

## **Abstract**

*This thesis presents an investigation on the heat and corrosion resistant properties of the silicone resin based coatings. Results of the study on silicone-titanate, silicone-titanate (with ceramic pigments), Rhodorsil silicone (with ceramic pigments) and epoxy-silicone based coatings are presented in chapter 3, 4 and 5.*

*The silicone resin based protective coatings have been used extensively for high temperature corrosion oriented applications. The principal difference between the silicone and nonsilicone coating is the volatility of the resins or binder at elevated temperatures. With its good solidity (-si-c-bond), thermal stability (-si-o-si-) and dielectric characteristics, it is very useful in paint technology for high temperature applications.*

*To evaluate the heat resistance of silicone based coatings that protect the mild steel surfaces from corrosion in high temperature atmospheres, the coatings are exposed to muffle furnace for heating according to ASTM specification D 2485. The ability of the paint film to withstand the temperature is related to its resistance as well as microcracks. These factors are very useful in precisely quantifying the degree of deterioration of the protective film.*

*The preparation and properties of heat resistant paints (silicone titanate coating, silicone titanate with ceramic, Rhodorsil silicone with ceramic and epoxy silicone coating) are described. The properties of the liquid paints are determined. The thermal stability of the developed coatings have been assessed by electrochemical (potential verses time & EIS) and structural (SEM with EDAX) means. The corrosion resistance (salt spray, chemical & solvent) properties are also analyzed.*

*As far as this particular study is concerned, it has been found that the coatings (silicone titanate coating, silicone titanate with ceramic, rhodorsil silicone with ceramic and epoxy silicone coating) are able to withstand (at 588 K, 643 K, 698 K and 473 K respectively) high temperature atmospheres for mild steel substrates. In general, it has also been found that the coatings studied with respect to SEM-EDAX and EIS analysis can provide complementary information on the study of heat stability of high temperature heat resistant protective coating systems. Immersion studies, salt spray test and EIS studies indicate that the developed heat resistant coatings imparted good corrosion protection for the mild steel surfaces.*

*Finally, field trials have been conducted on steel structures used in waste water treatment plants in rubber and palm oil industries. The results confirm that the epoxy-silicone coating systems are effective for the protection of steel structures in these industries for considerably longer times.*