Which Anodes Should I Use?

- Your choice of anode requires consideration of three key issues:
  1. The nature of the underwater metals on your vessel;
     - Stainless Steel, Bronze, Mild Steel, Aluminum are most common
       - Fiberglass hulls with Inboard Engines have stainless steel and bronze, possibly some mild steel
       - Outdrives and outboards are made of aluminum
  2. The nature of water your vessel operates in;
     - Salt, Brackish, Fresh water
  3. Whether your vessel may galvanically couple to other underwater metals around it.
     - e.g., Has AC shore power connection but no galvanic isolator

Which Anodes Should I Use?

Chart A

For Vessels with AC Shore Connections and <u>no</u> Galvanic Isolation[1]

	Inboard				Outdrive		Outboard	
	Fiberglass[2]	Aluminum[3]	Steel[4]	Wood[5]	Alum Prop[6]	SS Prop[7]	Alum Prop[6]	SS Prop[7]
Salt	**Zn**/Al	**Zn**/Al	**Zn**/Al	**Zn**/Al	**Zn**/Al	**Zn**/Al	**Zn**/Al	**Zn**/Al
Brackish	**Al**/Zn	**Al**/Zn	**Al**/Zn	**Al**/Zn	**Al**/Zn	**Al**	**Al**/Zn	**Al**
Fresh	**Mg**/Al	**Mg**/Al	**Mg**/Al	**Al**	**Mg**/Al	**Mg**/Al	**Mg**/Al	**Mg**/Al

1) Without a galvanic isolation device, a vessel at dock can galvanically couple to nearby vessels via the ground wire in the AC shore power cable. The performance and service life of a vessel's anodes will be affected by underwater metals of nearby vessels.
2) On fiberglass inboard boats the underwater metals are typically stainless steel and bronze attached to the vessel's bonding system. In salt and brackish water use zinc anodes for galvanic compatibility with other vessels at dock. In freshwater, use more active aluminum or magnesium anodes for self-cleaning performance.
3) Aluminum hulls are susceptible to corrosion in all water types. In salt and brackish water use zinc anodes for dockside compatibility. In freshwater, use more active anodes for self cleaning performance. Caution: Magnesium anodes should never be use on aluminum metal in salt water.
4) Steel hulls are susceptible to corrosion in all water types. In salt and brackish water use zinc anodes for dockside compatibility. In freshwater, use more active aluminum or magnesium anodes for self-cleaning performance.
5) Wood hulls with metal fittings on a bonding system are subject to alkali delignification of the wood fibers around metal fittings. Use anodes only with a corrosion controller.
6) Outdrives and outboards with aluminum propellers should use zinc anodes for dockside compatibility in salt and brackish waters. In freshwater, use more active aluminum or magnesium anodes for self-cleaning performance.
7) Stainless steel propellers of outdrives and outboards are galvanically incompatible with their aluminum housings and tend to inflict severe corrosion. Use zinc anodes for dockside compatibility in salt and brackish water, and more active aluminum and magnesium anodes in freshwater. Exception: Outdrives with dual stainless steel propellers (e.g., Bravo 3) should use more active aluminum anodes in salt and brackish water and, whenever possible, magnesium in freshwater.

Which Anodes Should I Use?

Chart B

For Vessels with:

1) No AC Shore Connections; or
2) AC Shore Connections <u>with</u> Galvanic Isolation

	Inboard				Outdrive		Outboard	
	Fiberglass[8]	Aluminum[9]	Steel[10]	Wood[11]	Alum Prop[12]	SS Prop[13]	Alum Prop[12]	SS Prop[13]
Salt	**Zn**/Al	**Zn**/Al	**Zn**/Al	**Zn**/Al	**Zn**/Al	**Al**/Zn	**Zn**/Al	**Al**/Zn
Brackish	**Al**/Zn	**Al**/Zn	**Al**/Zn	**Al**/Zn	**Al**/Zn	**Al**	**Al**/Zn	**Al**
Fresh	**Mg**/Al	**Mg**/Al	**Mg**/Al	**Al**	**Mg**/Al	**Mg**/Al	**Mg**/Al	**Mg**/Al

8) The underwater metals on fiberglass inboard vessels are usually stainless steel and bronze attached to the vessel's bonding system. Use zinc or aluminum anodes, but don't mix types if bonded together. In freshwater, use more active aluminum or magnesium anodes for self-cleaning performance.
9) Aluminum hulls are susceptible to corrosion in all water types. In salt or brackish water use zinc or aluminum anodes. In freshwater, use more active magnesium anodes (preferred) or aluminum anodes. Caution: Magnesium anodes should never be used on aluminum metal in salt water.
10) Steel hulls are susceptible to corrosion in all water types. In salt or brackish water use zinc or aluminum anodes. In freshwater, use more active magnesium anodes (preferred) or aluminum anodes for self-cleaning performance.
11) Wood hulls with metal fittings on a bonding system are subject to alkai delignification of the wood fibers around metal fittings. Use anodes only with a corrosion controller.
12) Outdrives and outboards with aluminum propellers should use zinc or aluminum in salt and brackish waters. In freshwater, use more active aluminum and or magnesium anodes for self-cleaning performance.
13) Stainless steel propellers on outdrives and outboards are galvanically incompatible with their aluminum housings and tend to inflict severe corrosion. In salt and brackish water use zinc or aluminum anodes. In freshwater, use more active aluminum or magnesium anodes for self-cleaning performance. Exception: Outdrives with dual stainless steel propellers (e.g., Bravo 3) should only use aluminum anodes in salt and brackish water, and where possible, magnesium in freshwater.

Which Anodes Should I Use?

Chart Merc-A

For Mercruiser Outdrives with AC Shore Connections and <u>no</u> Galvanic Isolation(1)

	Bravo 3	**Bravo 2**	**Bravo 1**	**Alpha 1 Gen II**	**Alpha 1**
Salt Water	**Al**	**Zn**	**Zn**	**Zn**	**Zn**
Brackish Water	**Al**	**Al**/Zn	**Al**/Zn	**Al**/Zn	**Al**/Zn
Fresh Water	**Mg**	**Mg**/Al	**Mg**/Al	**Mg**/Al	**Mg**/Al

(1) When at dock many Mercruiser outdrives are DC coupled to other vessels around them via their AC ground wire in their shore power connection. As a result, an outdrive in salt and brackish water is often forced to its “dock potential” as determined by the anodes installed on neighboring boats (generally zinc). Adding stronger aluminum anodes to your Mercruiser drive may result in reduced service life of the anodes.

(2) Do not use magnesium anodes if your Mercruiser outdrive ventures into salt water. They can damage the outdrive’s paint and metal.

Which Anodes Should I Use?

Chart Merc-B

For Mercruiser Outdrives:

1) With <u>no</u> AC Shore Connections; or
2) Having AC Shore Connections <u>with</u> Galvanic Isolation

	Bravo 3	**Bravo 2**	**Bravo 1**	**Alpha 1 Gen II**	**Alpha 1**
Salt Water	**Al**	**Al**	**Al**	**Al**	**Al**
Brackish Water	**Al**	**Al**	**Al**	**Al**	**Al**
Fresh Water	**Mg**	**Mg**/Al	**Mg**/Al	**Mg**/Al	**Mg**/Al

(1) Do not use magnesium anodes if your Mercruiser outdrive ventures into salt water. They can damage the outdrive's paint and metal.

Which Shaft Anodes Should I Use?

Chart Shaft

For Inboard Boats

	AC Shore Power, No Isolation (1)	AC Shore Power w/ Isolation (2)	No AC Shore Power
Salt Water	**Zn**	**Zn**/Al	**Zn**/Al
Brackish Water	**Zn**	**Al**/Zn	**Al**
Fresh Water	**Al**/Mg	**Al**/Mg	**Al**/Mg

(1) When at dock many Mercruiser outdrives are DC coupled to other vessels around them via their AC ground wire in their shore power connection. As a result, an outdrive in salt and brackish water is often forced to its “dock potential” as determined by the anodes installed on neighboring boats (generally zinc). Adding stronger aluminum anodes to your Mercruiser drive may result in reduced service life of the anodes.

(2) Do not use magnesium anodes if your Mercruiser outdrive ventures into salt water. They can damage the outdrive’s paint and metal.