



Certificate no.:
TAS0000505

TYPE APPROVAL CERTIFICATE

This is to certify:

that the **Sacrificial Anode Material for Corrosion Protection**

with type designation(s)

HYAL: Al-Zn-In-based Sacrificial Anode Material

issued to

Jiaozuo Huayu Magnesium Co., Ltd.
Jiaozuo, Henan Province, China

is found to comply with

DNV class programme DNV-CP-0107 – Type approval – Sacrificial anode materials

DNV recommended practice DNV-RP-B401 – Cathodic protection design, May 2021

Application:

The mean current capacity of the sacrificial anode material after 12 months galvanostatic control testing is 2441 Ah/kg. The mean closed circuit potential is -1096 mV vs. Ag/AgCl seawater.

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.

Issued at **Hamburg** on **2025-09-19**

This Certificate is valid until **2030-09-18**.

for **DNV**

DNV local unit: **Qingdao NB & CMC**

Approval Engineer: **Gisle Hersvik**

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.

LEGAL DISCLAIMER: Unless otherwise stated in the applicable contract with the holder of this document, or following from mandatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees ("DNV") arising from or in connection with the services rendered for the purpose of the issuance of this document or reliance thereon, whether in contract or in tort (including negligence), shall be limited to direct losses and under any circumstance be limited to USD 300 000.

Product description

HYAL: Al-Zn-In-based Sacrificial Anode Material.

Chemical composition (%):

Zn	In	Si	Fe	Cu	Cd	Pb	Al
2.5-5.75	0.015-0.040	0.12 max.	0.09 max.	0.003 max.	0.002 max.	na.	Remainder

Place of manufacture

Jiaozuo Huayu Magnesium Co., Ltd., No. 218, Hetang Road, Middle Section of Heshuo Avenue, Wuzhi County, Jiaozuo City, 454950 Henan Province, P.R. China

Application/Limitation

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

Anodes may be installed on vessels, platforms and subsea constructions according to manufacturer's recommendations.

The mean current capacity of the sacrificial anode material after 12 months galvanostatic control testing is calculated to be **2441** Ah/kg. The mean closed circuit potential is -1096 mV vs. Ag/AgCl seawater.

The recommended design electrochemical capacity for aluminium based alloys in seawater is 2000 Ah/kg (ref. DNV-RP-B401) for use in seawater at temperatures up to 30°C. Please observe Guidance note in para. 10.4.4 of DNV-RP-B401.

DNV-RP-B401, Edition May 2021, Table 8-6, gives recommended design electrochemical capacity and design closed circuit potential for anode materials at seawater ambient temperatures:

Anode material	Anode surface temperature [°C]	Seawater exposure	
		Closed circuit potential [V]	Electrochemical capacity [Ah/kg]
Al-Zn-In	≤30	-1.050	2,000
	60	-1.050	1,500
	80	-1.000	720

Type Approval documentation

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**, including 12 months testing reported in Test Report JQ2554215XY 'Chemical composition and Long-term Electrochemical Test' from Qingdao Ship Materials Testing Station for Corrosion and Protection of China Shipbuilding Industry of 2025-09-05.

Testing has been performed with basis in DNV-RP-B401 (2021).

Marking of product

The products are to be marked: **HY AL XXXXXXXXXX** (HY: company trademark; AL: material type; XXXXXXXXXX: serial no. (traceable back to manufacturing year, month, date, and heat 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 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 assessments (for Certificate Retention / Certificate Renewal) shall be performed according to DNV-CP-0338.



Job ID: **262.1-041645-1**
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This certificate is only valid if required Periodical assessments are carried out with satisfactory results. To check the validity of this certificate, please look it up in <https://approvalfinder.dnv.com>

END OF CERTIFICATE