MANUAL

# EQUIPMENT RECORD CARDS

DEP 70.10.01.10-Gen.

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**DESIGN AND ENGINEERING PRACTICE**

## PREFACE

DEP (Design and Engineering Practice) publications reflect the views, at the time of publication, of:

Shell International Oil Products B.V. (SIOP)
and
Shell International Exploration and Production B.V. (SIEP)
and
Shell International Chemicals B.V. (SIC)

The Hague, The Netherlands,

and other Service Companies.

They are based on the experience acquired during their involvement with the design, construction, operation and maintenance of processing units and facilities, and they are supplemented with the experience of Group Operating companies. Where appropriate they are based on, or reference is made to, national and international standards and codes of practice.

The objective is to set the recommended standard for good design and engineering practice applied by Group companies operating an oil refinery, gas handling installation, chemical plant, oil and gas production facility, or any other such facility, and thereby to achieve maximum technical and economic benefit from standardization.

The information set forth in these publications is provided to users for their consideration and decision to implement. This is of particular importance where DEPs may not cover every requirement or diversity of condition at each locality. The system of DEPs is expected to be sufficiently flexible to allow individual operating companies to adapt the information set forth in DEPs to their own environment and requirements.

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All administrative queries should be directed to the DEP Administrator in SIOP.

NOTE: In addition to DEP publications there are Standard Specifications and Draft DEPs for Development (DDDs). DDDs generally introduce new procedures or techniques that will probably need updating as further experience develops during their use. The above requirements for distribution and use of DEPs are also applicable to Standard Specifications and DDDs. Standard Specifications and DDDs will gradually be replaced by DEPs.

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## APPENDICES

# 1. INTRODUCTION

## 1.1 SCOPE

This DEP specifies requirements and gives recommendations for the use of Equipment Record Cards (ERCs)

This is a revision of the DEP of the same number dated May 1992. This have been primarily only editorial changes; a summary of the main changes since the last edition is given in (1.5).

## 1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by SIOP and SIEP, the distribution of this DEP is confined to companies forming part of the Royal Dutch/Shell Group or managed by a Group company, and to Contractors and Manufacturers/Suppliers nominated by them (i.e. the distribution code is “C”, as described in DEP 00.00.05.05-Gen.).

This DEP is intended for use in oil refineries, gas plants, chemical plants, oil and gas 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 DEP, the Contractor shall determine by careful scrutiny which of the requirements are 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 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 with the object of obtaining agreement to follow this DEP 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 and commissioning or management of a project or operation of a facility. The Principal may sometimes undertake all or part of the duties of the Contractor.

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

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 the Principal.

The word **Shall** indicates a requirement.

The word **Should** indicates a recommendation.

### 1.3.2 Specific definitions

Pressure and temperature levels shall be as defined in DEP 01.00.01.30-Gen.

## 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 (4).

## 1.5 SUMMARY OF CHANGES SINCE LAST REVISION

Other than editorial changes, the following are the main changes since the last revision:

| Section | Change |
|---|---|
| Title | Extended to all equipment, not just static equipment |
| 2.2.1 | Responsibilities simplified |
| 2.2.2 | Requires service limits to be included |
| 3. | Extended section on computerised data, including reference to ISO 10303 |
| Appendix 1 | List of ERCs extended.<br>Specimen ERCs removed. |

## 2. EQUIPMENT RECORD CARDS (ERCs)

### 2.1 GENERAL

An efficient equipment data recording system is essential for the proper functioning of inspection, maintenance and operations activities.

ERCs can be used as the basis for such a system. These cards should be used by the inspection and maintenance sections of the Principal for establishing a basic record of the design and construction data for all items of installed equipment, and subsequently for building up the history of each item throughout its operational life.

ERCs can be used to make readily available, in concise form:

- all relevant data on a specific piece of equipment as installed at site;
- the history of the equipment during its lifetime.

### 2.2 TYPE OF DATA/RESPONSIBLE PARTIES

Types of data for entering onto equipment record cards can be split into three main categories:

- initial (design and construction) data;
- service (operational) data;
- historical (maintenance) data which includes modifications, plant changes and failure.

#### 2.2.1 Initial (construction) data

The party responsible for entering this data should be clearly specified by the Principal prior to manufacture, and should be as follows:

| Method of Equipment Procurement | Responsible Party | Reference Document |
|---|---|---|
| Projects | Contractor (see notes) | Project specification and applicable equipment DEPs |
| Individual Purchase Orders | Manufacturer | Purchase Order and applicable equipment DEPs |

NOTES: 1. The Principal may have the role of Contractor on smaller projects (e.g. field projects).

2. The Contractor may delegate to the Manufacturer the physical act of entering the data but remains responsible for this being done.

The responsible party shall in each case ensure that manufacturing data are derived from a valid source as follows:

- the relevant data/requisition sheet(s) completed and verified by the Manufacturer;
- the Manufacturer's drawings, latest issues and stamped 'approved for construction';
- the manufacturing report(s).

The data source should be indicated at the time of filling in the ERC. This is particularly important for key data such as design pressures and temperatures. Such indications add greatly to the confidence given to future end users of the data and make cross-referencing/auditing simpler.

NOTE: The data should **NOT** be obtained from Contractor's or Manufacturers' quotations for equipment. Such data is often at variance from either specification requirements or the 'as-built' situation (or both).

Supplementary information relating to other requirements, such as those of the local authority, should be included when recording the baseline data for each (new) piece of equipment.

The column headed 'Enclosures' on the inside of the form should be reserved for recording all documents relating to the equipment and the data.

### 2.2.2 Service (operational) data

This shall be the responsibility of the Principal. Departments/functions assigned to do so may differ but generally would be operations/technology/inspection/materials/corrosion, preferably as a joint effort.

This data shall clearly indicate the service (operational) limits for the equipment.

### 2.3.3 Historical (maintenance) data

This shall be the responsibility of the Principal, and is usually assigned to inspection personnel for updating.

## 3. COMPUTERISATION OF INSPECTION AND MAINTENANCE DATA

ERC data should be stored electronically, thereby allowing the power of computer systems to help asset management. With electronic data, the presentation format has only minor relevance, the content being more important.

The data collected should be STEP compliant to ISO 10303 as far as possible.

NOTE: ISO 10303 is an emerging standard but several elements are already published and many others are in draft. The design contractors and equipment suppliers' databases should all conform to this standard. The use of contractors/suppliers that cannot comply should be challenged.

Electronic databases should be used to at least:

- Assist in the automatic preparation of standard data e.g. by generating process requirements for equipment (ERC) directly from the process database using the equipment location in the Process Flow scheme.
- Automatically compare data, thereby improving its quality and:
  - to ensure consistency, e.g. within and between ERCs, data requisition sheets, process data, equipment data, etc.
  - to identify potential problems, e.g. maximum process temperature less than equipment capability. In such cases the use of the power of the computer will improve integrity. A monitoring mechanism has been implemented at a number of Group sites which acts as an early warning of deviations from original operating or process conditions. The mechanism is variously called "Integrity Management System " (IMS) or "Integrity Operating Window" (IOW) and is implemented in a number of ways, depending on the system architecture at the particular site.

Systems currently in operation have been developed specifically to assure static equipment integrity by monitoring process parameters in order to confirm inspection frequencies. Depending on the systems available, the scope can be extended to support maintenance strategies by supplementing condition monitoring. However, this Section concentrates on the inspection aspects of IOWs.

A typical system will use dynamic data from the process control system (DCS). The higher level manipulation of this data can be achieved in a number of ways, e.g. by PROSS and/or Operational Data Servers (ODS). The output from the system can alert operators of breaches from the integrity window, according to set criteria, e.g. number and duration of breaches in a given time. The system can also provide clear instruction of what has to be done to re-establish the parameter within the integrity window.

The inspector can interrogate the system by exception, and assess the need to reconfirm the S-RBI analysis. More sophisticated systems can alert the inspector of deviations automatically by e-mail.

It is not the intention to apply integrity monitoring to every measured process parameter. Typically, 5% of static equipment will require integrity monitoring windows. The advantages of this process are:

- increased confidence in the predicted degradation mechanisms;
- reduced inspection scope through focused inspection;
- confirmation of optimum inspection schedules;
- increased operations awareness of integrity issues.

Once an integrity management system is established, it can be readily extended to produce executive information, specific performance monitoring and management of critical product; quality parameters.

- Access to the data should be password protected.
- Amendments/updates of data should only be possible by the inspection department. All other users should have access on a "read only" basis.
- The records of redundant equipment should be stored in an electric folder identified as "Redundant Equipment". In this way useful service history is not lost.

## 4. REFERENCES

In this DEP reference is made to the following publications:

NOTE: Unless specifically designated by date, the latest edition of each publication shall be used, together with any amendments/supplements/revisions thereto.

### SHELL STANDARDS

| | |
|---|---|
| Index to DEPs and standard specifications | DEP 00.00.05.05-Gen. |
| Standard Forms (binder) | DEP 00.00.10.05-Gen. |
| Definition and determination of temperature and pressure levels | DEP 01.00.01.30-Gen. |

### INTERNATIONAL STANDARDS

| | |
|---|---|
| Industrial automation systems and integration - Product data representation and exchange | ISO 10303 |

*Issued by:*
*International Organisation for Standardization*
*1, Rue de Varembé*
*CH-1211 Geneva 20*
*Switzerland*

*Copies can also be obtained from national standards organisations.*

## APPENDIX 1 LIST OF EQUIPMENT RECORD CARDS

| TITLE | FORM NUMBER |
|---|---|
| General purpose card | DEP 30.00.00.80-Gen. |
| Heat exchanger shell | DEP 31.21.01.80-Gen. |
| Tube bundle | DEP 31.21.01.81-Gen. |
| Barometric condenser vacuum equipment | DEP 31.21.01.82-Gen. |
| Air-cooled heat exchanger | DEP 31.21.70.80-Gen. |
| Columns | DEP 31.22.00.80-Gen. |
| Pressure vessel | DEP 31.22.00.81-Gen. |
| Fired steam boiler | DEP 31.24.00.80-Gen. |
| Furnaces | DEP 31.24.00.81-Gen. |
| Air preheaters | DEP 31.24.48.80-Gen. |
| Conveyors/elevators | DEP 31.27.00.80-Gen. |
| Weighing equipment | DEP 31.27.04.80-Gen. |
| Mixing equipment | DEP 31.27.10.80-Gen. |
| Gearboxes | DEP 31.29.00.80-Gen. |
| Centrifugal pumps | DEP 31.29.02.80-Gen. |
| Reciprocating pumps | DEP 31.29.12.80-Gen. |
| Rotary displacement pumps | DEP 31.29.22.80-Gen. |
| Axial pumps | DEP 31.29.32.80-Gen. |
| Centrifugal compressors/blowers | DEP 31.29.40.80-Gen. |
| Reciprocating compressors | DEP 31.29.43.80-Gen. |
| Fans | DEP 31.29.47.80-Gen. |
| Reciprocating vacuum pumps | DEP 31.29.53.80-Gen. |
| Rotary vacuum pumps | DEP 31.29.56.80-Gen. |
| Steam turbine | DEP 31.29.60.80-Gen. |
| Gas turbines | DEP 31.29.70.80-Gen. |
| Internal combustion engines | DEP 31.29.80.80-Gen. |
| Steam engines | DEP 31.29.85.80-Gen. |
| Safety relief valves | DEP 31.36.90.50-Gen. |
| Pipelines | DEP 31.38.00.80-Gen. |
| Instruments | DEP 32.31.00.80-Gen. |
| Electric motors | DEP 33.66.05.80-Gen. |
| Fixed roof tank | DEP 34.51.00.80-Gen. |
| Floating roof tank | DEP 34.51.00.81-Gen. |
| Spherical pressure tank | DEP 34.51.00.82-Gen. |
| RLG tank | DEP 34.51.00.83-Gen. |

NOTES: 1. Paper copies of the ERCs can be found in the Standard Forms binder (DEP 00.00.10.05-Gen.).

2. Copies of the ERCs on more durable card are available from SIOP.