PhibroAC™

PRODUCT GUIDELINES

Removing and controlling deposit buildup in evaporators and other plant equipment can keep your ethanol plant running more smoothly and efficiently. When used regularly as part of your Clean in Place (CIP) program, ***PhibroAC*** provides the cleaning power needed to remove and control the formation of the most difficult-to-eliminate deposits found in ethanol production facilities.

Formulated for Superior Cleaning Performance

PhibroAC is a proprietary formulation consisting of a highly efficient, low-foaming surfactant system combined with an acid concentrate, to provide a powerful dual-action cleaning system.

Benefits

- Proven commercial performance
- Acid plus surfactant system penetrates and removes inorganic and organic scale
- Easy-to-apply liquid concentrate dosing
- Eliminates handling of powder products

Types of Deposits Removed

- Beer stone (calcium and magnesium oxalate)
- Struvite
- Calcium and magnesium phytates
- Combined organic and inorganic deposits

What is *PhibroAC*?

PhibroAC is a nitric acid–plus-surfactant concentrate for use in removing surface deposits from plant equipment and pipes in fuel ethanol plants.

Regulatory

PhibroAC is Generally Recognized As Safe (GRAS) and therefore suitable for use under the Food Safety and Modernization Act (FSMA).

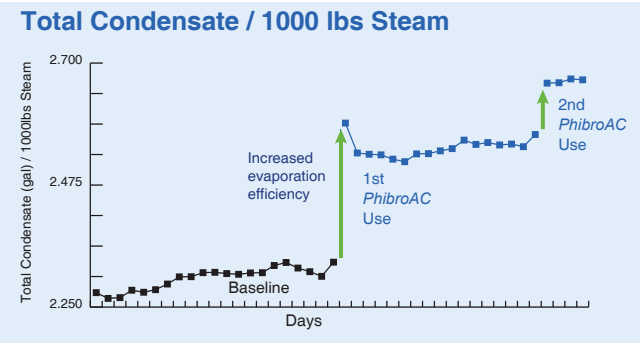
GRAS GENERALLY RECOGNIZED AS SAFE

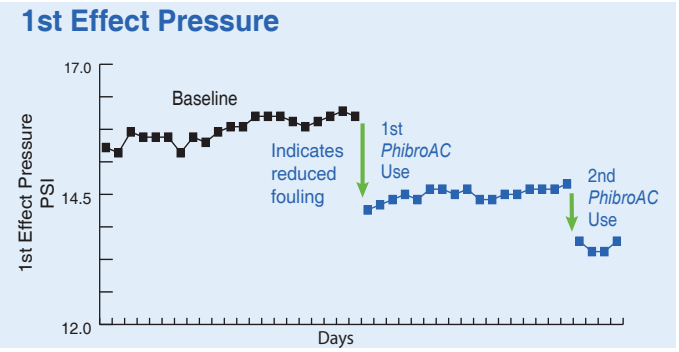
Dosage and Directions for Use

PhibroAC must be diluted in a premix tank prior to use. See the dosing chart for recommended use rates. After adding the product to the mix tank, ensure that the recirculation pump or mix system is in operation to achieve good mixing. The reaction rate of the product will improve as temperature increases and may allow a shorter cleaning cycle time with the heated solution. It is typical to see some foaming of the cleaning solution during use, as the product dissolves organics and solubilizes proteins. As ***PhibroAC*** dissolves inorganic and organic fouling, the pH of the solution will rise. This should be monitored closely. If the pH exceeds 3.0, it is recommended that additional ***PhibroAC*** concentrate is added to the existing cleaning solution to adjust the pH down to 1.0, or a fresh batch of ***PhibroAC*** cleaning solution is prepared to continue the cleaning cycle. At the end of the cycle, the cleaning solution is sent to the beer well for disposal.

NOTE: Transferring ***PhibroAC*** concentrate to the CIP acid tank should only be done with a pump and piping system constructed from materials compatible with nitric acid.

Proven Plant Performance





Note: Results above from recent commercial trials.

Packaging

PhibroAC is available in 2,400-pound totes

Shelf Life

Six months

Appearance

Clear, yellow liquid

Safety and Handling

Read product label and SDS prior to use.

Hazard Classification

- SKIN CORROSION/IRRITATION – Category 1A
- SERIOUS EYE DAMAGE/EYE IRRITATION – Category 1
- Hazard statement: Causes severe skin burns and eye damage.

Handling Instructions – Personal Protection

- Wear protective gloves.
- Wear eye or face protection.
- Wear protective clothing.
- Wash hands thoroughly after handling.

Chemical Compatibility

Material	Nitric Acid (5-10%) Compatibility	Nitric Acid (50%) Compatibility
ABS plastic	B - Good	C - Fair
Bronze	A1 - Excellent	A1 - Excellent
Buna N (Nitrile)	D - Poor	D - Poor
Carbon graphite	A - Excellent	D - Poor
Carbon Steel	D - Poor	D - Poor
Ceramic Al203	A - Excellent	A - Excellent
Copper	D - Poor	D - Poor
CPVC	A - Excellent	B1 - Good
EPDM	A1 - Excellent	D - Poor
Epoxy	A1 - Excellent	D - Poor
Fluorocarbon (FKM)	A - Excellent	A - Excellent
Hastelloy-C®	A1 - Excellent	A1 - Excellent
LDPE	B - Good	B1 - Good
Natural rubber	D - Poor	D - Poor
Neoprene	B - Good	D - Poor
NORYL®	A - Excellent	B2 - Good
Nylon	D - Poor	D - Poor
Polypropylene	A - Excellent	B - Good
Polyurethane	D - Poor	D - Poor
PTFE	A - Excellent	A - Excellent
PVC	A1 - Excellent	B1 - Good
PVDF (Kynar®)	A1 - Excellent	A1 - Excellent
Silicone	C - Fair	D - Poor
stainless steel - 304	A - Excellent	A2 - Excellent
stainless steel - 316	A - Excellent	A1 - Excellent
Tygon®	D - Poor	D - Poor
Viton®	A - Excellent	A - Excellent

Explanation of Footnotes
1. Satisfactory to 72°F (22°C)
2. Satisfactory to 120°F (48°C)
Ratings -- Chemical Effect
A = Excellent.
B = Good -- Minor Effect, Slight corrosion or discoloration
C = Fair -- Moderate Effect, not recommended for continuous use. Softening, loss of strength, swelling may occur.
D = Severe Effect, not recommended for ANY use. N/A = Information not available

from Cole-Parmer
http://www.coleparmer.com/Chemical-Resistance

Phibro AC™

Plant Area	% Concentration	ppm
Beer/Mash Train	0.50	5,000
Props	0.50	5,000
Ferm Coolers	0.50	5,000
Corn Oil Centrifuge/Stacked Disc	0.50	5,000
Cook Water Pre-heat Stack Coil	0.50	5,000
Evaporators	1.00	10,000
Beer Column	1.00	10,000
Reboiler	1.00	10,000

Initial Dosing/Heavily Fouled Plant Areas

Plant Area	% Concentration	ppm
Evaporators	2.00	20,000
Corn Oil Centrifuge/Stacked Disc	1.00	10,000
CO2 Scrubber	1.00	10,000

Phibro ETHANOL PERFORMANCE GROUP™

Antimicrobials • Process Aids
Cleaning Products • Yeast

NOTE:

- Ensure the pH of the ***PhibroAC*** solution is at 3.0 or below prior to using it for any of the applications listed above.
- If the pH exceeds 3.0, it is recommended that additional Phibro AC concentrate is added to the existing cleaning solution to adjust the pH down to 1.0, or a fresh batch of Phibro AC cleaning solution is prepared to continue the cleaning cycle.
- The information provided should be used as a guide in selecting equipment for appropriate chemical compatibility. Before permanent installation or use, test the equipment with the chemicals and under the specific conditions of your application.

A Division of Phibro Animal Health Corporation • 300 Frank W. Burr Blvd., Ste 21, Teaneck, NJ 07666-6712
EthanolPerformanceGroup.com • 1-800-223-0434 • 201-329-7300 • Fax 201-329-7034