Approval of Material Manufacturers
Zulassung von Werkstoffherstellern

This is to certify that the works of
Hiermit wird bescheinigt, dass die Firma

SHANXI TAIGANG STAINLESS STEEL CO. LTD.
PROFILING PLANT
TAIYUAN, SHANXI PROVINCE
CHINA

has been subjected to an approval test in accordance with the Society's Rules with satisfactory results and is approved for the manufacture of the following products:
einer Zulassungsprüfung nach den Vorschriften des Germanischen Lloyd unterzogen wurde und für die Herstellung folgender Erzeugnisse zugelassen ist:

Forgings for Machine Construction and Shipbuilding
in accordance with the GL- Rules for Metallic Materials,
Chapter 2, Section 3.B

This approval is granted provided that all products intended to be used for the construction of ships or installations classed with Germanischer Lloyd comply in every respect with the Society's Rules and Requirements.
Die Zulassung erfolgt unter der Voraussetzung, dass alle Erzeugnisse, die zum Bau von Schiffen und Anlagen mit Klasse des Germanischen Lloyd bestimmt sind, die Vorschriften des Germanischen Lloyd in jeder Hinsicht erfüllen.

Certificate of approval No. WZ 2567 HH
Zulassungsbescheinigung Nr.

This Certificate is valid until: 2016-02-28
Diese Bescheinigung ist gültig bis:

Part of the approval is our letter of approval ref. no. 014009-13 of 2013-02-07.
Bestandteil der Zulassung ist das Zulassungsanschreiben, Tgb.-Nr. 014009-13 vom 2013-02-07.

Hamburg, 2013-02-07

Germanischer Lloyd

i.A.
Stefan Röhr

i.A.
Oliver Krömer

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GL-China MAIL IN
2013-02-21 000483
Date Reg.No.

GL

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Shanxi Taigang Stainless Steel Co. Ltd.
Profiling Plant
Attn. Mr. Xu Liwei
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Shanxi Province
030003 Taiyuan
China

GL Dalian Office File of GI
Incoming F E M Y A/D/I
Ref. No. DLC13-00417-1
Date 2013-03-05

Your reference	Your Letter of	Our reference	Extension	Date
		014009-13/OKoe	+49 40 3 61 49-4561	2013-02-07

Approval of your works for the manufacture of steel forgings

Dear Mr. Xu Liwei,

Thank you for your company's commitment to manufacture products with GL certification.

We refer to our Surveyor's report on the inspection of your works performed on 2012-12-19 and to the results of the approval test carried out on open die forgings made of unalloyed steel S44SY acc. to MAN B&W Material Sheet P 208-1 for the supply condition "normalized + tempered" (N+T) and low alloyed steel 42CrMo4 acc. to EN 10250-3 for the supply condition "quenched + tempered" (Q+T) each with dimensions of Ø400 mm and / or Ø200 mm and weight of 12,000 kg produced by Radial Forging Production Line as well as open die forgings made of unalloyed steel S44SY acc. to MAN B&W Material Sheet P 208-1 for the supply condition "normalized + tempered" (N+T) and low alloyed steel 42CrMo4 acc. to EN 10250-3 for the supply condition "quenched + tempered" (Q+T) for the supply condition "quenched + tempered" (Q+T) each with dimensions of Ø300 mm and / or Ø200 mm and weight of 5,000 kg produced by Quick Forging Production Line witnessed by him.

Additionally we received a description of your works, the manufacturing process and of your manufacturing and testing facilities.

As the review of these documents has shown us that our requirements are complied with we grant to your works our approval for the manufacture of steel forgings.

The material grades, supply conditions and dimensions / weights covered by the approval are indicated in the approval annex.

The manufacturing details covered by the approval are as follows:

1. **Products**
   Open die forgings made of unalloyed and low alloy steels intended for the manufacture of components and structural parts in machine construction and shipbuilding

2. **Manufacturing process**
   Steel Making Process - Radial Forging Production Line
   Electric arc furnace (EAF), secondary metallurgy by ladle furnace (LF), vacuum treatment by tank degasser (VD), ingot casting with bottom pouring for round raw ingots with weight of 6,000 kg or gating electrode blanks with weights of 2,900 kg, 5,600 kg or 9,220 kg, re-melting of gating electrode blanks by electroslag refining furnace (ESR) with ESR ingot sizes of Ø320 - Ø825 mm and weights of 2,500 - 16,000 kg, cutting, grinding, marking, stamping, final inspection, despatch

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Steel Making Process - Quick Forging Production Line
Electric arc furnace (EAF), secondary metallurgy by ladle furnace (LF), vacuum treatment by tank degasser (VD), ingot casting with bottom pouring for rectangular raw ingots with weight of 5,800 kg, grinding, marking, stamping, final inspection, despatch

Radial Forging Production Line (Diameter: Ø180 - Ø400 mm / Weight: max. 12,000 kg)
Inspection and preparation of raw material, reheating of ESR ingots by car-type or pit-type furnace of subcontractor Shanxi Guanjiaying Flange Forging Co., Ltd., upsetting process by hydraulic presses with forces up to 50 MN of subcontractor Shanxi Guanjiaying Flange Forging Co., Ltd. for steel ingot cogging, reheating of semi-finished ingots by chamber-type furnace, open die forging process by precision radial forging machine with forces up to 18 MN, 1st inspection, cutting, heat treatment, 2nd inspection, machining by milling machines, lathes and / or axis machining centres, non-destructive testing (NDT) such as ultrasonic testing (UT), magnetic particle inspection (MT) and / or visual inspection (VT), weight testing, marking, stamping, packaging, final inspection, despatch

Quick Forging Production Line (Diameter: Ø180 - Ø300 mm / Weight: max. 5,000 kg)
Inspection and preparation of raw material, reheating of rectangular raw ingots by annular-type or chamber-type furnace, open die forging process by double-pillar drop type compressor with forces up to 10 MN, 1st inspection, cutting, heat treatment, 2nd inspection, machining by milling machines, lathes and / or axis machining centres, non-destructive testing (NDT) such as ultrasonic testing (UT), magnetic particle inspection (MT) and / or visual inspection (VT), weight testing, marking, stamping, packaging, final inspection, despatch

3. **Prematerial suppliers**
   Only GL-approved material manufacturers which are approved by GL for the relevant products

4. **Fabrication welding**
   Not permitted

5. **Particulars**
   An outsourced process is a process that the need for its Quality Management System and which the organization chooses to have performed by an external party. That means in effect that an outsourced process can be performed by subcontractor (in our case material manufacturer Shanxi Guanjiaying Flange Forging Co. Ltd. approved by GL with existing certificate of approval no. WZ 1936 HH for process segment "upsetting process incl. reheating of ESR ingots") that is totally independent from the organization. It may be provided within the physical premises or work environment of the organization, at an independent site, or in some other manner.
   Where an organization chooses to outsource any process that affects product conformity to requirements according to the GL-Rules for Metallic Materials, the organization shall ensure control over such processes. The type and extent of control to be applied to these outsourced processes shall be defined within the Quality Management System.
   The organization has to demonstrate that it exercises sufficient control to ensure that this process is performed according to the relevant requirements. The nature of this control will depend on the importance of the outsourced process, the risk involved, and the competence of the service provider to meet the process requirements. The outsourced organization does not necessarily have to have a certified Quality Management System, but it has to demonstrate the capability of the previously mentioned processes. Furthermore, outsourced processes will interact with other processes from the organization's Quality Management System. These other processes may be carried out by the organization itself or may themselves be outsourced processes, but these interactions also need to be managed.
   That means in effect that the outsourced process by subcontractor Shanxi Guanjiaying Flange Forging Co. Ltd. also to be focussed on in the process for renewal of approval of material manufacturer Shanxi Taigang Stainless Steel Co. Ltd., Profiling Plant with existing certificate of

approval no. WZ 2567 HH.
The acquisition of outsourced processes will normally be subject to the capability of achieving the necessary control through the application of requirements. In our case there is the situation that frequently needs to be considered when deciding the appropriate level of control of an outsourced process, because the organization has the competence and ability to carry out a process, but chooses to outsource that process for commercial or other reasons. In this situation the process control criteria should already have been defined and can be transposed into requirements for the subcontractor of the outsourced process.
It may be necessary to define the methods to be used for control of the outsourced processes in a contract between the organization and the subcontractor. The potential impact of the outsourced process is based on the outsourcing's capability to provide product that conforms to requirements. The organization's control of the outsourced process has to be based on the need for product conformity to requirements. Ensuring control over outsourced processes does not absolve the organization of the responsibility of conformity to the requirements according to the GL-Rules for Metallic Materials.

Our approval is granted under provision that all forgings intended to be used for the outfit of ships classed with our Society will comply with our Rules in all respects and will be tested in the presence of our Surveyor.

The quality of your company's manufactured products, within the valid approved scope, contributes to the safety and reputation of GL classed ships.

Your company has been added to the list of approved manufacturers, which is regularly published on the Internet. In order to view the appropriate data start the GL website http://www.gl-group.com , from the menu "GL Tools" select "Approval Finder", and then "Manufacturers of Materials".

Enclosed please find our certificate of approval no. **WZ 2567 HH** , valid until 2016-02-28, as well as the corresponding annex.

We look forward to working with your company in the future and wish you every success.

Yours faithfully,

Germanischer Lloyd

i.A. Stefan Röhr

i.A. Oliver Krömer

Ref. no.: 014009-13

Manufacturer: Shanxi Taigang Stainless Steel Co. Ltd.

Profiling Plant

List 3: Forgings

Grade	Key	Supply Condition (1)	max. Thickness, mm	max. Weight	Remarks
S235J2G2 acc. to EN 10250-2	FF	N+T	400	12000 kg	
S235J2G3 acc. to EN 10250-2	FF	N+T	400	12000 kg	
S355J2G3 acc. to EN 10250-2	FF	N+T	400	12000 kg	
C22 acc. to EN 10250-2	FF	N+T	400	12000 kg	
C25 acc. to EN 10250-2	FF	N+T	400	12000 kg	
C25E acc. to EN 10250-2	FF	N+T	400	12000 kg	
C30 acc. to EN 10250-2	FF	N+T	400	12000 kg	
C35 acc. to EN 10250-2	FF	N+T	400	12000 kg	
C35E acc. to EN 10250-2	FF	N+T	400	12000 kg	
C40 acc. to EN 10250-2	FF	N+T	400	12000 kg	
C45 acc. to EN 10250-2	FF	N+T	400	12000 kg	
C45E acc. to EN 10250-2	FF	N+T	400	12000 kg	
20Mn5 acc. to EN 10250-2	FF	N+T	400	12000 kg	
28Mn6 acc. to EN 10250-2	FF	N+T	400	12000 kg	
S20S acc. to MAN B&W Material Sheet P 140-2	FF	N+T	400	12000 kg	
S30S acc. to MAN B&W Material Sheet P 170-1	FF	N+T	400	12000 kg	
S36S acc. to MAN B&W Material Sheet P 191-1	FF	N+T	400	12000 kg	
S39S acc. to MAN B&W Material Sheet P 197-1	FF	N+T	400	12000 kg	
S44S acc. to MAN B&W Material Sheet P 207-1	FF	N+T	400	12000 kg	
S44SY acc. to MAN B&W Material Sheet P 208-1	FF	N+T	400	12000 kg	
S45SU acc. to MAN B&W Material Sheet P 231-1	FF	N+T	400	12000 kg	
25CrMo4 acc. to EN 10250-3	FF	Q+T	400	12000 kg	
34CrMo4 acc. to EN 10250-3	FF	Q+T	400	12000 kg	
42CrMo4 acc. to EN 10250-3	FF	Q+T	400	12000 kg	

Key: FA Fibre Flow Forging FF Hammer Forging GE Die Forging HZ Prematerial ST Forged Bars

(1):

AC, AF, AR = as cast, as forged, as rolled
CR = controlled rolled
F = ferritized
HF = hot formed
N = normalized
N+T = normalized + tempered
Q+T = quenched + tempered
SH = surface hardened
S+Q = solution annealed + quenched
TM = thermomechanically rolled

(2):

CC = continuous casting
IC = ingot casting