MANUAL

SYMBOLS AND IDENTIFICATION SYSTEM - MECHANICAL

DEP 31.10.03.10-Gen.

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DESIGN AND ENGINEERING PRACTICE

PREFACE

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

When Contractors or Manufacturers/Suppliers use DEPs they shall be solely responsible for the quality of work and the attainment of the required design and engineering standards. In particular, for those requirements not specifically covered, the Principal will expect them to follow those design and engineering practices which will achieve the same level of integrity as reflected in the DEPs. If in doubt, the Contractor or Manufacturer/Supplier shall, without detracting from his own responsibility, consult the Principal or its technical advisor.

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2) Other parties who are authorized to use DEPs subject to appropriate contractual arrangements.

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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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1. INTRODUCTION

1.1 SCOPE

This DEP specifies requirements and gives recommendations for:

- Symbols for the graphical presentation of equipment and piping used in Process Flow Schemes (PFS) and Process Engineering Flow Schemes (PEFS).
- Identification numbering system for equipment and piping, which is used on PFS, PEFS and other documents.

This is a revision of the DEP of the same number dated May 1992; a summary of the main changes 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 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, chemical plants, gas plants, 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 DEP 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 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 AND ABBREVIATIONS

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** 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

CV	Control valve
D	Drain
ETr	Electrical tracing
FO	Flushing-out
FOR	Flushing-out, return
FOS	Flushing-out, supply
GO	Gear-operated
HC	Hose connection
LC	Locked-closed
LO	Locked-open
Lub	Lubricated
MOV	Motor-operated valve
NC	Normally closed
NNF	Normally no flow
NO	Normally open
PVV	Pressure vacuum valve
RO	Restriction orifice
ROV	Remote-operated valve
RV	Relief valve
SC	Sample connection
Scr	Screwed
SO	Steaming out
SP	Set pressure
StTr	Steam tracing
SW	Socket weld
TSO	Tight shut off
TW	Thermowell
UC	Utility connection
V	Vent

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 (6).

1.5 SUMMARY OF MAIN CHANGES

This is a revision of the DEP of the same number dated May 1992. This has been mainly an editorial revision, the main change being the transfer of symbols from this DEP to a new Standard Drawing, S 02.002.

2. GENERAL

Mechanical symbols for use on Proces Flow sheets (PFS) and for use on Process Engineering Flow Sheets (PEFS) shall be in accordance with Standard Drawing S 02.002. These symbols may also be used on other documents where required. Standard Drawing S 02.002 is made in such that the symbols may easily be copied in electronic form.

For equipment not shown in this DEP, a simple outline should be drawn, together with a short description of its function. For very complicated equipment hook-ups a rectangle (dot-and-dash line) should be drawn with a reference to a separate scheme.

In a number of cases, basic symbols have been included for use only on PFS. The other symbols may be applied for all documents mentioned above.

Where a symbol is not adequate to indicate the type or function of a piece of equipment, additional notes should be located next to the symbol.

For symbols not shown on standard drawing S 02.002, the symbols in BS 1553-1 shall be used. For coal handling and preparation plants, the symbols in ISO 561 shall be used.

For instrument symbols and identification, and valve actuating methods, reference is made to Standard Drawing S 37.000

For electrical symbols, reference is made to IEC 60617 and Standard Drawing S 64.000.

3. IDENTIFICATION OF EQUIPMENT

3.1 GENERAL

All equipment shall be identified by a tag number of the format: a-xxyyz, in which

"a" is a one or two-letter code identifying the device function in accordance with Table 1;

"xx" is a one or two-digit number used to identify the process unit;

"yy" is a two-digit serial number; and

"z" this one-letter shall only be applied to denote identical equipment when this is used for the same purpose.

3.2 LETTER CODE IDENTIFICATION "a"

The letter code shall be arranged as follows:

1. The first letter shall indicate the process function, in accordance with column 1 of Table 1
2. The optional second letter shall indicate the supporting function in accordance with column 2 of Table 1

3.3 PROCESS UNIT IDENTIFICATION "xx"

Examples:

for unit 1100, xx is 11
for unit 100, xx is 1
for unit 7400, xx is 74

3.4 SERIAL NUMBER "yy"

Serial numbers shall run consecutively from 01 for each group of equipment.

3.5 LETTER CODE IDENTIFICATION "z"

This code is used to denote identical equipment for the same purpose, and shall be one of the letters : "A", "B", "C", "D", etc. The letter "S" is to be used with common spare equipment.

Example of equipment numbering:
P-7004A
P-7004B
P-7008S

in which
P = equipment letter code of a pump
7004 = equipment number of pump 4 of unit 7000
A and B = are the letters indicating two identical pieces of equipment (either working in parallel or in series or equipment with single spare)
S = common spare (e.g. for P-7008 and P-7009)

TABLE 1 Letter code identification

Letter	Column 1	Column 2
A	Packaged units and miscellaneous equipment, e.g. extruders, crushers, cutters, kneaders, crystallisers, pelletisers	
C	Columns : tray columns packed columns rotating disc contactors	Chamber
D	Drying equipment	Diesel engine
E	Unfired heat transfer equipment: - heat exchangers - condensers - air-cooled heat exchangers - reboilers	
F	Fired furnaces, heaters, steam boilers	Fan
G	Generator	Gearbox
J	Jets (ejectors, injectors and eductors)	
K	Compressors, blowers, fans	
M	Mixers, stirrers, mixing nozzles, blenders, steam desuperheaters	Electric motor
P	Pumps (centrifugal, reciprocating, rotary)	
S	Gravity and mechanical separators, e.g. thickeners, cyclones, expellers, centrifuges, filters, dust collectors, sieves	
T	Atmospheric storage tanks, interceptors, neutralising pits	Turbine (steam or gas)
V	Vessels, incl. pressure storage vessels, silos and hoppers	
W	Weighing equipment	
X	Stationary transport equipment	
Z	Bulk loading arms	

NOTE: Where a choice has to be made between two or more letters, the most important function of the equipment shall prevail. If, for example, a jet is used for mixing purposes, M is preferred to J.

3.6 EXAMPLES USING THE LETTER CODES OF TABLE 1

EG Gearbox of heat transfer equipment (e.g. fin-fans)
GT Turbine of generator
KT Turbine of compressor
PD Diesel engine of pump
PG Gearbox of pump
PM Electric motor of pump
EM Electric motor of air-cooled heat exchanger

3.7 EQUIPMENT NUMBERING OF PARALLEL TRAINS

Identical equipment of identical parallel trains shall be given identical equipment numbers. PEFS's shall be applicable to each of the identical trains.

The equipment number shall be preceded by the number of the train on the requisition sheets of the equipment only.

Example:

1V-4205 for train 1 and 2V-4205 for train 2.

3.8 EQUIPMENT NUMBERING OF PACKAGE UNITS

The package unit shall be given a number as described above. The first digit of the serial number "yy" should be allocated such that this digit is identical for all equipment in the package unit.

Example:

Equipment in package unit A-4350

S-4351, P-4351, V-4351 and V-4352

4. IDENTIFICATION OF PIPING

4.1 GENERAL

All piping on PEFS and piping plan drawings shall be identified by the nominal size followed by the line number and piping class identification.

Example:

100	-P3001	-31011
Nominal	Line	Piping class identification
pipe size	number	in accordance with
(DN)	see (4.2)	DEP 31.38.01.12-Gen./ DEP 31.38.01.15-Gen.

4.2 LINE NUMBERING

To indicate the nature of the flowing medium the following letters shall be used.

Process	P	The letter P may be replaced, if desired, by: M for slurry lines T for toxic material
Inert gas	G	
Steam/condensate	S	
Water	W	
Air	A	
Drain	D	
Fuel	F	
Refrigeration	R	
Blow-down and relief	B	

Process lines shall be numbered from apparatus to apparatus. Where there is a considerable change in the pressure, volume or temperature, the numbering shall also be changed.

Parallel lines shall be numbered separately.

In the line number, the unit identifier shall come before the line sub-number.

Outgoing pipelines from one unit to another, either directly or indirectly via a pipe bridge, pipe track or other interconnecting system, shall be given line numbers corresponding to the unit of origin, seen in the direction of flow.

Lines entering a unit from other sources and not included in any other identification system shall be given line numbers corresponding to the unit they enter.

Utility headers on common pipe bridges or tracks not entering a specific unit shall be given a line number corresponding to the unit of origin, seen in the direction of flow.

Utility lines from utility headers entering a processing unit shall be given number(s) of that unit.

The changing of line numbers depends on changing conditions of the line, e.g. pressure, temperature, volume.

4.3 EXAMPLES OF LINE NUMBER AND PIPING CLASS IDENTIFICATION

4.3.1 Metallic piping

Example 1

100-P6002-31011
in which:

100	=	nominal pipe size (DN)
P	=	process, see (4.2)
6	=	unit identifier unit 600, see (3.3)
002	=	line sub-number
P6002	=	line number
31011	=	piping class; ASME rating class 300

Example 2

100-S43005-91011
in which:

100	=	nominal pipe size (DN)
S	=	steam, see (4.2)
43	=	unit identifier unit 4300, see (3.3)
005	=	line sub-number
S43005	=	line number
91011	=	piping class; ASME rating class 900

4.3.2 Non-metallic piping

100-W8003-17061

in which:

100	=	nominal pipe size (DN)
W	=	water, see (4.2)
8	=	unit identifier unit 600, see (3.3)
003	=	line sub-number
W8003	=	line number
17061	=	piping class, glass fibre reinforced epoxy

5. 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 DEP publications and Standard Specifications	DEP 00.00.05.05-Gen.
SIOP piping classes	DEP 31.38.01.12-Gen.
SIEP piping classes	DEP 31.38.01.15-Gen.
Instrumentation symbols and identification on process engineering flow schemes	DEP 32.10.03.10-Gen.

STANDARD DRAWINGS

Mechanical symbols for use on flow schemes: S 02.002

sheet 1	pipe symbols and pipe indicators
sheet 2	general and valves
sheet 3	vessels and tanks
sheet 4	columns and internals
sheet 5	pumps, compressors, blowers and fans
sheet 6	separators and filters
sheet 7	mixers
sheet 8	heat transfer equipment
sheet 9	drying equipment
sheet 10	furnaces
sheet 11	misellaneous equipment
sheet 12	data identification

PEFS legend for instrument symbols and identification	S 37.000
Electrical symbols (symbols not included in IEC 617)	S 64.000

BRITISH STANDARD

Graphical symbols for general engineering
Part 1: Piping systems and plant BS 1553-1

Issued by:
British Standards Institution
389 Chiswick High Road
London W4 4AL
UK

INTERNATIONAL STANDARDS

Graphical symbols for diagrams IEC 60617

Issued by:
Central Office of the IEC
3, Rue de Varembé
CH 1211 Geneva 20
Switzerland

Copies can also be obtained from national standards organizations.

Coal preparation plant – Graphical symbols ISO 561

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

Copies can also be obtained from national standards organizations.