BS ISO 14084-2:2015

BSI Standards Publication

Process diagrams for power plants

Part 2: Graphical symbols

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National foreword

This British Standard is the UK implementation of ISO 14084-2:2015.

The UK participation in its preparation was entrusted to Technical Committee TDW/4, Technical Product Realization.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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INTERNATIONAL STANDARD

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First edition
2015-04-01

Process diagrams for power plants —

Part 2: Graphical symbols

Schémas de procédés pour centrales électriques —

Partie 2: Symboles graphiques

Reference number
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Contents

Page

Foreword ... **vi**
Introduction ... **vii**
1 Scope ... **1**
2 Normative references ... **1**
3 Terms and definitions ... **1**
4 Graphical symbols ... **1**
4.1 General ... 1
4.2 Size of graphical symbols ... 1
4.3 Creation of new symbol examples ... 2
4.4 Symbols for large/complex objects ... 2
5 Structuring and representation ... **2**
5.1 Overall structure ... 2
5.2 Registration numbers ... 2
5.3 Representation of graphical symbols in the standard ... 3
5.4 Legend to table representation ... 3
6 Connections and related devices ... **4**
6.1 Fluid connections ... 4
6.1.1 Functional connections ... 4
6.1.2 Connections with indication of process media ... 4
6.1.3 Simplified representation ... 5
6.1.4 Symbols for direction, branching, crossing, etc. ... 5
6.1.5 Pipeline joints, couplings, etc. ... 6
6.1.6 Accessories for connections ... 6
6.1.7 Pipeline components ... 7
6.1.8 Pipeline insulation, tracing, etc. ... 8
6.2 Mechanical connections ... 9
7 Fluid flow control ... **9**
7.1 Valves ... 9
7.1.1 On-off valves ... 9
7.1.2 Non-return valves ... 10
7.1.3 Control valves ... 11
7.1.4 Safety and relief valves ... 12
7.1.5 Special valves ... 13
7.1.6 Supplementary valve symbols ... 13
7.1.7 Specific valve features ... 14
7.2 Dampers ... 14
7.2.1 On-off dampers ... 14
7.2.2 Non-return dampers ... 15
7.2.3 Control dampers ... 15
7.2.4 Safety dampers ... 16
7.3 Safety devices other than valves ... 16
8 Actuators ... **16**
8.1 Manual actuators ... 16
8.2 Mechanical actuators ... 16
8.3 Automatic actuators ... 17
8.4 Supplementary symbols ... 17
9 Fluid transport ... **18**
9.1 Pumps ... 18
9.2 Fans, ventilators, blowers, compressors, etc. ... 19
9.3 Vacuum pumps, etc. ... 20

AVA Documents
Document Sharing Hub

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Full document details: BS ISO 14084-2:2015

10 Fluid energy transfer **21**
10.1 Heat exchangers 21
10.2 Energy transfer by mixing 23
10.3 Cooling towers 23

11 Fluid processing **24**
11.1 Separation 24
11.1.1 Separation, general 24
11.1.2 Separation of suspended substances in liquids 25
11.1.3 Separation of suspended substances in gasses 27
11.2 Processing of fluids by adsorption, catalysis, conversion, thermic, etc. 28
11.2.1 Liquids 28
11.2.2 Gasses 29
11.3 Mixing 30
11.3.1 General 30
11.3.2 Devices for mixing 30

12 Storage **31**
12.1 Permanent storage 31
12.2 Storage devices, surface indications, etc. 32
12.3 Mobile storage devices 33
12.4 Energy storage, expansion devices 33

13 Material transport **34**
13.1 Conveyors, elevators, unloaders, etc. 34
13.2 Material flow control 36
13.3 Feeders 37
13.4 Handling equipment 38
13.5 Mobile transport equipment 39

14 Material processing **40**
14.1 Separation 40
14.2 Processing, size reduction 42
14.2.1 Size reduction 42
14.2.2 Coarse size reduction, crushers 42
14.2.3 Fine size reduction, mills 42
14.2.4 Biomass processing 43
14.3 Humidifieing 43

15 Thermal energy generators **44**
15.1 Conventional energy generators 44
15.2 Boiler combustion / heating systems 45
15.3 Boiler devices 45
15.4 Non-conventional energy generators 46
15.5 Thermal energy consumers 47

16 Machines, engines **47**
16.1 Steam turbines, steam engines 47
16.2 Combustion engines, gas turbines 47
16.3 Electrical engines, motors, generators, converters 48

17 Mechanical transmission, shafts, bearings, couplings, etc. **48**
17.1 Shafts 48
17.2 Bearings 48
17.3 Gears 49
17.4 Couplings 49
17.5 Brakes 50
17.6 Transmissions devices 50

18 Instrumentation, measurement and control **50**
18.1 Process control information (PCI) 50
18.2 Measurement devices, sensors, etc. 51

Documents
Document Sharing Hub

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Full document details: BS ISO 14084-2:2015

18.2.1 Sensors general, etc. 51
18.2.2 Temperature 51
18.2.3 Level 52
18.2.4 Weight 52
18.2.5 Flow 52
18.2.6 Speed, vibrations, etc. 53
18.2.7 Length, position displacement, etc. 54
18.3 Signals 54
18.4 Miscellaneous 54
18.5 Control processing elements 55

Annex A (informative) **Creation of new symbol examples** **57**

Annex B (informative) **Examples of large and complex symbols** **59**

Bibliography **60**

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Documents
Document Sharing Hub
Full document details: BS ISO 14084-2:2015

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 10, *Technical product documentation*, Subcommittee SC 10, *Process plant documentation*.

ISO 14084 consists of the following parts, under the general title *Process diagrams for power plants*:

— *Part 1: Specification for diagrams*

— *Part 2: Graphical symbols*

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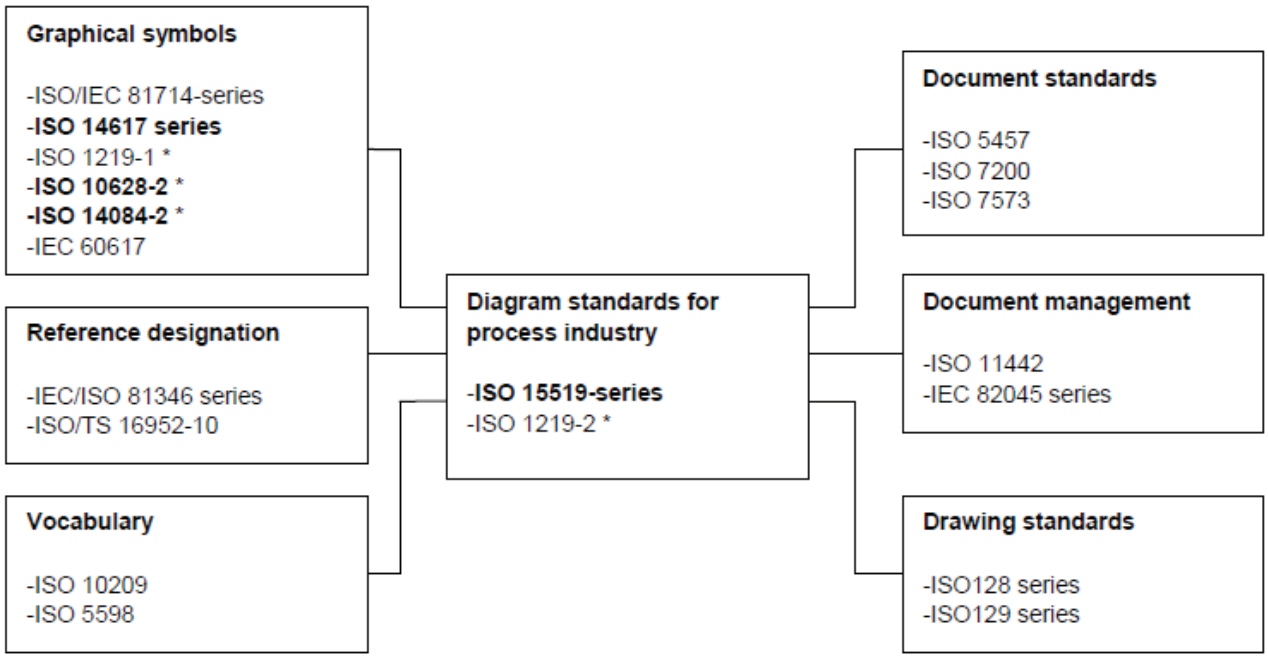
Introduction

General

This part of ISO 14084 deals with preparation of process diagrams for power plants.

ISO/TC 10/SC 10 prepares standards for diagrams including graphical symbols which together with standards prepared by other ISO committees and IEC constitute the basis for preparation of diagrams for process industry.

The interrelations between these standards are illustrated in Figure 1. Standards in bold are ISO/TC 10/SC 10 standards



NOTE Standards marked * are collective application standards.

Figure 1 — Interrelations between ISO and IEC standards for diagrams for power plants

Collective application standard

ISO/TC 10/SC 10 standards:

— ISO 15519-series: Specifications for diagrams for process industry;

— ISO 14617-series: Graphical symbols for diagrams;

are basic standards, which are general and apply to all fields of applications. Technical committees working in a specific application field are allowed to make extracts and publish them as collective application standards of ISO 15519-series, ISO 14617-series or both.

Application fields

This International Standard applies to the power plant field, which include conventional fossil and biomass fired power plants, hydro power plants, sea wave power plants, wind power plants, nuclear power plants, geothermal power plants, solar power plants, osmosis power plants, incineration plants, and industrial power plants.

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Process diagrams for power plants —

Part 2: Graphical symbols

1 Scope

This part of ISO 14084 specifies graphical symbols for process diagrams for power plants and guidelines for creation of new graphical symbol examples.

This part of ISO 14084 is a collective application standard of the ISO 14617-series.

Graphical symbols for fluid power diagrams can be found in ISO 1219-1.

Graphical symbols for electrotechnical diagrams can be found in IEC 60617.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10209, *Technical product documentation — Vocabulary — Terms relating to technical drawings, product definition and related documentation*

ISO 14617 (all parts), *Graphical symbols for diagrams*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in the ISO 15519-series and ISO 10209 and the following apply.

3.1
symbol example
graphical symbol created of basic and supplementary graphical symbols

4 Graphical symbols

4.1 General

Graphical symbols shall comply with ISO 14617-series.

General rules for graphical symbols are given in ISO 81714-1. Rules for CAx application of graphical symbols are given in IEC 81714-2.

Specific rules and guidelines for graphical symbols for use in diagrams are given in ISO 15519-1.

4.2 Size of graphical symbols

Graphical symbols in this part of ISO 14084 are shown in a grid system with module M = 2,5 mm.

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4.3 Creation of new symbol examples

This International Standard includes the most common used graphical symbols for diagrams for power plants. In case a needed symbol cannot be found in this International Standard or in ISO 14617-series then, the needed graphical symbol example should be created on basis of basic and supplementary graphical symbols in ISO 14617 as illustrated in Annex A.

In case the needed graphical symbol neither exists in ISO 14617 nor can be created on basis of basic and supplementary symbols in ISO 14617 then, a new graphical symbol shall be requested according to ISO/IEC Directives, Part 1, Consolidated ISO Supplement, 2014, Annex SH.

4.4 Symbols for large/complex objects

Graphical symbols for large and complex objects like boilers, turbines, flue gas treatment plants, boiler feed pumps, etc. are not standardized in this International Standard.

In diagrams, large and complex objects should be represented with a silhouette which allow for correct placement of graphical symbols for equipment, connections, PCI (Process Control Information; see 18.1) symbols for measurement, etc. of which the large and complex object consists of.

Annex B gives examples of symbols for large and complex objects.

5 Structuring and representation

5.1 Overall structure

This part of ISO 14084 is divided in following groups:

— Clause 6 — Connections and related devices;

— Clause 7 — Fluid flow control, valves, dampers, safety devices;

— Clause 8 — Actuators;

— Clause 9 — Fluid transport, pumps, fans compressors;

— Clause 10 — Fluid energy transfer, heat exchangers, condensers, cooling towers, etc.;

— Clause 11 — Fluid processing, filtration, separation, mixing, etc.;

— Clause 12 — Storage, tanks, vessels, accumulators, etc.;

— Clause 13 — Material transport and flow control, conveyors, feeders, transport devices, etc.;

— Clause 14 — Material processing, screens, size reduction, mixing, etc.;

— Clause 15 — Thermal energy generators, boilers, boiler devices, etc.;

— Clause 16 — Engines, turbines, generators, motors, etc.;

— Clause 17 — Mechanical transmission, shafts, bearings, couplings, etc.;

— Clause 18 — Instrumentation, measurement and control, etc.

5.2 Registration numbers

Graphical symbols, symbol examples, and application rules in ISO 14617 are assigned unique registration numbers, see ISO 14617–1.

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Symbol examples developed for this International Standard are assigned registration numbers in the 6000-7999 series, see Table 1.

NOTE New graphical symbols developed for this International Standard and which shall be implemented in ISO 14617 are assigned preliminary "P" registration numbers (*P* = power plants) in the development phase of this part of ISO 14084. In case of, that the preliminary registration numbers are not approved by ISO 14617 before publication of this part of ISO 14084 then the standard will be published with preliminary registration numbers which will be replaced with final ISO 14617 registration numbers at first periodical review.

Table 1 — Overview of types of ISO 14617 and ISO 14084 registration numbers

Subject	ISO 14617	ISO 14084	
Graphical symbols	nnn	nnn	Registration number from ISO 14617
		Pnnn	Preliminary registration number for new ISO 14617 symbols
Symbol examples	Xnnn	Xnnn	Registration number from ISO 14617
		X6nnn	Registration number for ISO 14084 symbol example

5.3 Representation of graphical symbols in the standard

In this part of ISO 14084 graphical symbols are represented in a 2,5 M dotted grid and imaginary connections as illustrated in Figure 2. The imaginary connections and the dotted grid are not part of the graphical symbol.

In case of mandatory flow direction, the imaginary connections are equipped with arrows as illustrated in Figure 2b.

a) Heat exchanger **b) Spring loaded safety valve**

Key

1 graphical symbol
2 imaginary connections
3 2,5 M dotted grid

Figure 2 — Representation of graphical symbols in the standard

5.4 Legend to table representation

Graphical symbols in this part of ISO 14084 are represented in tables with column headings according to Table 2.

Table 2 — Column headings

Column	Description
Entry number	Consecutive numbering within each clause/sub-clause
Graphics	Graphical symbol represented with solid lines on a dotted grid
Description	The preferred descriptors for the graphical symbol

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Table 2 *(continued)*

Column	Description
Reference number	Registration number for the actual symbol
Code	2-digit letter code according to IEC 81346–2

6 Connections and related devices

6.1 Fluid connections

6.1.1 Functional connections

Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.1.1		Pipeline, duct, Line width 0,5	X6001	WP
6.1.1.2		Instrument connection, control connection in Process Control Diagrams (PCD) Line width 0,25	X6002	WP WG
6.1.1.3		Pilot line, control connection in Process Flow Diagrams (PFD) Line width 0,25, ISO 128-20 line 02	422	WG
6.1.1.4		Representation of pipeline in adjacent diagram Representation of adjacent pipeline in same diagram Line width 0,5, ISO 128-20 line 12	X6017	WG

6.1.2 Connections with indication of process media

Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.2.1		Steam Line width 1,0	X6005	WP
6.1.2.2		Condensate, cooling water, feed water Line width 0,5	X6006	WP
6.1.2.3		Water, oil contaminated Line width 0,25. Circles: line width 0,25, D = 2,0. Spacing 7,5	X6007	WP
6.1.2.4		Vapour, oil contaminated Line width 0,7. Circles: line width 0,25, D = 2,0. Spacing 7,5	X6008	WP
6.1.2.5		Raw water, untreated water Line width 0,25. Segments: line width 1,0 length 9 and 3. Spacing 3	X6009	WP
6.1.2.6		Sludge water, waste water Line width 0,25. Dots: D = 2,0. Spacing 7,5	X6010	WP

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Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.2.7		Air Line width solid 0,5. Dashed line = 422. Line gap 1,0	X6011	WP
6.1.2.8		Solvents, chemical Line width 0,25. Segments: line width 1,0, length 5. Spacing 5	X6012	WP
6.1.2.9		Solid fuels, bulk fuels Line width 0,25. Line gap 1,0. Segments/ spacing 4,0	X6013	WP
6.1.2.10		Combustible waste Line width 0,25. Line gap 1,0. Dots D = 2,0. Spacing. 7,5	X6014	WP
6.1.2.11		Oil Line width 0,25. Line gap 1,0	X6015	WP
6.1.2.12		Combustible gases Line width 0,25 + 0,7. Line gap 1,0	X6016	WP
6.1.2.13		Non-combustible gas, flue gas, inert gas Line width centre line 0,7. Outside lines width 0,25. Line gaps 1,0	X6018	WP
6.1.2.14		Ash, slag Line width 0,25. Vertical lines: spacing 4,0	X6019	WP
6.1.2.15		Fly ash Line width 0,25. Line gap 1,0. Segments/ spacing 2,0	X6020	WP

6.1.3 Simplified representation

Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.3.1		Transition between multi-line and single-line representation	X6030	WP

6.1.4 Symbols for direction, branching, crossing, etc.

Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.4.1		Direction in general	241	
6.1.4.2		Direction in general	242	
6.1.4.3		Energy or signal flow	249	
6.1.4.4		T-branch, form 1	X504	
6.1.4.5		T-branch, form 2	X505	
6.1.4.6		Crossing with connection	X506	

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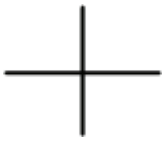
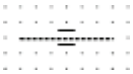
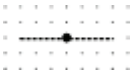
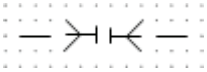
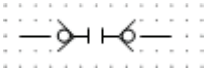
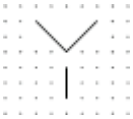
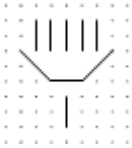
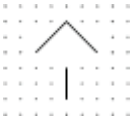
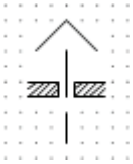
Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.4.7		Crossing without connection	X6031	
6.1.4.8		Interruption of connection line	P078	

6.1.5 Pipeline joints, couplings, etc.

Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.5.1		Flange joint	511	XL
6.1.5.2		Flange coupling, clamped	513	XL
6.1.5.3		Threaded joint	514	XL
6.1.5.4		Welded joint	515	XQ
6.1.5.5		Quick-release coupling, showed uncoupled	P032	XM
6.1.5.6		Quick-release coupling with automatic closing when uncoupled, showed uncoupled	P033	XM

6.1.6 Accessories for connections

Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.6.1		Drain, funnel	2040	
6.1.6.2		Drain pan	X6035	
6.1.6.3		Vent, outlet to atmosphere	2039	
6.1.6.4		Vent, outlet outside enclosure or building	X6040	
6.1.6.5		Siphon	2038	

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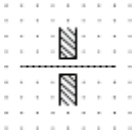
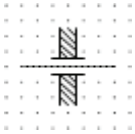
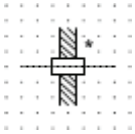
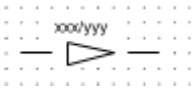
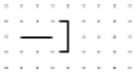
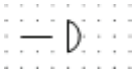
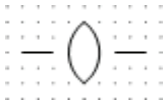
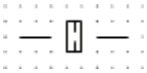
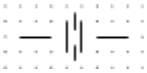
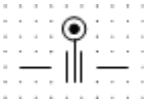
Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.6.6		Slope	3061	
6.1.6.7		Wall or roof penetration, general	P009	
6.1.6.8		Penetration through wall, etc., general	3001	
6.1.6.9		Penetration through wall, etc. sealed The * should be replaced with a designation for the type of seal, e.g. fire.	3002	

6.1.7 Pipeline components

Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.7.1		Change of pipe dimension, pipe reducer,	P069	XL
6.1.7.2		Flange, single	P023	XL
6.1.7.3		Blind flange	P029	XL
6.1.7.4		End cap, threaded	518	XL
6.1.7.5		End cap	P028	XL
6.1.7.6		Compensator Form 1	533	XM
6.1.7.7		Compensator Form 2	P052	XM
6.1.7.8		Flexible pipe, hose	444	XM
6.1.7.9		Restrictor, multistage type	X6032	RN
6.1.7.10		Orifice encapsulated	P087	RN
6.1.7.11		Orifice plate between flanges Form 1	772	RN
6.1.7.12		Orifice plate between flanges Form 2	P053	RN

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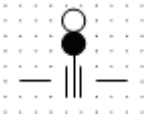
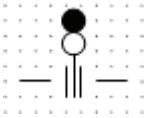
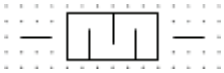
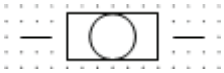
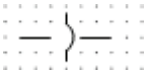
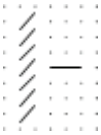
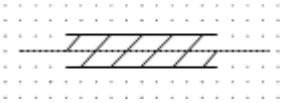
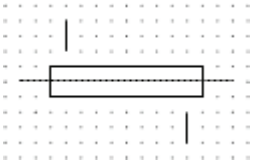
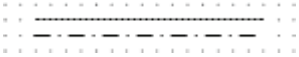
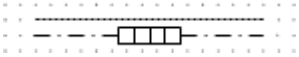
Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.7.13		Swing blind closed	2044	RN
6.1.7.14		Swing blind open	2045	RN
6.1.7.15		Flow straightener	2032	W_
6.1.7.16		Silencer	2033	RP
6.1.7.17		Viewing glass	2034	
6.1.7.18		Hose reel	P031	WN
6.1.7.19		Rupture disc	2035	FL
6.1.7.20		Air inlet or outlet grill	P030	HQ

6.1.8 Pipeline insulation, tracing, etc.

Entry no.	Symbol	Symbol name	Ref no.	Code
6.1.8.1		Pipe, insulated	X322	RQ
6.1.8.2		Jacketed pipe	X409	EP
6.1.8.3		Heating or cooling	P068 X8174	EB
6.1.8.4		Electrical tracing	X6050	EB

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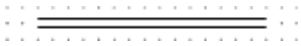
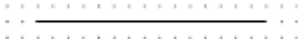
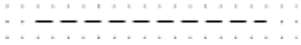
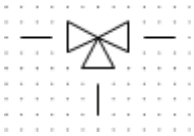
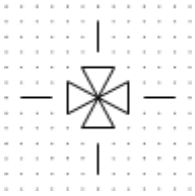
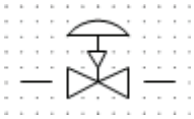
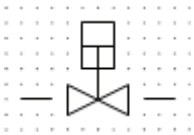
6.2 Mechanical connections

Entry no.	Symbol	Symbol name	Ref no.	Code
6.2.1		Mechanical link, shaft Form 1 Line width 0,5, line gap 1,0	402	WQ
6.2.2		Mechanical link, shaft Form 2 Line width 0,5	403	WQ
6.2.3		Electrically insulated mechanical link, shaft wire Line width 0,5, dashes 4,0, gaps 2,0	404	WQ

7 Fluid flow control

7.1 Valves

7.1.1 On-off valves

Entry no.	Symbol	Symbol name	Ref no.	Code
7.1.1.1		2-way on-off valve, straight type, general	2101	QM
7.1.1.2		2-way valve, angle type, general	2102	QM
7.1.1.3		3-way valve, general	2103	QM
7.1.1.4		4-way valve, general	2104	QM
7.1.1.5		2-way on-off valve with diaphragm actuator, fail to close	X2101	QM
7.1.1.6		2-way on-off valve with cylinder actuator	X6101	QM

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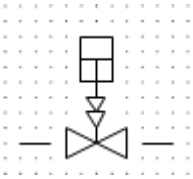
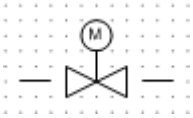
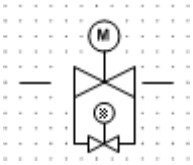
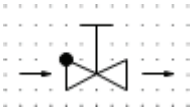
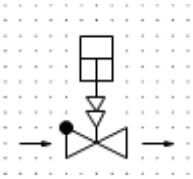
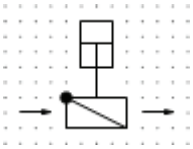
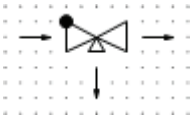
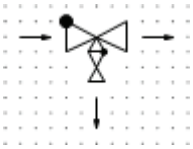
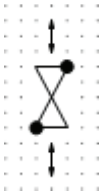
Entry no.	Symbol	Symbol name	Ref no.	Code
7.1.1.7		2-way on-off valve with cylinder actuator and quick closing – fail to close	X6102	QM
7.1.1.8		2-way on-off valve with electric motor actuator	X2104	QM
7.1.1.9		2-way on-off valve and integrated bypass valve both with electric motor actuators	X6103	QM

7.1.2 Non-return valves

Entry no.	Symbol	Symbol name	Ref no.	Code
7.1.2.1		Non-return valve, general Form 1	X6105	RM
7.1.2.2		Non-return valve, general Form 2	P090	RM
7.1.2.3		Non-return valve and manually actuated stop valve – combined	X2112	RM
7.1.2.4		Non-return valve with quick closing assisting cylinder actuator – fail to close	X6107	RM
7.1.2.5		Non-return valve with closing assisting cylinder actuator	X6104	RM
7.1.2.6		Pump combined non-return and recirculation valve	X6108	RM
7.1.2.7		Pump combined non-return and recirculation valve, non-return valve in the recirculation outlet	X6126	RM
7.1.2.8		Breather valve	X6109	RM

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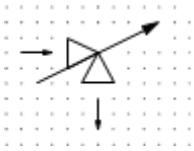
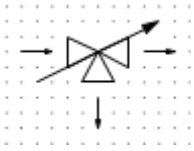
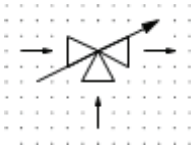
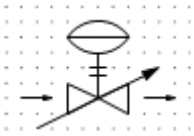
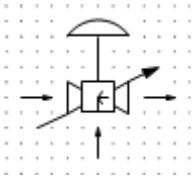
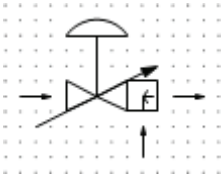
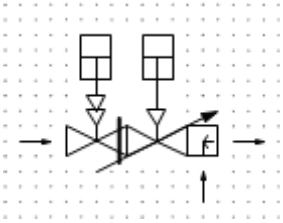
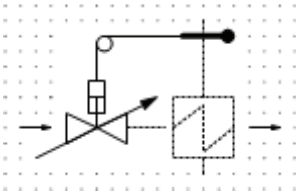
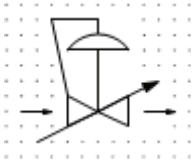
7.1.3 Control valves

Entry no.	Symbol	Symbol name	Ref no.	Code
7.1.3.1		Control valve, general	X6110	QN
7.1.3.2		Control valve, angle type, general	X6111	QN
7.1.3.3		Control valve, 3-way distributing mode, general	X6112	QN
7.1.3.4		Control valve, 3-way mixing mode, general	X6113	QN
7.1.3.5		Control valve, double diaphragm actuator, fail freeze	X6118	QN
7.1.3.6		Steam conditioning valve – pressure and temperature reduction – with integrated water injection	X6114	QN
7.1.3.7		Steam conditioning valve – pressure and temperature reduction – with downstream water injection	X6115	QN
7.1.3.8		Combined steam conditioning valve and safety valve with downstream de-super-heater. Separate actuators, control valve actuator fail to close, safety valve actuator quick fail quick close	X6116	QN
7.1.3.9		Temperature control valve, self-acting, with separate sensor	X6117	QN
7.1.3.10		Self-operating back-pressure control valve	X2132	QN

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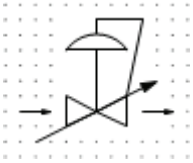
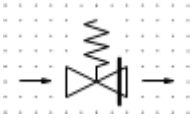
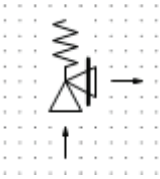
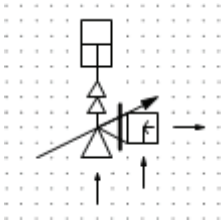
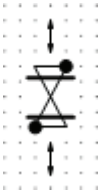
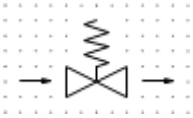
Entry no.	Symbol	Symbol name	Ref no.	Code
7.1.3.11		Self-operating pressure reducing control valve	X2133	QN
7.1.3.12		Pre-set control valve, e.g. flow balancing valve	X6119	QN

7.1.4 Safety and relief valves

Entry no.	Symbol	Symbol name	Ref no.	Code
7.1.4.1		Safety valve, general	X6120	FL
7.1.4.2		Safety valve, spring loaded, straight type, general	X6121	FL
7.1.4.3		Safety valve, spring loaded, angle type, general	X6122	FL
7.1.4.4		Steam bypass valve with quick fail safe open cylinder actuator and downstream de-superheater	X6123	FL
7.1.4.5		Breather valve with safety function, e.g. tank overpressure and vacuum protection	X6124	FL
7.1.4.6		Relief valve, spring loaded	X6125	FL

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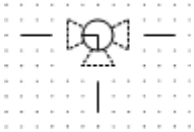
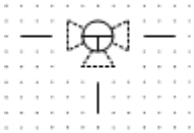
7.1.5 Special valves

Entry no.	Symbol	Symbol name	Ref no.	Code
7.1.5.1		Steam trap	X6130	QN
7.1.5.2		Air release valve	X6131	QN

7.1.6 Supplementary valve symbols

Entry no.	Symbol	Symbol name	Ref no.	Code
7.1.6.1		Valve, needle type	2125	QM
7.1.6.2		Valve, globe type	2121	QM
7.1.6.3		Valve, piston or plunger type	2127	QM
7.1.6.4		Valve, gate type	2124	QM
7.1.6.5		Valve, butterfly type Form 1	2126	QM
7.1.6.6		Valve, butterfly type Form 2	P089	QM
7.1.6.7		Valve, ball type	2122	QM
7.1.6.8		Valve, plug type	2123	QM
7.1.6.9		Valve, diaphragm type	2128	QM
7.1.6.10		Valve, hose type	2129	QM
7.1.6.11		Valve, L-bore in 3-way or 4-way valves	2113	QM
7.1.6.12		Valve, T-bore in 3-way or 4-way valves	2114	QM

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