

## **STATEMENT OF TECHNICAL REQUIREMENT FOR SACRIFICIAL ZINC ANODE STEEL FLANGES**

1. **Functionality**. Sacrificial Zinc anodes integrated with steel flanges are used onboard to control corrosion of pipes, valves, pumps etc which are in contact with seawater, by Galvanic Cathodic Protection process, where zinc of the anode flange gets sacrificed. These flanges are installed in sea water piping circuits of systems like weight management, Fuel Oil, Diesel Generator cooling, Aft and Forward cooling.

2. **Types of Flanges**. Requirement exists for two types of Sacrificial Zinc anode Steel Flanges :-

- (a) Operating Pressure 35 bar.
- (b) Operating Pressure 13 bar.

3. **Flange Body Material**.

- (a) Non alloy steel S355 K2G3.
- (b) Non alloy steel S355 K2+N.

4. **Construction**. Sacrificial Zinc anode Steel Flanges comprises of the steel Flanges, Zinc lining, Steel inserts coated with tin powder, braids and lugs for grounding etc.

5. **Manufacturing**. Manufacturing of Sacrificial Zinc anode Steel Flanges involves intricate machining to create groove inside the flanges, filling of zinc lining through centrifugal casting, welding of tin powder coated steel insert on the flanges.

(a) **Machining of Flange Body**. Fillet of the dovetail chamber is to be produced very carefully, without tool marks. Hole drilling for the bolting material is perpendicular to the joint seating surface and in compliance with the angular spacing. Joint seating surfaces machining is to be done by turning or any other method producing spiral or concentric ridges. Radial ridges or scratches are prohibited.

(b) **Zinc Lining Work procedure**. This is done by Centrifugal casting. Centrifugal casting is applicable to revolving parts or parts liable to be easily driven in rotation around the longitudinal axis of the part to be lined. The lining metal, previously heated and liquefied, is poured by gravity into the volume to be lined (circular dovetail chamber) driven by a rotating movement. Under centrifugal force exposure, the molten metal distributes quite evenly over the entire surface to be lined and when the liquid ring is formed, it is solidified by a cooling process of the part. The advantage of this process is in the fact that the lining metal solidification is carried out under centrifugal driving force, and progresses in a centripetal direction. The result is a regular adhesion and lining compactness because, under the centrifugal force exposure of the heaviest

element, being the metal, shifts outwards beating the gases inwards. The blow-holes are therefore located in the excess thickness.

6. For information, the zinc volumes and masses are listed below:-

ND	20	32	40	50	65	80	100	125
Volume (mm <sup>3</sup> )	22006	73034	89858	126492	164596	223033	313233	446977
Mass (Kg)	0,16	0,52	0,64	0,90	1,17	1,59	2,23	3,18

7. After the lining, each flange must be machined over again to size the inner face of the zinc excess thickness and eliminate the surface scale and obtain a clean zinc featuring constant dimensional characteristics.

8. **Inspection Document to be Provided by the Manufacturer on Delivery.** Type « 3.1 » reception certificate according to NF EN 10204, 01/2005 edition providing the following documents:-

- (a) Material certificates for the bodies, the inserts, the zinc, the tin and the electrodes.
- (b) Roughness inspection report (roughness class numbers) of the joint seating surfaces.
- (c) Dimensional inspection report.
- (d) Zinc adhesion sounding inspection report.