

Overpressure Protection by System Design (OPPSD) Requirements

Pressure vessels shall be provided with a means of overpressure protection. The use of an overpressure protection device (rupture disc, pressure relief valve, pressure safety valve) is the preferred and approved standard to safeguard a pressure vessel. The use of overpressure protection by system design (OPPSD) is an exception to the standard.

Approval for use of OPPSD to safeguard pressure vessels is available only to owners with a registered Quality Management System (QMS) in operation. The QMS holder must have engineering, operations, and inspection knowledge and resources to analyze, accept, and manage all responsibilities and risks associated with pressure vessels operating with overpressure protection provided by system design.

Note that OPPSD is not accepted in cases where the pressure is not self-limiting nor does it apply to low or high pressure boilers.

When an owner, or an owner's agent with concurrence of the owner, proposes the use of pressure vessels without using an overpressure protection device, the means of overpressure protection shall be proposed.

The following information will be required for an OPPSD application to be considered:

a) A Pressure Vessel List

A detailed list of pressure vessels to which overpressure protection by system design (OPPSD) is proposed to apply. The document shall indicate the pressure vessel identification, manufacturer, CRN, operating pressure and temperature, and the MAWP and design temperature. This document shall be signed and dated with a P.Eng. stamp.

b) Technical Justification for Using OPPSD in Lieu of an Overpressure Protection Device

OPPSD is only available in cases where the pressure is self-limiting (e.g., the maximum discharge pressure of a pump or compressor). A description of how the pressure is self-limiting shall be provided for each pressure vessel that the OPPSD is proposed to apply. The source(s) of pressure shall be indicated as well.

c) A Description of the Design Basis

A description of the design basis for the OPPSD shall include:

- How the maximum system upset pressure was established;

- That no creditable fire case applies to the pressure vessel directly;
- That all operating and upset scenarios were considered, including scenarios involving a fire in the system, those resulting from operator error and equipment and/or instrumentation malfunctions; and
- How the margin between maximum operating and design conditions was established.

d) An Overpressure Analysis Summary

A detailed analysis to identify and examine all potential overpressure scenarios must be conducted. A summary of the results from a hazards and operability analysis (HazOp), failure modes, effects and criticality analysis (FMECA), “what-if” analysis or other equivalent methodology is required. This section must summarize the analysis based on the design pressures proposed for all systems included within the OPPSD. The summary submitted with the application shall be stamped by a P.Eng. Additionally, the risk assessment analysis shall be reviewed, supported, and endorsed by the owner as confirmed by signature of an owner’s authorized representative on the submitted summary. Where the engineering work has not been completed by the owner, the summary shall be co-signed by both the owner’s authorized representative and an authorized representative of the owner’s agent (EPCM) doing the engineering work.

e) An Indication of a Monitoring System Established

A monitoring program must be established for all pressure vessels within the scope of the OPPSD. The monitoring program must address:

- Calibration, maintenance and testing requirements for the monitoring devices and instrumentation;
- Continuous monitoring of operating conditions and alarms if the MAWP is exceeded;
- Administrative procedures to initiate an internal investigation if the system pressure exceeds the maximum operating pressure (note that this is the MOP and not MAWP); and
- Records retention for the requirements noted above and periodic review / audit of the monitoring system.

f) An Indication of an OPPSD Identification System Established

A visual identification and warning system must be established for all pressure vessels and the pressure source (e.g., pump or compressor). This labeling should identify the pressure vessel and pressure source as parts of a system design used to ensure overpressure protection. It is recommended that a cautionary statement be made that any alterations, modifications, or replacement of the pressure vessel or pressure source must be considered within the original analysis and system design used to ensure overpressure protection. A physical label is not mandatory where an electronic inventory and work order system is used and can incorporate this identification and warning system.

g) An Owner Statement

A representative authority from the owner shall provide a letter, on letterhead, acknowledging their responsibility for OPPSD. The letter shall include statements to the effect:

- The owner accepts the OPPSD as presented and all risks associated with it;
- The owner will update its operating procedures and documentation to ensure that operators are informed about the systems safeguarded by OPPSD and that no changes to established safe operating limits are permitted;
- The owner will create and maintain management-of-change procedures which will prohibit any changes to the maximum operating conditions of the systems safeguarded by OPPSD, without first performing an analysis and providing details to TSASK for acceptance;
- The owner will update its Quality Management System to specifically address the OPPSD and address and list all records that are kept in regards to the OPPSD;
- A safe shutdown of plant equipment and / or reduction in pressure will occur in the event that a pressure exceeds safe operating limits;
- The owner, as a vendor, will notify the purchaser of pressure vessels safeguarded by OPPSD and their duty to satisfy all requirements of this directive. The owner needs to provide pressure vessel, system design, and operating procedure records, as necessary, to the person that acquires it; and
- If the pressure of a pressure vessel safeguarded by OPPSD exceeds the MAWP, it shall be reported as an unsafe condition event to the Chief Inspector.