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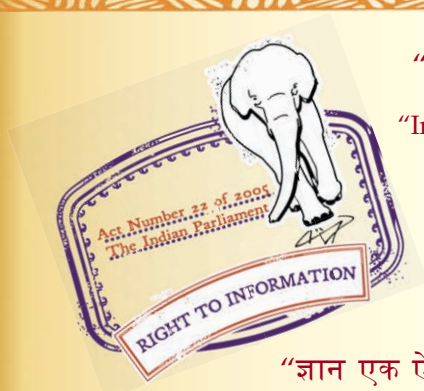
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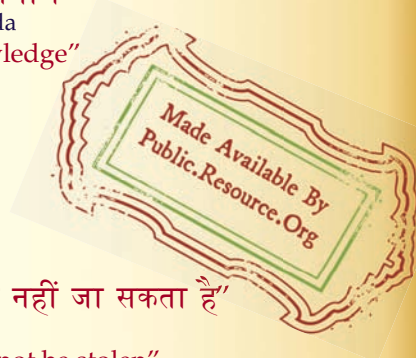
IS 10990-2 (1992): Technical drawings - Simplified representation of pipelines, Part 2: Isometric projections [PGD 24: Drawings]



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Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

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IS 10990 (Part 2) : 1992
ISO 6412-2 : 1989

भारतीय मानक

(Reaffirmed 2003)

औद्योगिक पाइप लगाने के आरोंों की रीति संहिता

भाग 2 त्रिसभलम्बास प्रक्षेप

(पहला पुनरीक्षण)

Indian Standard

TECHNICAL DRAWINGS — SIMPLIFIED
REPRESENTATION OF PIPELINES

PART 2 ISOMETRIC PROJECTION

(First Revision)

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BUREAU OF INDIAN STANDARDS

MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
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Indian Standard

TECHNICAL DRAWINGS — SIMPLIFIED REPRESENTATION OF PIPELINES

PART 2 ISOMETRIC PROJECTION

(First Revision)

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 6412 - 2 : 1989 'Technical drawings — Simplified representation of pipelines — Part 2 : Isometric projection' issued, by the International Organization for Standardization (ISO), was adopted by the Bureau of Indian Standards on the recommendations of the Drawing Sectional Committee (LMD 02) and approval by the Light Mechanical Engineering Division Council.

The original version of this standard IS 10990 : 1984 'Code of practice for industrial piping diagrams' was based on standards of other developed countries. ISO has published ISO 6412-1 : 1989 'Technical drawings — Simplified representation of pipelines — Part 1 : General rules and orthogonal representation' and ISO 6412-2 : 1989 'Technical drawings — Simplified representation of pipelines — Part 2 : Isometric projection'. Harmonization of the standard has been made by the adoption of ISO 6412-1 : 1989 and ISO 6412-2 : 1989, in two parts of IS 10990.

In the adopted standard certain terminology and conventions are not identical with those used in Indian Standards; attention is especially drawn to the following:

- a) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use point (.) as the decimal marker.
- b) Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'Indian Standard'.

CROSS REFERENCES

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 128 : 1982	IS 10714 : 1983 General principles of presentation on technical drawings	Identical
ISO 129 : 1985	IS 11669 : 1986 General principles of dimensioning on technical drawings	Identical
ISO 5261 : 1981	IS 10720 : 1983 Technical drawings for structural metal works	Identical
ISO 6412 - 1 : 1989	IS 10990 (Part 1) : 1991 Technical drawings — Simplified representation of pipelines : Part 1 General rules and orthogonal representation (first revision)	Identical

This Indian Standard (IS 10990) is issued in two parts. Other part is IS 10990 (Part 1) : 1991 'Technical drawings — Simplified representation : Part 1 General rules and orthogonal representation (first revision)

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1 Scope

This part of ISO 6412 specifies supplementary rules, in addition to the general rules given in ISO 6412-1, applicable to isometric representation. Isometric representation shall be used where the essential features are to be shown clearly in three dimensions.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6412. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6412 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 129 : 1985, *Technical drawings — Dimensioning — General principles, definitions, methods of execution and special indications*.

ISO 5261 : 1981, *Technical drawings for structural metal work*.

ISO 6412-1 : 1989, *Technical drawings — Simplified representation of pipelines — Part 1: General rules and orthogonal representation*.

3 Definitions

For the purposes of this part of ISO 6412, the definitions given in ISO 6412-1 apply.

4 Coordinates

As far as it is necessary to use Cartesian coordinates, for instance for calculations or numerical control of machine tools, the coordinate axes shall comply with figure 1.

In all cases, the coordinates of individual pipes or pipe assemblies should comply with those adopted for the complete installation and shall be indicated on the drawing or in an associated document.

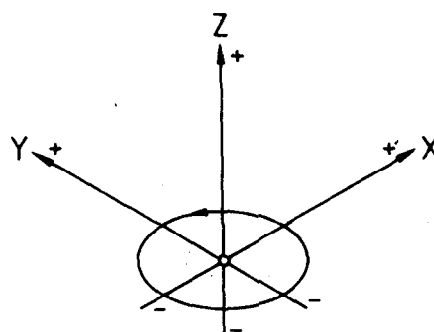


Figure 1

5 Line conventions

See ISO 6412-1.

6 Deviations from the direction of coordinate axes

6.1 General

Pipes, or parts of pipes, running parallel to the coordinate axes, shall be drawn parallel to the relevant axis without any further indication.

Deviations from the directions of the coordinate axes should be indicated by means of auxiliary hatched projection planes as shown in figure 2.

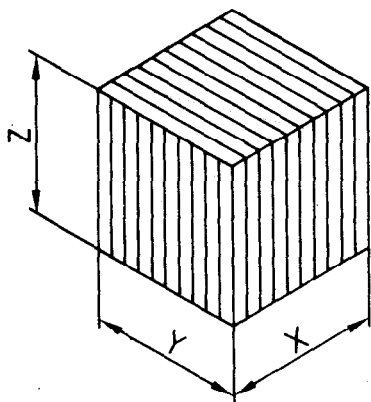


Figure 2

6.2 Pipes in a vertical plane

Pipes, or parts of pipes, situated in a vertical plane, shall be indicated by showing their projections on a horizontal plane [see figure 3a)].

6.3 Pipes in a horizontal plane

Pipes, or parts of pipes, situated in a horizontal plane, shall be indicated by showing their projections on a vertical plane [see figure 3b)].

6.4 Pipes not parallel to any coordinate plane

Pipes, or parts of pipes, not running parallel to any coordinate plane, shall be indicated by showing both their projections on a horizontal and on a vertical plane [see figure 3c)].

6.5 Auxiliary projection planes

It is recommended that the right angles of the triangles limiting the auxiliary projection planes be indicated.

Auxiliary projection planes may be emphasized by hatchings, parallel to the X- or Y-axis for horizontal auxiliary planes, and vertical for all other auxiliary planes.

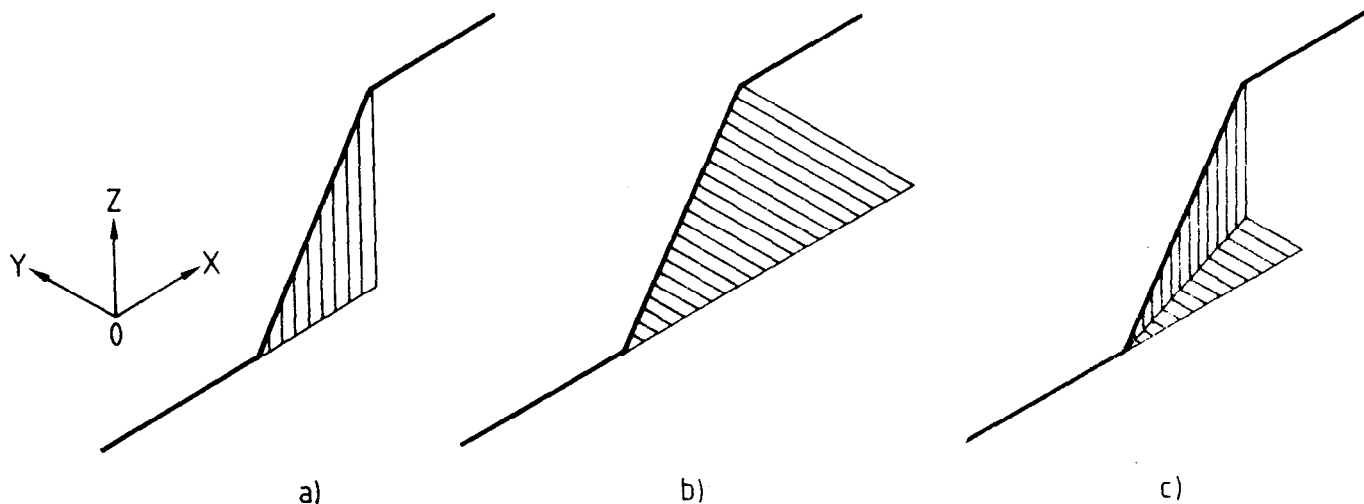


Figure 3

If such hatching is not convenient it may be omitted, but in that case the rectangle (see figure 4) or the rectangular prism (see figure 5), of which a diagonal coincides with the pipe, should be shown, using continuous thin lines (type B, ISO 128).

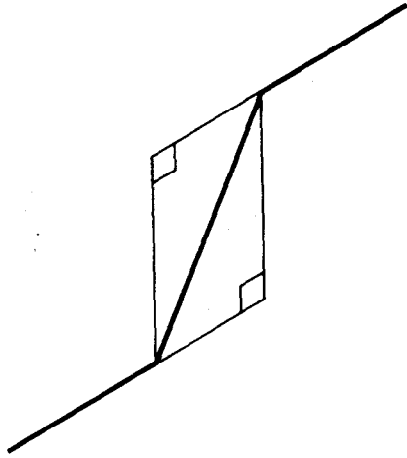


Figure 4

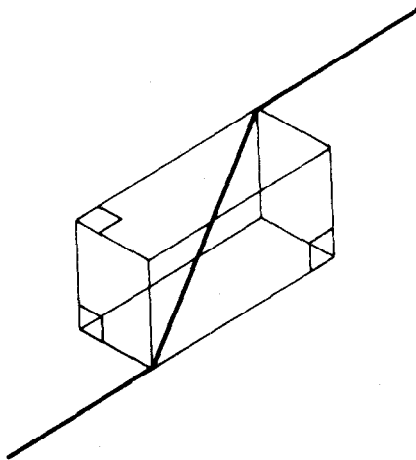


Figure 5

7 Dimensioning and special rules

7.1 General

Drawings shall be dimensioned in accordance with ISO 129. There are, however, special rules for isometric projection for pipelines which are specified in 7.2 to 7.10.

7.2 Diameters and wall thickness

The outer diameter (d) and the wall thickness (t) of pipes may be indicated in accordance with ISO 5261 (see figure 6). Nominal dimensions may be indicated in accordance with ISO 3545 using the short designation "DN" (see ISO 6412-1 : 1989, figure 1).

7.3 Longitudinal and angular dimensions

Longitudinal and angular dimensions should be indicated in accordance with ISO 129; the length shall start from the outer faces of the pipe ends, flanges, or centre of the joint, whenever appropriate.

7.4 Pipes with bends

Pipes with bends shall be dimensioned from central line to central line or from the central line to the end of the pipe (see figure 6).

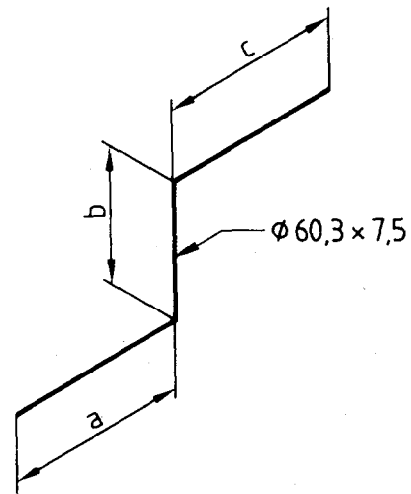


Figure 6

7.5 Radii and angles of bends

Radii and angles of bends may be indicated as shown in figure 7.

The functional angle shall be indicated.

NOTE — Bends may be simplified by extending the straight length of the flow line to the vertex. However, the actual bends in the pipes may be shown for sake of clarity. In this case, if projections of bends would otherwise have been elliptical, these projections may be simplified by drafting circular arcs.

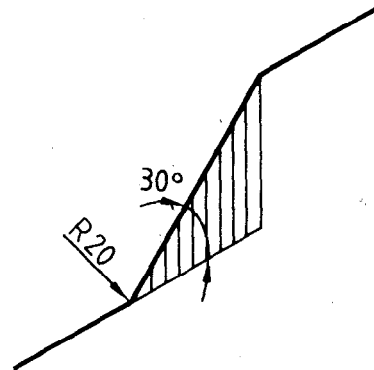


Figure 7

7.6 Levels

Levels should be indicated in accordance with ISO 129 and ISO 6412-1 (see figure 8).

The horizontal part of the leader line shall follow the direction of the associated flow line.

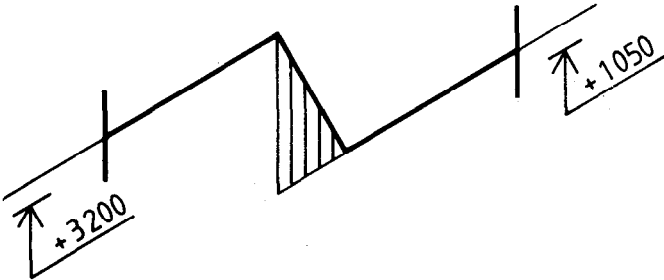


Figure 8

7.7 Direction of slope

The direction of slope shall be indicated by a right-angled triangle above the flow line, pointing from the higher down to the lower level, without changing the isometric direction of the flow line.

The amount of slope shall be indicated in accordance with the method shown in figure 9 and in ISO 6412-1.

It may, however, be useful to specify the slope by referring to a datum level (see figure 9).

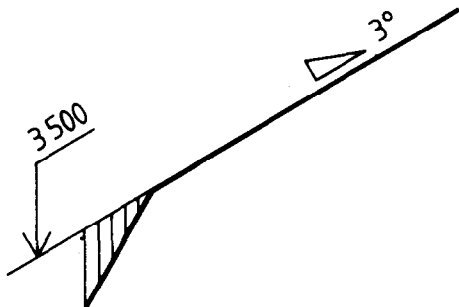


Figure 9

7.8 Positions of ends of pipes

If necessary, the positions of the ends of the piping may be specified by indicating the coordinates referring to the centres of the end faces.

In the case of adjacent drawings, a reference should be given. For example, "continued on drawing x".

7.9 Redundant dimensioning

If necessary, the auxiliary hatched projection planes can be dimensioned (see figure 10).

If it is necessary for manufacturing and/or technical reasons to indicate double dimensioning, one of the dimensions should be indicated in parentheses.

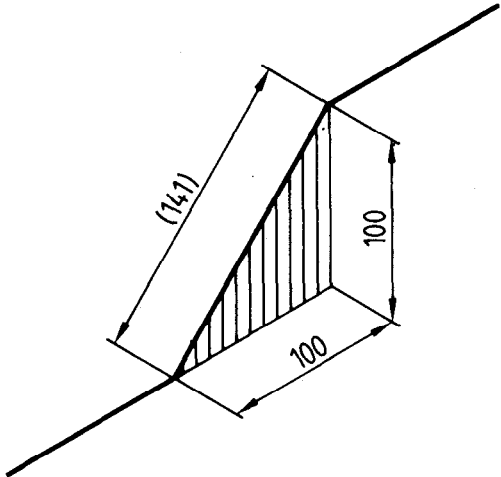


Figure 10

7.10 Dimensioning for pipe-bending machines

The dimensioning is defined on the basis of a reference system (point of origin) (see figure 23).

8 Graphical symbols

8.1 General

Graphical symbols for pipeline systems shall be in accordance with the International Standards given in clause 2 and in annex A and shall be drawn using the isometric projection method (see figure 11).

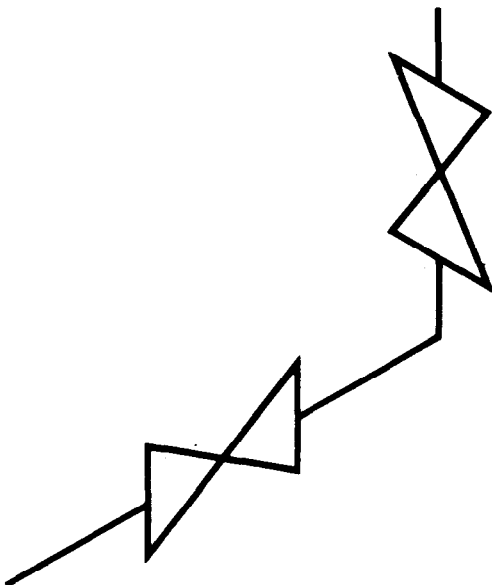


Figure 11

8.2 Examples of graphical symbols drawn with the isometric projection method

8.2.1 Valves

See examples in figures 12 and 13.

NOTE — Valve actuators should only be shown if it is necessary to define their positions or the kind of actuators (spindle, piston, etc.).

If shown, an actuator with a position parallel to one of the coordinate axes need not be dimensioned. Deviations from such positions should be indicated (see figure 13).

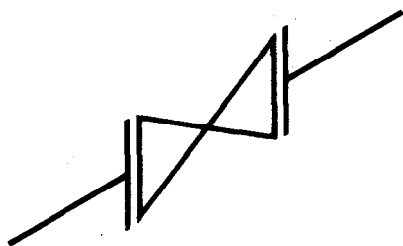


Figure 12

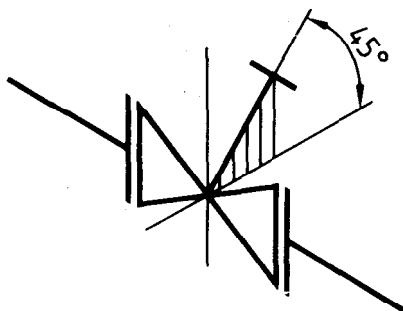


Figure 13

8.2.2 Transition pieces (cones)

The relevant nominal sizes shall be indicated above the graphical symbols (see figure 14).

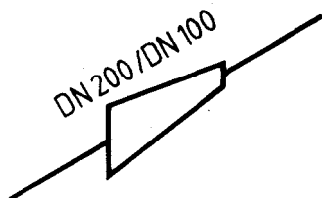


Figure 14

8.2.3 Supports and hangers

See examples in figures 15 and 16. See also ISO 6412-1 : 1989, 6.3.

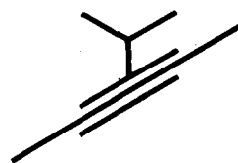


Figure 15

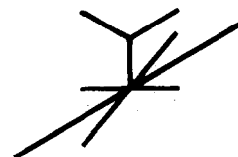


Figure 16

8.2.4 Crossings

Crossings shall be shown in accordance with ISO 6412-1 : 1989, 5.1.

If it is absolutely necessary to indicate that one pipe has to pass behind the other, the flow line representing the hidden pipe shall be interrupted (see figure 17). The width of each interruption shall not be less than five times the thickness of the continuous line.

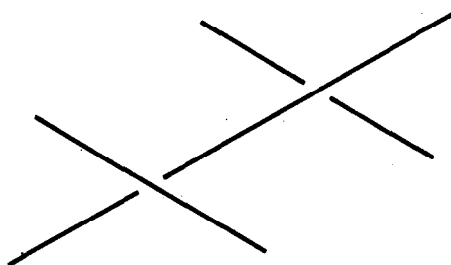


Figure 17

8.2.5 Permanent junctions

See examples of a weld in figure 18 and of a site weld in figure 19.

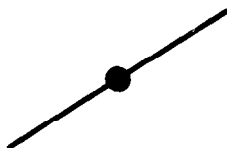


Figure 18

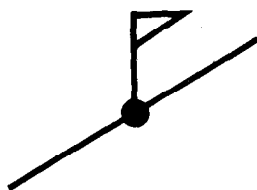


Figure 19

8.2.6 General connections

If the kind, or type, of connection is not specified, a general symbol should be used (instead of the more detailed symbols given in ISO 4067-1).

See example in figure 20.

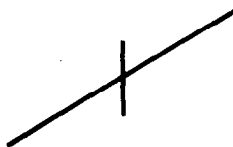


Figure 20

8.2.7 Flanges

See examples in figures 21 and 22.

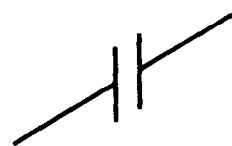


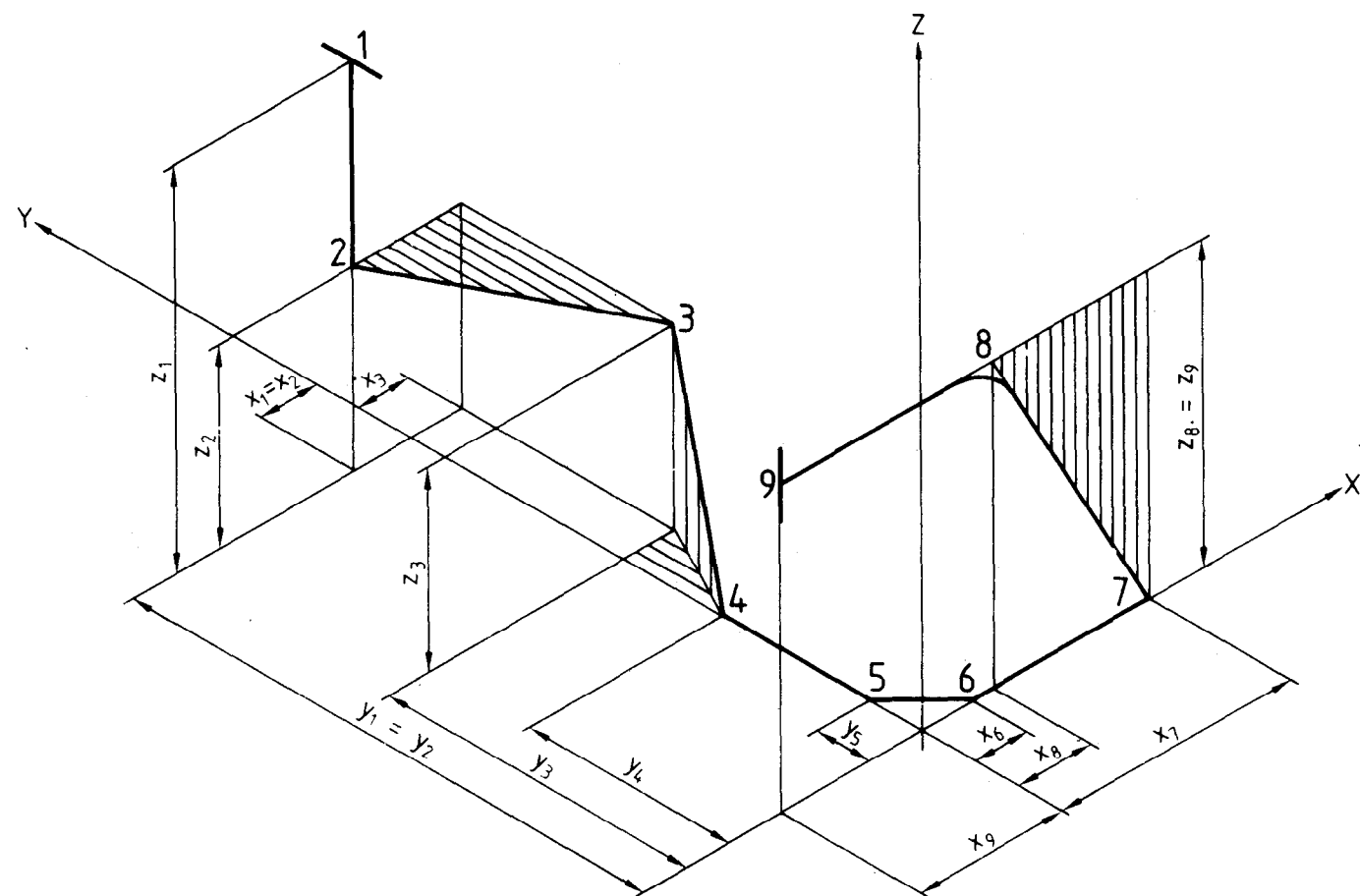
Figure 21



Figure 22

9 Examples

Examples of isometric projection are given in figures 23 and 24.



Reference number	Coordinates		
1	$x_1 = -8$	$y_1 = +72$	$z_1 = +50$
2	$x_2 = -8$	$y_2 = +72$	$z_2 = +25$
3	$x_3 = +7$	$y_3 = +42$	$z_3 = +25$
4	$x_4 = 0$	$y_4 = +28$	$z_4 = 0$
5	$x_5 = 0$	$y_5 = +7$	$z_5 = 0$
6	$x_6 = +7$	$y_6 = 0$	$z_6 = 0$
7	$x_7 = +32$	$y_7 = 0$	$z_7 = 0$
8	$x_8 = +10$	$y_8 = 0$	$z_8 = +40$
9	$x_9 = -20$	$y_9 = 0$	$z_9 = +40$

NOTE — Points at which the pipe changes direction and connections are indicated by reference numbers. The pipe and the reference numbers are identical to those in the orthogonal representation illustrated in ISO 6412-1 : 1989, figure 25.

Figure 23

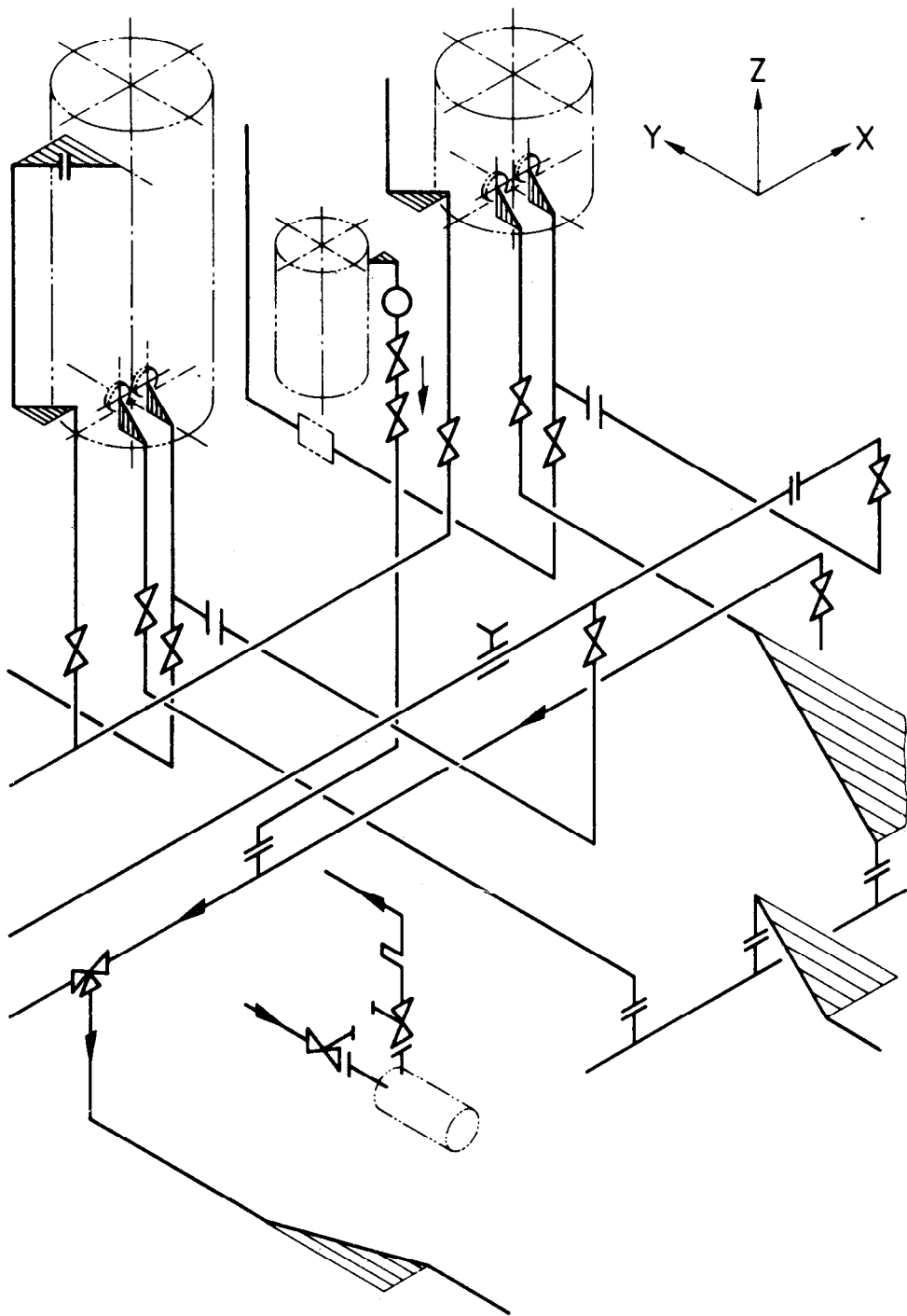


Figure 24

Annex A (informative)

Bibliography

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

ISO 3511-3 : 1984, *Process measurement control functions and instrumentation — Symbolic representation — Part 3: Detailed symbols for instrument interconnection diagrams.*

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

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ISO 4067-6 : 1985, *Technical drawings — Installations — Part 6: Graphical symbols for water supply and drainage systems in the ground.*

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