The effect of N550 carbon black in polyester resin for fire-retardant application in marine composite

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Abstract

This paper presents the experimental investigation on the influence of N550 carbon black (CBN550) series in polyester resin (wax and non -wax type). The CBN550 was added into polyester resin at different weight percentages with a curing agent. The investigation is mainlyto study the effect on fire retardance application in marine composite structure. The fire-resistant structural composites samples of 1000 mm by 1000 mm prepared which consist of 10 of composite mats layer in combination of CSM 450 g/m2 and Woven Roving 600 g/m2. The carbon black (CB) volume fraction range from/with 0% to 20% volume fractions. Optical observation revealed the most suitable fraction of CBN550 in wax polyester resin is at 10% and non-wax polyester resin is also at 10%. The fire resistance behavior of this CBN550 - CSM 450 g/m2 - Woven Roving 600 g/m2 composite (polyester wax) and polyester non wax was investigated by Fire Test Procedure Code-Resolution A.653 [1]. Though smaller filler size escalates the rheological behavior and values outstandingly at initial reading compare to large particles but it slow down the curing processdue to its small particle size, large surface area and high dispersion rate. Experimental data showed the retardance level has been increased up to 56.66% in non-wax type polyester resin (10%/CBN550) and 30.14% in wax polyester resin (10%/CBN550). The improvement in fire resistance points are due to the presence of CBN550 which acts as a positive additive in both polyester resin wax and non-wax. Filling CBN550 in polyester resin also reduces the cost of theend products.The preliminary results suggested that CBN550should attend to next level of experiment investigation such as oxygen content, TG value, microstructure as well as mechanical destructive test. The CBN550 could be a suitable candidate for fire retardance application in marine composite structure.In conclusion, crystallinity of polyester resin increases with additional of CB particles.

Author keywords

Carbon black, Fire retardance, Polyester, Volume fraction