APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No:
AMMM0000013
Revision No:
31

This is to certify:

That

Hunan Valin Xiangtan Iron & Steel Co., Ltd.
Gangcheng Road, Yuetan District, Xiangtan 411101, Hunan,
China

is an approved manufacturer of
Steelmaking and Rolled Steel Products

in accordance with
DNV rules for classification – Ships
DNV-OS-B101 – Metallic materials
DNV class programme – DNV-CP-0243 Rolled steel products – non stainless steel
DNV class programme – DNV-CP-0348 Rolled steel products specially designed for container ships properties

and the following particulars:

Application area	**Normal strength steel** **High strength steel** **Extra high strength steel,** **Z-grade steels (plates with through thickness properties),** **Steels for boiler and pressure vessels,** **Steel for low temperature service,** **Bars for chain cables,** **BCA steels (steels with brittle crack arresting properties),** **COD steels (steels with crack initiation resistance),** **Weldable steels for fixed offshore structures**
Products	**Plates and bars**
Manufacturing method	**Basic Oxygen Converter,** **Continuous Casting/Ingot Casting**
Max. thickness	**See page 2 ff.**
Heat treatment condition	**See page 2 ff.**
Additional approval conditions	**See page 2 ff.**

Manufacturer(s) approved by this certificate is/are 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 **Hamburg** on **2024-10-30**
This Certificate is valid until **2026-12-31**.
DNV local unit: **Wuhan NB & CMC**

for **DNV**

Approval Engineer: **Christian Wildhagen**

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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.

Particulars of the approval

Steel Plates Produced by Manufacturing Lines No. 1 & 2:

Normal strength steel

Grade	Product	Steel making[1)]	Fine grain elements	Max. thickness [mm]	Heat treatment condition[2)]	Z-quality
NV A, NV B	Plate	BOC, CC	Al	40	NR	Z35
			Al+Nb	60	N	Z35
NV B	Plate	BOC, CC	Al+Nb	40	TM	Z35
NV A, NV B, NV D	Plate	BOC, CC	Al	40	TM	Z35
NV D	Plate	BOC, CC	Al	40	NR	Z35
			Al+Nb	40	TM	Z35
			Al+Nb	60	N	Z35
NV E	Plate	BOC, CC	Al+Nb	60	N	Z35

High strength steel

Grade	Product	Steel making[1)]	Fine grain elements	Max. thickness [mm]	Heat treatment condition[2)]	Z-quality
NV A32, NV D32	Plate	BOC, CC	Al	40	TM	Z35
			Al+Nb	40	TM	Z35
			Al+Nb+Ti	100	N	Z35
				40	TM	Z35
NV A32, NV A36, NV D32, NV D36	Plate	BOC, CC	Al	40	NR	Z35
NV A36, NV D36, NV E32, NV E36	Plate	BOC, CC	Al+Nb	40	TM	Z35
NV A36, NV D36, NV E32, NV E36	Plate	BOC, CC	Al+Nb+Ti	100	N	Z35
				40	TM	Z35
NV F32, NV F36, NV A40, NV D40, NV E40, NV F40	Plate	BOC, CC	Al+Nb+Ti	40	TM	Z35
NV D36	Plate	BOC, CC	Al+Nb	40	CR	Z35
NV E32	Plate	BOC, CC	Al	40	TM	Z35
NV A32, NV D32, NV E32, NV F32, NV A36, NV D36, NV E36, NV F36	Plate	BOC, CC	Al+Nb+Ti	80	TM	Z35

Extra high strength steel

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
NV A420, NV D420, NV E420, NV F420, NV A460, NV D460, NV E460, NV F460 [18)], NV A500, NV D500, NV E500, NV F500, NV A550, NV D550, NV E550, NV F550 [19)], NV A620, NV D620, NV E620, NV F620 NV A690, NV D690, NV E690, NV F690 [20)]	Plate	BOC, CC	Al+Nb+Ti+V	100	QT	Z35
NV AO420, NV DO420, NV EO420, NV FO420 [18)], NV AO460, NV DO460, NV EO460, NV FO460, NV AO500, NV DO500, NV EO500, NV FO500, NV AO550, NV DO550, NV EO550, NV FO550 [19)], NV AO620, NV DO620, NV EO620, NV FO620 NV AO690, NV DO690, NV EO690, NV FO690 [20)]						

Steels acc. other standards

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
Steel acc. to EN 10025-2[3)]						
S235JR, S235J0, S235J2, S275JR, S275J0, S275J2, S355JR, S355J0, S355J2, S355K2	Plate	BOC, CC	Acc. standard	100	Acc. standard	Z35
Steel acc. to EN 10025-4[3)]						
S275M, S275ML, S355M, S355ML	Plate	BOC, CC	Acc. standard	40	Acc. standard	Z35

Steel for low temperature service

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
NV 32-2, NV 32-3, NV 32-4, NV 32-4L, NV 36-2, NV 36-3, NV 36-4, NV 36-4L, NV 4-2, NV 4-3, NV 4-4, NV 4-4L	Plate	BOC, VD, CC	Al+Nb+Ti	60 [12)]	N	Z35

Steel Plates Produced by Manufacturing Line No. 3 (5M Wide and Heavy Plate):

Normal strength steel

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
NV A, NV B	Plate	BOC, CC	Al	40	NR	-
			-	40	AR	-
			Al	60	N	-
NV A, NV B, NV D	Plate	BOC, CC	Al	40	NR	Z35
NV A, NV B, NV D, NV E	Plate	BOC, CC	Al+Nb	100	N	Z35
			Al+Nb	40	TM	Z35
NV A, NV B, NV D, NV E	Plate	BOC, IC	Al+Nb+Ti	150	N[4)]	Z35

High strength steel

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
NV A32	Plate	BOC, CC	Al	40	NR	Z35
			Al	35	AR	-
NV A32, NV A36, NV D32, NV D36	Plate	BOC, CC	Al	40	NR	Z35
NV A32, NV D32, NV E32,	Plate	BOC, CC	Al+Nb+Ti	90	TM	Z35
NV A36, NV D36, NV E36, NV A40, NV D40, NV E40	Plate	BOC, CC	Al+Nb+Ti	120	TM	Z35
NV A32, NV A36, NV D32, NV D36, NV E32, NV E36	Plate	BOC, IC	Al+Nb+Ti+V	150	N[5)]	Z35
NV A32, NV A36, NV D32, NV D36, NV E32, NV E36, NV F32, NV F36	Plate	BOC, CC	Al+Nb+Ti+V	150	N	Z35
NV A32, NV A36, NV D32, NV D36, NV E32, NV E36, NV F32, NV F36	Plate	BOC, CC	Al+Nb+Ti	100	TM	Z35

High strength steels of improved weldability

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
NV A32-W200, NV D32-W200, NV E32-W200, NV A36-W200, NV D36-W200, NV E36-W200	Plate	BOC, CC	Al+Ti	40	TM	Z35

Normal and high strength steels of improved weldability

Grade or type	Product	Steel making [1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition [2)]	Z- quality
NV A36-W700, NV D36-W700, NV E36-W700 *)	Plate	BOC, CC	Al+Nb+V+Ti	85	TM	Z35
NV A40-W700, NV D40-W700, NV E40-W700 *)	Plate	BOC, CC	Al+Nb+V+Ti	85	TM	Z35

- WPQT is required for each yard/construction site according to RU-SHIP Pt.2 Ch.4 Sec.5.; the exception given in RU-SHIP Pt.2 Ch.4 Sec.5 [6.2.2] d) is not applicable.
- chemical composition and Ceq shall be as per agreed manufacturer specification (refer to the original certificate in red print)
- further details which shall be adhered to for production testing are stated on the original certificate in red print.

Extra high strength steel

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
NV A420, NV D420, NV E420	Plate	BOC, CC	Al+Nb+Ti	100	TM	Z35
NV AO420, NV DO420, NV EO420						
NV A460, NV D460, NV E460	Plate	BOC, CC	Al+Nb+Ti	80	TM	Z35
NV AO460, NV DO460, NV EO460						
NV A420, NV A460, NV D420, NV D460, NV E420, NV E460	Plate	BOC, CC	Al+Nb+Ti	50	QT	Z35
NV AO420, NV AO460, NV DO420, NV DO460, NV EO420, NV EO460						
NV A500, NV D500, NV E500, NV A550, NV D550, NV E550 [7)]	Plate	BOC, CC	Al+Nb+Ti	90	QT	Z35
NV AO500, NV DO500, NV EO500, NV AO550, NV DO550, NV EO550 [7)]						
NV A460, NV D460, NV E460, NV F460, NV A500, NV D500, NV E500, NV F500 [8)], NV A550, NV D550, NV E550, NV F550 [9)], NV A620, NV D620, NV E620, NV F620 NV A690, NV D690, NV E690, NV F690 [10)]	Plate	BOC, CC	Al+Nb+V+Ti	120	QT	Z35
NV AO460, NV DO460, NV EO460, NV FO460, NV AO500, NV DO500, NV EO500, NV FO500 [8)], NV AO550, NV DO550, NV EO550, NV FO550 [9)], NV AO620, NV DO620, NV EO620, NV FO620 NV AO690, NV DO690, NV EO690, NV FO690 [10)]						
NV A620, NV D620, NV E620, NV A690, NV D690, NV E690 [21)]	Plate	BOC, CC	Al+Nb+Ti	50	QT	Z35
NV AO620, NV DO620, NV EO620, NV AO690, NV DO690, NV EO690 [21)]						

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
NV A620, NV D620, NV E620, NV A690, NV D690, NV E690 [22)]	Plate	BOC, IC	Al+V	210	QT	Z35
NV AO620, NV DO620, NV EO620, NV AO690, NV DO690, NV EO690 [22)]						
NV A47, NV D47, NV E47 [11)]	Plate	BOC, CC	Al+Nb+Ti	120	TM	Z35

Brittle Crack Arrest BCA Steel and COD Steel

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
NV A40 BCA1, NV A40 BCA2, NV A47 BCA1, NV A47 BCA2 NV D40 BCA1, NV D40 BCA2, NV D47 BCA1, NV D47 BCA2, NV E40 BCA1, NV E40 BCA2, NV E47 BCA1, NV E47 BCA2[x)]	Plate	BOC, CC	Al+Nb+Ti	100	TM	Z35
NV A40 BCA1COD, NV A40 BCA2COD, NV A47 BCA1COD, NV A47 BCA2COD, NV D40 BCA1COD, NV D40 BCA2COD, NV D47 BCA1COD, NV D47 BCA2COD, NV E40 BCA1COD, NV E40 BCA2COD, NV E47 BCA1COD, NV E47 BCA2COD [x)]	Plate	BOC, CC	Al+Nb+Ti	100	TM	Z35
NV A40 COD, NV A47 COD, NV D40 COD, NV D47 COD, NV E40 COD, NV E47 COD [x)]	Plate	BOC, CC	Al+Nb+Ti	120	TM	Z35

[x)] Including corresponding grades A36/D36/E36 with BCA1, BCA2 and COD properties. For acceptance testing the requirements as stated in the remarks in the *original* certificate shall be fulfilled.

Rolled steels for boiler and pressure vessels

Steel for low temperature service

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
NV 4-4L M32 S [13)], NV 4-4L M36 S [14)]	Plate	BOC, VD, CC	Al+Nb+Ti	40	TM	Z35
NV 360-2FN, NV 2-2, NV 2-3, NV 2-4, NV 2-4L, NV 4-2, NV 4-3, NV 4-4, NV 4-4L	Plate	BOC, VD, CC	Al+Nb+Ti	60 [12)]	TM	Z35
NV 32-2, NV 32-3, NV 32-4, NV 32-4L, NV 36-2, NV 36-3, NV 36-4, NV 36-4L, NV 4-2, NV 4-3, NV 4-4, NV 4-4L	Plate	BOC, VD, CC	Al+Nb+Ti	60 [12)]	N	Z35
NV 5Ni/a	Plate	BOC, VD, CC	Al	50 [15)16)]	QT	Z35
NV 5Ni/c	Plate	BOC, VD, CC	Al	60 [15)16)]	QT	Z35
NV 9Ni/a	Plate	BOC, VD, CC	Al	50 [15)16)]	QT	Z35
NV Mn 400 [A)]	Plate	BOC, VD, CC	Al+Nb+Ti+V [B)]	40	Hot rolled and controlled cooling (TM)	Z35

A) In accordance with IACS Rec. No. 169 (Sept. 2021), see also remarks in red in original certificate.
B) As per makers specification

Rolled steels for boiler and pressure vessels according to other standards

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
ASME SA-516 Gr. 70, ASTM A516 Gr.70 [5) 6)]	Plate	BOC, VD, CC	acc. to standard	40	AR	Z35
ASME SA-516 Gr. 70, ASTM A516 Gr.70 [5) 6)]	Plate	BOC, VD, CC	acc. to standard	102	N	Z35
ASME SA-537 CL.2, ASTM A537 CL.2 [5) 6)]	Plate	BOC, VD, CC	acc. to standard	80	QT	Z35
ASTM A553/A553M Type III, ASME SA553/SA553M Type III [5)]	Plate	BOC, VD, CC	Al	50	QT	Z35
ASTM 645/A645M Grade B, ASME SA-645/SA-645M Grade B [5)]	Plate	BOC, VD, CC	Al	60 [15)16)]	QT	Z35

Steels acc. other standards

Grade	Product	Steel making[1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition[2)]	Z-quality
Steel acc. to EN 10025-2 [3)]						
S235JR, S235J0, S235J2, S275JR, S275J0, S275J2, S355JR, S355J0, S355J2, S355K2	Plate	BOC, CC	Acc. standard	100	Acc. standard	Z35
Steel acc. to EN 10028-4 [3)]						
X12Ni5, X7Ni9, X8Ni9	Plate	BOC, VD, CC	Al	50	QT	Z35
Steel acc. to EN 10225-1[3)]						
S355MLO, S420MLO	Plate	BOC, CC	Al+Nb+Ti	100	TM	Z35
S460MLO (S460G1+M)[17)]	Plate	BOC, VD, CC	Al+Nb+Ti	100	TM	Z35

Bars for chain cables

Steel type	Product	Steel making [1)]	Fine grain elements	Max. Thickness [mm]	Heat treatment condition [2)]
NV K1, NV K2, NV K3	Bars for chain cable	BOC, VD, CC	Al	100	AR

Remarks:

1) BOC: Basic oxygen converter; CC: Continuous casting; IC: Ingot casting; VD: Vacuum degassing
2) AR: as rolled; NR: normalizing rolling; TM: thermo-mechanical rolling; N: normalized; QT: quenched and tempered; ACC: accelerated cooling
3) Possible application and certification of any material to classed object is subject to case by case approval
4) Specially approved rolling procedure 'Normalized preceded by Thermo-mechanical rolling with accelerated cooling' (TM+ACC+N). Approved as per RU Ship Pt.2 Ch.2 Sec.2 [2.7.9]
5) For applications subject to special plan approval for the respective grades due to possible deviations to DNV-RU-SHIP-Pt2-Ch2-Sec.3
6) Approved grades ASME SA-516Gr. 70 / ASTM A516Gr.70 can cover: ASME SA-516Gr. 55, 60, 65, 70, ASTM A516Gr.55, 60, 65, GB/T 713 Q245R, P265GH acc. to EN 10028-2, ASME SA-285Gr.2, ASTM A285Gr.C.; Approved grades ASME SA-537CL.2 / ASTM A537CL.2 can cover: ASME SA-537CL.1/3, ASTM A537CL.1/3
7) Qualified max. heat input. 3.0 kJ/mm. C_{eq} = 0.55 during weldability testing
8) Qualified max. heat input. 3.5 kJ/mm. C_{eq} = 0.45 during weldability testing
9) Qualified max. heat input. 3.0 kJ/mm. C_{eq} = 0.61 during weldability testing
10) Qualified max. heat input. 3.0 kJ/mm. C_{eq} = 0.66 during weldability testing
11) Qualified max. heat input. 5.0 kJ/mm. C_{eq} = 0.41 during weldability testing
12) Thickness over 40 mm special approval required on a case-by-case basis. From 40 mm to 60 mm thickness the test temperature has been qualified as per the scheme in table 14 of DNV-RU-SHIP-Pt2-Ch2-Sec3 by extrapolation: each 5 mm additional thickness results in 5°C decreased test temperature.
13) NV 4-4L M32 S: specified mechanical properties (yield strength Rp min = 315 N/mm²; tensile strength Rm = 440 – 590 N/mm²; elongation A5 min = 22 %)
14) NV 4-4L M36 S: specified mechanical properties (yield strength Rp min = 355 N/mm²; tensile strength Rm = 490 – 610 N/mm²; elongation A5 min = 21 %)
15) Test temperature for 40 < t ≤ 50 mm in acc. with IACS W1
16) Max. heat input for weldability testing 3.5 kJ/mm

17) Weldable structural steel for offshore structures, qualified maximum heat input 3.5 kJ/mm, C_{eq}=0.41 during weldability testing.
18) Qualified max. heat input. 5.0 kJ/mm. C_{eq} = 0.47 during weldability testing
19) Qualified max. heat input. 3.0 kJ/mm. C_{eq} = 0.59 during weldability testing
20) Qualified max. heat input. 3.0 kJ/mm. C_{eq} = 0.64 during weldability testing
21) Qualified max. heat input. 3.0 kJ/mm. C_{eq} = 0.59 during weldability testing
22) Qualified max. heat input. 3.0 kJ/mm. C_{eq} = 0.59 during weldability testing