

Introduction

Very serious corrosion problems can occur to plant equipment, tankage, and piping components that are thermally insulated if the insulation becomes wet. Many companies have had to repair or replace major pieces of equipment at considerable expense. At one chemical process plant alone, the cost was reported to be in the millions of dollars.

On carbon steels, the corrosion is usually of a general or pitting type. On austenitic stainless steels, the corrosion is almost always chloride stress corrosion cracking. It is an insidious problem. The insulation usually hides the corroding metal and the problem can go undetected for years until metal failure occurs. This sometimes occurs five or more years after the insulation becomes wet.

Insulation materials received from manufacturers and distributors are dry, or nearly so. Obviously, if they remain dry there is no corrosion problem. So, the solution to the corrosion under wet insulation problem would appear to be fairly obvious: keep the insulation dry or protect the metal.

Unfortunately, application of these solutions is not that simple. Insulation can get wet in storage and field erection. Weather barriers are not always installed correctly or they are not effective in fully preventing water ingress. Weather barriers and protective coatings get damaged and are not maintained and repaired.

To further complicate the problem, it appears that the degree of corrosion when an insulation gets wet is dependent on the type of insulation. Some insulations contain elements that promote corrosion, such as chloride stress corrosion cracking of austenitic stainless steels.

Inspection for the problem is often difficult. Good inspection techniques to determine that the insulation is wet or that the metal surface is corroded or stress cracked have not been widely available.

Many companies have developed the practice of applying a protective coating to steels to keep moisture from contacting the metal. Some do this only for carbon steels, some only for stainless steels, some for both. What coatings to use have varied considerably from one plant site to another.

Wet insulation is significantly less thermally efficient than dry insulation. This alone should be a high driving force for keeping insulation dry, but, interestingly, this has not been the case on many plant sites.

Little has appeared on this overall problem in the literature, and there has not been a major conference in North America before this one. In Nov. 1980, a

conference was held in Britain on "Corrosion Under Lagging." The success of that meeting stimulated the organization of a similar type conference in the U.S.

The purpose of this conference was to provide a forum for a thorough review of the problem and the various control and inspection methods being used and under development. Because the problem is broad based, several technical societies were cosponsors: ASTM Committee C-16 on Thermal Insulation and Committee G-1 on Corrosion; the National Association of Corrosion Engineers (NACE); Materials Technology Institute of the Chemical Process Industries (MTI); and Institution of Corrosion Science and Technology, a sponsor of the British conference.

The conference was very successful with some 150 people attending. It provided high recognition to a costly problem where the solutions are many faceted, as indicated by the papers in this publication.

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