Yacht & Powerboat
Issue 6.0

MGDUFF
...trust the name

Anode Product Guide &
Cathodic Protection Handbook

MGDUFF

MGDUFF is the UK's original marine cathodic protection company.

In the early 1950's Merlin Graham "Chunky" Duff, partnered by naval architects and marine engineers, developed and set the standards for ship and small craft corrosion protection. Sixty years on these are still the accepted principles and our continuous development builds on that heritage, keeping pace with modern vessel design and construction.

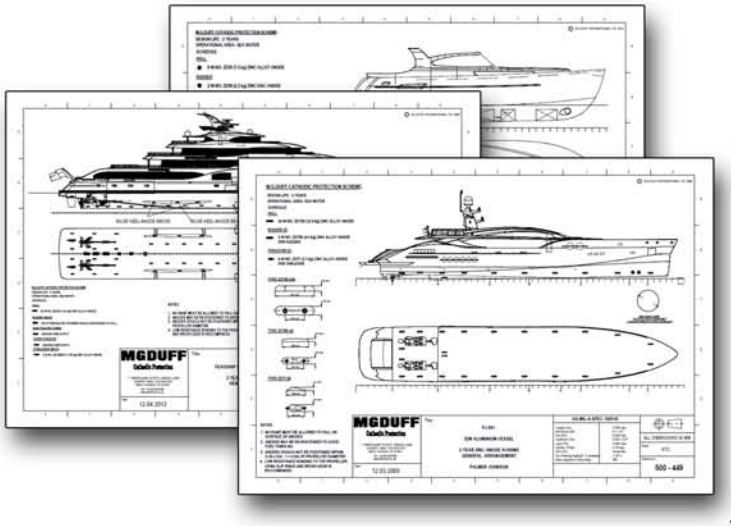
Sacrificial anodes in zinc, aluminium and magnesium are manufactured at our foundries here in the UK, in accordance with internationally approved specifications and using the highest purity ingredients.

MGDUFF products are specified and fitted by leading European yacht and boat builders, commercial shipping companies and ship repair yards. Experienced personnel offer customers cathodic protection schemes, full technical back-up and produce anode designs for ships, tugs, ferries, and superyachts.

FOUNDRY

MGDUFF's main foundry and warehouse, located at our south coast head office in Chichester, has the flexibility to meet short lead time requirements on bespoke anodes whilst maintaining excellent stock levels on standard items. All anodes are manufactured to strict quality standards through an ISO 9001 Quality Management System, and in particular our zinc anodes meet the stringent US Mil-A-18001K specification code.

Each melt is batch tested using our in-house spectrometer to check chemical composition. This ensures the correct percentage of alloying materials has been added, producing only a top quality anode.



CORROSION WILL OCCUR IN ALL TYPES OF WATER WITH DRAMATIC EFFECT

Metals of differing electrochemical potential when in contact with one another form Galvanic cells. The metal with a lower potential in the galvanic cell will be anodic and will corrode. The same effect can occur in areas of different electrochemical potential in a single piece of metal such as a steel plate. Any craft moored and operating in fresh, salt or estuarine water is at risk from corrosion and the effects can be costly.

Corrosion on Steel & Aluminium vessels can be identified as either areas of localised pitting to the hull plate, rudders, bilge keels etc. or less obviously in the form of general wastage of the hull plating often occurring below the paint coating. Pitting can lead to the complete penetration of the hull below the waterline. General wastage of the steel can be just as critical, weakening the hull and necessitating expensive re-plating.

Corrosion on Aluminium vessels is also generally in the form of localised pitting to the hull plate, rudders, bilge keels and particularly in way of weld seams. Pitting can lead to the complete penetration of the hull below the waterline necessitating expensive re-plating.

On Wood and GRP vessels the areas of concern are principally the stern gear i.e. The propellers, shafts, shaft brackets, stern tubes and rudders which are expensive to replace and vital to the vessel, the failure of a propeller or rudder could have disastrous consequences. The effects of corrosion can vary from pitting of propellers and shafts to the decomposition of the alloy of propeller. The failure of something as small and inexpensive as a split pin can result in the loss of the propeller.

Stray current leakage is quite often cited as the cause of corrosion on all types of vessel however more often than not the problem can be traced to a galvanic action. Stray current leakage is the action of electrical current from an external power source such as a battery or shore power supply which because of some electrical system fault on board the vessel passes out through the hull or a fitting in the hull and flows through the water causing “Electrolytic” corrosion. Stray current leakage is usually a result of damage or wear to the wiring system or poor installation of wiring or electrical equipment.

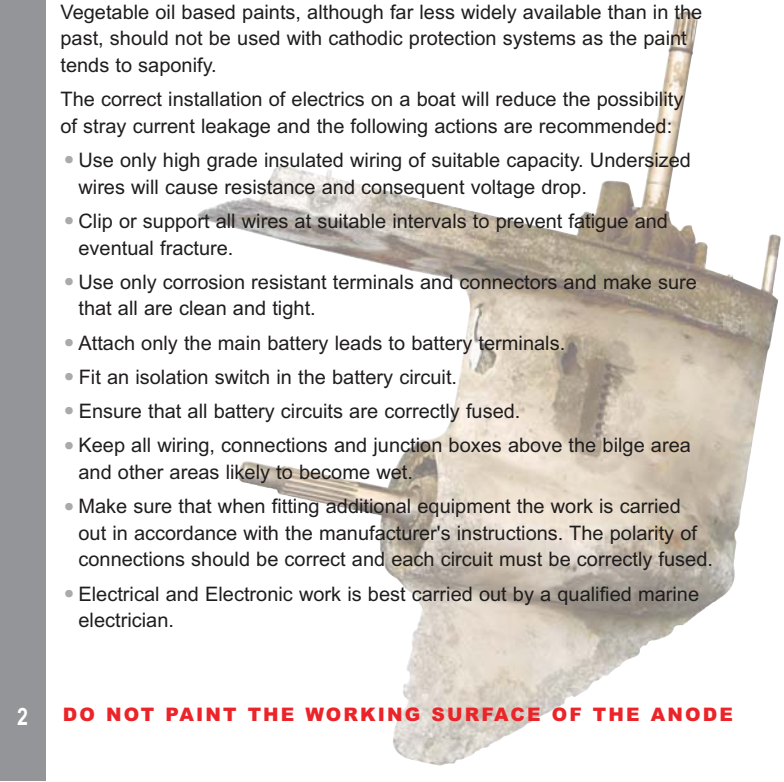
WHAT CAN BE DONE TO PREVENT CORROSION?

The selection of materials is of prime importance in the construction of craft. Generally naval architects and boat builders ensure that they select metals which are as far as possible compatible to each other and when this is not possible metals must be isolated from one another. There will always be occasions when fittings or steel-work require replacement or repair and it is important that when this is done attention is paid to the same criteria. In particular ensure that fastenings and split pins are compatible and of the highest quality. The paint system on any boat is an important first barrier against corrosion. Seek advice from the paint manufacturers for their recommendations on the most appropriate coating system and follow the application instructions completely. Ensure that a good anti-corrosive primer is applied if anti fouling is to be used. When using a copper based anti-fouling none of the paint must be applied directly to bare metal surfaces.

Vegetable oil based paints, although far less widely available than in the past, should not be used with cathodic protection systems as the paint tends to saponify.

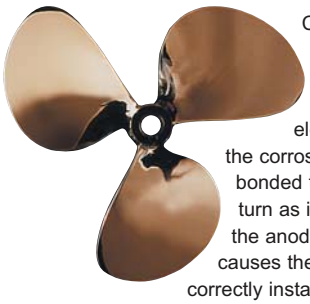
The correct installation of electrics on a boat will reduce the possibility of stray current leakage and the following actions are recommended:

- Use only high grade insulated wiring of suitable capacity. Undersized wires will cause resistance and consequent voltage drop.
- Clip or support all wires at suitable intervals to prevent fatigue and eventual fracture.
- Use only corrosion resistant terminals and connectors and make sure that all are clean and tight.
- Attach only the main battery leads to battery terminals.
- Fit an isolation switch in the battery circuit.
- Ensure that all battery circuits are correctly fused.
- Keep all wiring, connections and junction boxes above the bilge area and other areas likely to become wet.
- Make sure that when fitting additional equipment the work is carried out in accordance with the manufacturer's instructions. The polarity of connections should be correct and each circuit must be correctly fused.
- Electrical and Electronic work is best carried out by a qualified marine electrician.



- Ongoing maintenance on your boat is essential. Metal work, paint coatings and electrical installations all require regular inspection. In particular you should inspect the wind and water line area if owning a steel vessel. This area is particularly vulnerable because it is often prone to mechanical damage but derives no protection from an anode system being above the water line.

WHAT IS CATHODIC PROTECTION?



Cathodic protection is an electrochemical process which halts the natural reaction (corrosion) of metals in a particular environment by superimposing an electrochemical cell more powerful than the corrosion cell. Sacrificial Anodes are fitted or bonded to the metal to be protected which in turn as it has a greater electrical potential than the anode material becomes cathodic and causes the anode to waste instead of itself. In a correctly installed MGDUFF Cathodic Protection System the only corrosion occurs to the sacrificial anode which is replaceable. The number and size of anodes is determined by the type of material and the surface area being protected.

The term bonding refers to the connection of the anode to a remote metal component such as the propeller shaft or rudder stock and it should be remembered that the integrity of the bonding is critical to the effectiveness of the cathodic protection system.

Several factors determine the type of cathodic protection system fitted. Firstly the environment in which the vessel is operating, secondly the size and type of construction and finally the length of time that the vessel is likely to be afloat before the next maintenance slipping.

FIT THE CORRECT ANODE MATERIAL FOR THE WATERS YOUR VESSEL IS OPERATING IN

As a general rule owners should fit the anodes suitable for the environment they most regularly berth in and the following table provides a useful guide:

Salt Water	**Fit**	**Zinc or Aluminium Anodes**
In Brackish Water	**Fit**	**Aluminium Anodes**
In Fresh Water	**Fit**	**Magnesium Anodes**

Some vessels will from time to time move between salt and fresh water, others are berthed within marinas and behind tidal barriers where the water is enclosed and likely to be brackish or even virtually fresh. Owners must be aware of the effects that this may have on their boats and fit the correct cathodic protection system to avoid corrosion.

Not all anodes are suitable for every environment, for example the surface of a zinc or aluminium anode will if left in fresh water for some time become covered with an off white crust of oxide which effectively seals the anode and stops it working even when returned to salt water. Zinc Anodes suffer a similar problem even in brackish conditions whereas Aluminium will continue to operate effectively in river estuaries and other areas of brackish water indefinitely. The consequences of this passivation of the anode are that the next most anodic item within the anode bonding system will start to sacrifice itself which could of course be very serious.

It is therefore very important to check Zinc and Aluminium anodes after any trips into fresh water and if necessary clean off or change the anodes.

Should a vessel move into fresh water for more than two weeks MGDUFF recommend that an alternative anode system is used suitable for fresh water situations.

Magnesium Anodes on the other hand have a much higher driving voltage than zinc or aluminium making them highly suitable for use in Fresh Water, they will however become very active in salt water where they will probably only last a matter of months. Protected surfaces can build up a layer of off white calcarious deposit which will be difficult to remove.

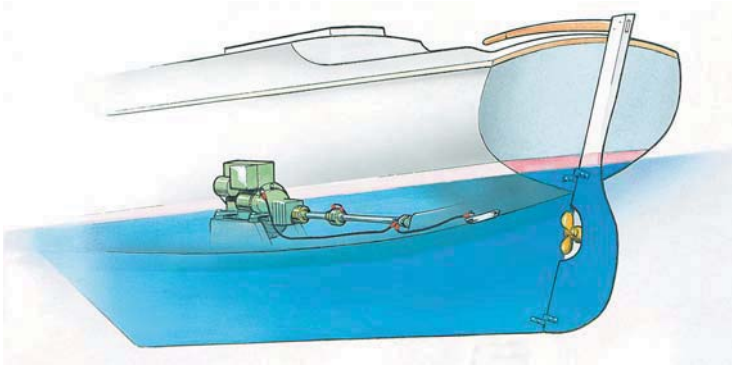
Magnesium anodes are not designed for prolonged use in sea water and if you are taking your boat into a salt water location for more than seven days (Fourteen days in any one year) you should consider changing the anodes.

Magnesium Anodes should never be fitted to wooden hulled vessels as they can damage the timber.

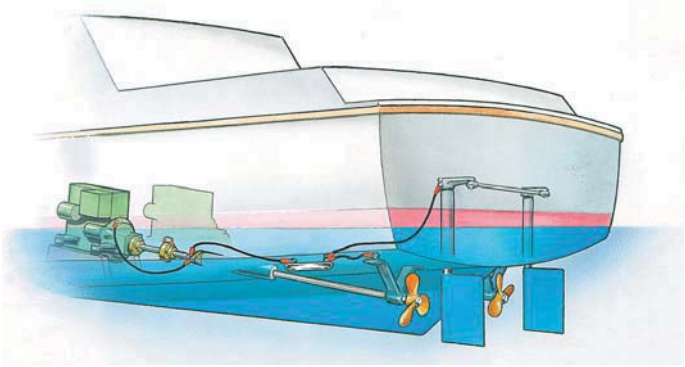
CATHODIC PROTECTION OF WOODEN AND GRP HULLED VESSELS

To determine the number and size of anodes required, match the type of vessel and select the anode suitable for the size of propeller and the type of water

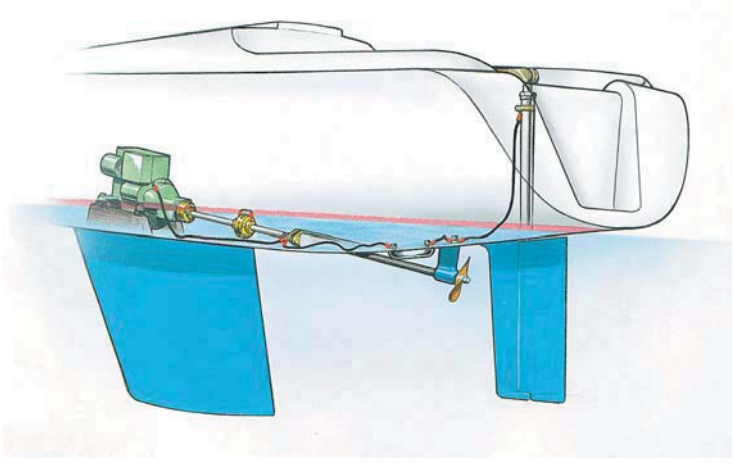
■ **TYPE A** Vessels are single screwed with a very short length of propeller shaft exposed to the water and fitted with GRP or wooden rudders. One anode will be required to protect the propeller and shaft



■ **TYPE B** Vessels are single or twin screwed with a long length of propeller shaft exposed to the water supported by a shaft bracket. One anode will be required to protect each shaft assembly. Bronze or stainless steel rudders or GRP rudders with bronze or stainless steel stocks should also be bonded to the same anode, however mild steel rudders will require separate anodes.



■ **TYPE C** Vessels are single screwed with a long length of propeller shaft exposed to the water supported by a shaft bracket and GRP rudders with bronze or stainless steel stocks. One anode will be required to protect the propeller, shaft and rudders.



DO NOT PAINT THE WORKING SURFACE OF THE ANODE

For Type A, B or C Vessels
the following anode selection table applies

FOR EACH PROPELLER ASSEMBLY FIT ONE

Propeller Diameter	In Salt Water	In Salt or Brackish Water	In Fresh Water
250mm	ZD56 Zinc Anode	AD56 Aluminium Anode	MD56 Magnesium Anode
500mm	ZD77 Zinc Anode	AD77 Aluminium Anode	MD77 Magnesium Anode
750mm	ZD78B Zinc Anode	AD78B Aluminium Anode	MD78B Magnesium Anode

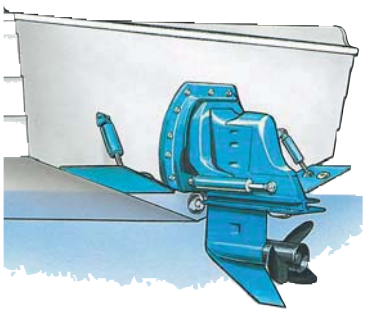
All schemes must be inspected annually and the anodes renewed if more than 50% wasted

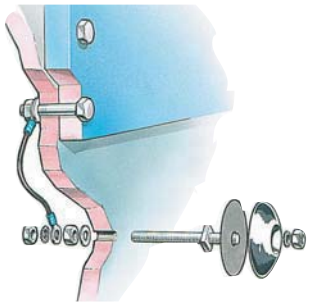
■ **TYPE D** Vessels are those fitted with saildrives, sterndrives or outboard motors. Most are fitted with sacrificial anodes specifically designed for them, and MGDuff replacements may be found on pages 22-29. We recommend regular visual inspection of outboards and sterndrives when moored, at least every 2-3 months, as the wear rate of the anodes can be affected by a variety of factors:

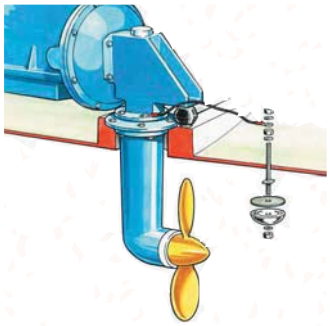
- The degree of tilt of the drive – anodes must be fully immersed.
- Substitution of aluminium propellers by stainless steel versions.
- Addition of stainless steel accessories such as propeller guards
- Loss of electrical continuity – many sterndrives have small continuity wires fitted between the component parts which must be replaced if broken, and stainless steel clips on rubber gaiters can loosen through pitting corrosion.

Saildrive anodes too can be affected by bronze propellers and stainless steel rope cutters.

In these circumstances we recommend that a supplementary anode is fitted to the hull and bonded to the transom plate or drive flanges as shown:







SELECT APPROPRIATE ANODE:

Propeller Diameter	In Salt Water	In Salt or Brackish Water	In Fresh Water
250mm	ZD56 Zinc Anode	AD56 Aluminium Anode	MD56 Magnesium Anode

All schemes must be inspected annually and the anodes renewed if more than 50% wasted

CATHODIC PROTECTION OF WOODEN HULLED VESSELS

Wooden hulled vessels operating in fresh water are subject to the same corrosion problems as GRP craft. However the fitting of magnesium anodes is **NOT** recommended as they will have a damaging effect on the timbers around the fixings known as electro-chemical decay.

MGDUFF advise that the appropriate action is to fit a magnesium shaft collar on the exposed propeller shaft and if necessary to fit anodes directly to mild steel rudders and keels.

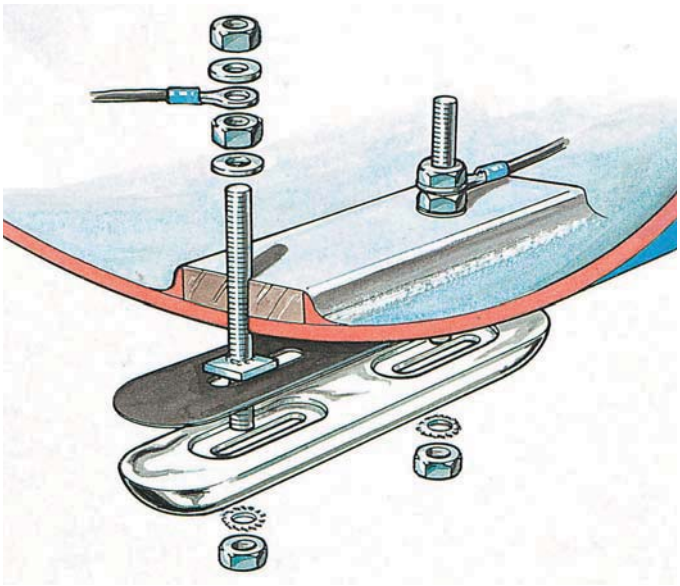
MAGNESIUM ANODES SHOULD NEVER BE FITTED TO THE TIMBERS OF A WOODEN HULLED VESSEL

DO NOT PAINT THE WORKING SURFACE OF THE ANODE

FITTING AND BONDING SACRIFICIAL ANODES

WHEN FITTING ANODES TO WOODEN OR GRP HULLED VESSELS REMEMBER:

- The anode should be positioned on the outside of the hull below the waterline.
- The anodes can “see” the parts to be protected.
- The fixing studs are located above the bilges.
- The anode location ensures the minimum run of bonding cable to the parts to be protected.
- There must be reasonable internal access to the studs.
- The anode should not be positioned forward of or in line with Echo Sounding Transducers or log Impellers.



Hull Anode Installation

- Stiffen the inside of the hull where the anode is to be fitted if necessary.
- Drill holes to take the fixing studs at the appropriate centres.
- On wooden hulled vessels studs should be sleeved or painted to insulate them from the surrounding timber. When sleeving the stud either use a heat shrink tube or ensure that the inside of the sleeve is packed with marine grade sealant.
- Before inserting and securing each stud assembly, apply a generous amount of marine grade sealant to the shank and collar where the stud touches the hull to ensure a good seal.
- Whenever an anode is fitted to a GRP or wooden hull an anode backing sheet must be used to control the wastage of the anode and protect the hull. The anode backing sheet should be replaced each time the anode is replaced.
- Always ensure that the anodes are fitted with MGDUFF Fan Disc Washers under the securing nuts which will help to assure the contact between anode and cathodic protection system. The fan disc washers and nuts should be replaced each time the anode is replaced.
- Protect the anode fixing studs on assembly with paint or grease inside and outside the vessel.

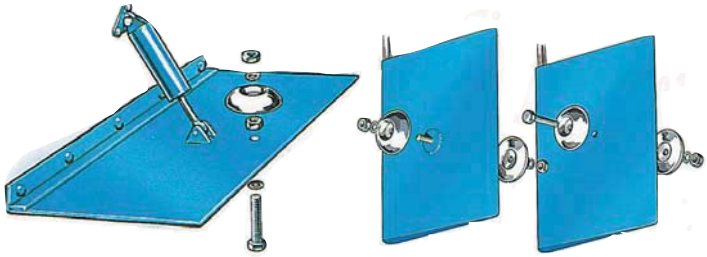
CATHODIC PROTECTION OF ALUMINIUM HULLED VESSELS

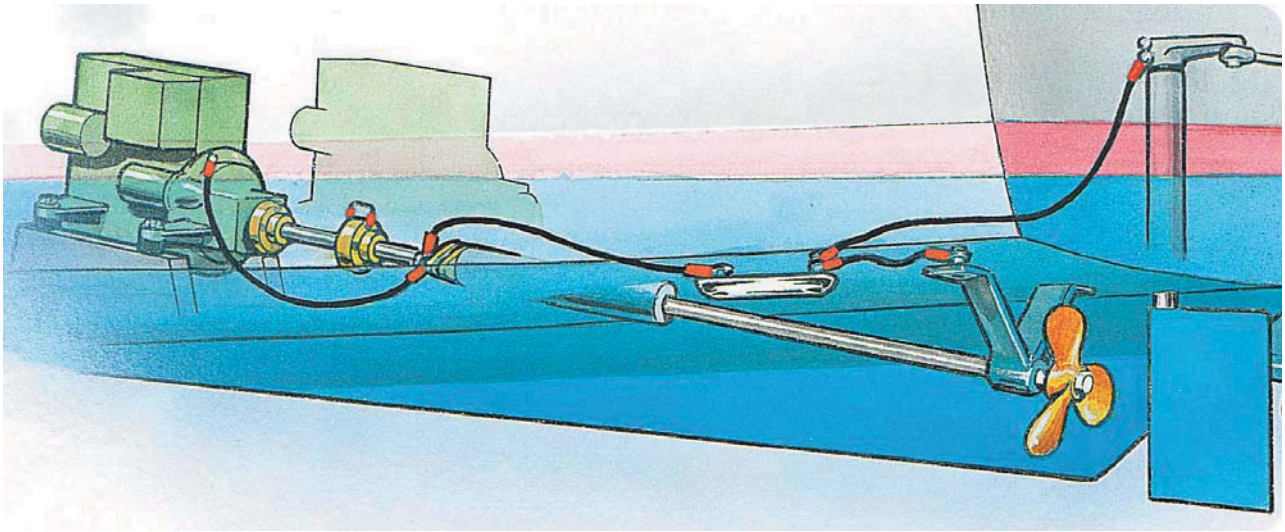
Aluminium is an excellent material for boat construction, but needs special attention regarding cathodic protection and paint application. For anode selection and placement refer to the technical sheets on the MGDuff website.

WHEN USING A COPPER BASED ANTIFOULING ENSURE NO PAINT IS APPLIED DIRECTLY TO BARE METAL SURFACES

BONDING THE CATHODIC PROTECTION SYSTEM

- The correct bonding of the cathodic protection system is imperative.
- Use 4mm² PVC Insulated Multi-Stranded Copper Cable or larger.
- Ensure that all connections are clean and tight.
- The best way to bond the anode to the shaft is by using a MGDUFF Electro Eliminator as well as bonding the anode to the gear box or Engine casing.
- Insulated Flexible Couplings should be bridged by using a short length of bonding cable or a copper strap to carry through the contact between anode shaft and propeller.
- Bronze and Stainless Steel Rudders, Rudder Hangings and Shaft Brackets should also be bonded to the main anodes.
- Trim Tabs should be protected with separate anodes.
- Do not bond the same anode to ferrous and non-ferrous metals. Steel Rudders must be protected with separate anodes.





DO NOT PAINT THE WORKING SURFACE OF THE ANODE

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CATHODIC PROTECTION OF STEEL HULLED VESSELS

WHEN DETERMINING THE CATHODIC PROTECTION REQUIREMENTS FOR A STEEL HULLED VESSEL THE FIRST CRITERION IS THE SURFACE AREA OF STEEL HULL BELOW THE WATER LINE - THE WETTED SURFACE AREA.

This is calculated by multiplying the water line length by the sum of the beam and draft i.e. LWL x (Beam+Draft). This calculation will apply to most motor cruisers and sailing boats.

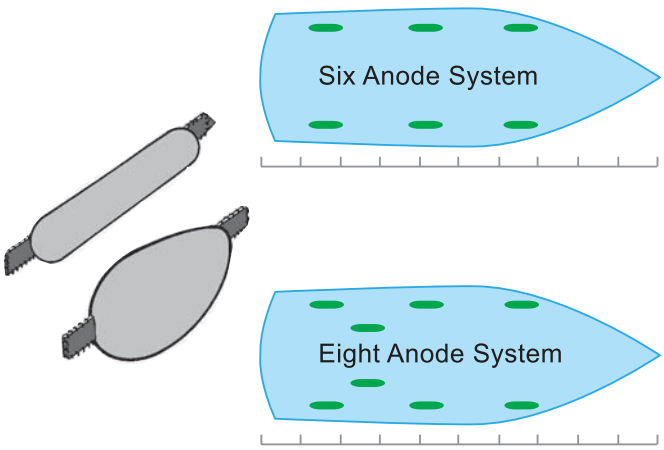
Once the wetted surface area is calculated, it can be applied to the selection tables below from which the number of anodes required can be taken.

For One Year in Salt Water fit the following Zinc Anodes

Area		Hull	Anodes per Rudder
Up to 28m² (300ft²)	Stud Fixed	2 x ZD78B	2 x ZD56
	Welded	(2 x ZD78)	(2 x ZD76)
28.1 - 56m² (300ft²)	Stud Fixed	4 x ZD78B	2 x ZD56
	Welded	(4 x ZD78)	(2 x ZD76)
56.1 - 84m² (600 - 900ft²)	Stud Fixed	6 x ZD78B	2 x ZD56
	Welded	(6 x ZD78)	(2 x ZD76)
84.1 - 102m² (900 - 1100ft²)	Stud Fixed	4 x ZD72BM	2 x ZD58
	Welded	(4 x ZD80)	(2 x ZD77)
102 - 148m² (1100 - 1600ft²)	Stud Fixed	6 x ZD72BM	2 x ZD58
	Welded	(6 x ZD80)	(2 x ZD77)

For Two Years in Salt Water fit the following Zinc Anodes

Area		Hull	Anodes per Rudder
Up to 28m² (300ft²)	Stud Fixed	4 x ZD78B	2 x ZD58
	Welded	(4 x ZD78)	(2 x ZD77)
28.1 - 56m² (300ft²)	Stud Fixed	8 x ZD78B	2 x ZD58
	Welded	(8 x ZD78)	(2 x ZD77)
56.1 - 84m² (600 - 900ft²)	Stud Fixed	4 x ZD72B	2 x ZD58
	Welded	(6 x ZD73)	(2 x ZD77)
84.1 - 102m² (900 - 1100ft²)	Stud Fixed	6 x ZD72B	2 x ZD78B
	Welded	(6 x ZD73)	(2 x ZD78)
102 - 148m² (1100 - 1600ft²)	Stud Fixed	8 x ZD72B	2 x ZD78B
	Welded	(8 x ZD73)	(2 x ZD78)



For One Year in Salt or Brackish Water fit the following Aluminium Anodes

Area		Hull	Anodes per Rudder
Up to 28m² (300ft²)	Stud Fixed	2 x AD78B	2 x AD56
	Welded	(2 x AD78)	(2 x AD76)
28.1 - 56m² (300ft²)	Stud Fixed	4 x AD78B	2 x AD56
	Welded	(4 x AD78)	(2 x AD76)
56.1 - 84m² (600 - 900ft²)	Stud Fixed	6 x AD78B	2 x AD56
	Welded	(6 x AD78)	(2 x AD76)

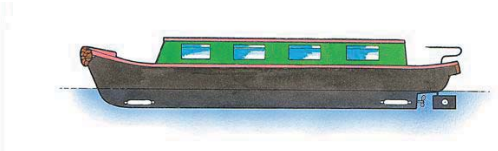
For Two Years in Salt or Brackish Water fit the following Aluminium Anodes

Area		Hull	Anodes per Rudder
Up to 28m² (300ft²)	Stud Fixed	4 x AD78B	2 x AD58
	Welded	(4 x AD78)	(2 x AD77)
28.1 - 56m² (300ft²)	Stud Fixed	8 x AD78B	2 x AD58
	Welded	(4 x AD78)	(2 x AD77)
56.1 - 84m² (600 - 900ft²)	Stud Fixed	4 x AD72B	2 x AD58
	Welded	(4 x AD73)	(2 x AD77)

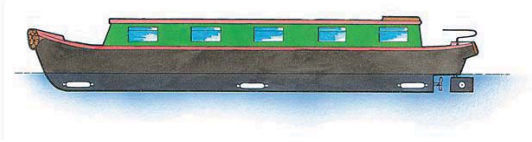
For Two Years in Fresh Water fit the following Magnesium Anodes

Area	Hull	Anodes per Rudder
Up to 28m² (300ft²)	4 x MD78	2 x MD56
28.1 - 56m² (300ft²)	4 x MD73	2 x MD56
42.1 - 56m² (450 - 600ft²)	4 x MD72	2 x MD56
56.1 - 70m² (600 - 750ft²)	6 x MD72	2 x MD77

NOTE **When fitting and replacing bolt-on anodes always ensure that the serrated fan disc washers are replaced**



Four anode fixing plan - narrow boat



Six anode fixing plan - narrow boat

MGDUFF
HULL ANODES

Disc Anodes

The MGDUFF disc anode range is an ideal solution for protecting your rudder, trim tabs and other more refined parts of your vessel from corrosion.

SALT WATER	BRACKISH WATER	FRESH WATER
ZD52/59 Zinc Anode	N/A Aluminium Anode	MD59 Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Width	Depth			
N/A	50	15	ZD52	N/A	N/A
N/A	70	25	ZD59	N/A	MD59

SALT WATER	BRACKISH WATER	FRESH WATER
CMR Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Width	Depth			
N/A	95	24	CMR03	N/A	N/A
N/A	127	32	CMR04	N/A	N/A
N/A	130	44	CMR05	N/A	N/A
N/A	165	44	CMR07	N/A	N/A

SALT WATER	BRACKISH WATER	FRESH WATER
ZD51 Zinc Anode 0.5 KG	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
N/A	70	30	Fixing Hole To Suit Stud Size M10

SALT WATER	BRACKISH WATER	FRESH WATER
ZD56 Zinc Anode 1.0 KG	AD56 Aluminium Anode 0.42 KG	MD56 Magnesium Anode 0.3 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
N/A	100	25	Fixing Hole To Suit Stud Size M10

SALT WATER	BRACKISH WATER	FRESH WATER
ZD58 Zinc Anode 2.2 KG	AD58 Aluminium Anode 0.9 KG	N/A Magnesium Anode

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
N/A	150	35	Fixing Hole To Suit Stud Size M10

SALT WATER	BRACKISH WATER	FRESH WATER
ZD27 Zinc Anode 2.7 KG	AD27 Aluminium Anode 1.1 KG	N/A Magnesium Anode

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
N/A	135	28	Fixing Hole To Suit Stud Size M10

SALT WATER	BRACKISH WATER	FRESH WATER
ZD35 Zinc Anode 3.5 KG	AD35 Aluminium Anode 1.3 KG	MD35 Magnesium Anode 0.75 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
N/A	160	25	Fixing Hole To Suit Stud Size M10

SALT WATER	BRACKISH WATER	FRESH WATER
ZD45 Zinc Anode 4.5 KG	AD45 Aluminium Anode 1.7 KG	N/A Magnesium Anode

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
N/A	135	41	Fixing Hole To Suit Stud Size M10

SALT WATER	BRACKISH WATER	FRESH WATER
ZD55 Zinc Anode 7.2 KG	AD55 Aluminium Anode 2.85 KG	MD55 Magnesium Anode 2.25 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
N/A	229	25	Fixing Hole To Suit Stud Size M10

* All anode weights shown are nominal *
Images are representative.

MGDUFF
HULL ANODES

Bolt On Anodes

MGDUFF bolt on hull anodes have a variety of stud centres and hole diameters to suit all European and American designed boats. Bolt on anodes are a quick and effective way to secure anodes to your vessel, without the need for any specialist tools. MGDuff have a full range of fixing solutions to suit your vessel, please see page 18 & 19 for more information.

SALT WATER	BRACKISH WATER	FRESH WATER
CM200Z EUROPEAN Zinc Anode	N/A EUROPEAN Aluminium Anode	N/A EUROPEAN Magnesium Anode
0.2 KG		

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
95	33	15	100 - 135mm Hole Centres (7mm Diameter)

SALT WATER	BRACKISH WATER	FRESH WATER
CM500Z EUROPEAN Zinc Anode	N/A EUROPEAN Aluminium Anode	N/A EUROPEAN Magnesium Anode
0.5 KG		

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
116	43	24	113 - 150mm Hole Centres (7mm Diameter)

SALT WATER	BRACKISH WATER	FRESH WATER
CM1000Z EUROPEAN Zinc Anode	N/A EUROPEAN Aluminium Anode	N/A EUROPEAN Magnesium Anode
1.0 KG		

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
118	60	30	149 - 187mm Hole Centres (7mm Diameter)

SALT WATER	BRACKISH WATER	FRESH WATER
ZD76 MINI EURO Zinc Anode	N/A MINI EURO Aluminium Anode	N/A MINI EURO Magnesium Anode
1.4 KG		

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
200	65	32	0" - 4" (0 - 110mm) Hole Centres for use with M10 Studs

SALT WATER	BRACKISH WATER	FRESH WATER
ZD77 Zinc Anode	AD77 Aluminium Anode	MD77 Magnesium Anode
2.1 KG	1.0 KG	0.7 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
229	83	41	8" (200mm) Hole Centres for use with M10 studs

SALT WATER	BRACKISH WATER	FRESH WATER
ZD77 EURO Zinc Anode	AD77 EURO Aluminium Anode	MD77 EURO Magnesium Anode
2.4 KG	1.0 KG	0.7 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
318	65	32	4" - 8" (110 - 210mm) Hole Centres for use with M10 studs

SALT WATER	BRACKISH WATER	FRESH WATER
ZD79 Zinc Anode	AD79 Aluminium Anode	MD79 Magnesium Anode
3.0 KG	1.5 KG	1.0 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
229	83	41	8" (200mm) Hole Centres for use with M10 studs

SALT WATER	BRACKISH WATER	FRESH WATER
ZD78B Zinc Anode	AD78B Aluminium Anode	MD78B Magnesium Anode
4.0 KG	1.85 KG	1.3 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
305	76	32	8" (200mm) Hole Centres for use with M10 studs

SALT WATER	BRACKISH WATER	FRESH WATER
40ZHD Zinc Anode	40AHD Aluminium Anode	40MHD Magnesium Anode
4.4 KG	1.9 KG	1.0 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
200	100	40	110mm Hole Centres for use with M16 studs

* All anode weights shown are nominal *
Images are representative.

SALT WATER	BRACKISH WATER	FRESH WATER
ZD78BM Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode
5.0 KG		

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
356	76	32	8" (200mm) Hole Centres for use with M10 studs

SALT WATER	BRACKISH WATER	FRESH WATER
ZD72BM Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode
6.5 KG		

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
457	102	38	200 - 229mm Hole Centres for use with M10 or M16 studs

SALT WATER	BRACKISH WATER	FRESH WATER
ZD72 BMLP Zinc Anode	N/A BMLP Aluminium Anode	N/A BMLP Magnesium Anode
7.25 KG		

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
450	95	25	200 - 229mm Hole Centres for use with M10 or M16 studs

SALT WATER	BRACKISH WATER	FRESH WATER
ZD80B Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode
8.2 KG		

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
300	150	32	125 - 160mm Hole Centres for use with M10 or M16 studs

SALT WATER	BRACKISH WATER	FRESH WATER
ZD72B Zinc Anode	AD72B Aluminium Anode	MD72B Magnesium Anode
12.2 KG	5.0 KG	3.5 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
457	102	64	9" (229mm) Hole Centres for use with M16 studs

Arneson Surface Drive Anodes

MGDUFF offer two sizes of Arneson teardrop anodes as a direct replacement for the OEM anodes supplied with the drive.

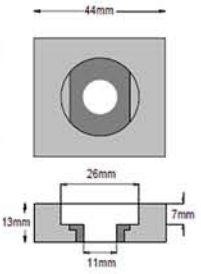
SALT WATER	BRACKISH WATER	FRESH WATER
ARN Zinc Anode	ARN-A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Width	Depth			
154	32	30	ARNSMALL	ARNSMALLA	N/A
190	45	44	ARNLARGE	ARNLARGEA	N/A

Zinc Strip Anodes (ZD42)

This is a low profile zinc anode with a non reactive aluminium insert, ideally suited for fitting to high speed vessels.

Maximum length is 72" (1828mm), available cut to suit with a verity of different hole centres or via standard configurations detailed below.



SALT WATER	BRACKISH WATER	FRESH WATER
ZD42 Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)				
Part No.	Length	Section	Weight	Hole Centres
ZD42/5"-2H	127 (5")	44 x 13	0.5kg	2 Holes - 76mm (3") Centres
ZD42/6"-1H	152 (6")	44 x 13	0.6kg	1 Holes - Centre
ZD42/6"-U/D	152 (6")	44 x 13	0.6kg	Undrilled
ZD42/12" -2H	305 (12")	44 x 13	1.2kg	2 Holes - 203mm (8") Centres
ZD42/12" -U/D	305 (12")	44 x 13	1.2kg	Undrilled
ZD42/15" -2H	381 (15")	44 x 13	1.5kg	2 Holes - 229mm (9") Centres
ZD42/15" -UD	381 (15")	44 x 13	1.5kg	Undrilled
ZD42/18" -2H	457 (18")	44 x 13	1.8kg	2 Holes - 305mm (12") Centres
ZD42/18" -U/D	457 (18")	44 x 13	1.8kg	Undrilled
ZD42/24" -2H	610 (24")	44 x 13	2.4kg	2 Holes - 406mm (16") Centres
ZD42/24" -3H	610 (24")	44 x 13	2.4kg	3 Holes - 229mm (9") Centres
ZD42/24" -U/D	610 (24")	44 x 13	2.4kg	Undrilled
ZD42/36" -3H	914 (36")	44 x 13	3.5kg	3 Holes - 305mm (12") Centres
ZD42/36" -U/D	914 (36")	44 x 13	3.5kg	Undrilled
ZD42/54" -3H	1372 (54")	44 x 13	5.3kg	3 Holes - 457mm (18") Centres
ZD42/54" -U/D	1372 (54")	44 x 13	5.3kg	Undrilled
ZD42/72" -U/D	1829 (72")	44 x 13	7kg	Undrilled

MGDUFF
HULL ANODES

Weld On Anodes

MGDUFF anodes are either 'stud fixed' or 'weld on' types. The 'stud fixed' anodes with a 'steel to steel' connection are recommended for yachts and similar small craft or on craft with high quality coatings where repeated ginding off and welding on of new anodes would damage coatings. Also on vessels where anodes may be renewed underwater or where welding equipment may not be available.

The 'weld on' anodes are recommended on vessels where a long life anode scheme is fitted or where the anodes may be subject to considerable abrasion, vibration or other physical disturbance. For guaranteed continuity and a 100% secure fixing, a welded connection is best. All MGDuff zinc anodes are supplied with a cast-in steel core bars.

A guide for anode selection can be found on page 8 & 9 of the catalogue.

SALT WATER	BRACKISH WATER	FRESH WATER
ZD78 Zinc Anode	AD78 Aluminium Anode	MD78 Magnesium Anode
4.5 KG	2.0 KG	1.5 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)		
Length	Width	Depth	Length	Width	Depth
385	76	32	305	76	32

SALT WATER	BRACKISH WATER	FRESH WATER
N/A Zinc Anode	N/A Aluminium Anode	MD20LP Magnesium Anode
		2.0 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)		
Length	Width	Depth	Length	Width	Depth
475	150	25	375	150	25

SALT WATER	BRACKISH WATER	FRESH WATER
ZD75 Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode
0.6 KG		

Overall Dimensions (mm)			Anode Body Dimensions (mm)		
Length	Width	Depth	Length	Width	Depth
152	45	28	100	45	28

SALT WATER	BRACKISH WATER	FRESH WATER
ZD60 Zinc Anode	AD60 Aluminium Anode	N/A Magnesium Anode
6.0 KG	2.9 KG	

Overall Dimensions (mm)			Anode Body Dimensions (mm)		
Length	Width	Depth	Length	Width	Depth
380	125	25	320	125	25

SALT WATER	BRACKISH WATER	FRESH WATER
ZD76 Zinc Anode	AD76 Aluminium Anode	MD76 Magnesium Anode
1.0 KG	0.5 KG	0.3 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)		
Length	Width	Depth	Length	Width	Depth
160	76	32	114	76	32

SALT WATER	BRACKISH WATER	FRESH WATER
ZD80 Zinc Anode	AD80 Aluminium Anode	MD80 Magnesium Anode
8.5 KG	4.0 KG	2.8 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)		
Length	Width	Depth	Length	Width	Depth
405	152	32	305	152	32

SALT WATER	BRACKISH WATER	FRESH WATER
ZD350 Zinc Anode	AD350 Aluminium Anode	N/A Magnesium Anode
3.5 KG	1.85 KG	

Overall Dimensions (mm)			Anode Body Dimensions (mm)		
Length	Width	Depth	Length	Width	Depth
270	90	30	210	90	30

SALT WATER	BRACKISH WATER	FRESH WATER
ZD73 Zinc Anode	AD73 Aluminium Anode	MD73 Magnesium Anode
10.0 KG	5.0 KG	3.5 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)		
Length	Width	Depth	Length	Width	Depth
459	152	32	356	152	32

* All anode weights shown are nominal *
Images are representative.

MGDUFF
Anode Fixings

Anode Fixing Studs

MGDUFF anode fixing studs (M10B & M16B range plus Stainless Steel) feature a fully welded square plate mounting washer, which is more secure than some designs with a simple threaded washer. Anode studs are a one time fitment and as a through hull fitting, the best available should be used. Often anodes are secured **incorrectly**, the anode core bar should be secured and **not** the anode material to the structure!

Part no - M10B
Zinc Plated Stud Assemblies c/w Nuts & Washers for Wood and GRP Vessels

Part no - M16B
Zinc Plated Stud Assemblies c/w Nuts & Washers for Wood and GRP Vessels

Part no - M10B Stud Packs (5)
Carded Packs of five M10B Stud Assemblies

Part no - M10BSS
Stainless Steel (316) Stud Assemblies c/w Nuts & Washers for Wood and GRP Vessels

Part no - M16BSS
Stainless Steel (316) Stud Assemblies c/w Nuts & Washers for Wood and GRP Vessels

M16C
Stud Assemblies c/w Nuts & Washers For Steel Vessels

M10C
Stud Assemblies c/w Nuts & Washers For Steel Vessels

M10NW
Zinc Plated Nuts & Washers

Anode Backing Sheets

A backing pad is designed to stop the back of the anode from wasting away, and possibly causes the anode fixing to come loose. It also provides a barrier to help protect a GRP hulls from alkilinity that can be produced as part of the cathodic protection process.

Part no - B42/6
Backing Sheet for ZD42/6"-1H

Part no - B42/12
Backing Sheet for ZD42/12"-2H

Part no - B42/15
Backing Sheet for ZD42/15"-2H

Part no - B56
Backing Sheet for ZD56

Part no - B58
Backing Sheet for ZD58

Part no - B72/B72BMLP
Backing sheet for ZD72 & ZD7SBMLP

Part no - B72B
Backing Sheet for ZD72B

Part no - B76Euro
Backing Sheet for ZD76 Mini Euro

Part no - B77
Backing Sheet for ZD77

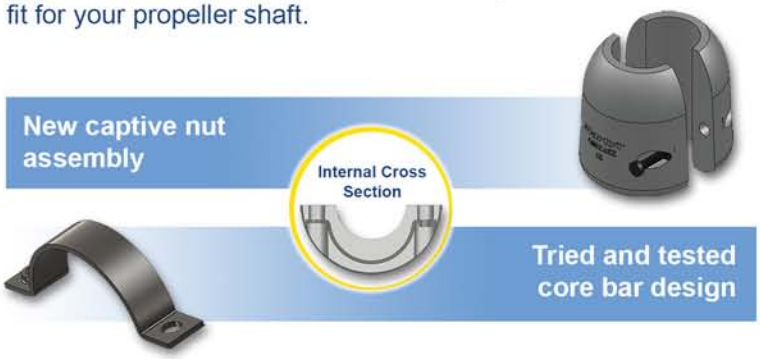
Part no - B77Euro
Backing Sheet for ZD77 Euro

Part no - B78B
Backing Sheet for ZD78B

MGD Shaft Anodes

The **MGD** range of shaft anodes are known for their superior quality, and particularly suited to vessels with high shaft speeds.

Building on the integral core bar design that controls wastage, ensuring the shaft anode remains secure, the MGD range now incorporates socket head (allen bolt) stainless steel fixings with captive nuts to ensure maximum reliability. Available in a wide range of metric and imperial sizes, offering a direct fit for your propeller shaft.



SALT WATER — MGD Zinc Anode | BRACKISH WATER — MGDA Aluminium Anode | FRESH WATER — N/A Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Outer Dia	Shaft Dia			
65	55	25	MGD25MM	MGDA25MM	N/A
65	55	30	MGD30MM	MGDA30MM	N/A
78	68	35	MGD35MM	MGDA35MM	N/A
78	68	40	MGD40MM	MGDA40MM	N/A
100	72	45	MGD45MM	MGDA45MM	N/A
100	83	50	MGD50MM	MGDA50MM	N/A
100	85	60	MGD60MM	MGDA60MM	N/A
95	110	70	MGD70MM	MGDA70MM	N/A

Overall Dimensions (Inches)			Individual Anode Part No.		
Length	Outer Dia	Shaft Dia			
2 1/2"	2 1/8"	3/4"	MGD34	MGDA34	N/A
2 1/2"	2 1/8"	7/8"	MGD78	MGDA78	N/A
2 1/2"	2 1/8"	1"	MGD1	MGDA1	N/A
2 1/2"	2 1/8"	1 1/8"	MGD118	MGDA118	N/A
3"	2 5/8"	1 1/4"	MGD114	MGDA114	N/A
3"	2 5/8"	1 3/8"	MGD138	MGDA138	N/A
3"	2 5/8"	1 1/2"	MGD112	MGDA112	N/A
4"	3 1/4"	1 3/4"	MGD134	MGDA134	N/A
4"	3 1/4"	2"	MGD2	MGDA134	N/A

ZSA & MSA Shaft Anodes

The **ZSA** & **MSA** range of shaft anodes are well known for their quality, and classic golf ball shape. This range of shaft anodes are an excellent way to protect your shaft from corrosion.

SALT WATER — ZSA Zinc Anode | BRACKISH WATER — ASA Aluminium Anode | FRESH WATER — MSA Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Outer Dia	Shaft Dia			
54	54	22	N/A	N/A	MSA88
54	54	25	ZSA98	N/A	MSA98
63	58	30	ZSA120	N/A	MSA120
73	66	35	ZSA140	N/A	N/A
82	73	38	N/A	N/A	N/A
82	73	40	ZSA155	N/A	N/A
82	73	45	ZSA178	N/A	N/A
82	73	50	ZSA198	N/A	N/A
107	90	60	ZSA236	N/A	N/A

Overall Dimensions (Inches)			Individual Anode Part No.		
Length	Outer Dia	Shaft Dia			
2"	2"	3/4"	ZSA75	N/A	N/A
2"	2"	7/8"	ZSA88	N/A	MSA88
2"	2"	1"	ZSA100	ASA100	MSA100
2"	2"	1 1/8"	ZSA112	N/A	N/A
2 1/2"	2 1/2"	1 1/4"	ZSA125	ASA125	MSA125
2 1/2"	2 1/2"	1 3/8"	ZSA138	N/A	N/A
2 1/2"	2 1/2"	1 1/2"	ZSA150	N/A	MSA150
2 7/8"	3 1/4"	1 3/4"	ZSA175	N/A	N/A
2 7/8"	3 1/4"	2"	ZSA200	N/A	N/A
3 3/4"	4 1/4"	2 1/4"	ZSA225	N/A	N/A
3 3/4"	4 1/4"	2 1/2"	ZSA250	N/A	N/A
3 5/8"	4 3/4"	2 3/4"	ZSA275	N/A	N/A
3 5/8"	4 3/4"	3"	ZSA300	N/A	N/A
3 7/8"	5 1/8"	3 1/2"	ZSA350	N/A	N/A
3 1/2"	6"	4"	ZSA400	N/A	N/A
3 1/2"	6 1/4"	4 1/2"	ZSA450	N/A	N/A
3 1/2"	6 3/4"	5"	ZSA500	N/A	N/A

Top Tip - *Ensure adequate clearance between the shaft anode and the shaft bracket, to allow correct cooling of the cutless bearing.*

MGDUFF
SHAFT ANODES

Shaft Collar Anodes

Shaft Collar Anodes are an ideal solution for boats with limited clearance between the propeller and propeller bracket. The ZSC and ZSC(T) range fits this bill, with its thin moulded section.

The ZSC(T) collar is one of the thinnest shaft anodes on the market, allowing boat owners with minimal shaft clearance to protect their valuable propeller and shaft.

SALT WATER	BRACKISH WATER	FRESH WATER
ZSC Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
STD Wall	Outer Dia	Shaft Dia			
25	54	20	ZSC20	N/A	N/A
25	54	22	ZSC22	N/A	N/A
32	54	25	ZSC25	N/A	N/A
32	63	28	ZSC28	N/A	N/A
32	63	30	ZSC30	N/A	N/A
32	76	35	ZSC35	N/A	N/A
32	76	40	ZSC40	N/A	N/A
35	89	45	ZSC45	N/A	N/A
35	89	50	ZSC50	N/A	N/A

Overall Dimensions (Inches)			Individual Anode Part No.		
STD Wall	Outer Dia	Shaft Dia			
1"	2 1/8"	7/8"	ZSC22	N/A	N/A
1 1/4"	2 1/2"	1 1/8"	ZSC27	N/A	N/A
1 1/4"	2 1/2"	1 1/4"	ZSC32	N/A	N/A
1 1/4"	2 1/2"	1 1/2"	ZSC38	N/A	N/A
1 3/8"	3"	1 3/4"	ZSC44	N/A	N/A
1 3/8"	3 1/2"	2 1/4"	ZSC57	N/A	N/A

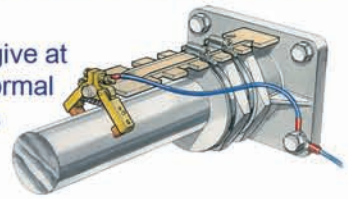
SALT WATER	BRACKISH WATER	FRESH WATER
ZSC(T) Zinc Anode	ASC(T) Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Thin Wall	Outer Dia	Shaft Dia			
15	60	20	ZSC20T	N/A	N/A
15	60	22	ZSC22T	ASC22T	N/A
15	60	25	ZSC25T	ASC25T	N/A
18	60	30	ZSC30T	ASC30T	N/A
18	74	35	ZSC35T	ASC35T	N/A
18	74	40	ZSC40T	ASC40T	N/A
18	82	45	ZSC45T	ASC45T	N/A
18	82	50	ZSC50T	ASC50T	N/A

Shaft Earthing Assemly - Electro Eliminator

Whether your boat is steel or GRP, to provide the best protection to the stern gear the shaft should be fitted with an MGDUFF Electro Eliminator Brush assembly.

The MGDUFF Electro-Eliminators offer the most effective shaft bonding solution. Running directly onto the propeller shaft the electro eliminator puts the anode in constant low resistance contact with the propeller shaft.



The copper graphite brushes will give at least 2000 running hours under normal conditions. The electro eliminators will also remove the interference to electronic equipment caused by the rotating shaft.

Top Tip - *Always use an Electro Eliminator inconjunction with the standard anode to engine bonding connection and not on its own!*

➡ To provide the best protection for the stern gear, the shaft should be fitted with an electro-eliminator brush and connected to the hull anode.

Electro Eliminator - EE1
shaft earthing assembly for propeller shafts up to 50mm diameter.Comes with mounting brackett.

Electro Eliminators - EE2/208
Shaft earthing assembly for propeller shafts over 40mm dia to 100mm. Does not include mounting bar.

Electro Eliminator - EE3
shaft earthing assembly for propeller shafts up to 200mm diameter.

Sleipner Side Power Bow & Stern Thruster Anodes

Bow & Stern thrusters are more common then ever, helping you to control your craft in all situations. MGDUFF supply 5 sizes of anodes to suit the most popular Sleipner Side Power thrusters on the market. All of the anodes in the range offer a simple bolt on fixing directly to the thruster unit giving you maximum continuity.

SALT WATER	BRACKISH WATER	FRESH WATER
N/A Zinc Anode	SP61180A Aluminium Anode	N/A Magnesium Anode
	0.016 KG	

Overall Dimensions (mm)			Anode Suitable For Thruster Models
Length	Width	Depth	
N/A	26	20	SE30 and SE40 *(Mounting screw included)*

SALT WATER	BRACKISH WATER	FRESH WATER
N/A Zinc Anode	SP71190A Aluminium Anode	N/A Magnesium Anode
	0.05 KG	

Overall Dimensions (mm)			Anode Suitable For Thruster Models
Length	Width	Depth	
N/A	45	20	SP55S, SE60, SP75T, SE80, SP95T and SE100 models (*Mounting screw included*)

SALT WATER	BRACKISH WATER	FRESH WATER
N/A Zinc Anode	SP201180A Aluminium Anode	N/A Magnesium Anode
	0.07 KG	

Overall Dimensions (mm)			Anode Suitable For Thruster Models
Length	Width	Depth	
N/A	46	41	SP125T-285TC, SE120, SE150, SP220/300HYD and SH160 Composite Props - 2 needed *(Mounting screw included)*

SALT WATER	BRACKISH WATER	FRESH WATER
N/A Zinc Anode	SP71180A Aluminium Anode	N/A Magnesium Anode
	0.35 KG	

Overall Dimensions (mm)			Anode Suitable For Thruster Models
Length	Width	Depth	
N/A	73	53	7HP models - 3 bladed props *(Mounting screw included)*

SALT WATER	BRACKISH WATER	FRESH WATER
N/A Zinc Anode	SP501180A Aluminium Anode	N/A Magnesium Anode
	1.2 KG	

Overall Dimensions (mm)			Anode Suitable For Thruster Models
Length	Width	Depth	
N/A	73	53	SP550 HYD *(Mounting screw included)*

Zinc Pencil Anodes & Brass Plug

Designed for engine cooling & heat exchanges systems. MGDuff's P range of pencil anodes feature a steel integral core bar to ensure the pencil anode remains secured to the brass mounting plug.

SALT WATER	BRACKISH WATER	FRESH WATER
PENCIL Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (Inches)				
Part No.	Length	Dia	Weight	Thread
P375/2"	2"	3/8"	0.028kg	3/8"-16NC (3/8" Whit) x 7/16"
P375/3"	3"	3/8"	0.039kg	3/8"-16NC (3/8" Whit) x 7/16"
P375/4"	4"	3/8"	0.049kg	3/8"-16NC (3/8" Whit) x 7/16"
P500/2"	2"	1/2"	0.044kg	3/8"-16NC (3/8" Whit) x 1/2"
P500/4"	4"	1/2"	0.090kg	3/8"-16NC (3/8" Whit) x 1/2"
P500/6"	6"	1/2"	0.138kg	3/8"-16NC (3/8" Whit) x 1/2"
P625/2"	2"	5/8"	0.065kg	3/8"-16NC (3/8" Whit) x 1/2"
P625/3"	3"	5/8"	0.102kg	3/8"-16NC (3/8" Whit) x 1/2"
P625/4"	4"	5/8"	0.130kg	3/8"-16NC (3/8" Whit) x 1/2"
P625/6"	6"	5/8"	0.213kg	3/8"-16NC (3/8" Whit) x 1/2"
P750/2"	2"	3/4"	0.105kg	5/8"-11NC (5/8" Whit) x 1/2"
P750/3"	3"	3/4"	0.160kg	5/8"-11NC (5/8" Whit) x 1/2"
P750/4"	4"	3/4"	0.205kg	5/8"-11NC (5/8" Whit) x 1/2"
P750/6"	6"	3/4"	0.297kg	5/8"-11NC (5/8" Whit) x 1/2"
P1050/2"	2"	1.05"	0.203kg	3/4"-10NC (3/4" Whit) x 1/2"
P1050/3"	3"	1.05"	0.305kg	3/4"-10NC (3/4" Whit) x 1/2"
P1050/4"	4"	1.05"	0.388kg	3/4"-10NC (3/4" Whit) x 1/2"
P1050/6"	6"	1.05"	0.585kg	3/4"-10NC (3/4" Whit) x 1/2"

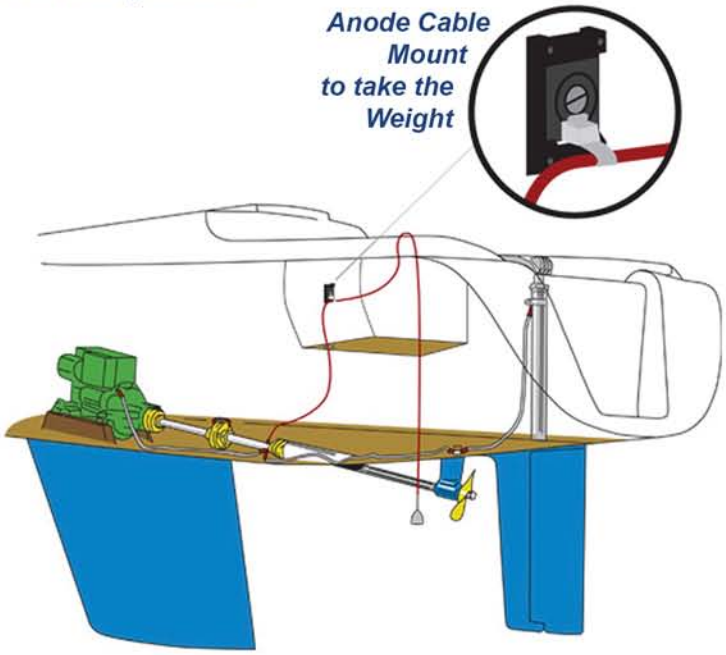
SALT WATER	BRACKISH WATER	FRESH WATER
PLUG Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (Inches)				
Part No.	Suits Pencil	Length	Weight	Thread
PP250B	P375	7/8"	0.023kg	1/4" NPT (Taper Thread) x 9/16"
PP375B	P500	7/8"	0.036kg	3/8" NPT (Taper Thread) x 9/16"
PP500B	P625	1"	0.085kg	1/2"NPT (Taper Thread) x 5/8"
PP750B	P750	1 1/8"	0.118kg	3/4" NPT (Taper Thread) x 3/4"
PP1000B	P1050	1 3/8"	0.238kg	1" NPT (Taper Thread)

MGDUFF
Hanging Anode

What Are Hanging Anodes?

Hanging anodes are an alternative method to hull mounted anodes and will provide the same cathodic protection for all types of water craft whether GRP, steel or wood. Most leisure craft are constructed of GRP and the following information is based on this type of vessel. Hanging anodes can also be used to protect sail drives, sterndrives and even outboards. The anode is hung over the side of the craft and the cable is connected inside the vessel to provide continuity to the underwater items to be protected.



Traditional hanging anodes have the wire cast into the anode material and once consumed the whole system has to be disposed of. The hanging anode range from MG DUFF features an interchangeable anode system allowing the replacement of the anode material without disturbing the bonding system. This is particularly useful when a craft is moored in differing water types as the system allows the correct anode material to be selected whilst only using one hanging cable. It can also be used to back up existing anode systems. Another advantage is the anode can be checked by simply lifting the anode out of the water and visually inspecting it for wear.

Hanging anodes are only to be used when the vessel is moored. When under way, coil the cable and secure with the supplied re-usable rubber tie wraps. Store the anode and cable away until required. Never start an engine with a hanging anode deployed, the anode may be drawn into the propeller and cause damage.

Hanging Anode Kit

The complete system comprises of galvanised cable with a bright red pvc outer. Two re-useable rubber tie wrap are included to help store the anode when not in use. The included cable mount is designed to be secured to the vessel and **must** take the weight of the anode. The electrical connection is made via a robust m10 terminal.

SALT WATER	BRACKISH WATER	FRESH WATER
ZD57L KIT Zinc Anode	AD57L KIT Aluminium Anode	MD57L KIT Magnesium Anode
1.8 KG	0.95 KG	0.71 KG

Overall Dimensions (mm)			Kit Includes
Length	Width	Depth	4 metres of cable with an M10 terminal, 1x 57L anode, 1x mounting bracket and 2x re-useable rubber tie wraps.
120	75	75	

Replacement Hanging Anode

Once the anode is 85% consumed, it can be simply unscrewed and a new anode fitted, retaining the existing cable.

SALT WATER	BRACKISH WATER	FRESH WATER
ZD57L Zinc Anode	ZD57L Aluminium Anode	ZD57L Magnesium Anode
1.8 KG	0.8 KG	0.7 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	M10 terminal for fitting to cable
120	75	75	

* All anode weights shown are nominal *
Images are representative.

MGDUFF
PROPELLER ANODES

Radice Propeller Anode

Propeller nut anodes replace the existing locknut used to hold the propeller to the prop shaft, with a boss that allows an anode to be secured to it. It also features a locking tab washer to ensure the nut stays tight.

Prop nut anodes, similar to shaft anodes help provide protection to the prop and shaft, and do not rely on bonding wire as they attach directly to the item to be protected.

Where a hull mounted anode is **not** fitted it is advisable to fit a shaft anode (see pages 20 & 21) **as well** as a prop nut anode.

SALT WATER	BRACKISH WATER	FRESH WATER
RAD Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Outer Dia	Thread Size			
60	**37**	**16 x 1.5**	RAD22/25 CPT	N/A	N/A
75	**45**	**20 x 1.5**	RAD30 CPT	N/A	N/A
77	**48**	**24 x 2.0**	RAD35 CPT	N/A	N/A
92	**54**	**24 x 2.0**	RAD40 CPT	N/A	N/A
100	**64**	**33 x 2.0**	RAD45 CPT	N/A	N/A
118	**75**	**36 x 3.0**	RAD50 CPT	N/A	N/A
120	**78**	**40 x 3.0**	RAD55 CPT	N/A	N/A
135	**88**	**45 x 3.0**	RAD60 CPT	N/A	N/A

Replacement Radice Propeller Anode

Replacement Propeller Anodes only for Radice propellers with hex fitment.

SALT WATER	BRACKISH WATER	FRESH WATER
RAD Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Outer Dia	Hex Size			
39	**32**	**23**	RAD22/25Z	N/A	N/A
57	**41**	**27**	RAD30Z	N/A	N/A
58	**44**	**32**	RAD35Z	N/A	N/A
65	**50**	**36**	RAD40Z	N/A	N/A
73	**59**	**41**	RAD45Z	N/A	N/A
83	**72**	**46**	RAD50Z	N/A	N/A
83	**72**	**50**	RAD55Z	N/A	N/A
95	**82**	**55**	RAD60Z	N/A	N/A

"Sole Diesel" Pattern Replacement Anodes With Cut-Out

Propeller nut anode to suit sole sterngear, these shaft anodes feature a cut out to suit the specific sole prop boss. Popular on Spanish & French built boats.

SALT WATER	BRACKISH WATER	FRESH WATER
SOLE Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Outer Dia	Inner Dia			
39	**32**	**24**	SOLE32	N/A	N/A
45	**37**	**26**	SOLE37	N/A	N/A
60	**46**	**36**	SOLE45	N/A	N/A
70	**55**	**45**	SOLE55	N/A	N/A

**** Popular on Spanish & French Built Boats ****

Flex-O-Fold Pattern Propeller Anode

To suit the 3-blade Flex-O-Fold folding propellers.

SALT WATER	BRACKISH WATER	FRESH WATER
FLX01 Zinc Anode 0.45 KG	FLXA01 Aluminium Anode 0.18 KG	N/A Magnesium Anode

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	
N/A	**68**	**37**	1 x 8mm Hole Through Centre

Max-Prop Pattern Propeller Anode

Multi fit anode to suit old & new Max-Prop hubs with M5 & M4 bolts.

SALT WATER	BRACKISH WATER	FRESH WATER
CMMP MULTI FIT Zinc Anode	N/A SHAFT ANODE Aluminium Anode	N/A SHAFT ANODE Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Width	Depth			
N/A	**54**	**38**	CMMP63RZ	N/A	N/A
N/A	**67**	**45**	CMMP70RZ	N/A	N/A
N/A	**79**	**57**	CMMP83RZ	N/A	N/A

Beneteau / Jeanneau Propeller Anode

The MGDUFF CMAN propeller nut range offers a tapered section with integral keyway to suite the OEM boss suplied with the Beneteau / Jeanneau propeller assembly.

SALT WATER	BRACKISH WATER	FRESH WATER
CMAN Zinc Anode	N/A Aluminium Anode	N/A Magnesium Anode

Overall Dimensions (mm)			Individual Anode Part No.		
Length	Outer Dia	Inner Dia			
40	**34**	**25**	CMAN225	N/A	N/A
54	**41**	**30**	CMAN230	N/A	N/A
58	**46**	**35**	CMAN235	N/A	N/A
67	**51**	**40**	CMAN240	N/A	N/A
76	**61**	**45**	CMAN245	N/A	N/A

Mercury / Mercruiser Kits

MGDUFF provide a range of engine sterndrive anode kits to suit all popular Mercruiser & Volvo Penta systems. Available in Zinc, Aluminium and Magnesium anode alloys, protecting your vessel in all water conditions.

SALT WATER	BRACKISH WATER	FRESH WATER
CMALPHA KITZ Zinc Anodes 6 PIECE KIT	CMALPHA KITA Aluminium Anode 6 PIECE KIT	CMALPHA KITM Magnesium Anode 6 PIECE KIT

Kit Suitable For Engine Models
Alpha 1, Generation 2
Kit Includes: *CM76214, CM806105, CM806189 (x2), CM821629C, CM821631*

SALT WATER	BRACKISH WATER	FRESH WATER
CMALPHA KITZ1 Zinc Anode 4 PIECE KIT	CMALPHA KITA1 Aluminium Anode 4 PIECE KIT	CMALPHA KITM1 Magnesium Anode 4 PIECE KIT

Kit Suitable For Engine Models
Alpha 1, Generation 1
Kit Includes: *CM31640, CM55989 (x2) CM821631*

SALT WATER	BRACKISH WATER	FRESH WATER
CMBRAVO 1KITZ Zinc Anode 5 PIECE KIT	CMBRAVO 1KITA Aluminium Anode 5 PIECE KIT	CMBRAVO 1KITM Magnesium Anode 5 PIECE KIT

Kits Suitable For Engine Models
Bravo 1
Kit Includes: *CM76214, CM806188 CM806190 (x2), CM821630C2*

SALT WATER	BRACKISH WATER	FRESH WATER
CMBRAVO 23KITZ Zinc Anode 4 PIECE KIT	CMBRAVO 23KITA Aluminium Anode 4 PIECE KIT	CMBRAVO 23KITM Magnesium Anode 4 PIECE KIT

Kit Suitable For Engine Models
Bravo 2 & 3
Kit Includes: *CM762145, CM806190 CM821630C2*

SALT WATER	BRACKISH WATER	FRESH WATER
CMBRAVO 3KITZ Zinc Anode 6 PIECE KIT	CMBRAVO 3KITA Aluminium Anode 6 PIECE KIT	CMBRAVO 3KITM Magnesium Anode 6 PIECE KIT

Klit Suitable For Engine Models
Bravo 3 (2004+)
Kit Includes: *CM762144, CM762145 CM806190 (x2) CM821630C2, CM865182*

SALT WATER	BRACKISH WATER	FRESH WATER
N/A KITZ Zinc Anode	CMVERADO 4KITA Aluminium Anode 4 PIECE KIT	N/A KITM Magnesium Anode

Kit Suitable for Engine Models
Mercury Verado - 4cyl Kit
Kit Includes: *CM762145A, CM818298A, CM826134A (x2)*

SALT WATER	BRACKISH WATER	FRESH WATER
N/A KITZ Zinc Anode	CMVERADO KITA Aluminium Anode 8 PIECE KIT	N/A KITM Magnesium Anode

Kit Suitable for Engine Models
Mercury Verado - 6cyl Kit
Kit Includes: *CM880653, CM892227 (X4), CM826134 (X2), CM762145*

MGDUFF
ENGINE ANODES

SALT WATER	BRACKISH WATER	FRESH WATER
CM865182Z Zinc Anode	CM865182A Aluminium Anode	CM865182M Magnesium Anode
0.5 KG	0.19 KG	0.12 KG

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	Bravo 3 Prop Shaft Anode (2004+)
N/A	54	61	

SALT WATER	BRACKISH WATER	FRESH WATER
CMV280 KIT Zinc Anodes	CMV280 KITA Aluminium Anode	CMV280 KITM Magnesium Anode
2 PIECE KIT	2 PIECE KIT	2 PIECE KIT

Kit Suitable For Engine Models
Volvo 280
Kit Includes: *CM832598, CMV18*

Volvo Engine Anode Kits

MGDUFF provide a range of engine sterndrive anode kits to suit all popular Mercruiser & Volvo Penta systems. Available in Zinc, Aluminium and Magnesium anode alloys, protecting your vessel in all water conditions.

SALT WATER	BRACKISH WATER	FRESH WATER
CMV280 DPKIT Zinc Anode	CMV280 DPKITA Aluminium Anode	CMV280 DPKITM Magnesium Anode
2 PIECE KIT	2 PIECE KIT	2 PIECE KIT

Kit Suitable For Engine Models
Volvo 280 DP
Kit Includes: *CM832598, CM875821*

SALT WATER	BRACKISH WATER	FRESH WATER
N/A KITZ Zinc Anode	CMDPH KITA Aluminium Anode	CMDPH KITM Magnesium Anode
	2 PIECE KIT	2 PIECE KIT

Kits Suitable For Engine Models
DPH Drives
Kit Includes: *CM3841427, CM3863206*

SALT WATER	BRACKISH WATER	FRESH WATER
CMV290 KIT Zinc Anode	CMV290 KITA Aluminium Anode	CMV290 KITM Magnesium Anode
2 PIECE KIT	2 PIECE KIT	2 PIECE KIT

Kits Suitable For Engine Models
Volvo 290
Kit Includes: *CM852835, CMV18*

SALT WATER	BRACKISH WATER	FRESH WATER
N/A KITZ Zinc Anode	CMDPS KITA Aluminium Anode	CMDPS KITM Magnesium Anode
	2 PIECE KIT	2 PIECE KIT

Kit Suitable For Engine Models
Volvo SX-A/DPS Drives
Kit Includes: *CM3841427, CM3883728*

SALT WATER	BRACKISH WATER	FRESH WATER
CMV290 DPKIT Zinc Anode	CMV290 DPKITA Aluminium Anode	CMV290 DPKITM Magnesium Anode
2 PIECE KIT	2 PIECE KIT	2 PIECE KIT

Klit Suitable For Engine Models
Volvo 290 DP
Kit Includes: *CM852835, CM875821*

SALT WATER	BRACKISH WATER	FRESH WATER
CMSX KITZ Zinc Anode	CMSX KITA Aluminium Anode	CMSX KITM Magnesium Anode
2 PIECE KIT	2 PIECE KIT	2 PIECE KIT

Kit Suitable For Engine Models
Volvo SX
Kit Includes: *CM3854130, CM3855411*

SALT WATER	BRACKISH WATER	FRESH WATER
CM872793Z Zinc Anode	CM872793A Aluminium Anode	N/A Magnesium Anode
0.11 KG	0.05 KG	

Overall Dimensions (mm)			Anode Body Dimensions (mm)
Length	Width	Depth	Volvo Penta - Triangle for 290, 290DP, SX, DP-X
38	65	13	

MGDUFF
SAILDRIVE ANODES

Saildrive Anodes

Saildrives have anodes specifically designed to fit on the gearbox housing, with some types able to be replaced without removing the propeller. Whatever style is used, we recommend the fastening screws are assembled and tightened with a small amount of liquid threadlocker to prevent loosening, then tested for electrical continuity after fitting.

Changing the propeller material (i.e. from aluminium to bronze) may require additional anodes – see 'type D' vessels in our technical pages. If fitting a folding propeller, check if it has an integral shock absorbing sleeve, as this can isolate the propeller from the Saildrive anode. In this instance the propeller normally has extra anodes fitted to the hub.

SALT WATER	BRACKISH WATER	FRESH WATER
CM385 8399Z Zinc Anode	CM385 8399A Aluminium Anode	CM385 8399M Magnesium Anode
0.35 KG	0.3 KG	0.25 KG

Overall Dimensions (mm)			Kits Suitable For Saildrive Models
Length	Width	Depth	
15	83	12	Volvo Penta - Folding Propeller Ring (Includes Fixing Bolts)

SALT WATER	BRACKISH WATER	FRESH WATER
CM852 018Z Zinc Anode	N/A 018A Aluminium Anode	N/A 018M Magnesium Anode
0.06 KG		

Overall Dimensions (mm)			Kits Suitable For Saildrive Models
Length	Width	Depth	
63	15	15	Volvo Penta - Folding Prop (100S, 110S, 120S, S-B, S-C) *2 required per assembly.*

SALT WATER	BRACKISH WATER	FRESH WATER
CM875 812Z Zinc Anode	CM875 812A Aluminium Anode	CM875 812M Magnesium Anode
0.92 KG	0.41 KG	0.23 KG

Overall Dimensions (mm)			Kits Suitable For Saildrive Models
Length	Width	Depth	
106	138	43	Volvo Penta - Saildrive Ring (110)

SALT WATER	BRACKISH WATER	FRESH WATER
CM1964 2002652Z Zinc Anode	N/A 2002652A Aluminium Anode	CM1964 2002652M Magnesium Anode
0.85 KG		0.21 KG

Overall Dimensions (mm)			Kits Suitable For Saildrive Models
Length	Width	Depth	
147	107	26	For Yanmar Drives Without Adaptor Plates

SALT WATER	BRACKISH WATER	FRESH WATER
CM851 983Z Zinc Anode	CM851 983A Aluminium Anode	CM851 983M Magnesium Anode
0.5 KG	0.24 KG	0.19 KG

Overall Dimensions (mm)			Kits Suitable For Saildrive Models
Length	Width	Depth	
123	96	28	Volvo Penta - Saildrive Ring (120)

SALT WATER	BRACKISH WATER	FRESH WATER
CM1964 4002660Z Zinc Anode	N/A 4002660A Aluminium Anode	N/A 4002660M Magnesium Anode
0.78 KG		

Overall Dimensions (mm)			Kits Suitable For Saildrive Models
Length	Width	Depth	
145	102	25	For Yanmar Drives With Adaptor Plates (Mounting Holes 125mm Centre)

SALT WATER	BRACKISH WATER	FRESH WATER
CM358 407Z Zinc Anode	CM358 407A Aluminium Anode	CM358 407M Magnesium Anode
1.48 KG	0.65 KG	0.41 KG

Overall Dimensions (mm)			Kits Suitable For Saildrive Models
Length	Width	Depth	
135	110	40	Volvo Penta - Saildrive Ring (130/150)

To find out more information about our available products and for further technical details please visit our web site - **www.mgduff.co.uk** or contact our sales office - **sales@mgduff.co.uk**

MGDUFF ZINGA®

LIQUID ANODE TECHNOLOGY
TECHNOLOGY

Zinga is a film-galvanising system comprising precisely milled zinc particles suspended in a unique liquid base. It bonds to any prepared steel substrate to form a finished surface layer of 96%zinc.

Zinga has all of the advantages of hot-dip galvanising and thermal zinc spray, but none of their application and overcoating problems. Steel coated in up to 60 µm of Zinga can still be welded.

Zinga is:

- ✔ Easy to use.
- ✔ A cost-effective alternative to hot-dip galvanising.
- ✔ Highly resistant to mechanical abrasion.
- ✔ Certified for use with potablewater (BS 6920).
- ✔ Certified as non-flammable (BS 476 parts 6 & 7: fire propagation and surface spread of flame).
- ✔ Suitable for large and small areas, from bridges to nuts and bolts.
- ✔ NORSOK Standard M-501 Revision 5 approved.
- ✔ Approved by London Underground.

Zinga can:

- ✔ Be used on top of existing galvanising, existing or damaged zinc thermal spray or a previously applied layer of Zinga.
- ✔ More than double the service-life when part of a duplex system.
- ✔ Be applied to damp surfaces in up to 90% relative humidity.
- ✔ Be applied in extreme temperatures: from minus 15°C to plus 40°C.

Zinga offers:

- ✔ Longer protection than hot-dip galvanising applied to the same thickness (DFT).
- ✔ On-site application.
- ✔ Excellent adhesion properties.
- ✔ Extreme flexibility: it will not crack or delaminate.

Technical Specification:

Surface Preparation	Grit blast to SA2.5 (Rz 50 - 70 µm)
Approx. Drying Times @ 15°C	
Touch Dry	10mins
Dry to Handle	30mins
Overcoat with Zinga	30 - 60mins
Overcoatwith Epoxy	24 hrs
Application Temp Range	-15°C to +40°C
Application Humidity Range	90%
Substrate Temp	>3°C above DewPoint
Thinner	Zingasolv
Cleaner	Zingasolv/Gunwash
Pot Life	Unlimited
Packaging	1Kg Can 2Kg Can 5Kg Can 10Kg Can 25Kg Can 500ml Spray

Theoretical Coverage:

When brushed, rolled or spray applied the layer thickness should be approximately 50 µmDFT. At this film thickness Zinga will provide a coverage of 3m²/Kg.

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INSTITUTE OF CORROSION

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