Technical Product Information
CATHODIC PROTECTION
System Design

corrpro®

EXTERNAL HULL

Cathodic protection systems can be designed either by experienced Corrpro service engineers visiting a vessel or in the company's design and estimating offices. When necessary, Classification Society approval can be obtained on an owners' behalf.

In order to design cathodic protection systems, Corrpro requires the following information.

Actual Wetted Surface Area (WSA) Which Can Be Calculated from
SHIPS HULLS
Principal dimensions, ie. length between perpendiculars, breadth moulded and maximum draught (if protection is required to stern frame and rudder system only the maximum draught and or dwt tonnage are required)
Block coefficient
Type of coatings
Desired system life
Nature of service
Is propeller bonded with slip-ring?
Number of propellers, rudders, thrusters, seachests
Any special factors?

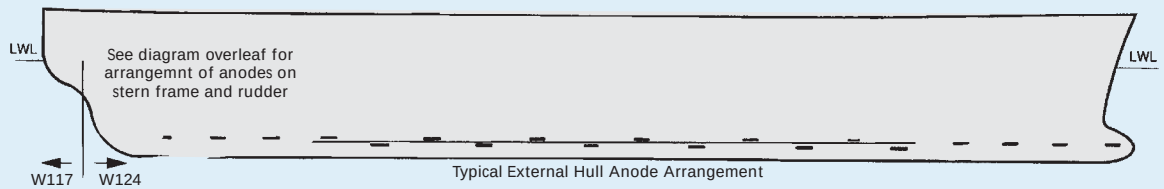
Anode requirements – Full Hull

The number and type of galvanic anodes required to protect the external hull of a specific vessel are calculated by taking into account several factors - size, the type of vessel, service conditions and the condition of the hull - whether it is new or in service.

Current density requirements vary for each vessel but the following table gives a general indication of recommendations for a broad range of vessel types.

Type of Vessel	New Building mA/m²	In Service mA/m²
Ocean-going ships (SPC coated)	10	15
Other ocean-going ships	12	15
Coasters	14	20
Ro-Ro ferries	14	20
Trawlers	22	24
Kort nozzle tugs	22	24
Dredgers	24	27
Ice vessels	25	30
Tugs	18	22

Having determined the number of anodes required, it is important to ensure that the current distribution is effective. With the propeller located at the stern of the vessel - an area of major turbulence - it is necessary to fit a higher proportion of the anodes in the after part of the vessel, particularly close to the propeller..



Typical External Hull Anode Arrangement

The diagram above shows a typical anode distribution for a large vessel.

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EXTERNAL HULL

As a guide, it is recommended that 60% of the anodes are mounted in the after half and the balance in the forward section. Due to the possibility of the anchor cables abrading the forward quarters and removing the paint, more anodes should be fitted in this part rather than at midships. Positions where the anchor actually contacts the hull should be avoided.

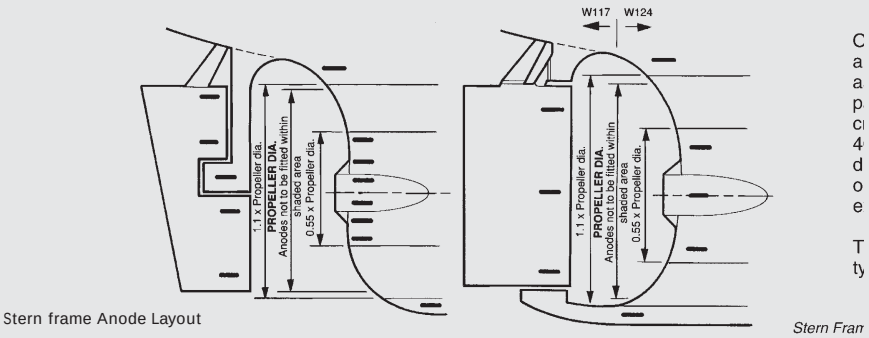
Anode requirements – Stern frame Protection

For stern frame and rudder protection, Corrpro have devised the following tables of typical quantities and types of anodes required for various sizes of vessel.

Draft (metres)	DWT (tonnes)	Number of Anodes W117	or W124	or W14Z
4.5 – 7	2,000 – 5,000	12		14
7 – 8	5,000 – 8,000	14		18
8 – 9	8,000 – 10,000	16		20
9 – 10	10,000 – 20,000	18		22
10 – 11	20,000 – 30,000	20		26
11 – 12	30,000 – 40,000	24		30
12 – 13	40,000 – 60,000	30		38
13 – 14	60,000 – 80,000	36		44
14 – 15	80,000 – 115,000	40	24	50
15 – 17	115,000 – 200,000	52	30	64
17 – 19	200,000 –	66	38	82

Once the quantity of anodes required has been assessed, distribution, particularly in this area, is critical. For vessels of 40,000 dwt or more, the distance between anodes on the rudder should not exceed 4m.

The diagram below shows typical systems.



Stern frame Anode Layout

With all stern frame systems, anodes should be positioned to avoid areas of the hull lying directly ahead of the propeller blade tips and in the area within the outer half of the propeller radius. Anodes placed in these positions can cause cavitation and a consequent reduction in the efficiency of the propeller.

If the propeller is bonded to the hull by a slipring, the number of anodes required, as shown in the table, will increase by 30%.

Installation Drawings

Plans showing anode layout, traced from owners' drawings, are provided free of change when anodes are supplied. Bilge keels are not usually shown on a GA drawing so it is important that Corrpro is always advised of the extent and location of the bilge keels.

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