

GENERAL SPECIFICATION

ROTATING MACHINERY

GS EP MEC 253

Anti-Surge System for Centrifugal and Axial Compressors

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1. Scope

This General Specification defines the minimum requirements for design, selection and testing of anti-surge system for centrifugal and axial compressors.

2. Reference documents

This document is the TOTAL E&P transposition of the TOTAL S.A. Harmonized GS GR MEC 253.

The reference documents listed below form an integral part of this General Specification.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published at the effective date of this document.

Reference	Title
ANSI/FCI 70-2	Control valve seat leakage
ASME PTC 10	Performance test code on compressors and exhausters
ISO 5167 (All parts)	Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - All parts
ISA Guide	Control valves: practical guide for measurement and control

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Reference	Title
GS EP INS 101	Instrumentation design
GS EP INS 120	Control valves
GS EP INS 900	Instrument hook-up diagrams
GS EP MEC 292	Rotating machines packages installation requirements
GS EP PVV 102	Piping hook-up standards
GS EP PVV 112	Piping material classes

3. Applicability

This specification applies to offshore and onshore applications.

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4. Definitions of terms

For the purpose of this document, the following terms and definitions apply:

Company:	Any entity of the TOTAL Group mentioned in the contract or the order.
Plant control system:	Refers to control systems and associated instrumentation used for industrial process control (DCS or ICSS).
Surge Flow:	The volume flow capacity below which a dynamic compressor starts to surge.
Surge line:	A line composed of dedicated points where for each speed, the actual surge occurs when the flow is reduced.
Surge Control Line (SCL):	A parallel line to the surge line where the anti-surge valve is operated to keep minimum flow through the compressor without surging.
Surge Protection Line (SPL):	Called also Safety Line, is a line between the surge line and the surge control line where the anti-surge valve is ordered to be fully open.

5. System overview

A dynamic compressor requires a recycle loop to control the flow and avoid surge by keeping a specified minimum flow through the compressor. Surge is a non-steady state condition with flow reversal inside the impellers and can cause severe damages to the machine, particularly to the impellers, the thrust bearings and the seals. It can also affect the suction and discharge piping.

To prevent surge conditions, an anti-surge system is employed. This system continuously checks the process conditions and adjusts the flow through the anti-surge valve in order that at least the minimum flow is maintained. It attempts to anticipate surge through the field instruments and takes pre-emptive action, by opening the anti-surge valve before any surge occurs.

The anti-surge system is designed for control and asset protection. It is not designed as a safety system. Exception is taken for axial flow compressor for which an electronic surge detection system shall be supplied.

The compressor anti-surge protection loop(s) shall be free of any isolation or check valve.

The flow measurement shall be installed on the suction line. For very low pressure application (close to atmospheric), and after Company approval, the flow measurement can be installed on the discharge line, and in such a case a dedicated discharge temperature transmitter shall be provided for flow compensation.

The anti-surge system shall consist as a minimum of:

- Compressor suction flow measuring device
- Compressor suction flow transmitter
- Compressor suction and discharge pressure transmitters
- Compressor suction temperature transmitter if required for flow compensation
- Anti-surge valve and associated accessories (refer below)
- Anti-surge control system based on PLC technology.