

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM000006F
Revision No:
2

This is to certify:

That

HI Quality Steel Castings Ltd.

**Trinity Works, Foundry Street, Whittington Moor, S41 9AX Chesterfield,
Derbyshire, United Kingdom**

is an approved manufacturer of
Steel Castings

in accordance with

DNV GL rules for classification – Ships

DNVGL-OS-E304 – Offshore mooring steel wire ropes, Edition July 2020

DNVGL-OS-B101 – Metallic Materials

and the following particulars:

Application Area	Castings for offshore mooring steel wire rope sockets Castings for hull structures and equipment Casting for machinery Stainless steel castings
Steel types	Carbon and carbon-manganese, Alloy, Austenitic stainless
Max. weight	See pages 2 and 3
Max. thickness	See pages 2 and 3

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 **2020-09-02**

for **DNV GL**

This Certificate is valid until **2023-06-30**.

DNV GL local station: **Manchester**

Approval Engineer: **Shylate Mahachi**

Sondre Løken
Head of Section

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Particulars of the approval**Castings for hull structures and equipment**

Steel type	Grade	Max. thickness [mm]	Max. weight [kg]	Heat treatment condition ¹⁾	Casting method
Carbon and carbon-manganese	VL C400UW, VL C440UW, VL C480UW, VL C520UW, VL C560UW, VL C600UW	380	8000	N, NT, QT	Sand casting
Alloy	VL C550AW, VL C620AW	380	8000	QT	

Castings for machinery

Steel type	Grade	Max. thickness [mm]	Max. weight [kg]	Heat treatment condition ¹⁾	Casting method
Carbon and carbon-manganese	VL C400U, VL C440U, VL C480U, VL C520U, VL C560U, VL C600U	380	8000	N, NT, QT	Sand casting
Alloy	VL C550A, VL C600A, VL C690A	380	8000	QT	

Stainless steel castings

Steel type	Grade	Max. thickness [mm]	Max. weight [kg]	Heat treatment condition ¹⁾	Casting method
Austenitic	GX2CrNiMo18-10 (304L)	203	8000	SHT	Sand casting
	GX5CrNi19-9 (304)				
	GX2CrNiMo19-11-2 (316L)				
	GX5CrNiMo19-11-2 (316)				

Steel castings according to other standards

Steel type	Standard	Max. thickness [mm]	Max. weight [kg]	Heat treatment condition ¹⁾	Casting method
Carbon and carbon-manganese	EN 10293	380	8000	N, NT, QT	Sand casting
Austenitic stainless	EN 10283	380	8000	SHT	

Remarks:

- 1) N: normalised, NT: normalised and tempered, QT: quenched and tempered, SHT: solution heat treated

Castings for offshore mooring wire rope sockets

Grade	Max. thickness [mm]	Max. weight [kg]	Heat treatment condition	Casting method
ASTM 487M Grade 10B with modified properties ^{2a) 2b)}	170	1 798	Annealed, Quenched and Tempered	Sand casting
ASTM 487M Grade 4B ^{2a)}	165	1 306	Normalised, Quenched and Tempered	
ASTM 487M Grade 4C ^{2a)}	140	398		

Remarks:

- 2a) Unless otherwise specified, chemical composition and mechanical properties shall be in accordance with relevant ASTM standard and DNVGL-OS-E304.
 b) Periodical analysis of Sn, Sb and As is required. In such cases, the maximum content shall be 0.010 % for Sn, 0.010 % for Sb and 0.025 % for As.

- 3) Mechanical properties for ASTM 487M Grade 10 B with modified properties:

Tensile strength, min.	700 MPa
Yield stress, min.	470 MPa
Impact energy, average min.	50 J at -20°C
Elongation, min.	15 %
Reduction of area, min.	35 %