



GNC MARINE

PRODUCT DATA SHEET

ARC 360

ARC 360

An advanced alternative to conventional acids used for manual and cleaning in place (CIP) descaling operations. Ideal for cleaning and descaling black water systems and vacuum system pipework, through to and a variety of on-board process equipment such as plate heat exchangers, evaporators and coolers. ARC 360 is formulated with bio-based degreasing surfactants to improve scale removal so there is no need for a separate degreaser treatment. Also included is an effective corrosion inhibitor optimised for the formulation to protect exposed, cleaning metal surfaces, welds and joints.

Product Description

ARC 360 is a bleach, ammonia, phosphate and solvent free descalant product for safely cleaning a variety of shipboard equipment. The non-abrasive formulation contains alternatives to traditional mineral and organic acids so is much less aggressive to metal surfaces and finishes. Additionally, this product has a much-improved safety profile enabling it to be used where and whenever traditional acids cannot.

Included in the formulation of is a powerful bio-based degreasing and cleaning chemistry, so the product can be used to descale surfaces contaminated with oil and grease. Thus, ARC360 is a 2-in1 degrease and descaler.

ARC 360 also incorporates a complimentary corrosion inhibitor to protect exposed metal surfaces, welds, joints and areas of heat stress in metal piping. This provides enhanced asset protection where regular, repeated descaling is required.

With all descalers the pH rises as the alkaline scale and mineral deposits are dissolved and the descaling efficiency reduces at the same time. The descaling solution can be optimised by adding further ARC 360 product as the alkalinity rises.

Application Area

Scale of various compositions occur in a wide range of marine applications and processes. These range from struvite, uric and carbonate scales in black and grey water systems, to complex mineral scales encountered in process equipment such as plate heat exchangers, evaporators, coolers and freshwater generators.

Acid descaling generally falls into two categories:

- Regular/daily maintenance application of solutions of weaker organic acids (e.g. citric or sulphamic acids)
- Aggressive descaling with strong mineral acids (e.g. hydrochloric or phosphoric acids)

With the exception of sulphamic acid, weak organic acids have a good environmental profile, but are not that effective in difficult, high scale situations. Strong mineral acids such as hydrochloric acid are very effective at removing scale but are also very corrosive towards metal and people. Their use is often restricted to port or dry dock and by specially trained and equipped operators. ARC360 is far safer to use than strong mineral acids during normal ship operations and whilst at sea. ARC360 is 100% biodegradable and is not only safer to use by personnel and materials, is safer for the environment.

Features and Benefits

Features	<ul style="list-style-type: none">✓ More effective than most organic acids (citric, malic) and many mineral acids such as phosphoric acid✓ Contains a powerful bio-based degreasing agent✓ Formulated with a corrosion inhibitor✓ pH increases as descaling action proceeds, so the sewage treatment system does not require balancing✓ Breaks down to natural compounds which are totally biodegradable in a sewage treatment plant or in the environment.
Benefits	<ul style="list-style-type: none">✓ Wide range of applications including CIP, manual cleaning of process equipment scaled during use, such as plate heat exchangers, evaporators, coolers, black water systems.✓ Removes scale, mineral deposits, light rust, light oil✓ Safer to handle at sea than concentrated mineral acids✓ Not classified as harmful to environment✓ 100% biodegradable✓ 2 in 1 product: contains a powerful degreaser and descaler. No need for a prior degreasing step.✓ Saves time and resources

In Use

Carbonate Scale Removal

Time taken to completely dissolve 5g of a mixture of calcium and magnesium carbonates at 20°C (static) by ARC 360 (1/10 dilution) = 48 mins.

(this compares to 2.8% HCl (43mins) and 6.7% Citric acid (58mins))

Black Water Scale Removal

316L SS pipe recovered from black water system of a Scandinavian ferry
 ARC 360 diluted 1/10. Temperature = 20°C. Sections soaked (no agitation) for 60mins, rinsed dried and weighed.

Before:



Scale = 110g/m

After:



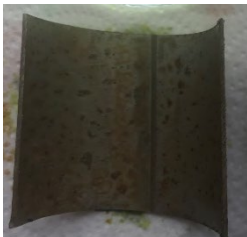
97.7% scale removal

(>95% removal required
 2.8% HCl or 8% H₃PO₄ or
 6.7% citric acids)

Corrosion Inhibition

316L SS sections were (cold) cut into sections, soaked in ARC 360 (1/10 dilution), 14% HCl or 28% H₃PO₄ for 2hrs and air dried for 24hrs

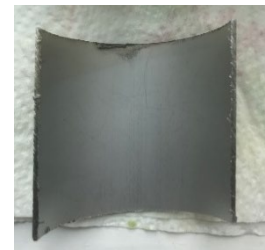
HCl



H₃PO₄



ARC 360



Galvanised mild steel coupons were soaked for 2h in ARC 360 (1/10 dilution), with and without inhibitor and compared to 14% HCl and 6.7% Citric acid

Product	Inhibitor	Weight loss
ARC 360	+	0%
ARC 360	-	2.8 %
HCl	+	0.7%
HCl	-	11.5%
Citric acid	+	0.6%
Citric acid	-	10.2%

Aluminium coupons were soaked for 2h in ARC 360 (1/10 dilution), with and without inhibitor and compared to 14% HCl and 6.7% Citric acid

Product	Inhibitor	Weight loss
ARC 360	+	0.15%
ARC 360	-	10.2%
HCl	+	1.2%
HCl	-	27.2%
Citric acid	+	1.8%
Citric acid	-	19.4%

Conclusions

- ARC 360 when diluted by 1/10 standard working concentration dissolves carbonate scale and mixed black water scale in the same time as HCl and other common acids (corrected for H⁺ concentration).
- No corrosion on 316L or 304 stainless results with correct use.
- Protection of galvanised metals and aluminium surfaces is enhanced with correct use compared to common mineral and organic acids.

Application/Directions for Use

Black Water Systems

Deep Clean black water pipes -

1. In situ whilst the ship is operational, add 200ml of ARC 360 down each toilet and flush it with warm water (30-40C) repeat 3 times per day over 5 days. At the end of each day flush with clean warm water.
2. In-Situ when ship not operational, Isolate sections of pipe and fill with neat ARC 360 allow to stand for 24 hours then flush out pipe section with clean water. Repeat if required with a 50% solution of ARC 360 again soaking for 24 hours and rinse through when finished. Should a 3rd application be required repeat above at 25% solution of ARC 360.
3. If vacuum produced via an ejector, then the addition of an Antifoam agent will be required to stop excessive foaming.

Maintenance

For Descaling of black water waste system apply between 100-200ml of ARC 360 in a 2L of hot water. Poured down the cabin toilet and flush once only. Repeat as required. Apply weekly as a maintenance treatment or as per maintenance schedule. ARC 360 has a built-in degreaser so no separate degreasing step is required even if the scale is contaminated with body fats, oil, greases typically found in black water pipes.

Cleaning in Place (CIP)

Suitable for use on such as plate heat exchangers, evaporators, coolers, freshwater generators and other process equipment that is normally cleaned by CIP. Also suitable for off-line cleaning. The product concentration required depends on the extent of scale build up and the desired time to achieve a satisfactory result. For guidance, use between 2 to 30% solution (i.e. between 1:50 and 1:3 dilution). In the absence of any existing CIP procedures, it is recommended to start with a 1:10 dilution of the product in clean water and to circulate this through the CIP equipment for 3-4 hours. Product dilution and contact time may need to be varied depending on initial results. It is also possible to simply replace the current CIP liquid with an equivalent concentration of ARC 360.

Manual Descaling

Manual cleaning with ARC 360 is effective in removing scale and light rust. Use the same product concentrations as for CIP making up solutions in a suitable plastic container. Soaking with agitation is recommended. Brushing will also improve results and reduce cleaning time

After Use

At the end of the cleaning operation it is important to thoroughly rinse the equipment and all contacted surfaces with clean water to remove any residual product and dissolved scale. Always refer to equipment manufactures guidance on use of and contact with acidic cleaners.

For further instructions and useful tips consult the **GNC Marine Products Applications Manual** available to customers only upon request

NOTE:

- **Not recommended for blackwater pipes that are free from scale.**
- **Do not use for routine maintenance in systems that are not regularly flushed**
- **Do not allow product excessive contact time (deep clean) or to pool in pipework (maintenance)**
- **Care must be taken on vessels that use flush water from with their own freshwater generators, desalination systems and water softeners as these may result in a high level of free chlorine.**
- **Avoid use on poor quality or damaged stainless steel, especially if heavily welded and or drilled.**

Should any of the above arise, then consult GNC Marine or Hans Buch for advice and selection of best method or product

Regulatory Guidance

Descaling processes in the marine industry do not fall directly under any of Annexes of the International Convention for the Prevention of Pollution from Ships (MARPOL). However, there are regulations governing the use of dangerous chemicals on board ships. Commonly used mineral acids such as hydrochloric and phosphoric acids cause severe burns on contact with skin and are also very corrosive towards metals. It is therefore necessary for personnel to be highly trained and properly equipped when using the materials

In certain marine applications such as black water system treatment, the use of hydrochloric acid is now mostly done when ships are in dry dock, by very highly trained specialists using the appropriate safety equipment.

Packaging

2x5 litre case *

20 litre jerry cans.

* Requires DGN prior to shipment. However, Packing Group III in this container size is classified as Limited Quantity (LQ) thus outside scope of ADR and IMDG



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