DNV·GL

Certificate No:
TAS00000MM

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Sacrificial Anode Material for Corrosion Protection

with type designation(s)
Duralnode XP Aluminium Alloyed Sacrificial anodes,
Duralnode LD Marathon Aluminium Alloyed Sacrificial anodes

Issued to
MME Engineering Ltd.
Faversham, United Kingdom

is found to comply with
DNV GL class programme DNVGL-CP-0107 – Type approval – Sacrificial anode materials
DNV GL rules for classification – Ships
DNV GL offshore standards
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 2722 Ah/kg (Duralnode XP) and 2929 Ah/kh (Duralnode LD Marathon). The mean closed circuit potential is -1082 mV vs. Ag/AgCl seawater (Duralnode XP) and -1079 mV vs. Ag/AgCl seawater (Duralnode LD Marathon). The approval is given for use in seawater 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 **2021-08-15**.
Issued at **Høvik** on **2016-08-16**

DNV GL local station: **Southampton**

Approval Engineer: **Gisle Hersvik**

for **DNV GL**

Digitally Signed By: Strande, Martin
Location: DNV GL Høvik, Norway
Signing Date: 2016-08-17

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.

Job Id: **262.1-019622-1**
Certificate No: **TAS00000MM**

Product description

Al-Zn-In-based Sacrificial Aluminium Anode Materials;
Duralnode XP
Duralnode LD Marathon

	Duralnode LD Marathon	**Duralnode XP**
Cu	≤0.003%	≤0.005%
Si	≤0.05%	≤0.05%
Fe	≤0.06%	≤0.09%
Zn	2.5-5.5%	2.5-5.0%
In	0.015 – 0.40%	0.015-0.40%
Ti	0.01-0.02%	0.01-0.02%
Others each	≤0.02%	≤0.02%
Others total	≤0.05%	≤0.05%
Aluminium	Balance	Balance

Application/Limitation

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

For cathodic protection of permanent and semi-permanent offshore and civil engineering structures, including FPSO's, buoys, ships etc.

The mean current capacity of the sacrificial anode material after 12 months free running testing is calculated to be;
Duralnode XP: **2722** Ah/kg.
The mean closed circuit potential is -1082 mV vs. Ag/AgCl seawater.
Duralnode LD Marathon: **2929** Ah/kg.
The mean closed circuit potential is -1079 mV vs. Ag/AgCl seawater.

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

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

Type Approval documentation

1. Application for Type Approval of 2015-03-24.
2. Assessment Report from DNV GL Southampton of 2015-04-14.
3. DNV GL Technical Report No. 2016-5214, Rev. 0 "Long term anode testing of two Al-Zn-In-based alloys at 7-10°C according to DNV-RP-B401 (2010), Annex C" of 2016-06-27 – issued to Materiaal Metingen Europe B.V.
4. ITS-9801-0001-Rev A-000-NN0 Supplement to Type Approval SA Application DNV.
5. ITS-9801-0001-Rev 0-000-NN0 Supplement to Type Approval SA Application DNV.

Tests carried out

Type Testing carried out according to **Type Approval documentation**. Refer to DNV GL Technical Report No. 2016-5214, Rev. 0 "Long term anode testing of two Al-Zn-In-based alloys at 7-10°C according to DNV-RP-B401 (2010), Annex C" of 2016-06-27 for details on testing performed.

Testing has been performed with basis in DNV-RP-B401 (2010).

Marking of product

For traceability to this Type Approval Certificate, the products are to be marked with *Manufacturer's name/logo* and *type designation/trade name* and *heat/trace no.*.

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 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 the DNV GL Type Approval Certificate.

END OF CERTIFICATE