



# APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:  
**AMMM000000A**  
Revision No:  
**10**

This is to certify:

That  
**SIDENOR ACEROS ESPECIALES , S.L.**  
**Basauri, Reinosa and Azkoitia plants**  
**Basauri, Bizkaia, Spain**

is an approved manufacturer of  
**Steelmaking and Rolled Steel Products**

in accordance with  
**DNVGL-OS-E302 – Offshore mooring chain, Edition July 2018**  
**DNV GL rules for classification – Ships**  
**DNVGL-OS-B101 – Metallic materials**

and the following particulars:

<b>Products</b>	<b>Round bars for chain cables, Rolled round bars intended to be machined into components, Semi-finished products; ingots, blooms and billets for forging and rolling stock</b>
<b>Grades</b>	<b>See page 2 and 3</b>
<b>Steelmaking</b>	<b>See page 2 and 3</b>
<b>Deoxidation</b>	<b>Killed</b>
<b>Fine grain elements</b>	<b>See page 2, 3 and 4</b>
<b>Delivery conditions</b>	<b>See page 2</b>
<b>Max. thickness/diam.</b>	<b>See page 2</b>
<b>Remarks</b>	<b>See page 2, 3 and 4</b>

Manufactures approved by this certificate is accepted to deliver according to DNV GL, DNV and GL rules. Materials to be applied to DNV classed object shall fulfill the material requirements in the applicable DNV class rules.

Issued at **Høvik** on **2021-10-29**

This Certificate is valid until **2022-11-15**.

DNV local station: **Area NB/CMC Iberia**

for **DNV**

Approval Engineer: **Dechun Lou**

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**Sondre Løken**  
**Head of Section**

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to 300,000 USD.



**Particular of the approval:**

<b>Rolled round bars<sup>1)2)6)</sup> intended to be machined into components (as a substitute for forged bars), Semi-finished products for forging or rolling stock</b>				
<b>Steel types</b>	<b>Steelmaking <sup>3)</sup></b>	<b>Fine grain elements</b>	<b>Delivery conditions <sup>4)</sup></b>	<b>Max. diameter (mm)</b>
Carbon and carbon-manganese	EAF, IC or CC	Al or Al+V	N <sup>5)</sup>	220 <sup>5)</sup>
Alloy <sup>6)</sup>	EAF, IC or CC	Al or Al+V	QT <sup>5)</sup>	220 <sup>5)</sup>

Remarks:

- <sup>1)</sup> Minimum rolling reduction ratio 6:1
- <sup>2)</sup> Sampling, inspection and testing requirements shall be according RU-SHIP Pt.2 Ch.2 Sec. 6
- <sup>3)</sup> EAF: Electric Arc Furnace; IC: Ingot Casting; CC: Continuous Casting.
- <sup>4)</sup> N: Normalised; QT: Quenched and Tempered.
- <sup>5)</sup> Not applicable for semi-finished products.
- <sup>6)</sup> Including clean steel of grade 18CrNiMo7-6 according to EN 10084, DNVGL RU-SHIP Pt.2 Sec.6 and DNVGL-CP-0247 Sec.3 [2.1].

<b>Round bars for chain cables</b>				
<b>Grade</b>	<b>Max. diameter (mm)</b>	<b>Steelmaking <sup>1)</sup></b>	<b>Fine grain elements</b>	<b>Delivery condition <sup>2)</sup></b>
<b>R3</b>	185	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC <sup>3)</sup>		
	150	EAF, VD, CC <sup>5)</sup>		
	203	EAF, VD, CC <sup>5)</sup>		
<b>R3S</b>	185	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC <sup>3)</sup>		
	150	EAF, VD, CC <sup>5)</sup>		
	186.5	EAF, VD, CC <sup>5)</sup>		
<b>R3S</b>	169	EAF, VD, CC <sup>7)</sup>	Al	AR/HA
<b>R4</b>	86	EAF, VD, CC <sup>4)</sup>	Al	AR
<b>R4</b>	175	EAF, VD, CC <sup>5)</sup>	Al	AR/HA
<b>R4 <sup>6)</sup></b>	185	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC <sup>3)</sup>		
	88	EAF, VD, CC <sup>4)</sup>		
	191	EAF, VD, CC <sup>5)</sup>		
<b>R4S <sup>6)</sup></b>	185	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC <sup>3)</sup>		
	88	EAF, VD, CC <sup>4)</sup>		
	174	EAF, VD, CC <sup>5)</sup>		
<b>R5 <sup>6)</sup></b>	230	EAF, VD, IC	Al+V	AR
	78	EAF, VD, CC <sup>3)</sup>		
	88	EAF, VD, CC <sup>4)</sup>		
	174	EAF, VD, CC <sup>5)</sup>		
<b>R6 <sup>8)</sup></b>	165	EAF, VD, CC <sup>7)</sup>	Al+V	AR

Remarks:

- <sup>1)</sup> EAF: Electric Arc Furnace; VD: Vacuum Degassing; IC: Ingot Casting; CC: Continuous Casting.
- <sup>2)</sup> AR: As Rolled; HA: Annealed at 680°C x 8h for Hydrogen diffusion only if it is necessary.
- <sup>3)</sup> Dimensions of billet: 185 mm x 185 mm.
- <sup>4)</sup> Dimensions of billet: 240 mm x 240 mm.
- <sup>5)</sup> Dimensions of bloom: 300 mm x 400 mm or 350 mm x 470 mm.
- <sup>6)</sup> Minimum tempering temperature shall be 610°C for quenching and tempering condition.
- <sup>7)</sup> Dimension of bloom: 350 mm x 470 mm.
- <sup>8)</sup> Minimum tempering temperature shall be 580°C for quenching and tempering condition.

9) Specification for chemical composition according to table S1.

<b>Ingots, blooms and billets for chain cables</b>		
<b>Grade <sup>2)</sup></b>	<b>Steelmaking <sup>1)</sup></b>	<b>Fine grain elements</b>
<b>R3S</b>	EAF, VD, CC	Al
<b>R4</b>	EAF, VD, CC	Al
<b>R3, R3S R4, R4S R5</b>	EAF, VD, IC or CC	Al+V
<b>R6 <sup>3)</sup></b>	EAF, VD, CC	Al+V

Remarks:

- <sup>1)</sup> EAF: Electric Arc Furnace; VD: Vacuum Degassing; IC: Ingot Casting; CC: Continuous Casting.
- <sup>2)</sup> Specification for chemical composition according to table S2
- <sup>3)</sup> Specification for chemical composition as per table S1.