SLOVENSKI STANDARD
SIST EN ISO 10628:2002

01-februar-2002

Sheme procesnih obratov - Splošna pravila

Flow diagrams for process plants - General rules (ISO 10628:1997)

Fließschemata für verfahrenstechnische Anlagen - Allgemeine Regeln (ISO 10628:1997)

Schémas de procédé pour les unités de fabrication/de production - Regles générales (ISO 10628:1997)

Ta slovenski standard je istoveten z: **EN ISO 10628:2000**

ICS:

01.080.30	Grafiļ ni simboli za uporabo v risbah, diagramih, naļ rtih, zemljevidih v strojniġtvu in gradbeniġtvu ter v ustrezni tehniļ ni proizvodni dokumentaciji	Graphical symbols for use on mechanical engineering and construction drawings, diagrams, plans, maps and in relevant technical product documentation
71.020	Proizvodnja v kemijski industriji	Production in the chemical industry

SIST EN ISO 10628:2002 **sl**

EUROPEAN STANDARD

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EUROPÄISCHE NORM

EN ISO 10628

December 2000

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English version

Flow diagrams for process plants - General rules (ISO 10628:1997)

Schémas de procédé pour les unités de fabrication/de production - Règles générales (ISO 10628:1997)

Fließschemata für verfahrenstechnische Anlagen - Allgemeine Regeln (ISO 10628:1997)

This European Standard was approved by CEN on 16 November 2000.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Foreword

The text of the International Standard from Technical Committee ISO/TC 10 "Technical drawings, product definition and related documentation" of the International Organization for Standardization (ISO) has been taken over as an European Standard by CMC.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by Juni 2001, and conflicting national standards shall be withdrawn at the latest by Juni 2001.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 10628:2000 has been approved by CEN as a European Standard without any modification.

Annexes A to D of this international Standard are informative only.

INTERNATIONAL STANDARD

ISO 10628

First edition
1997-04-15

Flow diagrams for process plants — General rules

Schémas de procédé pour les unités de fabrication/de production — Règles générales

Reference number
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Contents

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10628 was prepared by Technical Committee ISO/TC 10, *Technical drawings, product definition and related documentation.*

Annexes A to D of this International Standard are for information only.

Introduction

The purpose of this International Standard is to provide guidelines for the development of flow diagrams for process plants. Flow diagrams for process plants are used principally in the chemical, petrochemical, petroleum, pharmaceutical, food and beverages, and environmental industries.

They can also be used in other industries, for example the mining and metallurgical industries, where they are used to describe production processes and auxiliary systems.

Depending on the amount of information to be furnished a distinction should be made between a block diagram, a process flow diagram and a piping and instrument diagram (P & ID).

Standardization of diagrams will simplify the preparation and understanding of such diagrams by specialists.

Flow diagrams for process plants — General rules

1 Scope

This International Standard establishes general rules for the preparation of flow diagrams for process plants. These diagrams represent the configuration and function of process plants and form integral parts of the complete technical documentation necessary for planning, mechanical engineering, erecting, managing, commissioning, operating, maintaining and decommissioning of a plant.

Flow diagrams help to simplify the exchange of information between the parties involved in the development, mechanical engineering, erection, operation and maintenance of such process plants.

This International Standard does not apply to electrotechnical diagrams.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 128:1982, *Technical drawings — General principles of presentation.*

ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units.*

ISO 3098-1:1974, *Technical drawings — Lettering — Part 1: Currently used characters.*

ISO 3461-2:1987, *General principles for the creation of graphical symbols — Part 2: Graphical symbols for use in technical product documentation.*

ISO 3511-1:1977, *Process measurement control functions and instrumentation — Symbolic representation — Part 1: Basic requirements.*

ISO 3511-2:1984, *Process measurement control functions and instrumentation — Symbolic representation — Part 2: Extension of basic requirements.*

ISO 3511-4:1985, *Industrial process measurement control functions and instrumentation — Symbolic representation — Part 4: Basic symbols for process computer, interface, and shared display/control functions.*

ISO 4196:1984, *Graphical symbols — Use of arrows.*

ISO 5457:1980, *Technical drawings — Sizes and layout of drawing sheets.*

ISO 7200:1984, *Technical drawings — Title blocks.*

ISO 10209-1:1992, *Technical product documentation — Vocabulary — Part 1: Terms relating to technical drawings: general and types of drawings.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 10209-1 and the following definitions apply.

NOTE — In addition to terms used in the three official ISO languages (English, French and Russian), this part of ISO 10628 gives the equivalent terms in the German, Italian and Spanish languages; these are published under the responsibility of the member body(ies) for Germany (DIN), Italy (UNI) and Spain (AENOR).

However, only the terms given in the official languages can be considered as ISO terms.

3.1 process: Sequence of chemical, physical or biological operations for the conversion, transport or storage of material or energy.

3.2 process step: Part of a process which is predominantly self-sufficient and consists of one or several unit operations.

3.3 unit operation: Simplest operation in a process according to the theory of process technology.

3.4 works: System of industrial complexes and the associated infrastructure in one location.

3.5 industrial complex: Number of discrete or interconnected process plants, together with the associated buildings.

3.6 process plant: Facilities and structures necessary for performing a process.

NOTE — Different processes or process steps can be carried out in the same process plant or plant section (see 3.7) at different times.

3.7 plant section: Part of a process plant that can, at least occasionally, be operated independently.

3.8 equipment: Single parts of a plant, such as vessels, columns, heat exchangers, pumps, compressors.

3.9 flow diagram: Diagram representing the procedure, configuration and function of a process plant or plant section.

NOTE — Depending on the information and presentation, a distinction should be made between the three types of flow diagram for process plants, namely:

— block diagram (see 4.1);
— process flow diagram (see 4.2);
— piping and instrument diagram (P & ID) (see 4.3).

3.10 reference designation: Code for identification of equipment in the functional position of the process.

4 Classification, information content and presentation of flow diagrams

Every kind of flow diagram shall respect the functional requirements.

The graphical presentation shall conform to the rules given in clause 5. The routes and the direction of flow shall be indicated by lines and arrows.

4.1 Block diagram

The block diagram depicts a process or process plant by means of rectangular frames including the relevant inscriptions, interconnected by flow lines (see figures B.1 and B.2 for examples).

The frames may represent:

— processes;
— process steps;
— unit operations;
— process plants or groups of process plants;
— plant sections;
— equipment.

The flow lines may represent streams of materials or energy flows (see figure 1 for an example).

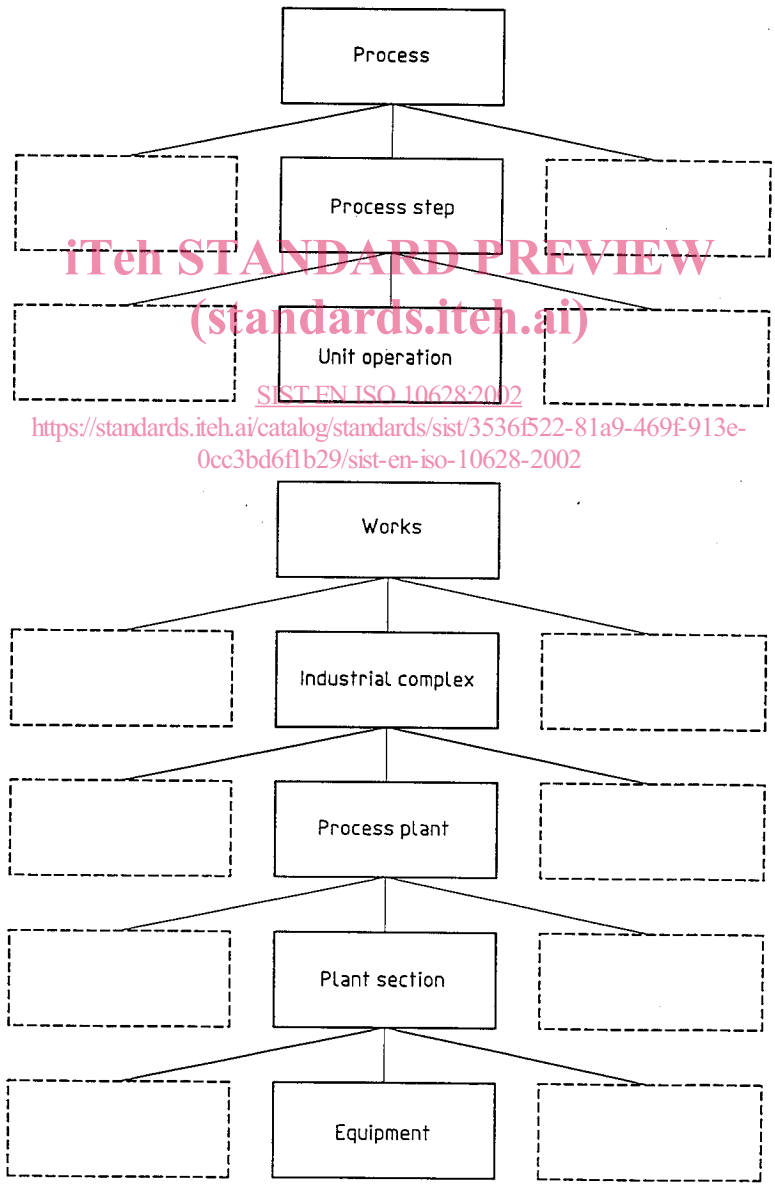

Figure 1

4.1.1 Basic information

The block diagram shall contain at least the following information:

a) denomination of frames;
b) denomination of ingoing and outgoing material flows and energy flows;
c) direction of main flows between frames.

4.1.2 Additional information

The block diagram may also contain:

a) denomination of the main flows between the frames;
b) flow rates of the ingoing and outgoing materials;
c) flow rates of the ingoing and outgoing energy;
d) flow rates of the main flows between the frames;
e) characteristic operating conditions.

4.2 Process flow diagram

The process flow diagram depicts a process or a process plant by means of graphical symbols, interconnected by flow lines (see figures B.3 and B.4 for examples).

The graphical symbols represent equipment and the lines represent flows of mass or energy or energy carriers.

4.2.1 Basic information

The process flow diagram shall use graphical symbols (see annex C for the basic series) and shall at least contain the following information:

a) kind of equipment necessary for the process, except drives;
b) reference designations for equipment, except drives;
c) route and direction of the ingoing and outgoing material and energy flows;
d) denomination and flow rates of ingoing and outgoing materials;
e) denomination of energy flows or flows of energy carriers;
f) characteristic operating conditions.

4.2.2 Additional information

The process flow diagram uses graphical symbols (see annex C for the basic and/or detailed series) and may also contain the following information:

a) denomination of flows and flow rates of process fluids between the process steps;
b) flow rates or amounts of energy or energy carriers;
c) essential valves in the logical process position with respect to their function;
d) functional demands for process measurement and control at essential points;
e) supplementary operating conditions;
f) denomination of equipment and characteristic data of equipment, indicated on the drawing or in separate lists;
g) denomination of drives and characteristic data of drives, indicated on the drawing or in separate lists;
h) elevation of platforms and approximate relative vertical position of equipment.

4.2.3 Representation

Equipment, flow lines and valves should be represented by graphical symbols in accordance with annex C, primarily those from the basic series.

The equipment should be designated in accordance with annex D.

The functional demands for process measurement and control shall be indicated in accordance with ISO 3511-1, ISO 3511-2 and ISO 3511-4.

4.3 Piping and instrument diagram (P & ID)

The piping and instrument diagram (P & ID), based on the process flow diagram, represents the technical realization of a process by means of graphical symbols for equipment and piping together with graphical symbols for process measurement and control functions (see figures B.5 and B.6 for examples).

The utility flow diagram (UFD) is a special type of piping and instrument diagram. It is a schematic representation of the utility systems within a process plant showing all lines and other means required for the transport, distribution and collection of utilities. The process equipment in the UFD can be represented as a box with an inscription (e.g. the identification number) and with utility connections (see figure B.7 for an example).

4.3.1 Basic information

The piping and instrument diagram shall use graphical symbols (see for example annex C for the basic and/or detailed series) and shall contain at least the following information:

a) function or type of equipment, including drives, conveyors as well as installed spares;

b) identification number of equipment, including drives, conveyors as well as installed spares;

c) characteristic data of equipment, given in separate lists if necessary;

d) indication of nominal diameter, pressure rating, material and type of piping, for example by pipeline number, piping class or identification number;

e) details of equipment, piping, valves and fittings, thermal insulation;

f) process measurement and control functions with identification number;

g) characteristic data of drives, given in separate lists if necessary.

4.3.2 Additional information

The piping and instrument diagram may also contain the following information:

a) denomination of flow rates or amounts of energy or energy carriers;

b) route and direction of flow of energy or energy carriers;

c) type of essential primary elements and sensors;

d) essential construction materials for equipment;

e) elevation of platforms and approximate relative vertical position of equipment;

f) reference designation for valves and fittings;

g) denomination of equipment.

4.3.3 Representation

The representation of all equipment, valves and fittings should comply with annex C.

The equipment, valves and fittings should be designated in accordance with annex D.

Auxiliary systems may be represented by rectangular frames with reference to separate diagrams.

The process measurement and control functions shall comply with ISO 3511-1, ISO 3511-2 and ISO 3511-4.

5 Draughting rules

5.1 General draughting rules

The standardized draughting rules shall be used for the representation of flow diagrams for process plants.

5.1.1 Drawing sheet sizes

Drawing sheet sizes conforming to ISO 5457 (sheet type X) shall be used. Considering the various copying techniques available, long sizes and sizes larger than A0 should be avoided.

5.1.2 Title block

The basic title block for drawings and lists (with additional fields) as shown in ISO 7200 shall be used.

5.2 Layout of flow diagrams

Dimensions of the graphical symbols for equipment (except pumps, drives, valves and fittings) should reflect the actual relative dimensions with respect to scale and elevation.

Devices to be expected at the uppermost level of the plant shall appear at the top of the drawing, and those being expected at the lowest level shall appear at the bottom of the drawing.

The graphical symbols for process related measurement and control functions for equipment and piping, as well as piping and valves themselves, shall be shown in the logical position with respect to their functions.

5.3 Connecting lines

5.3.1 Line widths

Line widths will be related to the grid module for flow diagrams M = 2,5 mm.

To obtain a clear representation, different line widths shall be used. Lines representing main flows or main piping shall be highlighted.

The following line widths, chosen from ISO 128, should be used:

a) 1 mm (0,4 M) for main flow lines;

b) 0,5 mm (0,2 M) for
   - graphical symbols for equipment, except valves and fittings and piping accessories,
   - rectangular frames for illustrating unit operations, process equipment, etc.,
   - subsidiary flow lines,
   - energy carrier lines and auxiliary system lines;

c) 0,25 mm (0,1 M) for
   - graphical symbols for valves and fittings and piping accessories,
   - symbols for process measurement and control functions, control and data transmission lines,
   - reference lines,
   - other auxiliary lines.

Line widths less than 0,25 mm (0,1 M) shall not be used.

5.3.2 Line spacing

The space between parallel lines shall not be less than twice the width of the widest line (see ISO 128), with a minimum value of 1 mm.

A space of greater than 10 mm is desirable between flow lines.

5.3.3 Direction of flow

In general, the main direction of flow proceeds from left to right and from top to bottom.

Inlet and outlet arrows conforming to ISO 4196 are used for indicating the inlet and outlet of flows of essential substances.

Arrows are incorporated in the line for indicating the direction of the flows within the flow diagram. If necessary for proper understanding, arrows may be used at the inlets to equipment (except for pumps) and upstream of pipe branches.

If a diagram consists of several sheets, it is recommended that lines representing incoming and outgoing flows and piping be drawn in such a manner that the lines continue at the same level when the individual sheets are horizontally aligned.

5.3.4 Connections

Connections between flow lines or pipelines shall be drawn as shown in figures 2 and 3.

Figure 2 **Figure 3**

Figures 4 and 5 show two ways of representing flow lines or pipelines, which are not connected.

The style of figure 5 is preferred.

Figure 4 **Figure 5**

5.3.5 Connections of auxiliary system lines

Auxiliary system lines (e.g. energy carrier lines) shall be shown by dashed lines with indication of the direction of flow and reference to the type of energy carrier and, if possible, the drawing number (see figures B.5 and B.6).