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Flow diagrams for process plants — General rules

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

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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).

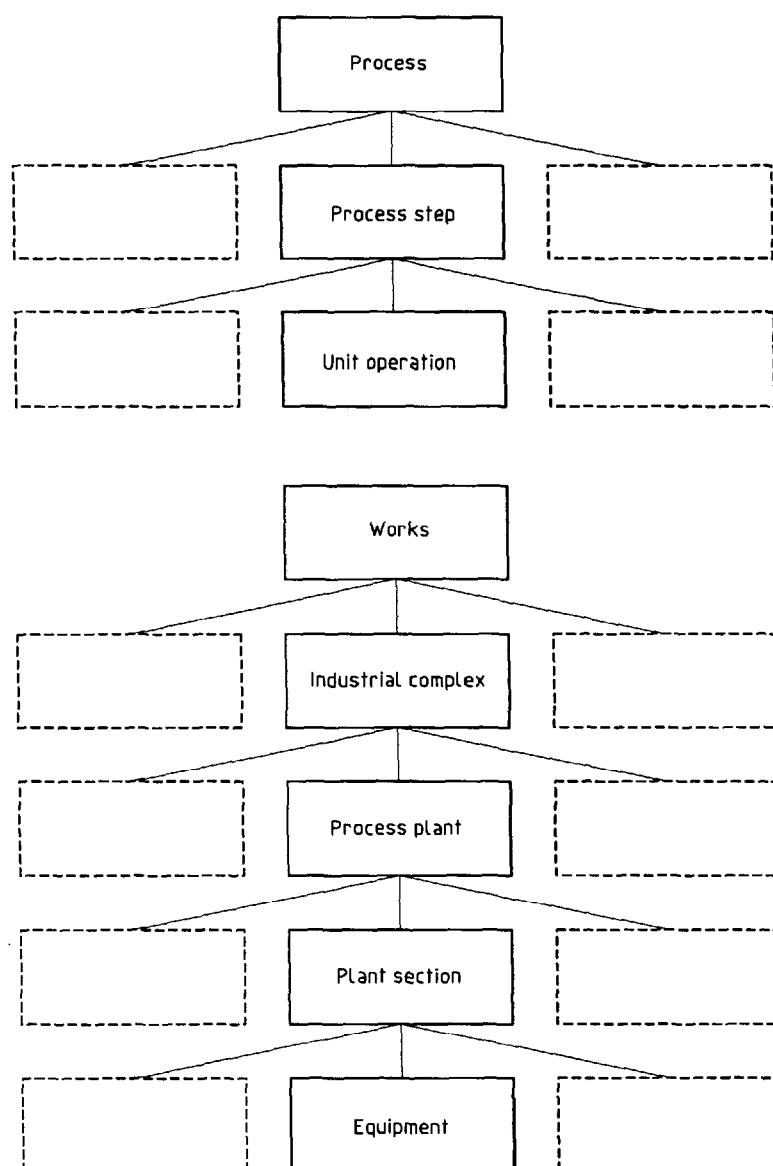


Figure 1

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.