Waterborne thermal insulation paintings: fundamentals and performance

Flávio V. V. de Sousa[1], *Douglas S. Fortunato*[1], *Oswaldo E. Barcia*[2], *Joaquim P. Quintela*[3], *Isabel C. P. Margarit-Mattos*[1]

[1] UFRJ/COPPE/POLI - Dep. de Engenharia Metalúrgica e Materiais - LNDC (Lab. Ensaios Não Destrutivos, Corrosão e Soldagem), Av. Pedro Calmon, 89, Ilha do Fundão, Cidade Universitária, CEP 21941-972, Rio de Janeiro (RJ), Brasil.
douglas.fortunato@coppe.ufrj.br, margarit@metalmat.ufrj.br
[2] UFRJ/IQ – Dep. Físico-Química – barcia@metalmat.ufrj.br
[3] Petrobras/CENPES/PDIDP/TMEC – quintela@petrobras.com.br
Referring author: vasques@metalmat.ufrj.br

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The unwanted transfer of thermal energy can generate problems in industrial processes affecting fluid flow, phase stabilization, energy efficiency and personal protection. Solving these problems requires the use of thermal insulators. Conventional insulators have thick layers that make equipment integrity inspections difficult. Furthermore, they are difficult to apply, especially in structures with complex shapes, and are always associated with serious corrosion under insulation (CUI) problems. Thermal insulation paint technology (TIPs) is an advance in the area of thermal insulation of industrial equipment, exposed to the atmosphere, which operates at temperatures of up to approximately 200 ^{o}C. Compared to conventional thermal insulators, TIPs can be applied using conventional industrial painting techniques and, as they are monolithic, do not involve CUI. Although TIPs have been on the market for more than a decade, there is still: i) uncertainty in sizing the paint thickness depending on the thermal gradient desired for the insulation; ii) it is not known how their thermal properties vary with their aging process and, iii) their anticorrosive properties are not well known. The objective of the work is to disseminate the fundamentals of TIP technology, discussing aspects related to application and testing conditions. Six commercial paints are studied so that the state of the art of this type of product is highlighted. Experimental procedure, partly inspired by statements of NACE SP0198-2010, makes it possible to discuss the need to integrate TIPs into corrosion protective painting systems depending on the exposure and operating conditions of the equipment. Holistic approach including thermomechanical, electrochemical and other physical-chemical properties provide better product choices, support technical specifications for large users, guide and encourage suppliers in the technology development and better organization of technical sheets.