Approval Certificate for Manufacturing Process

[Semi-Finished Products and Rolled Steels]

Initial Approval	12 April 2005
Manufacturer	Jiangsu Shagang Steel Co., Ltd. Jinfeng Town, Zhangjiagang City, Jiangsu Province, 215625, P.R.China
Product Description	Semi-Finished Products Rolled Steel Plates for Hull Structures Rolled Steel Plates for Low Temperature Service High Strength Steel Plates for Welded Structures YP47 Steel Plates and Brittle Crack Arrest Steel Plates * See Appendix 1
Approval Condition	Individual Product Certification is required except semi-finished products.

THIS IS TO CERTIFY that the manufacturing process for the above mentioned product has been approved in accordance with the relevant requirement of this Society's Rules and/or of the recognized standards as follows.

Pt 2, Ch 1, Sec 3 of the Rules for Classification of Steel Ships.

This Certificate is valid until 11 April 2030

Issued at Shanghai, China on 4 March 2025

This certificate is signed electronically in accordance with IMO FAL.5/Circ.39/Rev.2. Validation and authentication of the certificate can be confirmed from "http://e-cert.krs.co.kr" by using the tracking No(ME25034583967) and certificate No.(SHI18031-SP001).

KOREAN REGISTER

General Manager of
Ship System Solution Team

Note : *1. This certificate will be valid subject to complying with the approval conditions described on the certificate and/or on the Rules of this Society.*
2. This certificate will be invalid from the expiry date aforementioned unless the extension or renewal has been granted to the applicant or the manufacturer.
3. Any significant modifications or changes in design or construction to the above product without approval from this Society will render this certificate invalid.
4. Should the specified rules, regulations or standards be amended during the validity of this certificate, the product is to be re-approved by this Society in accordance with the requirements as amended.

Product Description and/or Approval Condition

Date of Issue : 4 March 2025

A. Semi-Finished Products

1. No.1 & 2 Steel Making Workshop

Types	Steel making	Grades	Max.
Slabs	BOC, CC	All of the plates listed below or equivalent Carbon steel	320 mm in thickness

B. Rolled Steel Plates for Hull Structures

1. No.1 & 2 Plate Rolling Workshop

Grades	Z-quality	Steel making	Deoxidation	Grain Refining Elements	Thickness Max. (mm)	Heat Treatment
A, B, D, E	Z25/Z35	BOC, CC	Killed	Al	40	AR
A, B	Z25/Z35	BOC, CC	Killed	Al	60	CR(NR)
D, E	Z25/Z35	BOC, CC	Killed	Al	60	TMCP
A, B	Z25/Z35	BOC, CC	Killed	Al+Ti	100	N
D, E	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	100	N
AH32,AH36	-	BOC, CC	Killed	Al+Ti	30	AR
AH32,DH32	Z25/Z35	BOC, CC	Killed	Al+Ti	40	CR(NR)
AH32,DH32	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	60	TMCP
EH32,FH32	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	60	TMCP
AH36,DH36	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	40	CR(NR)
AH36,DH36	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	60	TMCP
EH36,FH36	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	60	TMCP
AH/DH/EH/FH40	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti+V	60	TMCP
AH/DH/EH/FH32	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	100	N
AH/DH/EH36 AH/DH/EH40	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti+V	100	N

2. No.2 Plate Rolling Workshop

Grades	Z-quality	Steel making	Deoxidation	Grain Refining Elements	Thickness Max. (mm)	Heat Treatment
A, B, D, E	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	100	TMCP
AH/DH/EH32 AH/DH/EH36 AH/DH/EH40	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	100	TMCP
AH/DH/EH32-W200 AH/DH/EH36-W200	Z25/Z35	BOC, CC	Killed	Nb+Ti+V	35	TMCP
AH/DH/EH32-W100 AH/DH/EH36-W100	Z25/Z35	BOC, CC	Killed	Nb+Ti+V	70	TMCP

Product Description and/or Approval Condition

Date of Issue : 4 March 2025

3. 3500mm Medium Plate Workshop

Grades	Z-quality	Steel making	Deoxidation	Grain Refining Elements	Thickness Max. (mm)	Heat Treatment
A, B	Z25/Z35	BOC, CC	Killed	Al	40	AR
D	Z25/Z35	BOC, CC	Killed	Al	40	CR(NR)
D, E	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	40	TMCP
AH/DH32 AH/DH36	Z25/Z35	BOC, CC	Killed	Al+Ti	40	CR(NR)
AH/DH32 AH/DH36	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	40	TMCP

C. Rolled Steel Plates for Low Temperature Service

1. No.2 Plate Rolling Workshop

Grades	Z-quality	Steel making	Deoxidation	Grain Refining Elements	Thickness Max. (mm)	Heat Treatment
RL235A/B RL325A/B RL360	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	40	TMCP
RL9N490 (1)	Z25/Z35	BOC, CC	Killed	Al	50	QT

(1) Heat input for weldability test : 15 kJ/cm and 30 kJ/cm.

D. High Strength Steel Plates for Welded Structures

1. No.2 Plate Rolling Workshop

Grades	Z-quality	Steel making	Deoxidation	Grain Refining Elements	Thickness Max. (mm)	Heat Treatment
AH/DH/EH/FH43 AH/DH/EH/FH47 AH/DH/EH/FH51 AH/DH/EH/FH56 AH/DH/EH/FH63 AH/DH/EH/FH70	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	100	QT
AH/DH/EH43 AH/DH/EH47	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	80	TMCP
FH43 FH47 AH/DH/EH/FH51 AH/DH/EH/FH56	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	60	TMCP

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E. YP47 Steel Plates and Brittle Crack Arrest Steel Plates (1)(2)
1. No.2 Plate Rolling Workshop

Grades	Z-quality	Steel making	Deoxidation	Grain Refining Elements	Thickness Max. (mm)	Heat Treatment
EH36 BCA1 EH40 BCA1	-	BOC, CC	Killed	Al+Nb+V+Ti	85	TMCP
EH47-H BCA1	-	BOC, CC	Killed	Al+Nb+V+Ti	80	TMCP
EH36 BCA1/2 EH40 BCA1/2	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	100	TMCP
EH47-H BCA1/2	Z25/Z35	BOC, CC	Killed	Al+Nb+Ti	100	TMCP

(1) Grades with BCA also cover non-BCA grades.
(2) ASTM E 208 drop-weight test may be used for product testing.
- Acceptance criteria
  EH40 BCA1 : NDTT(Surface) ≤ -70℃ and NDTT(Eig) ≤ -44.5℃
  EH40 BCA2 : NDTT(Surface) ≤ -70℃ and NDTT(Eig) ≤ -51℃
  EH47-H BCA1 : NDTT(Surface) ≤ -70℃ and NDTT(Eig) ≤ -41℃
  EH47-H BCA2 : NDTT(Surface) ≤ -70℃ and NDTT(Eig) ≤ -48.5℃
- Notes
  NDTT(Surface) : Nil-Ductility Transition Temperature at surface
  NDTT(Eig) = [NDTT(1/2T) x NDTT(1/4T) x NDTT(Side)] ^ (1/3)
  NDTT(1/2T) : Nil-Ductility Transition Temperature at 1/2 Thickness
  NDTT(1/4T) : Nil-Ductility Transition Temperature at 1/4 Thickness
  NDTT(Side) : Nil-Ductility Transition Temperature of Side at 1/2 Thickness

※ Abbreviations

BOC : Basic Oxygen Converter
CC : Continuous Casting
AR : As Rolled
CR : Controlled Rolling condition
N : Normalized Condition
QT : Quenched and Tempered
TMCP : Thermo-Mechanical Controlled Processing

< End of certificate >