No. :14EW7506ROL

Date : 25 July 2014

Angang Steel Company Limited Hong Qi Road, Ling Shan, Li Shan District, Liao Ning Province, China

Approval for Manufacturing Process of Rolled Steels (Renewal)

Dear Sirs,

This is to inform that we have approved the captioned manufacturing process.

Enclosed please find the certificate of approval and particulars of approval together with invoice.

Apart from the above, your company is kindly requested to return the previous certificate (Certificate No.: NKR-270ROL and NKR-532ROL) and particulars (Certificate No.: 08EW4426ROL, 11EW9752ROL and 11EW9753ROL) to NK Dalian office.

We appreciate the opportunity to work with your company.

Yours faithfully,

T. Imamura

General Manager

Material and Equipment Department

Encl.:

- (1) Certificate of approval (TA14588E)
- (2) Particulars of approval (TA14589E, TA14590E, TA14591E)
- (3) Invoice

Cc.: NK Dalian Office

Approval No. ST107RO Certificate No. TA14588E



APPROVAL OF MANUFACTURING PROCESS

This is to certify that

Angang Steel Company Limited Anshan, Liaoning China

has been approved for the manufacturing process of undermentioned materials by the NIPPON KAIJI KYOKAI in accordance with the requirements of 1.2, Part K of the Society's "Rules for the Survey and Construction of Steel Ships" and Chapter 1, Part 1 of the Society's "Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use".

MATERIALS: Rolled Steels for Hull High Strength Quenched and Tempered Rolled Steel Plate for Structures

The details of the relevant approval conditions are given in the PARTICULARS OF APPROVAL listed in the reverse of this certificate

The products for the ships classed with the Society are to be manufactured, tested and inspected in compliance with the Rules.

This certificate is valid until 30 June 2018. Issued at Tokyo on 25 July 2014.

Renewal Date: 22 May 2014

General Manager Material and Equipment Department



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<u>List of PARTICULARS OF APPROVAL</u>

Heavy Plate Mill of Medium and Heavy Plate Plant

Ref. No.		Date			
1.	TA14589E	22	MAY	2014	
2.	TA14590E	22	MAY	2014	

Medium Plate Mill of Medium and Heavy Plate Plant

Ref. No. Date
1. TA14591E 22 MAY 2014



No. : TA14589E

Date: 22 May 2014

PARTICULARS OF APPROVAL

Approval Condition for Manufacturing Process of Rolled Steels for Hull

1. Manufacturer : Angang Steel Company Limited

Heavy Plate Mill of Medium and Heavy Plate Plant

2. Kind of Product : Steel Plates

3. Grade : KA, KB, KD, KE, KA32, KD32, KE32, KF32,

KA36, KD36, KE36, KF36, KA40, KD40,

KE40 and KF40

4. Supply Conditions

(1) Deoxidation Practice : See Table.

(2) System of Constituents : See Table.

(3) Max. Thickness : See Table.

(4) Heat Treatment : See Table.

5. Steel Making Process : Basic Oxygen Furnace

6. Casting Process : Continuous Casting

(to be cont.)



No. : TA14589E

Date: 22 May 2014

Table Supply Conditions

$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Grade			Thickness		Note
Killed Si-Mn-Al 100 TMCP (AcC) (1)		Killed	Si-Mn	40	AR	
KB Killed Si-Mn-Al 100 TMCP (AcC) (1) KD Fine-grained Killed Si-Mn-Al 40 CR CR KE Fine-grained Killed Si-Mn-Al 40 N TMCP (AcC) (1) KA32 Fine-grained Killed Si-Mn-Al-Nb-V 40 CR CR CR CR KB32 Fine-grained Killed Si-Mn-Al-Nb-V 40 N N TMCP (AcC) (1) KF32 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA36 Fine-grained Killed Si-Mn-Al-Nb-V 40 CR CR <t< td=""><td>KA</td><td>Ü</td><td>Si-Mn-Al</td><td>100</td><td>TMCP (AcC)</td><td>(1)</td></t<>	KA	Ü	Si-Mn-Al	100	TMCP (AcC)	(1)
Killed Si·Mn·Al 40 CR	IZD	Fine-grained Si-Man Al		40	AR	
Killed Si-Mn-Al 100 TMCP (AcC) (1)	KB	Killed	Si-Min-Ai	100	TMCP (AcC)	(1)
Killed Si-Mn-Al 40	KD	Si-Mn-Al		40	CR	
KE Killed Si-Mn-Al 100 TMCP (AcC) (1) KA32 Fine-grained Killed Si-Mn-Al-Nb-V 40 CR CR KD32 Killed Fine-grained Killed 40 N N KE32 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA36 Fine-grained Killed Si-Mn-Al-Nb-V 40 CR CR KD36 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KE36 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KF36 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA40 KD40 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KE40 KF40 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)	KD			100	TMCP (AcC)	(1)
Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)	IZE	Fine-grained C: Mar. Al		40	N	
KD32 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KE32 Fine-grained Killed Si-Mn-Al-Nb-V 40 N 100 TMCP (AcC) (1) KF32 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA36 Fine-grained Killed Si-Mn-Al-Nb-V 40 CR CR KD36 Killed Si-Mn-Al-Nb-V 40 N N KE36 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KF36 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA40 KD40 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA40 KB40 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)	K.E.	Killed	Si-Win-Ai	_ 100	TMCP (AcC)	(1)
KD32 Killed 100 TMCP (AcC) (1) KE32 Fine grained Killed Si-Mn-Al-Nb-V 40 N TMCP (AcC) (1) KF32 Fine grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA36 Fine grained Killed Si-Mn-Al-Nb-V 40 CR CR KB36 Fine grained Killed Si-Mn-Al-Nb-V 40 N TMCP (AcC) (1) KF36 Fine grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA40 KD40 Fine grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KE40 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)	KA32	Fine-grained	C' M. Al NIL 37	40	\mathbf{CR}	
KE32 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KF32 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA36 Fine-grained Killed Si-Mn-Al-Nb-V 40 CR CR KD36 Fine-grained Killed Si-Mn-Al-Nb-V 40 N N KE36 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA40 KD40 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KE40 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)	KD32	Killed	Si-Min-Al-No-v	100	TMCP (AcC)	(1)
Killed 100 TMCP (AcC) (1)	KE32	Fine-grained G. M. Al NI W.	40	N		
Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)		Killed Si-Mn-Al-Nb-V		100	TMCP (AcC)	(1)
KD36 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)	KF32	_	Si-Mn-Al-Nb-V	100	TMCP (AcC)	(1)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	KA36	Fine-grained	C' M. Al NI 17	40	CR	
KE36 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KF36 Fine-grained Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KA40 KD40 Fine-grained KE40 Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KF40 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)	KD36	Killed	Si-Mn-Al-Nb-V	100	TMCP (AcC)	(1)
Killed 100 TMCP (AcC) (1)	KE36	Fine-grained	C' ME ALNEL TO	40	N	
KF36 Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)		Killed	Si-Min-Al-No-V	100	TMCP (AcC)	(1)
KD40Fine-grained KE40Si-Mn-Al-Nb-V100TMCP (AcC)(1)KF40TMCP (AcC)(1)	KF36	_	Si-Mn-Al-Nb-V	100	TMCP (AcC)	(1)
KE40 Killed Si-Mn-Al-Nb-V 100 TMCP (AcC) (1) KF40 Si-Mn-Al-Nb-V 100 TMCP (AcC) (1)	KA40					
KE40 Killed KF40	KD40	Fine-grained	Si-Mn-Al-Nh-V	Si-Mn-Al-Nb-V 100	TMCP (AcC)	(1)
	KE40	Killed	SI WIII AI NO V			(4)

Note:

(1) Including "Z35" through thickness properties.

General Manager Material and Equipment Department



No. : TA14590E

Date: 22 May 2014

PARTICULARS OF APPROVAL

Approval Condition for Manufacturing Process of High Strength Quenched and Tempered Rolled Steel Plates for Structures

1. Manufacturer

: Angang Steel Company Limited

Heavy Plate Mill of Medium and Heavy Plate Plant

2. Kind of Product

: Steel Plates

3. Grade

: KA420, KD420, KE420, KF420, KA460, KD460, KE460, KF460, KA500, KD500, KE500, KF500, KA550, KD550, KE550, KF550, KA620, KD620,

KE620, KF620, KA690, KD690, KE690 and

KF690

4. Supply Conditions

(1) Deoxidation Practice

: See Table.

(2) System of Constituents

: See Table.

(3) Max. Thickness

: See Table.

(4) Heat Treatment

: See Table.

5. Steel Making Process

: Basic Oxygen Furnace

6. Casting Process

: Continuous Casting

(to be cont.)



No. : TA14590E

Date: 22 May 2014

Table Supply Conditions

	Table Supply Contained						
Grade	Deoxidation Practice	System of Constituents	Max. Thickness (mm)	Heat treatment	Note		
KA420			80	TMCP (AcC)	(1)		
KD420		Si-Mn-Al-Nb					
KE420							
KF420							
KA460							
KD460							
KE460	Fine-grained Killed						
KF460							
KA500							
KD500							
KE500							
KF500							
KA550							
KD550							
KE550							
KF550							
KA620							
KD620	Fine-grained	Si-Mn-Al-Nb-V	32	TMCP (AcC)	(1), (2)		
KE620	Killed						
KF620							
KA690							
KD690	Fine-grained	Si-Mn-Al-Nb-V	50	TMCP	(1), (2)		
KE690	Killed			(AcC)	(1), (2)		
KF690							

Note:

(1) Including "Z35" through thickness properties.

(2) Welding heat input to the steel plates in question is to be less than or equal to 15kJ/cm.

T. Imam re-General Manag

Material and Equipment Department

No. : TA14591E

Date: 22 May 2014

PARTICULARS OF APPROVAL

Approval Condition for Manufacturing Process of Rolled Steels for Hull

1. Manufacturer

: Angang Steel Company Limited

Medium Plate Mill of Medium and Heavy Plate Plant

2. Kind of Product

: Steel Plates

3. Grades

: KA, KB, KD, KA32, KD32, KA36 and KD36

4. Supply Conditions

(1) Deoxidation Practice

: See Table.

(2) System of Constituents: See Table.

(3) Max. Thickness

: See Table.

(4) Heat Treatment

: See Table.

5. Steel Making Process

: Basic Oxygen Furnace

6. Casting Process

: Continuous Casting

Table Supply Conditions

Grade	Deoxidation Practice	System of Constituents	Max Thickness (mm)	Heat Treatment	
KA KB	Killed	Si-Mn	40	AR	
KD	Killed	Si-Mn-Al	_ 20	CR	
	Fine grained killed	Si-Mn-Al	40		
KA32 KA36	Fine grained killed	Si-Mn-Al-Nb-V	40	CR	
KD32 KD36	Fine-grained killed	Si-Mn-Al-Nb-V	40	CR	

General Manager Material and Equipment Department