



**PERFORMANCE STANDARD FOR
ENGINE PROTECTION SYSTEMS
EGSA 100F, 1992a**

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EGSA 100F 1992a

PERFORMANCE STANDARD

ENGINE PROTECTION SYSTEMS

1. SCOPE

This standard covers systems used to monitor various engine functions and to activate alarms and/or engine shutdown devices whenever predetermined operating variables are reached. Minimum points of protection include low lube oil pressure, high engine temperature, overspeed and over crank, and low coolant level. This protection applies to both manual and auto start systems.

2. REFERENCE STANDARDS

EGSA 101E-1984	Glossary of Standard Industry Terminology and Definitions - Electrical
EGSA 101M-1984	Glossary of Standard Industry Terminology and Definitions - Mechanical
MIL STD 810D	Environmental Test Methods
SAE J1211	Recommended Environmental Practices for Electronic Equipment Design

3. DEFINITIONS

Alarm and Annunciation. The alarm may be a single device or have multiple points. It may be visual and/or audible and may differentiate between first fault and subsequent faults. It may be local and/or remote mounted to suit the application.

Control System. The control system is that portion of the system which interfaces between the input devices and output devices. It monitors the status of the input devices and compares their input against a predetermined normal status. When the actual input status differs from the normal input status, the control systems actuates the appropriate output device. The decision portion may be separate from the function sensor(s) or be an integral part of the sensor(s).

Engine Protection System. An engine protection system consists of input devices such as temperature, level, pressure and speed sensors; a control system which monitors and reacts to changes in these sensors; and output devices such as alarms, annunciator and shutdown mechanisms which are actuated by the control system. The system may be self-monitoring or allow testing by individual sensor point or may be sealed against testing and adjustment.

Engine Speed Sensor. An engine speed sensor is a device whose output is directly proportional to the engine speed.

Input Devices. Input devices are function sensors which measure the engine's pressure, temperature, etc. and send a signal which results in alarm or shutdown of the engine. The sensor(s) may be mechanical or electrical or a combination of the two. They may be engine mounted or remote mounted.

Output Devices. Output devices are actuated by a command from the control system. The devices may be of an alarm or indicating type such as to advise attending personnel of an undesirable engine condition. The devices may be such as to automatically effect engine shutdown by shutting off fuel, ignition, or air flow.

Shutdown. The shutdown device may be electrically or mechanically actuated as signaled from the function sensor(s) or the control system. It will operate the appropriate device on the engine to cause shutdown by interrupting the ignition, the fuel supply, shutting off the air intake, or a combination of these methods.

4. RATINGS

The rating for an engine protection system will consist of the following:

- Number and Type of Input Devices
- Engine Operating RPM
- Engine overspeed RPM
- Control System Power Requirements
- Steady State Current Draw of Control System
- Current and Voltage Drop of Control Systems Output
- Type and Ratings of Output Devices

5. CLASSIFICATION

An engine protection system is classified by the type of output function; be it informative only, lights, alarms, etc., or automatic engine shutdown.

6. APPLICATION

Important factors to consider when specifying an engine protection system are:

- 6.1 Engine type and model
- 6.2 Engine application and will it be attended or unattended
- 6.3 Should automatic engine shutdown occur, or is indication only adequate
- 6.4 Required or desired sequence of operation of the engine protection system
- 6.5 How the engine is equipped in terms of shutdown actuators or devices; ignition system; fuel valve; sensors, etc.
- 6.6 Are input and output devices provided
- 6.7 Ratings, tolerances, response times and types of input and output devices
- 6.8 Type of power source available, i.e. storage batteries, ignition, line voltage, pneumatic source, etc.
- 6.9 Ambient environmental conditions system must withstand

7. PERFORMANCE SPECIFICATIONS

The system shall meet all pre-determined criteria for operating alarms and/or shutting down the engine under the conditions specified, and in accordance with accepted industry practices. It shall operate in accordance with the manufacturer's stated parameters. Caution should be exercised to be sure of total system reliability when parts of systems from different manufacturers are used.

- 7.1 **Operating Environment.** The system shall meet all requirements of the operating environment in terms of weather proofing, electrical classification, building codes, etc.
- 7.2 **Activation.** The system shall be self activating.
- 7.3 **Startup Override.** The system shall have a means to override the automatic shutdown features during cranking. The length of the override time delay shall be of sufficient length to allow the protected variables to reach their normal operating value. Overspeed shall not be overridden. It must have an immediate stop.
- 7.4 **Overspeed Set Point Accuracy.** +/- 1% of overspeed set point over the specified voltage and temperature range.
- 7.5 **Overspeed Set Point Stability.** +/- 1% of overspeed set point over the specified voltage and temperature range.
- 7.6 **Overspeed Set Point Hysteresis.** 100%
- 7.7 **Adjustable Trip Points.** Alarm or shutdown trip points must be adjustable. This is necessary to match the sensor outputs to the specific operating characteristics of the engine.
- 7.8 **Test Feature.** A means shall be provided to test the operation of each shutdown/alarm sensor output.
- 7.9 **Switched Inputs.** Switched sensor inputs may be either normally closed, normally open, or in combination. A normally closed or energized to run feature is preferable to one that is energized to shutdown/alarm. However, the application may dictate that the system be either.
- 7.10 **Latched Operation.** Shutdown or alarm operation must latch in the tripped position and require manual reset by the operator before the engine can be restarted or the alarm cleared.
- 7.11 **Fault Indication.** Where required, indicators may include LEDs, LCD display, electromechanical indicators, etc. The fault is to remain latched on until cleared by the operating personnel.
- 7.12 **Power Supply Input.** An electrically operated engine protection system shall operate over the following power supply input ranges:
 - 12 volts DC system.....8-14 volts DC Min
 - 24 volts DC system..... 16-30 volts DC Min
 - 12 or 24 volts DC system 8-30 volts DC Min
 - 32 volts DC system.....24-40 volts DC Min
 - 125 volts DC system.....90-150 volts DC Min
- 7.13 **Crank Disconnect.** Automatic crank disconnect must be included in automatic start systems. It is advisable for manual start systems as well.

- 7.13.1 **Crank Disconnect Set Point Accuracy.** +/- 3% of crank disconnect set point over the specified voltage and temperature range.
- 7.13.2 **Crank Disconnect Set Point Stability.** +/- 3% of crank disconnect set point over the specified voltage and temperature range.
- 7.13.2 **Crank Disconnect Set Point Hysteresis.** 100%
- 7.14 **Tolerances.** System and sensor tolerances will be in accordance with engine manufacturer's requirements and shall meet all tolerances as stated by the sensor and/or system manufacturer's specifications.

8. OPTIONAL PERFORMANCE SPECIFICATIONS

- 8.1 Function indicating gauges provide a visual indication of the operating value of the function being monitored. They can be used to visually indicate an approaching fault condition, to verify the proper trip set point, and to provide information for trend records of the operating variable.
- 8.2 The control system may have provisions for outputting fault indications to a remote annunciator. Outputs of the control system and inputs to the remote annunciator must be compatible.

9. INSTALLATION

- 9.1 **Manufacturer Recommendation.** The system including sensors will be installed in accordance with the recommendations for the manufacturer.
- 9.2 **Industry Practice.** All wiring, plumbing, etc., should be done according to accepted industry practices and according to the specific requirements of the particular engine application.
- 9.3 **Environmental Conditions.** The control system should be mounted so that environmental conditions are within the specifications of section 7.0.

10. MAINTENANCE

- 10.1 **Periodic Inspection.** Periodic inspections should be made to ensure that all parts of the system are capable of operating.
- 10.2 **Connections.** Electrical and mechanical connections should be checked for tightness and continuity.

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