

PETRONAS TECHNICAL STANDARDS

DESIGN AND ENGINEERING PRACTICE

TECHNICAL, PROCEDURAL AND SPECIFICATIONS

GUIDELINES FOR COMPRESSOR ANTISURGE CONTROL SYSTEMS

PTS 32.30.40.44

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This new PTS **32.30.40.44 – Guidelines for Antisurge Compressor Control Systems** has been developed to provide a standard guideline for the Design, Implementation, Testing and Commissioning and Maintenance for Compressor Antisurge Control Systems.

Document Approval

	Name	Designation	Date	Signature
Prepared	Andriny Rusman and Prakash Kumar	Staff Engineer, Advanced Process Control, PGTS	9/2/10	
		Principal Engineer, Advanced Process Control, PGTS/PP(M)SB	9/2/10	
Reviewed	1) Machinery CoP 2) SkG14 TPs		25-26/11/ 2009 19/01/2010	
Approved	V R Harindran	Custodian Engineer, Instrumentation & Control, Engineering - PGTS	11/2/10	
Verified	Saifol Mualim Ahmad Yahaya	Senior Manager, Process Automation & Optimisation, Engineering - PGTS	10/2/10	
Endorsed	Pau Kiew Huai	Acting Senior General Manager, PGTS	22/2/2010	

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1 INTRODUCTION

1.1 OBJECTIVE

The objective of this document is to provide a standard guideline for the design, implementation, testing, commissioning and maintenance for Compressor Antisurge Control Systems. It is intended for use by PETRONAS and Vendor while developing and also during the operation and maintenance of the system.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by PETRONAS, the distribution of this document is confined to companies forming part of or managed by PETRONAS, and to Contractors and Manufacturers/Suppliers nominated by them.

This PTS is intended for use in oil refineries, gas plants, chemical plants and, where applicable, in exploration and production facilities and supply/marketing installations. If national and/or local regulations exist in which some of the requirements may be more stringent than in this PTS, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable as regards safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this PTS which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the authorities concerned with the object of obtaining agreement to follow this PTS as closely as possible.

1.3 DEFINITIONS

1.3.1 General Definitions

The **Contractor** is the party which carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project or operation of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier/Vendor** is the party which manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party which initiates the project and ultimately pays for its design and construction. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word “**shall**” indicates a requirement.

The word “**should**” indicates a recommendation.

1.3.2 Abbreviations

DCS	Distributed Control System
ASC	Antisurge Controls
AS	Antisurge
ECA	Equipment Criticality Analysis
IPF	Instrumented Protective System
HAZOP	Hazard and Operability Studies

HMI	Human Machine Interface
FAT	Factory Acceptance Test
SIT	Systems Integration Test
SAT	Site Acceptance Test

1.4 BACKGROUND

1.4.1 Scope of Coverage

This document covers antisurge control on aerodynamic compressors (centrifugal and axial compressors). In addition, it covers both single and multi-stage compressor configurations with either fixed or variable speed drivers.

1.4.2 Antisurge Controls

The objective of the antisurge control is to prevent a machine from approaching its surge region. Surge is defined as the point in the compressor operating map where the machine loses its forward flow and head, resulting in a cyclic flow reversal. The event is cyclical, rapid and detrimental to the machine's performance and integrity. The cycle speed is directly dependant on volumes within the downstream pipes, the compressor itself and its operating point. The cycle speeds are typically less than a second.

Due to its inherent robust design, centrifugal compressors are less susceptible to surge damage as compared to axial compressors. Additional precautions are mandated for the design of surge controls around axial compressors.

The antisurge control shall be designed to provide optimum efficiency and stability of the compressor throughout its operating envelope while safeguarding the compressor from surge.

1.4.3 Phases of Development of Antisurge Control Systems

This document covers four distinct phases of the development:

1. Design
 - Covering elements of measuring instruments, controllers, final control element, control schemes (including performance, decoupling, limiting and other types of controls), compressor curves, speed of response, user interfaces, alarm and trip configuration, failure handling, power supply
2. Implementation
 - Covering instrument installation guidelines, interfacing with other systems and sub-systems
3. Testing and Commissioning
 - Covering factory acceptance testing (FAT), systems integration test (SIT), site acceptance testing (SAT) and compressor surge testing and tuning
4. Maintenance
 - Covering spares, training and recommended proactive preventive maintenance