

Mariner Life – Legal Desk

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“Electrolysis” and Impressed Current Corrosion as an insured “Peril of the Sea”

If your vessel has ever been damaged by “electrolysis” and you have claimed on your hull and machinery insurance, chances are you have been denied insurance coverage for the damage. Despite the fact that only some policies of marine insurance specifically exclude “electrolysis” as a loss insured against, coverage for such damage is invariably denied because underwriters take the convenient view that “electrolysis” is a gradual and inevitable process (like wood rot), and therefore not a sudden and fortuitous event that qualifies as a “peril of the sea”, that is, a typical insurable loss.

I am currently running two lawsuits against underwriters on this issue, both with a view to setting precedents whereby underwriters are bound to accept, as a loss covered by the insurance policy, damage by some forms of “electrolysis” – these are matters of public record. In this legal desk I will discuss why certain electrochemical corrosion, particularly “impressed stray current corrosion”, should (and hopefully will) be a form of damage covered by typical hull and machinery claims in the near future. Underwriters should sit down while reading this article.

Coverage for Perils of the Sea under a Hull & Machinery Policy

Hull and machinery policies are “named perils” policies, that is, the owner (or “assured”) is protected from losses that occur as a result of perils that are named in the policy. The most common example of this on the West Coast is the Canadian Hull (Pacific) Clauses 1991. These insuring clauses, in conjunction with provisions in the Canadian *Marine Insurance Act*, set out that losses that occur as the result of a *marine adventure* or *peril* are covered, unless they are specifically excluded. A “marine peril” is a peril consequent to marine navigation, and typically refers to damage by waves, sinking, and so on. Underwriters will often attach to these general Canadian Hull (Pacific) Clauses other provisions that set out particular exclusions to coverage, such as “mold”, “vermin” or “electrolysis” damage. In the two cases referred to above, neither policy contains a specific exclusion for electrolysis (as discussed below, even if they did, in my opinion, underwriters may not be able to deny coverage for some types of electrolysis, such as impressed current corrosion).

Under the Canadian Hull (Pacific) Clauses, a loss must result from a “marine peril” or “peril of the sea” to be afforded coverage. A “peril” has traditionally been construed to only include events that are “sudden” and “fortuitous” (meaning they are accidental, or not an inevitable event). To explain by analogy, while you can have life insurance in the event of a heart attack or stroke (these are sudden and not inevitable events), you cannot insure against death by old age generally because this is a gradual and inevitable event.

Those typical exclusions noted above, such as “mold” and “vermin” are generally associated with a failure to maintain the vessel, and not a “sudden” and “fortuitous” loss.

The difficulty with the word “electrolysis” is that it has been so badly misused over the years, that underwriters simply understand it to be a gradual and inevitable process, and therefore not a “peril” that can be insured against (unless of course underwriters simply use it as an excuse to deny coverage and save a few bucks, but I can’t imagine that being the case). For example, when one of my clients received a letter from their insurance broker confirming the policy would not cover the damage to his boat that occurred over a period of only a few days and in proximity to a vessel that was measured to be leaking current, the broker stated:

I refer you to correspondence received from your Insurer dated June 17, 2005. It clearly outlined the reasons for denial. It states “the surveyor had revealed that the vessel had sustained electrolysis damage in the form of pin-holing, pitting and patches of surface erosion over the entire underwater hull”. It referred to insuring conditions contained in the Canadian Hulls (Pacific) clauses, 1991 which is a named perils policy. Electrolysis damage over a ‘period of time’ is not a covered peril as it was not considered ‘sudden and accidental’.

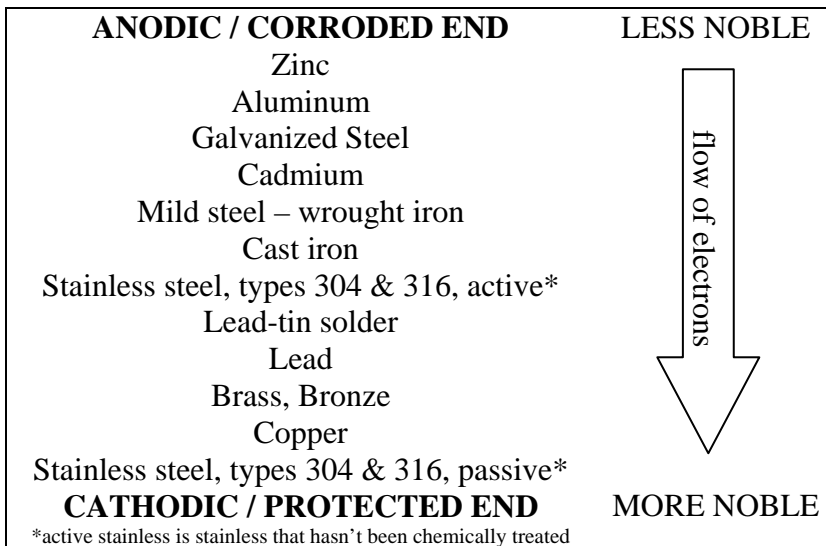
In my opinion, it is the underwriter’s misconception of “electrolysis”, and perhaps their motivation to save money by denying a claim, that results in the erroneous conclusion that the damage was not sudden and accidental (fortuitous). To this end, a discussion on this type of corrosion is appropriate.

The Common Misunderstanding of “Electrolysis”

“Electrolysis” is a misused word. In a marine context, “electrolysis” may most commonly be defined as a chemical change in a metal that results from the passage of electrons (from one metal to another) through an electrolyte such as salt water. We most often see electrochemical corrosion in two forms, galvanic corrosion and electrolytic corrosion.

Galvanic corrosion will occur when two different metals, each with their own electrical potential (ability to hold their electrons), are placed in proximity - the flow of electrons from one metal to the other results in corrosion to the metal. Figure 1 is a common table of the galvanic potential of various metals – the further apart two metals are on the galvanic scale the more vigorously they will react. Galvanic corrosion is most effective when an electrolytic solution (such as salt water) is present between the metals, but can occur when it is dry if the metals are touching. This type of corrosion tends to be a gradual process, and does not require an external source of current to occur. It can be found on a boat when, for example, a steel and a brass pipe fitting, each having a different potential, are joined (the steel will lose electrons to the brass, causing the steel to rust).

Figure 1



Electrolytic corrosion, on the other hand, may commonly be understood to be the loss of metal as electrons flow from one metal to distant metal through an electrolyte such as salt water. Zincs on your hull dissolve as electrons pass from the zinc out into the water and onto other metals. Unlike galvanic corrosion, electrolytic corrosion can be found even when metals are not tied together or in close proximity, and will only occur when there is an electrolyte solution. In normal circumstances, electrolytic corrosion typically happens relatively slowly – some mariners may replace their zincs only once every two years or so. Unfortunately, not all circumstances are “normal”.

Stray Current (Electrolytic) Corrosion - Electrolytic corrosion can occur much more quickly when there is “stray current” present. Stray current is current that exists between two substances other than because of the difference in each metal’s natural potential. Stray current can occur, for example, when there is a fault in the DC system of a vessel and the DC current strays, or leaks, through the vessel and out the hull into the water looking for ground – as it leaves the hull it takes electrons of metal with it causing the metal to corrode. Another example is when a vessel, who is plugged into shore power, has a ground fault in the DC system which allows DC current to flow into the dock’s ground system – this DC current will flow back onto each vessel (unless the vessel is protected with a galvanic isolator or isolation transformer) in the marina that is plugged into the ground, and out through each of the hulls back to ground. Again, as this current passes out of the hull it takes electrons of metal with it, corroding the metal. This corrosion can be more than zincs can handle. Indeed, corrosion may occur to portions of the hull even though there is life left in the zincs because the zincs may be insulated by a thin layer of zinc oxide, or the zinc has lost a proper connection to the hull.

Impressed Current Corrosion - More severe forms of stray current corrosions also exist, such as when there is a great deal of stray current or the voltage associated with the current is high. Because it is impressed, the current can cause catastrophic damage to the hull extremely quickly – destroying the hull in a matter of days. More severe examples of DC current ground faults can cause this. As well, although AC current is commonly thought not to be able to cause stray current corrosion, there are some authorities that opine that metallic oxides can act as diodes that convert the AC current into DC current at the surface of the metals, and that because the voltage of AC is much higher than DC, damage caused by AC current can occur as dramatically and as quickly as that caused by DC current. There are however conflicting opinion on this point.

In summary, contrary to underwriter's common position that all electrochemical corrosion is "electrolysis", and that electrolysis is "*damage over a 'period of time' and 'not a covered peril as it was not considered 'sudden and accidental'*", stray current corrosion, particularly when associated with impressed current, can cause sudden and accidental corrosion. Hence, in my opinion, this is damage that qualifies as a "peril of the sea" and is thus an insured loss.

In both of the cases referred to above, the vessels were either found in areas where there was significant stray current recorded in close proximity to the damage, and the vessel was tied into a common ground, or there was a significant ground fault in the onboard system and the vessel had no mechanism to isolate the stray current from the hull. Both vessels suffered sudden and dramatic damage to the hull. In both cases, I expect, the underwriter is in for a rude awakening.

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