
<td>5 (129.70)</td>
<td>14.00-23.00</td>
<td>6.20-10.54</td>
<td>J55, K55, N80Q, P110, R95,</td>
<td>OCTG with “Buttress”, round thread, STC, LTC, tight joints VMZ-1 and threadless OCTG for oil and gas wells fastening</td>
</tr>
<tr>
<td></td>
<td>6%</td>
<td>20.00-28.00</td>
<td>7.02-10.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 (177.80)</td>
<td>20.00-29.00</td>
<td>6.91-10.36</td>
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</tr>
<tr>
<td></td>
<td>8% (219.08)</td>
<td>24.00-36.00</td>
<td>6.71-10.16</td>
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<tr>
<td></td>
<td>9% (244.48)</td>
<td>32.30-43.50</td>
<td>7.92-11.05</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>10-3/4 (273.05)</td>
<td>40.50-51.00</td>
<td>8.89-11.43</td>
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<tr>
<td></td>
<td>13-3/8 (339.72)</td>
<td>48.00-68.00</td>
<td>8.38-12.19</td>
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<tr>
<td></td>
<td>16 (406.40)</td>
<td>65.00-84.00</td>
<td>9.53-12.57</td>
<td>J55, K55</td>
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Producing mill: Vyksa Steel Works
**API Spec 5CT**

<table>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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</thead>
<tbody>
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<td>4.5/2</td>
<td>114.40</td>
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<td>5-1/2</td>
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<tr>
<td>6-5/8</td>
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<tr>
<td>7</td>
<td>217.08</td>
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</tr>
<tr>
<td>8-5/8</td>
<td>219.08</td>
<td>✗</td>
<td>✗</td>
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<td>✗</td>
<td>✗</td>
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<td>9-5/8</td>
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</tr>
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<td>10-3/4</td>
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<tr>
<td>11-5/8</td>
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<td>✗</td>
<td>✗</td>
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<td>✗</td>
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</tr>
<tr>
<td>12</td>
<td>306.40</td>
<td>✗</td>
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<td>✗</td>
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</tbody>
</table>

**Tubing and OCTG (Electric-Weld Pipe Workshop 1)**

<table>
<thead>
<tr>
<th>Diameter, mm</th>
<th>Wall Thickness, mm</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3/4</td>
<td>66.04</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
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<td>✗</td>
</tr>
<tr>
<td>3-1/2</td>
<td>88.9</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>4-1/2</td>
<td>114.30</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

Pipe production as per GOST 31446-2017, API Spec 5CT. Thread types: НКТН, NU, НКМ, unthreaded. Steel grades: J55, К55, К75, L80-1, N80Q, P95, P110.

Designed capacity (Electric-Weld Pipe Workshop 1): 165 thousand tons.

**ERw OCTG manufacturing process**

1. Coils examination
2. Strips slitting
3. Uncoiling, leveling and shearing
4. Welding
5. Looper
6. Skelp forming
7. HF welding
8. Inside & Outside weld bead removal
9. UT of weld
10. Seam-annealing
11. Sizing
12. Cutting to length
13. Entire heat treatment (upon agreement)
14. Straightening
15. Facing & beveling
16. UT of pipe ends
17. UT of pipe body
18. Threading
19. MPI of thread, visual inspection of geometry
20. Coupling manufacturing
21. Coupling
22. Couling Screwing-on
23. Hydrostatic test
24. UT of body, weld of pipe
25. Protector Screwing-on
26. Weighing and length measuring
27. Marking & Stamping
28. Final Inspection
29. Packaging
Large Diameter Pipes
Large Diameter Pipes

LDPs are manufactured by Vyksa Steel Works, one of the key plants within OMK.

Product range:
- SAWL pipes Ø 508 - 1422 mm (20-56”), wall thickness up to 48 mm (1.89”);
- ERW pipes Ø 508 - 530 mm (20-21”).

Standard length of all pipes is from 11.6 to 12.4 m (38 - 40 ft).

At customer’s request, pipes can be produced with external three-layer anticorrosive coating or with external three-layer polyethylene or polypropylene coating, as well as with one-/two-layer epoxy coating.

In 2007, a Compliance Certificate was issued for VSW products according to Det Norske Veritas requirements, DNV-OS-F101 standard for offshore pipeline systems. This allowed OMK to win international tenders Nord Stream (Line 1, 2, 3, 4) and Turk Stream (Line 1, 2).

For the Nord Stream Project, VSW supplied 1,224 thousand tons of pipes with internal diameter of 1153 mm (48”) and wall thickness of 26.8, 30.9, 34.6 and 41.0 mm (1.1", 1.2", 1.4", 1.6") to construct an offshore gas pipeline on the Baltic Sea bed.

For the Turk Stream Project, VSW supplied 454 thousand tons of pipes with diameter of 813 mm (32") and wall thickness of 39.0 mm (1.5") to construct an offshore gas pipeline on the Black Sea bed.

Basic Equipment
Pipes are produced on two separate lines using different production methods - UOE Line and JCO Line.
Pipes can be made with either one or two longitudinal welds.

UOE Line
Produces pipes with diameter of 508 - 1067 mm (20-42") and wall thickness from 8 to 32 mm (0.28-1.26”), strength grade X80. Design capacity is 1012 thousand tons of pipes per year.

JCO Line
Produces pipes with diameter of 508 - 1422 mm (20-56") and wall thickness from 8 to 48 mm (0.28-1.89”), strength grade up to X100, and working pressure up to 24.7 MPa (250 atm.). Design capacity is 950 thousand tons of pipes per year.

Product range and scope of application

<table>
<thead>
<tr>
<th>Standard</th>
<th>Outside dia., inches (mm)</th>
<th>Wall thickness, mm</th>
<th>Steel grade</th>
<th>Scope of application</th>
</tr>
</thead>
<tbody>
<tr>
<td>API Spec 5L/ ISO 3183</td>
<td>20&quot; (508) - 56&quot; (1422)</td>
<td>8.0 - 48.0</td>
<td>Strenght class Gr.В - X100 Steel L245 - L555</td>
<td>For construction of gas and oil pipelines, water pipelines, and in oil and gas industry</td>
</tr>
<tr>
<td>DNV-OS-F101</td>
<td>20&quot; (508) - 56&quot; (1422)</td>
<td>8.0 - 48.0</td>
<td>Steel L245 - L555</td>
<td>Submarine systems used in the oil and gas sector</td>
</tr>
<tr>
<td>DIN 10217</td>
<td>20&quot; (508) - 44&quot; (1122)</td>
<td>8.0 - 40.0</td>
<td>Steel P235 - P265</td>
<td>Multi-purpose pipes</td>
</tr>
<tr>
<td>DIN 10219</td>
<td>20&quot; (508) - 56&quot; (1422)</td>
<td>8.0 - 40.0</td>
<td>Steel S235 - S460</td>
<td>Multi-purpose pipes</td>
</tr>
</tbody>
</table>

Producing mill: Vyksa Steel Works
### Large Diameter Pipes

**Production of large diameter SAWL pipes**

- Longitudinal electric-welded large diameter pipes are manufactured by submerged arc welding (SAW).
- At present large diameter pipes can be manufactured by two independent lines having different pipe forming processes: UOE and JCO.

**API Spec 5L, ISO 3183**

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>20</th>
<th>22</th>
<th>24</th>
<th>26</th>
<th>28</th>
<th>30</th>
<th>32</th>
<th>34</th>
<th>36</th>
<th>38</th>
<th>40</th>
<th>42</th>
<th>44</th>
<th>46</th>
<th>48</th>
<th>50</th>
<th>52</th>
<th>56</th>
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</thead>
<tbody>
<tr>
<td>Diameter (inch)</td>
<td>0.762</td>
<td>0.879</td>
<td>0.950</td>
<td>1.030</td>
<td>1.11</td>
<td>1.19</td>
<td>1.312</td>
<td>1.438</td>
<td>1.563</td>
<td>1.771</td>
<td>2.062</td>
<td>2.322</td>
<td>2.540</td>
<td>2.813</td>
<td>3.150</td>
<td>3.491</td>
<td>3.650</td>
<td></td>
</tr>
</tbody>
</table>

- **UOE and JCO process:** pipes are manufactured from **B, X42, X46, X52, X56, X60, X65, X70, X80 (API Spec 5L)** and **L245, L290, L360, L415, L450, L485, L555 (ISO 3183)** grades.
- **JCO process:** pipes are manufactured from **B, X42, X46, X52, X56, X60, X65, X70, X80 (API Spec 5L)** and **L245, L290, L360, L415, L450, L485, L555 (ISO 3183)** grades.

### Large Diameter Pipes

**LDP manufacturing process flow (UOE)**

1. **Plate piling**
2. **Unpiling**
3. **Plate leveling**
4. **Plate dimensional examination and UT**
5. **TAB Welding-up**
6. **Edge trimming**
7. **Edges quality control**
8. **Edge crimping**
9. **U–forming**
10. **O–forming**
11. **Pipe marking**
12. **Water flushing**
13. **Hot drying**
14. **Tack welding**
15. **Inside welding**
16. **Outside welding**
17. **AUT of weld**
18. **X-Ray TV testing**
19. **MUT, Visual examination & repair**
20. **Tab removal**
21. **Expansion of pipe body**
22. **Inside and outside weld bead removal on pipe ends**
23. **Hydrostatic test**
24. **Weld final AUT**
25. **AUT of pipe ends**
26. **X-Ray TV testing of welds**
27. **Facing**
28. **MPI of pipe ends**
29. **Final inspection & marking**
30. **Product storage**
Large Diameter Pipes

LDP manufacturing process flow (JCO)

1. Plate piling
2. Unpiling
3. Plate dimensional examination and UT
4. TAB Welding-up
5. Edge trimming
6. Edge crimping
7. JCO-forming
8. Water flushing
9. Hot drying
10. Tack welding
11. Inside welding
12. Outside welding
13. AUT of weld
14. X-Ray TV testing
15. MUT, Visual examination & repair
16. Tab removal
17. Expansion of pipe body
18. Inside and outside weld bead removal on pipe ends
19. Facing
20. Hydrostatic test
21. Weld final AUT
22. AUT of pipe ends
23. X-Ray TV testing of welds
24. Facing
25. MPI of pipe ends
26. Final inspection & marking
27. Product storage

Anti-corrosive Pipe Coating
Anti-corrosive Pipe Coating

Starting from the year of 2000, VSW has produced pipes with external two-/three-layer polyethylene or polypropylene coating, anticorrosive epoxy coating, and one-/two-layer epoxy coating. In 2005, VSW started to produce pipes with internal flow and anticorrosive coating.

External anti-corrosion coating is designed for corrosion protection of oil and gas pipelines, pipe lines of compressor, gas distribution and pumping stations. Pipes with external three- and two-layer coating are used for pipeline construction, in transition areas by directional drilling with dragging of pipe strings through wells, during production of cold bends, with pipeline installed in soils with inclusions of pebbles, gravel and in rocky soils.

Pipes with external coating produced by the plant are designed for construction of pipelines in different climate and soil conditions with ambient temperature ranging from minus 45°C to plus 60°C for polyethylene coating and from minus 30°C to plus 60°C for polypropylene coating. Temperature of continuous pipe operation is from minus 20°C to plus 80°C for polyethylene coating and from minus 20°C to plus 110°C for polypropylene coating. The minimum service life of the protective coating is 30 years.

Pipes with one- and two-layer epoxy coating are used for construction of oil and gas underground pipelines, water pipelines and utility networks. Pipes with one- and two-layer epoxy coating can be stored from minus 60°C to plus 60°C, transported, constructed and installed from minus 60° to plus 60°C. Operating range is from minus 60°C to plus 80°C for two-layer coated pipes, and from minus 60° to plus 110°C for one-layer coatings.

Two-layer epoxy coating has increased impact and abrasive resistance.

Today external and internal coatings are applied on six process lines with high-tech equipment:

- 4 lines for external three- and two-layer PE and PP or one- and two-layer epoxy anti-corrosion coatings on pipes with diameter of 508-1422 mm (20-56”);
- 1 line external three- and two-layer PE and PP or one- and two-layer epoxy anti-corrosion coatings on pipes with diameter of 219-508 mm (8⅝-20”);
- 1 line for internal flow and anti-corrosive coatings on pipes with diameter of 508-1422 mm (20-56”);
- 1 line for internal anti-corrosive coatings on pipes with diameter of 114-508 mm (41/2-20”).

At the coating areas the following procedures are used according to ISO 14001:

- incoming inspection of pipes and materials used for pipe coating;
- check of parameters of production and secondary processes;
- acceptance and periodic tests of anti-corrosive coatings;
- quality certificate issued for each pipe batch.
Jacketed PU foam thermal insulation of steel line pipes

In the year of 2017, VSW installed facilities on its own site to apply polyurethane (PU) foam based thermal insulation to middle and large diameter pipes.

VSW produces preinsulated pipes designed to lay above-ground and subsurface main and process oil and gas pipelines and to construct heating networks for housing and utility sector.

A preinsulated pipe is a steel pipe with anticorrosive coating, PU foam insulation layer, and external protective jacket.

As an option, pipe can be equipped with heating tubes for a tracing system (skin effect heating system) and fireproof inserts.

Thermal insulation improves pipeline reliability, protects transported fluids against low temperatures, reduces heat losses, and prevents soil thawing which is particularly important in the Extreme North regions and neighboring areas.

Certification:

Coated pipe range:
Ø 219 to 1220 mm.

Allowable ambient temperature during transportation, storage, and operation:
from -60 to +60 С˚.

Scope
- Oil and gas pipelines: without skin effect heating system, with skin effect heating system, with fireproof inserts;
- Heating networks: hot water supply.

Above Ground Design
- Steel pipe, anticorrosive coating, and thermal insulation are produced by one and the same manufacturer at single production site;
- State-of-the-art equipment allows applying insulation to pipes of any size;
- Unique system of equipment integration with plant information system provides for total control over all processes at each production stage;
- Handling equipment unrivaled throughout the world;
- Storage tanks for receiving and storage of PU foam components allow raw material processing up to 2.5 tons per hour.

Underground Design
- Steel pipe, anticorrosive coating, and thermal insulation are produced by one and the same manufacturer at single production site;
- State-of-the-art equipment allows applying insulation to pipes of any size;
- Unique system of equipment integration with plant information system provides for total control over all processes at each production stage;
- Handling equipment unrivaled throughout the world;
- Storage tanks for receiving and storage of PU foam components allow raw material processing up to 2.5 tons per hour.

Major Advantages
- Steel pipe, anticorrosive coating, and thermal insulation are produced by one and the same manufacturer at single production site;
- State-of-the-art equipment allows applying insulation to pipes of any size;
- Unique system of equipment integration with plant information system provides for total control over all processes at each production stage;
- Handling equipment unrivaled throughout the world;
- Storage tanks for receiving and storage of PU foam components allow raw material processing up to 2.5 tons per hour.

Certification:
Anti-corrosive Pipe Coating

Technical characteristics of pipe coating

<table>
<thead>
<tr>
<th>Standard</th>
<th>Pipe diameter, mm</th>
<th>Application/Interference</th>
<th>Allowable temperature for coating long-term service, °C</th>
<th>Allowable pipe storage temperature °C</th>
<th>Coating structure</th>
<th>Coating thickness</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN 30670</td>
<td>219-1422</td>
<td>Pipeline steel surface corrosion protection. For onshore and offshore pipelines.</td>
<td>Internal epoxy coating</td>
<td>From minus 60 °C up to plus 80 °C</td>
<td>External three-layer polyethylene or polypropylene</td>
<td>1.8-2.5 mm</td>
</tr>
<tr>
<td>NFA 49711</td>
<td>219-1422</td>
<td>Corrosion protection of onshore and offshore pipelines.</td>
<td>Internal epoxy coating</td>
<td>From minus 20 °C up to plus 80 °C</td>
<td>External three-layer polyethylene or polypropylene</td>
<td>1.8-2.5 mm</td>
</tr>
<tr>
<td>CAN/CSA Z245.20-21-18</td>
<td>219-1422</td>
<td>For buried or submarine pipelines.</td>
<td>Internal epoxy coating</td>
<td>From minus 60 °C up to plus 80 °C</td>
<td>External three-layer polyethylene or polypropylene</td>
<td>1.8-2.5 mm</td>
</tr>
<tr>
<td>Shell SGP 31.40.30.31-Gen</td>
<td>219-1422</td>
<td>Coating corrosion of onshore and offshore pipelines. For oil and gas transportation.</td>
<td>Internal epoxy coating</td>
<td>From minus 60 °C up to plus 80 °C</td>
<td>External three-layer polyethylene or polypropylene</td>
<td>1.8-2.5 mm</td>
</tr>
<tr>
<td>DNV RP-106</td>
<td>219-1422</td>
<td>For offshore pipelines.</td>
<td>Internal epoxy coating</td>
<td>From minus 20 °C up to plus 80 °C</td>
<td>External three-layer polyethylene or polypropylene</td>
<td>1.8-2.5 mm</td>
</tr>
<tr>
<td>DIN 30678</td>
<td>219-1422</td>
<td>Pipeline steel surface corrosion protection. For onshore and offshore pipelines.</td>
<td>Internal epoxy coating</td>
<td>From minus 60 °C up to plus 80 °C</td>
<td>External three-layer polyethylene or polypropylene</td>
<td>1.8-2.5 mm</td>
</tr>
<tr>
<td>NFA 4911</td>
<td>219-1422</td>
<td>Corrosion protection of onshore and offshore pipelines. For oil and gas transportation.</td>
<td>Internal epoxy coating</td>
<td>From minus 20 °C up to plus 80 °C</td>
<td>External three-layer polyethylene or polypropylene</td>
<td>1.8-2.5 mm</td>
</tr>
<tr>
<td>Projects and tenders</td>
<td>219-530</td>
<td>For onshore pipelines</td>
<td>Internal epoxy coating</td>
<td>From minus 60 °C up to plus 80 °C</td>
<td>External three-layer polyethylene or polypropylene</td>
<td>1.8-2.5 mm</td>
</tr>
<tr>
<td>API 5L2 (RP71-2)</td>
<td>219-1422</td>
<td>Internal flow coating of pipes for noncorrosive gas transportation.</td>
<td>Internal epoxy coating</td>
<td>From minus 20 °C up to plus 110 °C</td>
<td>Internal flow coating</td>
<td>Up to 1400 microns</td>
</tr>
<tr>
<td>ISO 15741</td>
<td>219-1422</td>
<td>Internal flow coating of onshore and offshore pipes for transportation of non-corrosive gases.</td>
<td>Internal epoxy coating</td>
<td>From minus 20 °C up to plus 110 °C</td>
<td>Internal flow coating</td>
<td>Up to 1400 microns</td>
</tr>
<tr>
<td>ISO 20809-1</td>
<td>219-1422</td>
<td>For pipeline transportation systems for oil and gas industry</td>
<td>Internal epoxy coating</td>
<td>From minus 40 °C up to plus 60 °C</td>
<td>External three-layer polyethylene coating</td>
<td>1.8-4.7 mm</td>
</tr>
<tr>
<td>ISO 20809-1</td>
<td>219-1422</td>
<td>For pipeline transportation systems for oil and gas industry</td>
<td>Internal epoxy coating</td>
<td>From minus 50 °C up to plus 60 °C</td>
<td>External three-layer polyethylene coating</td>
<td>1.8-4.7 mm</td>
</tr>
<tr>
<td>CAN/CSA Z245.20-21-18</td>
<td>219-1422</td>
<td>For buried or submarine oil and gas pipelines.</td>
<td>Internal epoxy coating</td>
<td>From minus 60 °C up to plus 80 °C</td>
<td>External three-layer polyethylene coating</td>
<td>1.8-4.7 mm</td>
</tr>
<tr>
<td>CAN/CSA Z245.20-21-18</td>
<td>219-1422</td>
<td>For buried or submarine oil and gas pipelines.</td>
<td>Internal epoxy coating</td>
<td>From minus 60 °C up to plus 80 °C</td>
<td>External three-layer polyethylene coating</td>
<td>1.8-4.7 mm</td>
</tr>
<tr>
<td>API RP SL7</td>
<td>114-530</td>
<td>For use in oil and gas pipeline transportation in oil industry.</td>
<td>Internal epoxy coating</td>
<td>Up to +90 °C</td>
<td>Internal epoxy coating</td>
<td>Coating thickness determined by the buyer during ordering.</td>
</tr>
</tbody>
</table>
Procedure of application of internal anticorrosive epoxy coating

External anti-corrosive coating application process flow

1. Thermal degreasing of pipes
2. Inner surface quality inspection
3. Heating of pipes before abrasive cleaning
4. Shot blasting of inner surface
5. Shot peening of inner surface
6. Inner surface quality inspection
7. Application of primer
8. Heating of pipes before epoxy coating application
9. Application of epoxy powder
10. Heating of pipes for polymerization
11. Acceptance tests
    Pipe marking
Trubodetal is one of the major producers of pipe fittings from carbon and low-alloyed steel grades with diameter 57–1420 mm (2.2–56") in Russia and CIS. The plant is one of the key suppliers for oil and gas utility lines construction as well as for trunk systems.

Steel grades: 20, 09Г2С, 20А, 09Г2С, 09ГФА, 09ХФА, 13ХФА, 15ХФА, 15ХМФА, 20ХФА, 10Г2ФБЮ, 10Г2СФБ, 06Г1НМФБД.

Trubodetal’s product range:
- elbows - bends, short radius bends, forged and welded bends
- T-pieces - forged, forged and welded
- hot induction bends
- reducers and reducing rings;
- caps and bottoms;
- pipeline assemblies;
- stabilizer couplings;
- piping supports;
- manhole hatches, charging chambers;
- nonconventional products;
- corrosion resistant coatings and heat insulation.

The company is a key supplier of components for construction of oil and gas pipelines and utility systems.

The Company is capable of producing up to 60,000 tons of pipe fittings per year.

All Company’s products are provided with API, ISO and GOST R certificates, and meet the requirements of ISO 9001, ISO 14001.
Pipe Valves

Blagoveshchensk Valves Plant is one of the major Russian producer of pipe valves.

The plant produces industrial grade pipe fittings and uses a complete technological cycle - starting from billets to assembling, testing and quality control of finished products.

BVP's primary product is pipe valves from carbon, low-alloyed and stainless steel grades, with nominal diameter 25 to 800 mm and nominal pressure 16 to 250 kgf/cm².

**BVP products:**
- cast taper-seat valves;
- spring safety valves;
- change-over valves;
- safety valve units with change-over valves;
- swing check valves;
- TPP fittings;
- API fittings;
- direct-flow gate valves;
- X-tee assemblies;
- ball valves.

BVP's customers include Russian gas and oil producers and oil processing companies: Gazprom, Rosneft, Lukoil, Bashneft, Surgutneftegaz, Transneft, Tatneft and others.

Supplies are made to the bordering countries: Ukraine, Byelorussia, Kazakhstan, Turkmenistan and Uzbekistan.
Steel Rolling Mills
Casting and Rolling Complex

Process Flow

Casting and rolling complex consists of two main shops: meltshop and Hot Strip Mill.

Meltshop includes the following main technological equipment:
- Electric Arc Furnace EAF-160/190 with tapping weight of 160 t.
- Two-position Ladle-Furnace.
- Twin-tank Vacuum Degasser.
- Single strand thin slab caster — to produce slabs with the following specifications: width — 830÷1830 mm, thickness 90 mm and 70 mm.

Hot Strip Mill includes the following main technological equipment:
- Tunnel Furnace.
- Roughing Mills.
- Heat Transfer Table.
- Finishing Mills.
- Laminar Cooling.
- Cutting, inspection, weighing, marking and stripping area.
- Casting and Stamping area.
- Descaler.
- Rotary shears.
- Heated transfer table.
- Crop shears.
- Finishing stands.
- Laminar cooling.
- Downcoiler.

1. Ladle turret
2. Tundish
3. Casting mold
4. Secondary cooling
5. Soft dynamic reduction
6. Decoupler
7. Rotary shears
8. Tunnel furnace
9. Shuttle section
10. Roughing stands
11. Hot coaling
12. Heated transfer table
13. Crop shears
14. Finishing stands
15. Laminar cooling
16. Downcoiler
17. Laminar cooling
18. Laminar cooling
19. Rotary shears
20. Crew shears
21. Descaler
**Casting and Rolling Complex**

Casting and rolling complex hot-strip mill is capable to produce sheets of 1 to 12.7 mm thick and width to 1750 mm. Production capacity of the complex amounts to 1.2 million tons of hot-rolled coils per year.

Steel grades:

- 09Г2С; 09Г2Д; 22ГЮ; 20; Ст3сп; Ст3пс; 09ГСФ; К55; К52; 17Г1С-У; Ст2пс; Ст1сп; 20КСХ; 13ХФА; 10; 08; 10Г2ФБЮ; 10ХСНД; 15ХСНД; S355JR; S275JR; S235JR; Х42-Х70 по API 5L; J55 по API 5CT; S235JR; SAE 1006 по ASTM.

The main supplier of the process equipment is the Italian company Danieli & C.

The Complex was put in operation in October 2008.

**Process Flow**

Basing on the impact made on metal, we chose equipment parameters and operations sequence to receive the finest grain possible as well as to form the targeted structure so that we gain the unique set of properties.

1. Reheat furnaces
2. B ruled
3. Four-high stand (12 000 tons force)
4. Preliminary leveling machine
5. Accelerated cooling unit with high-pressure and low-pressure sections
6. Hot Plate Leveler (4 000 tons force)
7. Disc cooling bed
8. Retarded cooling section of plates
9. Cold/Fast cooling (2 000 tons force)
10. Plate and billet sizing in the double side trimming shears
11. Plate ultrasonic control unit
12. Double side trimming shear and high-speed shear
13. Dividing shears
14. Pull-over gear
Wide plates produced by Mill-5000 are designed for large diameter pipes production for construction of oil and gas pipelines. Mill-5000 products can be used for pipes and steel structures for drilling platforms, ship building, mechanical engineering, atomic power engineering and other metal consuming sectors.

The Complex capacity equals to 1.2 mln tpy of wide plate.

Widths: 900—4850 mm.

Thickness: 7—150 mm.

Steel grades:
- pipe steel of К52–К80, Х42–X120 grades.
- steel grades with high corrosion resistance.
- high-strength and wear-resisting steels.

The main supplier of processing equipment is "SMS Siemag" Company, Germany.

Heavy Plate Mill-5000 was commissioned in 2011.