DNV·GL

Certificate No:
TAS00001FR

TYPE APPROVAL CERTIFICATE

This is to certify:

That the Sacrificial Anode Material for Corrosion Protection

with type designation(s)
DIMET Zinc Anode (DNV-Z)

Issued to
Tri-Star Industries Pte Ltd
Singapore, Singapore

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 recommended practice DNVGL-RP-B401 – Cathodic protection design, June 2017
NORSOK Standard M-503 Cathodic protection, Edition 3, May 2007

Application :

The mean current capacity of the sacrificial anode material after 12 months galvanostatic control testing is 795 Ah/kg. The mean closed circuit potential is -1030 mV vs. Ag/AgCl seawater. The approval is given for use in seawater at temperatures below 50°C.

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

This Certificate is valid until **2023-05-31**.

Issued at **Høvik** on **2018-06-01**
DNV GL local station: **Singapore** for **DNV GL**

Approval Engineer: **Gisle Hersvik**

Rikard Törnqvist
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.

© DNV GL 2014. DNV GL and the Horizon Graphic are trademarks of DNV GL AS.

Job Id: **262.1-028106-1**
Certificate No: **TAS00001FR**

Product description

DIMET Zinc Anode (DNV-Z): Sacrificial Zinc Alloy Anode Material for Corrosion Protection.

Chemical Composition (%):

Al	Pb	Cu	Cd	Fe	Zn
0.10-0.50	0.006 max	0.005 max	0.025-0.150	0.005 max	Remainder

Manufactured by

SBN INDUSTRIES SDN BHD, No. 6, Jalan Penaga, Kawasan Perindustrian Kota Puteri, 81750 Masai, Johor, West Malaysia

DNV GL local station: Singapore

Responsibility

The Company (stated on the front page of this Certificate) takes the responsibility that both design and production are in compliance with Rules, Standards and/or Regulations listed on page 1 of this certificate.

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 galvanostatic control testing is **795 Ah/kg**. The mean closed circuit potential is -1030 mV vs. Ag/AgCl seawater.

The recommended design eletrochemical 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 50°C. For zinc anodes buried in seawater sediments, please refer to below table for design eletrochemical capacity for temperatures up to maximum 50ºC:

Seawater temperature [ºC]	Design eletrochemical 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 according to **Type Approval documentation**. Refer to SBN Test Report No. SBN/OCT2016-01 for details on testing performed.

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

Marking of product

Product shall be marked with **SBN INDUSTRIES SDN BHD, Johor, Malaysia** and *type designation*.

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 the DNV GL Type Approval Certificate.

END OF CERTIFICATE