Certificate number: 14713/E0 BV
File number: MAT 1176
Product code: 8153I

This certificate is not valid when presented without the full attached schedule composed of 7 sections

www.veristar.com

APPROVAL CERTIFICATE for MATERIALS

This certificate is issued to

Doosan Enerbility Co., Ltd.

CHANGWON - KOREA (REPUBLIC OF)

for the type of product

STEEL FORGINGS

Forgings for crankshafts in carbon steels and alloy steels of maximum weight 270 tons

Requirements:
Bureau Veritas Rules on Materials and Welding for the Classification of Marine Units

This certificate is issued to attest that Bureau Veritas Marine & Offshore did undertake the relevant approval procedures for the product identified above which was found to comply with the relevant requirements mentioned above.

This certificate will expire on: 24 Feb 2031

For Bureau Veritas Marine & Offshore,
At BV PUSAN, on 24 Feb 2026,
Seungbeom HONG

This certificate was created electronically and is valid without signature

This certificate remains valid until the date stated above, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Bureau Veritas Marine & Offshore. Should the specified regulations or standards be amended during the validity of this certificate, the product(s) is/are to be re-approved prior to it/they being placed on board vessels to which the amended regulations or standards apply. This certificate is issued within the scope of the General Conditions of Bureau Veritas Marine & Offshore available on the internet site www.veristar.com. Any Person not a party to the contract pursuant to which this document is delivered may not assert a claim against Bureau Veritas Marine & Offshore for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel of the Society or of its Agents in establishment or issuance of this document, and in connection with any activities for which it may provide.

THE SCHEDULE OF APPROVAL

1. PRODUCT DESCRIPTION :

Steel forgings for crankshafts in carbon steels and alloy steels of maximum weight 270 tons.
Steelmaking by Electric Arc Furnace, Ingot casting.
Forgings delivered in normalised and tempered condition.

Typical grades are 34CrNiMo6, M60.6 KW, S34MnV as per Engine maker's specifications.

2. DOCUMENTS AND DRAWINGS :

2.1 - Documents issued by Doosan Heavy Industries & Construction Co., Ltd.
- "Documents for type approval" dated 16 November 2004.
- "Procedure FNG-0012 Rev.0" dated 15 May 2001.

2.2 - As per following documents issued by Man Energy Solutions:
-"Quality specification N° 0743099-1.3" dated December 2018.

3. TEST REPORTS :

3.1 - Documents issued by Doosan Heavy Industries & Construction Co., Ltd.
- Certificates of inspection No.0738PSN02 dated 26 October 2002 and No.2919PSN03 dated 20 March 2004.
- "H1487 Crancksaft - Quality documentation file" dated 21 February 2020.

4. APPLICATION / LIMITATION :

4.1 - As per Bureau Veritas Rules on Materials and Welding for the Classification of Marine Units.
4.2 - Chemical composition and mechanical properties requirements are to be as per Bureau Veritas Rules on Materials and Welding for the Classification of Marine Units, and/or alternative specification mentioned on reviewed drawings, as applicable.

5. PRODUCTION SURVEY REQUIREMENTS :

5.1 - The steel forgings are to be supplied by Doosan Enerbility Co., Ltd. in compliance with the type and the requirements described in this certificate.
5.2 - This type of product is within the category IBV of Bureau Veritas Rule Note NR320.
5.3 - BV product certificate is required.
5.4 - For information, Doosan Enerbility Co., Ltd. has declared to Bureau Veritas the following production site:

Doosan Enerbility Co., Ltd.
22, Doosan Volvo-ro,
Seongsan-gu,
51711 CHANGWON
KOREA (REPUBLIC OF)

6. MARKING OF PRODUCT :

6.1 - Each steel forging that has been tested with satisfactory results are to be marked with the following information:
- Manufacturer’s name or trademark
- Bureau Veritas’ Mark
- Identification marking enabling traceability, such as cast number, heat number, or batch number
- Material grade and classification
- Additional markings where applicable, such as test pressure or specific inspection references

Additional marking requirements specific to steel forging shall be in accordance with the “Marking” article in the relevant section of Bureau Veritas NR216 Rules on Materials and Welding for the Classification of Marine Units.

7. OTHERS :

7.1 - It is Doosan Enerbility Co., Ltd.'s responsibility to inform shipbuilders or their sub-contractors of the proper methods of fitting, use and general maintenance of the approved equipment and the conditions of this approval.
7.2 - This certificate supersedes the Type Approval Certificate N° 14713/D0 BV issued by the Society.

***** END OF CERTIFICATE *****