



**CERTIFICATE OF APPROVAL OF MANUFACTURERS OF  
MATERIALS**  
No. FAB023817XP/001

**This is to certify** that the manufacture of the product identified below is in compliance with the applicable requirements of the RINA Rules for the Approval of Manufacturers of Materials.

<i>Description</i>	<b>Carbon, Carbon - manganese and low alloy steel Ingots and steel forgings</b>
<i>Type</i>	<b>Forgings including forgings for Crankshafts maximum weight 100 tons - Ingots maximum weight 250 tons</b>
<i>Manufacturer</i>	<b>PILSEN STEEL S.R.O.</b>
<i>Place of manufacture</i>	<b>TYLOVA 1/57 316 00 Plzen CZECH REPUBLIC</b>
<i>Reference standards</i>	<b>RINA Rules for the approval of manufacturers of materials</b>
<i>Reference documents</i>	<b>-</b>

Issued in **GDANSK** on **April 11, 2017**. This Certificate is valid until **April 10, 2022**



**RINA**

**A. Lobodziński**

Gdańsk Marine Manager

Jurisdiction: Poland, Slovakia, Czech Republic

RINA Services S.p.A.

**Adam Konrad Lobodzinski**

This certificate consists of this page and 1 enclosure



## CERTIFICATE OF APPROVAL OF MANUFACTURERS OF MATERIALS

No. **FAB023817XP/001**

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Forgings including forgings for Crankshafts maximum weight 140 tons - Ingots maximum weight 250 tons

### APPROVAL CONDITIONS

- **Steel-making:** electric arc furnace
- **Steel-types:** carbon, carbon-manganese and alloy steels.
- **Forging process:** open die forging.

Unless otherwise approved, for Class 1 forgings the total reduction ratio is to be at least: 3:1 where  $L > D$  and 1,5:1 where  $L \leq D$  for forgings made from ingots or from forged blooms or billets. L and D are the length and diameter, respectively, of the part of the forging under consideration.

Crankshafts: steel specification relevant to chemical composition, mechanical properties and heat treatment is to be submitted for approval to RINA Plan Approval Center. The specified minimum tensile strength  $R_m$  is generally to be not lower than 400N/mm<sup>2</sup> and not higher than 1000N/mm<sup>2</sup>.

- **Heat treatment:** Normalizing, normalizing and tempering, quenching and tempering. The Manufacturer is to maintain records of heat treatment identifying the furnace used, furnace charge, date, temperature and time at temperature.
- **Supply conditions:** Rough and/or rough sandblasted and/or rough machined and final machined
- **Survey conditions:** all forgings to be used for construction of ships classed with RINA shall meet the requirements of the RINA Rules and shall be tested accordingly.

#### General conditions for the approval

- The approval is granted on condition that the RINA Rules for the approval, manufacture, testing and certification of materials are complied with in all respects.
- RINA is to be notified of any change of materials, manufacturing process, quality control routines that may affect the validity of this certificate.



**GDANSK April 11, 2017**

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