Certificate No:
TAS0000309

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Sacrificial Anode Material for Corrosion Protection

with type designation(s)
CP-HZn

Issued to
K.C. LTD.
Busan, **Republic of Korea**

is found to comply with
DNV GL class programme DNVGL-CP-0107 – Type approval – Sacrificial anode materials
DNV GL recommended practice DNVGL-RP-B401 – Cathodic protection design, June 2017

Application :

The mean current capacity of the sacrificial anode material after 12 months free running testing is 781 Ah/kg. The mean closed circuit potential is -1002 mV vs. Ag/AgCl/Seawater. The approval is given for use in sea water at temperatures up to maximum 60ºC.

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

Issued at **Høvik** on **2021-05-04**
This Certificate is valid until **2026-05-03**.
DNV local station: **Gimhae Station**

Approval Engineer: **Gisle Hersvik**

for **DNV**

Gustav Heiberg
Head of Section

Product description

CP-HZn: Sacrificial Zinc Alloy Anode Material intended for use in hot sea water (up to 60°C)..

Chemical Composition (%):

Fe	Cd	Pb	Cu	Al	Mg	Zn
0.002 max	0.001 max	0.006 max	0.001 max	0.10-0.25	0.05-0.15	Remainder

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 calculated to be **781 Ah/kg**. The mean closed circuit potential is –1002 mV vs. $Ag/AgCl_{(seawater)}$. Mean anodic current density 0.29 A/m^2.

The test temperature during the test period was approx. 60ºC.

The recommended design electrochemical capacity for zinc-based alloys in seawater is 780 Ah/kg (ref. DNVGL-RP-B401).

The approval is given for use in sea water at temperatures below 60°C. The anode material is intended for use in hot sea water applications and testing has justified 780 Ah/kg.

For zinc anodes buried in seawater sediments, please refer to below table for design electrochemical capacity for temperatures up to maximum 50ºC:

Seawater temperature [ºC]	Design electrochemical capacity [Ah/kg]		Reference
	Immersed in seawater	Buried in seawater sediments	
≤30	780	700	DNVGL-RP-B401
30	780	750	ISO 15589-2
40	780	580	
50	780	580	

* ISO 15589-2:2012 *Petroleum, petrochemical and natural gas industries -- Cathodic protection of pipeline transportation systems -- Part 2: Offshore pipelines*.

Type Approval documentation

Tests carried out

Type Testing carried out in accordance with **Type Approval documentation**. Refer to KTR Technical Report No. TBK-2019-008350, Rev. 01 “QUALIFICATION TESTING OF GALVANIC ANODE CP-HZn” of 2020-12-31 for details on the testing performed.

Testing has been performed with basis in DNVGL-RP-B401 (June 2017).

Marking of product

Product shall be marked with *manufacturer’s name*; **K.C. Ltd., Korea** and *type designation*: “**CP-HZn**”

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 and Certificate Renewal) shall be performed according to DNVGL-CP-0338.

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.dnvgl.com

END OF CERTIFICATE