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**Graphical symbols for diagrams —**

**Part 7:  
Basic mechanical components**

*Symboles graphiques pour schémas —  
Partie 7: Éléments mécaniques de base*



Reference number  
ISO 14617-7:2002(E)

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# Contents

	Page
Foreword .....	iv
Introduction.....	v
1 <b>Scope</b> .....	1
2 <b>Normative references</b> .....	1
3 <b>Terms and definitions</b> .....	1
4 <b>Mechanical elements</b> .....	2
5 <b>Pipe and duct elements</b> .....	5
6 <b>Devices for storage</b> .....	7
Bibliography.....	10

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this part of ISO 14617 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 14617-7 was prepared by Technical Committee ISO/TC 10, *Technical product documentation*, Subcommittee SC 10, *Process plant documentation and tpd-symbols*.

ISO 14617 consists of the following parts, under the general title *Graphical symbols for diagrams*:

- *Part 1: General information and indexes*
- *Part 2: Symbols having general application*
- *Part 3: Connections and related devices*
- *Part 4: Actuators and related devices*
- *Part 5: Measurement and control devices*
- *Part 6: Measurement and control functions*
- *Part 7: Basic mechanical components*
- *Part 8: Valves and dampers*
- *Part 9: Pumps, compressors and fans*
- *Part 10: Fluid power converters*
- *Part 11: Devices for heat transfer and heat engines*
- *Part 12: Devices for separating, purification and mixing*
- *Part 15: Installation diagrams and network maps*

Other parts are under preparation.

## Introduction

The purpose of ISO 14617 in its final form is the creation of a library of harmonized graphical symbols for diagrams used in technical applications. This work has been, and will be, performed in close cooperation between ISO and IEC. The ultimate result is intended to be published as a standard common to ISO and IEC, which their technical committees responsible for specific application fields can use in preparing International Standards and manuals.

14617-7:2002(E)



# Graphical symbols for diagrams —

## Part 7: Basic mechanical components

### 1 Scope

This part of ISO 14617 specifies graphical symbols in diagrams for

- mechanical elements such as weights, springs, clutches and brakes,
- pipe and duct elements such as restrictors, nozzles and air vents, and
- devices for storage such as tanks, pressure vessels and gas bottles.

For the fundamental rules of creation and application of graphical symbols in diagrams, see ISO 81714-1.

For an overview of ISO 14617, information on the creation and use of registration numbers for identifying graphical symbols used in diagrams, rules for the presentation and application of these symbols, and examples of their use and application, see ISO 14617-1.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 14617. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 14617 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 14617-1:2002, *Graphical symbols for diagrams — Part 1: General information and indexes*

ISO 14617-4:2002, *Graphical symbols for diagrams — Part 4: Actuators and related devices*

ISO 81714-1:1999, *Design of graphical symbols for use in the technical documentation of products — Part 1: Basic rules*

### 3 Terms and definitions

For the purposes of this part of ISO 14617, the following terms and definitions apply.

**NOTE** The list has been restricted to terms whose meaning is not obvious and which have not been defined elsewhere in an International Standard, or which have been defined in various ways in different standards. In preparing these definitions, ISO and IEC standards on terminology have been consulted; see the references in parentheses. However, most of the definitions in those standards were prepared by different technical committees within a restricted scope. This means that many terms so defined have to be given more general or neutral definitions when applied in the context of graphical symbols.

**3.1  
orifice plate**

flow sensor element producing a differential pressure by means of a plate with a specified hole

[IEC 60050-351]

**3.2  
flow nozzle**

flow sensor element producing a differential pressure by means of a convergent device being inserted in a fluid flow

[IEC 60050-351]

**3.3  
critical flow nozzle**

nozzle of which the geometrical configuration is such that the flow rate remains constant irrespective of the fluid condition downstream of the nozzle

[IEC 60050-351]

**3.4  
venturi element**

flow sensor element producing a differential pressure by means of a profiled tube generating a change in the velocity of the fluid flowing through it

[IEC 60050-351]

NOTE The tube consists of a cylindrical entrance part, a convergent part, a cylindrical throat and a divergent part.

**3.5  
pitot tube**

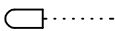
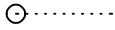


flow sensor element producing a differential pressure by means of two straight tubes mounted in line with the direction of the fluid movement

[IEC 60050-351]







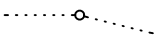
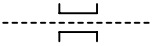

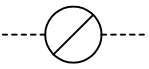


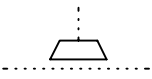




NOTE The two tubes may be mounted coaxially as a unit.

**4 Mechanical elements**

**4.1 Symbols of a basic nature**

4.1.1	711		Plunger; tracer
4.1.2	712		Roller
4.1.3	713		Cam profile See R711 (4.2.1).
4.1.4	715		Fluid-level-operated actuator, for example, in the form of a float



4.1.5	716		Flow-target-operated actuator, for example, in the form of a mechanical flag
4.1.6	771		Displacer
4.1.7	2001		Weight
4.1.8	2002		Spring See R2001 (4.2.2).
4.1.9	2003	Form 1 	Membrane; diaphragm
4.1.10	2004	Form 2 	
4.1.11	2005		Joint of two mechanical parts permitting motion of the parts in two or more dimensions EXAMPLE Cardan joint.
4.1.12	2006		Bearing
4.1.13	2007		Buffer head
4.1.14	2008		Mechanical gear pair
4.1.15	2009		Clutch, disengaged in unactuated state
4.1.16	2010		Clutch, engaged in unactuated state
4.1.17	2011		Brake, disengaged in unactuated state
4.1.18	2012		Brake, applied in unactuated state
4.1.19	2013		Wheel See R2002 (4.2.3).
4.1.20	2014	Form 1 	Ball
4.1.21	2015	Form 2 	

4.2 Application rules for the symbols in 4.1

4.2.1	R711	The shape of the symbol shall correspond to that of the cam itself. For an example, see X711 (4-6.5.1). A cam of circular form may be shown developed as in the symbol shown.
4.2.2	R2001	<p>The symbol may be used for springs that are used for the following.</p> <ul style="list-style-type: none"> <li>a) To exert a counter-force, for example, in spring-loaded safety valves. For an example, see X2002 (4.5.2).</li> <li>b) To perform an automatic return function, for example, in directional control valves. The symbol shall be located and interpreted as stated in R653 (4-4.2.3). For an example, see X2003 (4.5.3), in which the left-hand/right-hand spring symbol indicates automatic return to the right/left.</li> </ul> <p>The use of the symbol to indicate automatic return shall be confined to applications on symbols for valves for fluid power.</p> <ul style="list-style-type: none"> <li>c) To store energy, for example, in quick-acting valves and in actuating devices for circuit-breakers. For examples, see X2004 (4.5.4) and X2005 (4.5.5).</li> <li>d) To perform a function combining a) to c). For an example, see X2006 (4.5.6).</li> </ul>
4.2.3	R2002	The indication of the centre may be omitted if confusion is unlikely.

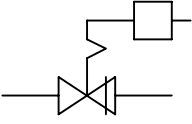
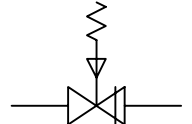
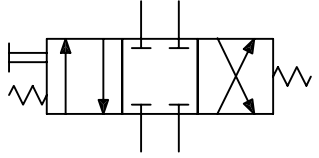
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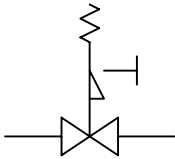
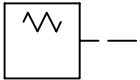


None.

4.4 Application rule for the symbol in 4.3

None.

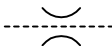




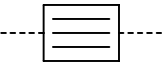
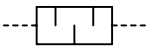
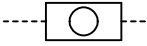

4.5 Application examples







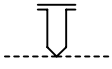
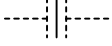
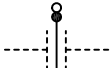
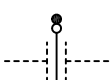
4.5.1	X2001	 <p>403, 655, 2001, 2101, 2112</p>	Weight-loaded safety valve detained in open position after operation
4.5.2	X2002	 <p>403, 654, 2002, 2101, 2112</p>	<p>Spring-loaded safety valve with automatic return after operation</p> <p>[Use symbol 2002 (4.1.8) to indicate a counter-force.]</p>
4.5.3	X2003	 <p>242, 402, 681, 2002, 2161, 2171, 2172</p>	<p>Directional control valve with four ports and three distinct positions, automatic return to mid-position</p> <p>[Use symbol 2002 (4.1.8) to indicate spring return.]</p>

4.5.4	X2004	 <p>403, 661, 681, 2002, 2101</p>	<p>Quick-acting valve, closing when spring is released</p> <p>[Use symbol 2002 (4.1.8) to indicate storing of energy.]</p>
4.5.5	X2005	 <p>404, 741, 2002</p>	<p>Spring-loaded actuating device, for example, for a circuit-breaker</p> <p>[Use symbol 2002 (4.1.8) to indicate storing of energy.]</p>
4.5.6	X2006	 <p>2002, 2007</p>	<p>Spring-equipped buffer</p> <p>[Use symbol 2002 (4.1.8) to indicate an automatic return, a counter-force, and storing of energy.]</p>
4.5.7	X2007	 <p>301, 2007</p>	<p>Hydraulic buffer</p>

## 5 Pipe and duct elements

### 5.1 Symbols of a basic nature

5.1.1	2031		Restrictor
5.1.2	772		Orifice plate
5.1.3	773		Flow nozzle
5.1.4	774		Critical flow nozzle
5.1.5	775		Venturi element
5.1.6	2032		Flow straightener
5.1.7	2033		Silencer
5.1.8	2034		Viewing glass
5.1.9	2035		Rupturing disc

5.1.10	2036		Flame arrestor
5.1.11	2037		Spray nozzle
5.1.12	2038		Siphon, anti-siphon trap
5.1.13	2039		Vent
5.1.14	2040		Drain funnel
5.1.15	2041		Stack
5.1.16	2042		Pig receiver; launcher
5.1.17	2043		Blind
5.1.18	2044		Spectacle blind, shown in closed position
5.1.19	2045		Spectacle blind, shown in open position

**5.2 Application rules for the symbols in 5.1**

None.

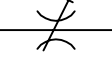
**5.3 Symbol giving supplementary information**

None.

**5.4 Application rule for the symbol in 5.3**


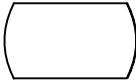

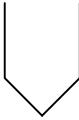
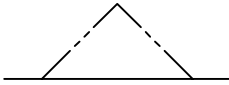



None.

**5.5 Application example**

5.5.1	X2031	 203, 2031, 2171	Restriction with pre-set adjustability
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## 6 Devices for storage

### 6.1 Symbols of a basic nature

6.1.1	2061		Container, tank, cistern for atmospheric pressure See R2061 (6.2.1).
6.1.2	2062	Form 1 	Pressure or vacuum vessel See R2061 (6.2.1).
6.1.3	2063	Form 2 	
6.1.4	2064		Bunker See R2061 (6.2.1).
6.1.5	2065		Open store
6.1.6	2066		Shelf store
6.1.7	2067		Barrel
6.1.8	2068		Bag

### 6.2 Application rule for the symbols in 6.1

6.2.1	R2061	The symbol may have another shape if the shape of the tank is significant for the function.
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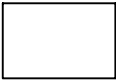
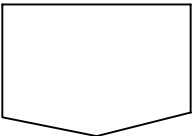
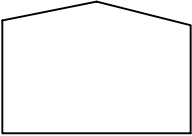
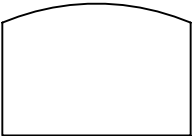
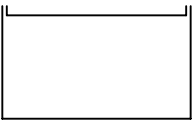

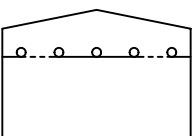
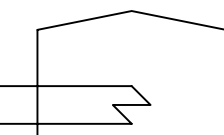
### 6.3 Symbol giving supplementary information

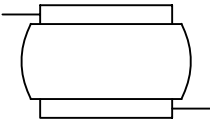
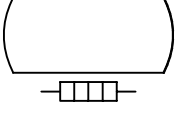
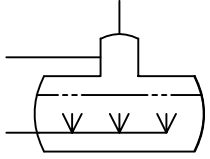


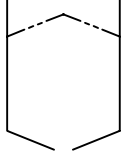
None.

### 6.4 Application rule for the symbol in 6.3

None.

6.5 Application examples

6.5.1	X2061	 2061	Closed tank for atmospheric pressure
6.5.2	X2062	 2061	Closed tank with conic bottom
6.5.3	X2063	 2061	Tank with conic roof
6.5.4	X2064	 2061/2062	Tank with torispheric roof
6.5.5	X2065	 2061	Tank with floating roof
6.5.6	X2066	 2062	Gas-holder
6.5.7	X2067	 2015, 2061	Tank with conic roof and surface of liquid provided with floating balls
6.5.8	X2068	 2061, 2501	Tank with conic roof and provided with internal heating or cooling coil

<p><b>6.5.9</b></p>	<p><b>X2069</b></p>	 <p>301, 2062</p>	<p>Pressure vessel with heating or cooling jacket</p>
<p><b>6.5.10</b></p>	<p><b>X2070</b></p>	 <p>2062, IEC</p>	<p>Pressure vessel provided with external electric heater</p>
<p><b>6.5.11</b></p>	<p><b>X2071</b></p>	 <p>405, 2037, 2062</p>	<p>Boiler feedwater vessel with deaerator</p>
<p><b>6.5.12</b></p>	<p><b>X2072</b></p>	 <p>244, 2062</p>	<p>Pressure vessel EXAMPLE      Expansion vessel.</p>
<p><b>6.5.13</b></p>	<p><b>X2073</b></p>	 <p>244, 2003, 2062</p>	<p>Pressure vessel with diaphragm EXAMPLE      Expansion vessel.</p>
<p><b>6.5.14</b></p>	<p><b>X2074</b></p>	 <p>2064</p>	<p>Open bunker with material indicated</p>

## Bibliography

- [1] IEC 60050-351, *International Electrotechnical Vocabulary — Part 351: Automatic control*



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**ICS 01.080.30**

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