This chapter presents a reliability assessment of a widely used protection system of medium-power squirrel cage induction motors. In conjunction with published field induction motors reliability data, this assessment effort is based on a predictive analysis integrating three predictive techniques: (1) a fault tree analysis (FTA) that allows to identify and then quantify the initiating events weighting factors; (2) an event tree analysis (ETA) that allows to predict the protection system probability outcomes following an external disturbance; and (3) a failure mode effect and criticality analysis (FMECA) that will help set the stage to develop a preventive maintenance program fit to keep up the induction motor protection system reliability at the required level with particular attention given to aggressive environmental factors such as found in cement plants