

DEP SPECIFICATION

INSTRUMENTATION FOR EQUIPMENT PACKAGES

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DESIGN ENGINEERING PRACTICE



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1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for instrumentation provided in equipment packages. It is intended for use by the Principal and Contractor when preparing a specification for equipment packages to be provided by a Manufacturer/Supplier.

This is a revision of the DEP of the same number dated May 2004; see (1.5) regarding the changes.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this DEP is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them. Any authorised access to DEPs does not for that reason constitute an authorization to any documents, data or information to which the DEPs may refer.

This DEP is intended for use in facilities related to oil and gas production, gas handling, oil refining, chemical processing, gasification, distribution and supply/marketing. This DEP may also be applied in other similar facilities.

When DEPs are applied, a Management of Change (MOC) process should be implemented; this is of particular importance when existing facilities are to be modified.

If national and/or local regulations exist in which some of the requirements could be more stringent than in this DEP, the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to the safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this DEP 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, the objective being to obtain agreement to follow this DEP as closely as possible.

1.3 DEFINITIONS

1.3.1 General definitions

The **Contractor** is the party that 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** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for it. 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 Specific definitions

Term	Definition
Distributed Control System (DCS)	A configurable microprocessor based control system.
Equipment Package	Single or combined units of equipment supplied by a Vendor which include instrumentation or to which instrument requirements may apply.
Functional tests	Tests carried out by simulating a process condition on the input side of the instrument to check the corresponding output 'function'. The conditions should be such that the required performance is demonstrated.
Instrument or Instrument Systems for Equipment Packages	Instruments or instrument systems necessary to operate the equipment package. These may also include 'free issue items', which are those supplied free of charge to the equipment package Vendor.
Installation Materials for Equipment Package Instrumentation	Miscellaneous installation items required for the instruments in the equipment packages, such as tubing, fittings, cables etc.
Instrumented Protective Function (IPF)	A function comprising one or more Initiators, a Logic Solver and one or more Final Elements whose purpose is to prevent or mitigate hazardous situations. An IPF is intended to achieve or maintain a safe state for the process, in respect of a specific hazardous event. In IEC 61508 and IEC 61511 an IPF is referred to as a Safety Instrumented Function (SIF).
Instrumented Protective System (IPS)	The electromechanical, electronic and/or programmable electronic Logic Solver component of the Instrumented Protective Function, complete with input and output equipment. In IEC 61508 and IEC 61511 an IPS is referred to as a Logic Solver.
'Loops' In The Equipment Package	These are local control loops, i.e. all control components such as local control panels or receivers that are confined within the boundaries of the equipment package. Remote control loops are control loops linked to the (F)AR through junction boxes installed within the boundaries of the equipment package. The primary element, final control element (control valve, etc.) and transmitter are mounted inside the package and the indicator, controller and alarms are in the DCS.
Principal's Standards	The standards specified in the contract or Purchase order (see 4.1).
Subsystem	A microprocessor based system configured for specific control and monitoring applications, which can operate in isolation or communicate with a DCS.
Total Cost of Ownership (TCO)	The total costs of owning an asset over its entire life, from conception of the need through to ultimate disposal. It is made up of the following cost elements: specification, price, purchasing, introduction/ installation, execution/ operation and termination/ disposal.

Term	Definition
Variety Control	The process of selecting an optimum number of different types of products, processes or services to meet prevailing needs. It rationalises the number of varieties of items used both within an operating company and among operating companies.

1.3.2 Abbreviations

BPCS	Basic Process Control System (used interchangeable with DCS)
CPU	Central Processing Unit
DCS	Distributed Control System (used interchangeable with BPCS)
DEP	Design and Engineering Practice
ESD	Emergency Shutdown
(F)AR	(Field) Auxiliary Room
FAT	Factory Acceptance Test
FGS	Fire, Gas and Smoke detection system
IA	Instrument Air
IPF	Instrumented Protective Function
IPS	Instrumented Protective System
JB	Junction Box
MDF	Main Distribution Frame
MOC	Management of Change
MPT	Modbus Protocol Translator
PLC	Programmable Logic Controller
RTU	Remote Transmission Unit
SCADA	Supervisory Control and Data Acquisition
SER	Sequence of Events Recorder
SIL	Safety Integrity Level
TCO	Total Cost of Ownership

1.4 CROSS-REFERENCES

Where cross-references to other parts of this DEP are made, the referenced section number is shown in brackets. Other documents referenced by this DEP are listed in (14).

1.5 SUMMARY OF MAIN CHANGES

This DEP is a revision of the DEP of the same number dated May 2004. The following are the main, non-editorial changes.

Old section	New section	Change
2.0	2.1	Update of general requirements to packaged equipment suppliers
3.1.1-3.1.6		Removed detail for Scope of vendor as this is covered in table located in 3.1 and Appendix A & B.
	4.0	Inclusion of general Instrumentation requirements.
4.4	5.0	Control & IPF Updated content with information taken from US EGGS, ESTG's, E&P Deepwater standards, lessons learnt projects.
4.5	7.0	Communication to the Plants DCS - Updated content with information taken from US EGGS, ESTG's, E&P Deepwater standards, lessons learnt projects.
4.6	9.0	Functional, Performance and Interface Test - Updated content with information taken from US EGGS, ESTG's, E&P Deepwater standards, lessons learnt projects.
4.7	10.0	Drawings and Documents - Updated content with information taken from US EGGS, ESTG's, E&P Deepwater standards, lessons learnt projects.
4.8	12.0	After Sales Service - Updated content with information taken from US EGGS, ESTG's, E&P Deepwater standards, lessons learnt projects.
4.9	13.0	Training - Updated content with information taken from US EGGS, ESTG's, E&P Deepwater standards, lessons learnt projects.
	6.0	Addition of wiring methods and references
	8.0	Addition of tubing requirements and references
	11.0	Addition of general packaging requirements

1.6 COMMENTS ON THIS DEP

Comments on this DEP may be sent to the Administrator at standards@shell.com, using the DEP Feedback Form. The DEP Feedback Form can be found on the main page of "DEPs on the Web", available through the Global Technical Standards web portal <http://www.shell.com/standards> and on the main page of the DEPs DVD-ROM.

2. GENERAL

The objective of this DEP is to ensure that packaged equipment instrumentation and control systems supplied are both fit for purpose and also recognize the overall Total Cost of Ownership.

The scope of supply for the packaged equipment shall be reviewed and agreed between the Manufacturer/Supplier, Contractor, Principal and where appropriate the technical authority (early engagement with the technical authority is encouraged).

The review of the overall solution proposed by the packaged equipment Manufacturer/Supplier shall include evaluation of the Total Cost of Ownership (TCO) in conjunction with the Principal.

3. SCOPE OF SUPPLY FOR INSTRUMENTATION**3.1 SCOPE OF SUPPLY OPTIONS**

Table 1 defines different scope of supply options available for packaged equipment. This table shall be used as a guide for developing the deliverables and scope of supply with the Manufacturer/Supplier.

Table 1 Scope of supply options

Option	Scope of Manufacturer/Supplier	Competence Requirement
A	Field instruments installed, which are an integral part of the proprietary equipment. Functional specification, special tools, special test equipment, drawings and documents.	Limited to instrumentation which is considered an integral part of the proprietary equipment.
B	Field instruments installed, which are an integral part of the proprietary equipment and any instrument installation materials required. Functional specification, special tools, special test equipment, drawings and documents.	Limited to instrumentation which is considered an integral part of the proprietary equipment, plus the required installation materials.
C	Field instruments supplied and installed according to Principal's standards. Functional specification, special tools, special test equipment, drawings and documents.	Manufacturer/Supplier is deemed competent by the Principal to meet the Principal's standards.
D	Field instruments supplied and installed according to Manufacturer/Supplier's standards. Functional specification, special tools, special test equipment, drawings and documents.	Manufacturer/Supplier's instrumentation standard for the equipment package has been accepted by the Principal.
E	Field instrumentation, control room instrumentation and (F)AR instrumentation supplied and installed to the Principal's standards. The required control and IPF (SIF) functionality, etc. are pre-configured in the (F)AR instrumentation. Functional specification, special tools, special test equipment, drawings and documents.	The Manufacturer/Supplier is deemed competent by the Principal to meet the Principal's standards. Competent to manage complex interfaces between other equipment and Manufacturer/Suppliers.
F	Field instrumentation, control room instrumentation and (F)AR instrumentation supplied and installed to Manufacturer/Supplier's standard, except each instrument to be given a tag number following	Manufacturer/Supplier's instrumentation standards for the equipment package has been accepted by the Principal.