

# A Study on Improvement of Heat Resistance of FRP for Salt Water Environment.

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## Summary

Stainless steel is used for salt manufacturing apparatus, then cheaper substitute material is desired. Fiber reinforced plastic which has good corrosion resistance is considered as the substitute, but FRP has low heat resistance. Then, improvement of heat resistance of FRP was examined by filling of inorganic particulate. Effect of alumina filler on heat resistance of some polyester and FRP was evaluated and discussed. Four polyester resins, ortho-UP, iso-UP, bis-A-UP and VE were used.

The heat resistance was evaluated by TMA with sine curve loading of 3-point bending. The glass transition temperature  $T_g$ , one of heat resistance index was obtained by  $\tan \delta$  peak temperature and another index, the deflection temperature under load HDT was also determined by modulus  $E^*$ . HDT increased with particulate content by increasing modulus, on the other hand,  $T_g$  was the same as neat resin. This tendency, that was improvement of HDT, was also recognized in FRP with four types of polyester matrix resins.

The evaluation method of HDT of FRP was also discussed. HDT measured by TMA was compared with that obtained by JIS method. Almost the same tendency was recognized in both methods, and to avoid the influence of oil diffusion into the specimen TMA method was recommended as the evaluation method.

The temperature dependence in  $E^*$  of matrix resins was greatly affect on HDT. Ortho-UP and bis-A-UP showed little improvement, because these  $E^*$  changed in limited temperature range. On the other hand, HDT of iso-UP elevated by 40°C with 100 phr filling, whose  $E^*$  gradually decreased. The iso-UP used in this study showed very good performance for high temperature use, compared with VE resin which is generally considered to be a heat resistant resin.