

# APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:  
**AMMM000000A**  
Revision No:  
**5**

**This is to certify:**

That  
**SIDENOR ACEROS ESPECIALES, S.L.**  
**Basauri, Vizcaya, Spain**

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

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

and the following particulars:

<b>Product</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</b>
<b>Steelmaking</b>	<b>See page 2</b>
<b>Deoxidation</b>	<b>Killed</b>
<b>Fine grain elements</b>	<b>See pages 2 and 3</b>
<b>Delivery conditions</b>	<b>See page 2</b>
<b>Max. diameter</b>	<b>See page 2</b>
<b>Remarks</b>	<b>See pages 2 to 4</b>

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

Issued at **Høvik** on **2018-11-16**

for **DNV GL**

This Certificate is valid until **2021-11-15**.

DNV GL local station: **Bilbao**

Approval Engineer: **Dechun Lou**

**Hanne Anita Hjerpetjønn**  
**Head of Section**



Job Id: **263.11-003845-7**  
 Certificate No: **AMMM000000A**  
 Revision No: **5**

### Particulars 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 <sup>5)</sup></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>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>		

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 for Hydrogen diffusion.

<sup>3)</sup> Dimensions of billet: 185 x 185 mm

<sup>4)</sup> Dimensions of billet: 240 x 240 mm

<sup>5)</sup> Dimensions of bloom: 300 x 400 mm or 350 x 470 mm.

<sup>6)</sup> Minimum tempering temperature shall be 610°C.

<sup>7)</sup> Specification for chemical composition according to table S1

Job Id: **263.11-003845-7**  
 Certificate No: **AMMM000000A**  
 Revision No: **5**

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

Remarks:

<sup>1)</sup> EAF: Electric Arc Furnace; IC: Ingot Casting; CC: Continuous Casting.

<sup>2)</sup> Specification for chemical composition according to table S2

- Specification for chemical composition -														
Grade, dia. (mm)			C	Si	Mn	P	S	Cr	Ni	Mo	Cu	Al	V	N
<b>R3</b>	203	Min. Max.				-	-							
<b>R3S</b>	185	Min. Max.				-	-							
	186.5	Min. Max.				-	-							
<b>R4</b>	185	Min. Max.				-	-							
<b>R4S</b>	185	Min. Max.				-	-							
<b>R5</b>	185	Min. Max.				-	-							
<b>R5</b>	230	Min. Max.				-	-							

Remarks:

The content of Sn, Sb and As may be required determined. In such cases, the maximum content shall be 0.030 % for Sn, 0.025% for As, 0.005 % for Sb and 0.001% for B.

