

Thesis Title	Studies on Peel Properties between Polyethylene Foam and Steel for Thermal Insulating System
Thesis Credits	15
Candidate	Mr. Nicom Nakornriab
Supervisor	Dr. Narongrit Sombatsompop
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Abstract

This thesis aimed to investigate the peel properties between polyethylene (PE) foam and steel using neoprene adhesive. The work covered the effects of PE foam characteristics, sample preparation conditions, and the service conditions on the peel properties. It was found that the peel strength of PE foam/steel composites increased with foam thickness, but decreased with cell size, the effect of cell size of the foam being relatively more pronounced. With respect to the foam density, the foam densities between 223 and 258 kg/m³ gave the highest peel strength. It was also found that the floating roller apparatus yielded better results interpretations, as compared with 180° peel test.

It was observed that the optimum condition for preparing the test samples, in order to give the maximum peel strength, was annealing at 90 °C for 40 minutes, this condition being most suitable for the adhesive to penetrate through the foam material, and thus increased peel strength. The work also showed that the UV light caused degradations of the polymer, and then led to the penetration of the moisture through the interface between the foam and steel, the moisture acting as a lubricant in the system. The foam samples treated by chromic acids showed greater peel strength as compared to untreated ones, concerning an increase in roughness of the foam surface. This effect was accelerated by increasing the concentrations of the chromic acid and the treating temperature. The mechanism of the treatment by chromic acid involved an appearance of carbonyl groups which were polar and enhanced the physical interaction between the interface of the PE foam and steel.

Keywords : Polyethylene Foam / Peel Strength / Floating Roller Peel Test / Neoprene adhesive / Adhesive or Cohesive Bonding