



GMA GARNET GROUP

CONDUCTIVITY, CORROSIVE SALTS AND CARBONATES: THE FACTS



All salts are not equal: The truth about Salts and Corrosion

1 There are many sources of garnet around the world, each with their own unique geological characteristics.

Garnet has evolved over millions of years from the formation of igneous and metamorphic rocks, formed under high pressures and temperatures.

FACT

GMA Garnet (Australian ore body) has a level of Calcium Carbonate (CaCO_3) and Bicarbonates (HCO_3^-) formed from sea shells. These are not corrosive salts.

- Port Gregory (Australia) – an almadine garnet deposit formed over millions of years, has a high concentration of sea shells mixed within the deposit. The seashells have broken down with the garnet to form calcite (Carbonates & Bi-Carbonates) on the surface over many thousands of years.
- Other garnets – many Indian/Chinese river garnets are younger and have minimally formed carbonate minerals. These garnets are usually more friable, with higher fractures and are lower quality.



GMA Garnet with slight carbonates on surface

- Solid alluvial particles from prolonged natural attrition.
- Very resistant to further breakdown.



River Garnet

- Inherently weaker due to relatively short sedimentary life.
- Characterised by more fracture plains.



Other Garnet - highly friable

- Low quality characterised by agglomerated structure.
- Highly friable.

2 Not all salts are corrosive

Not all salts are corrosive salts and many salt contaminants will not induce corrosion. It is important to understand which salts are corrosive and which will not induce corrosion.

The non corrosive or non harmful soluble salts on metals are:

- Carbonates
- Bicarbonates
- Hydroxides

Coating films are semi-permeable membranes and when there are salt

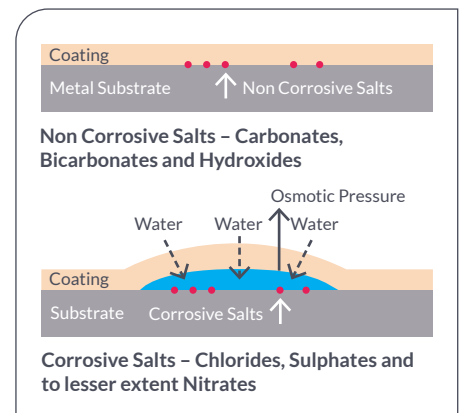
contaminants of chlorides and sulphates under the coating surface there is a tendency for water diffusing into the coatings to equilibrate the concentration.

This causes delamination and blistering. Osmotic blistering is one of the most common coating failures. Carbonates and Bicarbonates do not cause delamination and osmotic blistering.

The most harmful corrosive soluble salts on metals are:

- Chlorides
- Sulphates
- Nitrates

Osmotic Pressure with Corrosive Salts



FACT

Carbonates and Bicarbonates do not cause delamination and osmotic blistering.

3 Methods of assessment

Standards such as ISO 8502 presents methods of assessing salts and provide guidance to many specifiers, coating and corrosion specialists as well as asset owners and contractors in many countries around the globe.

- **ISO 8502-6:** Extraction of soluble contaminants for analysis - The Bresle method.
- **ISO 8502-9:** Field method for the conductometric determination of water-soluble salts.

4 Research findings

There has been numerous reports and investigations concluding that methods of testing and analysis of corrosive salts needs to be revised and updated.

While the methods described in ISO 8502-9 can be used to determine the presence of water soluble salts, this does not accurately indicate the presence of corrosive salts.

“This measurement does not distinguish between contaminants, but rather all dissolved soluble salts that are present to the capacity of the volume of water used...”

“measurement of conductivity is not representative of a single ionic species present in the water, nor can a single species be determined...”

GMA Garnet: Chloride and Conductivity Review and Testing, May 2019, Extrin Consultants in Corrosion Management.

FACT

ISO has recognised not all salts are corrosive! ISO is currently reviewing the Standards for release in 2020.

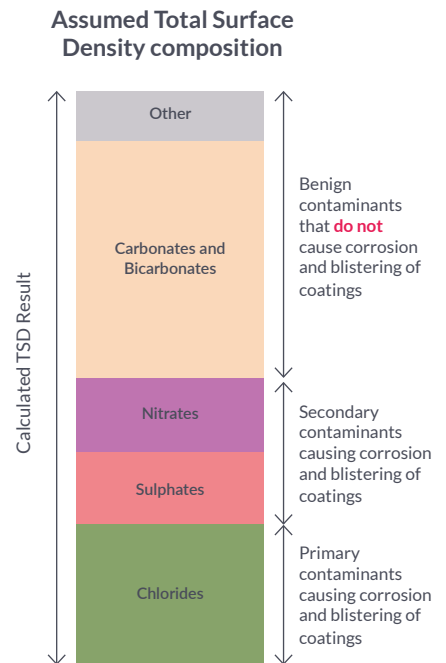
5 Using conductivity to measure corrosive salts is inaccurate

Why is this inaccurate?

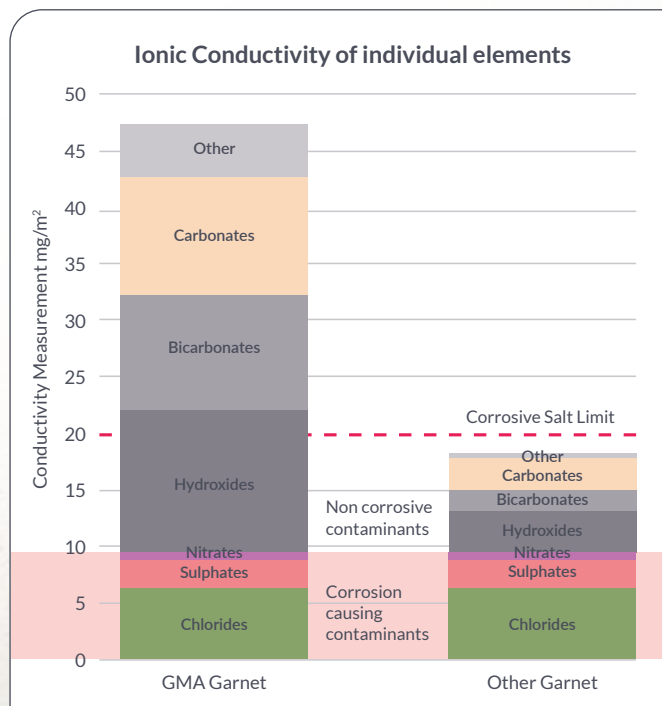
- Conductivity Measurement is a method that determines **the total amount of water soluble salts, as one single contaminant.**
- It is widely accepted in the industry that the primary salts that cause corrosion and blistering are Sodium Chloride, Sulphates and to a lesser degree Nitrates.
- Other salts such as **carbonates, bi-carbonates and hydroxides are non corrosive with minimal to no impact on coating performance.**

FACT

Conductivity measures both corrosive and non corrosive salts and therefore can be an inaccurate indication of contamination causing corrosion.



6 Conductivity measurement includes non corrosive salts



FACT

80% of salts in GMA Garnet are non corrosive*

* The percentage of benign contaminants will vary from product and batch.

7 What do I need to do?

There is a solution . . .

1. Discuss with the Project Specification Manager or Consultant to include the following addendums to the project specification:
 - a. Specify an ion specific test kit that measures Chlorides, Sulphates and Nitrates based on agreed testing and analysis methods
 - b. If using the current ISO 8502-9 method and the resulting calculation shows a Total Surface Density level above the specified limit, a secondary ion specific test is required to determine if corrosive salts are present above the limit.
2. Contact your GMA Sales Representative for expert advice on specification adjustment and testing procedures.

Why blast with GMA Garnet?

Throughout the world, GMA Garnet™ is recognised as the leading high performance, cost effective and safe blast abrasive for a variety of applications.



Higher Productivity

Superior cleaning rate against other abrasives.



Superior Surface Finish

Exceptionally clean surface & uniform profile.



Cost Effective

Lower garnet consumption, labour, clean up and disposal cost.



Safer

Meets all industry safety and environmental standards.



Secure Supply



Consistent Quality



Technical Expertise



Customer Focus



Abrasive Blasting



Waterjet Cutting



Recy-



engineered
to perform

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