

# Steamate\* NA Series

## Condensate Corrosion Inhibitors

- Reduce condensate corrosion
- Reduce maintenance costs
- Improve boiler system reliability
- Reduce the levels of iron and copper in boiler feedwater

### Description and Use

Steamate\* NA Series products contain water-soluble neutralising amines, and are designed to meet the specific needs of boiler and condensate systems.

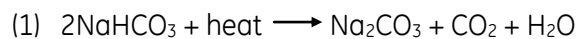
Steamate NA Series products chemically neutralise carbonic acid present in condensate, and are designed to protect all parts of the condensate system.

Some of the ingredients in Steamate NA Series products are listed in FDA 21CFR173.310 - boiler water additives for use in the preparation of steam that will contact with food.

### Problem Description

Steam containing carbon dioxide forms a weakly acidic solution "carbonic acid" when condensation occurs. Metal loss due to carbonic acid is one of the major causes of condensate corrosion.

Feedwater alkalinity is the main source of carbon dioxide as bicarbonate and carbonate alkalinity break down at elevated temperatures as follows:



The first decomposition reaction proceeds to 100% completion whereas, the second reaction proceeds to about 80% completion.

At points of condensation, carbon dioxide dissolves in water to form carbonic acid. This depresses the pH of the condensate and causes etching of the metal. This characteristic acidic corrosion shows up as thinning and grooving of the metal at and below the water level.

If the corrosion is severe, failures could occur in condensate pipe work, vessels and heat exchangers. This would result in costly equipment replacement, maintenance and possible production losses.

Furthermore, iron and copper corrosion products returned to the boiler may cause deposition in areas of high heat flux, resulting in reduced energy efficiency. Iron deposits are very porous and may promote under deposit corrosion, thus reducing boiler reliability.

### Condensate Corrosion Protection

Condensate corrosion can be controlled by applying volatile neutralising amines.

Steamate NA Series products contain neutralising amines with distribution characteristics that are designed to provide protection of metal surfaces at points of initial condensation as well as in extended areas of the condensate system.

Neutralising amines perform two functions when applied as condensate corrosion inhibitors. Firstly, they neutralise the acidity imparted to the condensate by carbon dioxide. Secondly, they elevate the pH of the condensate to a range, where iron pick-up is reduced to a minimum.

There are several important properties that govern the effectiveness of a particular neutralising amine.



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- Neutralising capacity: this is simply the quantity of neutralising amine required to neutralise a given quantity of carbon dioxide.
- Distribution ratio: this is a measure of the volatility of a neutralising amine under defined conditions.
- Basicity: this is a measure of the neutralising amines ability to elevate the pH of the condensate after all the carbon dioxide has been neutralised.

Steamate NA Series products can provide the required volatility, neutralising capacity and basicity for a typical condensate system.

## Treatment and Feeding Requirements

**Feed point** – Steamate NA Series products can be fed to the deaerator storage section, feedwater line, steam drum, or steam header.

In some systems, supplemental (“satellite”) feed points may be required to provide optimum system protection. This is especially true in complex multi-pressure steam/condensate systems with flash tanks and high alkalinity boiler feedwater.

**Feed rate** - Selection of the specific formulation as well as the required feed rate depends on the corrosion problem, system complexity, metallurgy and other system characteristics. The product feed rate is controlled by monitoring condensate pH, iron and copper levels.

**Dilution** - Steamate NA Series products can be fed neat, or diluted to any convenient strength with softened make-up, feedwater or condensate. They can be fed along with most other internal treatment chemicals.

## General Properties

The physical properties of Steamate NA Series products are shown on the Safety Data Sheet, a copy of which is available on request.

## Packaging Information

Steamate NA Series products are liquid blends and are available in a wide variety of customised containers and delivery methods. Contact your local GE representative for details.

## Safety Precautions

A Safety Data Sheet containing detailed information about this product is available on request.