

TYPE APPROVAL CERTIFICATE

This is to certify:**That the Sacrificial Anode Material for Corrosion Protection**with type designation(s)
Defender G3

Issued to

Aberdeen Foundries
ABERDEEN, ABERDEENSHIRE, United Kingdom

is found to comply with

DNV GL class programme DNVGL-CP-0107 – Type approval – Sacrificial anode materials
Det Norske Veritas' Recommended Practices, DNV-RP-B401 Cathodic Protection Design**Application :****The mean current capacity of the sacrificial anode material after 12 months free running testing is 2542 Ah/kg, the mean closed circuit potential is about -1090 mV vs. Ag/AgCl seawater. Approval is given for use in sea water at temperatures below 30°C.****Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.**This Certificate is valid until **2022-01-23**.Issued at **Høvik** on **2017-01-24**DNV GL local station: **Aberdeen**for **DNV GL**Approval Engineer: **Gisle Hersvik**

Martin Strande
Head of Section

This Certificate is subject to terms and conditions overleaf. Any significant change in design or construction may render this Certificate invalid. The validity date relates to the Type Approval Certificate and not to the approval of equipment/systems installed.

Product description

Defender G3; aluminium based sacrificial anode material.

Application/Limitation

Approval is given for the sacrificial anode material; not for anode design.

The mean current capacity of the sacrificial anode material after 12 months free running testing is **2542 Ah/kg**, the mean closed circuit potential is about -1090 mV vs. Ag/AgCl seawater. The mean anode current density was measured to 0.6 A/m².

The recommended design electrochemical capacity for aluminium based alloys in seawater is 2000 Ah/kg (ref. DNV-RP-B401).

The approval is given for use in seawater at temperatures below 30°C.

Type Approval documentation

Tests carried out

Type Testing carried out according to **Type Approval documentation**, refer to Test Report from DNV Bergen, BGN-R2704271 of 2004-07-22 for details on testing performed.

Testing has been performed with basis in DNV-RP-B401 (1993).

Marking of product

Product shall be marked with "**AF**" plus cast no. (xxddmmyy A), where A = G3 alloy.

The marking is to be carried out in such a way that it is visible, legible and indelible. The marking of product is to enable traceability to the DNV GL Type Approval Certificate.

Periodical assessment

The scope of the Periodical Assessment is to verify that the conditions stipulated for the Type Approval is complied with and that no alterations are made to the product design or choice of materials.

Periodical Assessment to be performed after 2 and 3.5 years (Certificate Retention) and at renewal after 5 years (Certificate Renewal).

The main elements of the Periodical Assessment are to:

- Ensure that **Type Approval documentation** is available.
- Review design, materials, production process, and performance with respect to possible changes, in order to ensure compliance with **Type Approval documentation** and/or referenced material specifications.
- Ensure traceability between manufacturer's product marking and DNV GL Type Approval Certificate.

END OF CERTIFICATE