

Rev

© British Standards Institution. No part of this publication may be photocopied or otherwise reproduced without the prior permission in writing of BSI

British Standard

Engineering drawing practice

Part 1. Recommendations for general principles

Pratique du dessin industriel
Partie 1. Principes généraux

Technische Zeichnungen
Teil 1. Allgemeine Grundsätze

British Standards Institution

ti A4

AVA Documents
Document Sharing Hub
ti 2151 0002

Contents

	Page		Page
Foreword	2	17 Patterns of repeated features	18
Committees responsible	Back cover	18 Locating repeated features	18
Recommendations		19 Economy in showing patterns	19
1 Scope	4	20 Cutting plane not indicated	19
2 Types of drawings in common use	4	21 Cutting plane indicated	19
3 Drawing sheets	4	22 Examples of orientation of hatching	20
4 Scales	7	23 Hatching of separated areas and adjacent parts	20
5 Lines	7	24 Hatching of large areas	20
6 Lettering	11	25 Subordination of hatching	21
7 Projection	13	26 Section through thin material	21
8 Views	15	27 Web in longitudinal section	21
9 Sections and sectional views	19	28 Spokes in longitudinal section	21
10 Item references	26	29 Assembly of pin, lever and shaft	21
11 Symbols and abbreviations	27	30 Half section	22
12 Conventional representations	28	31 Local section	22
13 Marking	43	32 Revolved sections	22
Appendix		33 Removed sections	23
A Aspects of engineering drawing practice covered by British and international (ISO) standards	44	34 Successive sections	24
Index	45	35 Section in parallel planes	25
Tables		36 Examples of section in intersecting planes	25
1 Recommended drawing sheet sizes (trimmed)	4	37 Section in contiguous planes	26
2 Types of line	8	38 Item references	26
3 Character height	11	39 Adjacent part	28
4 Symbols for gear teeth systems	34	40 Imaginary intersections lines	28
Figures		41 Developed views	28
1 Drawing sheets showing frame, title block and other markings	6	42 Indication of flat features on a shaft	29
2 Applications of the various types of line	9	43 Examples of knurling	29
3 Priorities of coinciding lines	10	44 Splines	30
4 Leader lines	11	45 Serrations	31
5 Examples of letters and numerals	12	46 Conventions for screw threads	31
6 Symbols indicating method of projection	13	47 Conventions for assembled screw threads	32
7 Example of first angle projection	13	48 Conventions for wire thread inserts	32
8 Example of third angle projection	14	49 Convention for rolling bearing	33
9 Special arrangement of views	14	50 Gears: showing conventions for contours, edges, pitch lines and circles	33
10 Example of a partial view projected from a full view	15	51 Gears and rack: showing conventions for root surface	34
11 Auxiliary view showing true shape of inclined surface	15	52 Examples of use of symbols for gear teeth systems	35
12 Enlarged features	16	53 Assembled mating gears	35
13 Representation of symmetrical parts	16	54 External engagement of cylindrical gears	36
14 Representation of symmetrical parts with asymmetrical features added	16	55 Internal engagement of cylindrical gears	37
15 Methods of indicating an interrupted view	17	56 Engagement of pinion with rack	37
16 Repeated parts and features	17	57 Engagement of bevel gears, axis intersection at any angle	38
		58 Engagement of wheel with cylindrical worm	38
		59 Chain wheels	39
		60 Compression springs	40
		61 Tension springs	41
		62 Torsion springs	41
		63 Cup springs	42
		64 Leaf springs	42
		65 Spiral springs	43



Foreword

This revision of BS 308 : Part 1 has been prepared under the direction of the Mechanical Engineering Standards Committee; it reflects the established conventions and also takes account of both national and international developments since the 1972 revision which is now withdrawn.

The proven record of standards applied to engineering drawing now enables its recognition as the graphical language of communication in engineering both nationally and internationally. Drawings made to the accepted standards in one country, when based on standards published by the International Organization for Standardization (ISO), are understood and can be used around the world in virtually all countries. With this in mind it was recognized and accepted to be important as a policy for this revision that particular attention and care should be paid to the quality of content of both text and figures to ensure their clarity and ease of understanding.

The UK continues to participate actively in ISO Technical Committees on technical drawing for the establishment of international published standards and much of the contents of this standard reflects those agreements reached internationally with which the UK has concurred. Some notes appear in this standard to draw attention to occasional divergence of practice. The appendix provides information on aspects of engineering drawing practice covered by British and international standards.

The recommendations of this standard have been established having regard to the requirements of microfilming. Drawings prepared in accordance with this standard should be suitable for microfilming and reduced-size reproduction techniques.

During the course of this revision particular attention has been paid to developments in computer aided machine draughting and it has been established that computerized draughting machines are currently capable of complying with this standard. Any minor exceptions due to the limitations of a particular system would not be expected to prejudice the understanding of a drawing otherwise claimed to comply with this standard.

The 1972 revision was coincidentally undertaken during the main period of transition of UK industry to the metric system and a limited recognition of the imperial system of units was included, but this has not been retained in the present revision.

In the ISO Technical Committee for technical drawing it is the intention to unify, in one set of standards, the practices and conventions of all disciplines using technical drawings. The ISO standards currently under revision attempt to reflect this policy. In the UK the traditional separations are maintained and it should be carefully noted that BS 308 continues to provide recommendations for engineering drawings in the manufacturing industries associated with mechanical, electrical, electronics, hydraulics, pneumatics and nuclear engineering disciplines, as previously. The requirements of the building, architectural, civil and

structural engineering and construction services industries continue to be covered by BS 1192. BS 308 does not cover special disciplines such as in naval architecture and aeronautical lofting. There are standards published for some industries using BS 308 as a basis, but requiring additional recommendations and conventions particular to the discipline. BS 4301, which gives recommendations for the preparation of drawings for optical elements and systems, and BS 2774, which gives drawing conventions for laboratory glassware, are examples.

BS 5070, dealing with engineering diagram drawing practice, is a companion standard to BS 308 and caters for the same industries providing recommendations on a wide variety of engineering diagrams. Commonly, as a diagram can be called a 'drawing' and a drawing can be called a 'diagram', it would be useful to summarize the difference in the scopes of these standards. BS 308 covers what are commonly accepted to be drawings that define shape, size and form. BS 5070 covers diagrams that are normally associated with flow of one form or another and which relate components (usually indicated by symbols) functionally one to another by the use of lines, but do not depict their shape, size or form; neither may they in general indicate actual connections or locations.

For convenience of use this revision of BS 308 follows the precedent established in 1972 of publishing in Parts.

This Part deals with general principles; it leads through from the choice of paper sizes and scales to a complete drawing of views and sections awaiting the application of dimensions, tolerances and related information.

The recommendations are generally in accordance with the following international standards.

ISO 128-1982	Technical drawings — General principles of presentation
ISO 2162-1973	Technical drawings — Representation of springs
ISO 2203-1973	Technical drawings — Conventional representation of gears
ISO 3098-1974	Technical drawings — Lettering Part 1. Currently used characters
ISO 5455-1979	Technical drawings — Scales
ISO 5457-1980	Technical drawings — Sizes and layout of drawing sheets
ISO 6410-1981	Technical drawings — Conventional representation of threaded parts
ISO 6433-1981	Technical drawings — Item references

Part 2 of this standard deals with dimensioning, tolerancing and interpretations and the application of surface roughness symbols. Part 3 of this standard deals specifically with geometrical tolerancing.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Notes on the presentation of this standard

NOTE 1. The figures in this standard are independent and each is selected solely for its simplicity and clarity to illustrate only the text to which it relates. They are not the only possible examples and they are not intended as design examples or to be fully dimensioned working drawings, but otherwise are drawn according to the basic recommendations of this standard.

NOTE 2. Linear dimensions shown in the figures are in millimetres.

NOTE 3. In the illustrations to this standard, a convention is adopted of using capital letters for notes that would appear as part of the drawing and lower case letters are used for notes explaining the point under consideration in relation to the text.

NOTE 4. This standard recognizes both the first and third angle projection methods as having equal status, see clause 7, as does ISO 128-1982. The first angle projection method is that normally used for British Standards and is thus used in this publication in the interests of uniformity of presentation. The third angle method is only shown where it illustrates the relevant clause. However, it should be understood that the alternative projection method, i.e. third angle projection, could equally well have been used without prejudice to the principles established.

NOTE 5. It is recognized in 9.3.1 that it is common for hatching to be omitted where the time and expense involved is not justified and the understanding of the drawings will not be impaired. Hatching is used throughout this publication as normal practice in British Standards.

NOTE 6. Due to the limitations of size of the figures in this standard, the sizes of arrowheads may not conform to 5.4.

Recommendations

1 Scope

This Part of BS 308 gives recommendations for the general principles of presentation and practice to be applied to all engineering drawings.* Recommendations are given for drawing layout, scales, types of lines, lettering, methods of orthographic projection, sections and conventional representations.

Drawings prepared in accordance with this standard will generally be suitable for the majority of reprographic processes and the requirements of BS 5536.

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Types of drawings in common use

2.1 General

A drawing is either of the following.

- (a) In general, any form of graphical representation.
 - (b) In particular, a graphical representation of an object which depicts the form and/or position of the object.
- A drawing may consist of more than one sheet.

2.2 Design layout drawing

A design layout drawing represents in broad principles the feasible solutions meeting the design requirements. A design scheme may fulfil a similar function.

2.3 Detail drawing

A detail drawing depicts a single object and includes all the necessary information required (e.g. the form, dimensions, tolerances, material, finishes, treatment, etc.) to define completely that object. A single part drawing fulfils a similar function.

An object will normally be referred to as a component, a part or an item (as contained in an item list, see 2.9).

2.4 Tabular drawing

A tabular drawing depicts an object (see 2.3) typical of a series of similar such objects having their variable characteristics presented in tabular form. (This could equally relate to a series of similar assemblies.)

2.5 Assembly drawing

An assembly drawing shows two or more parts, or sub-assemblies, in their assembled form, including any dimensions and instructions necessary to effect assembly. An item list should be included or referred to.

2.6 Combined drawing

A combined drawing shows an assembly, item list and constituent details drawn separately but all on the same drawing.

2.7 Arrangement drawing

An arrangement drawing of the complete finished product or equipment showing the arrangement of assemblies. It includes important functional and/or performance features. An installation drawing is a particular variation which provides the necessary information to effect proper installation on site or in further equipment.

2.8 Diagram

A diagram is a drawing depicting, by the use of simplified representation, the function of a system or the relationship between component parts, see BS 5070.

2.9 Item list

An item list is a list of component parts required for an assembly, shown either on the drawing or on a separate list. A parts list may fulfil a similar function.

2.10 Drawing list

A drawing list is a list of drawings associated with an assembly.

3 Drawing sheets

3.1 Sizes

It is recommended that ISO A series drawing sheet sizes be used as specified in BS 3429. Sizes of these sheets are given in table 1. Sizes larger than A0 should be exceptional.

Table 1. Recommended drawing sheet sizes (trimmed)

Designation	Size	Minimum border width from drawing frame to edge of sheet
	mm	mm
A0	841 x 1189	20
A1	594 x 841	20
A2	420 x 594	10
A3	297 x 420	10
A4	210 x 297	10

3.2 Formats

3.2.1 *General.* Drawing sheets have two formats.

- (a) *Landscape:* intended to be viewed with the longest side of the drawing sheet horizontal, see figure 1(a).
- (b) *Portrait:* intended to be viewed with the longest side of the drawing sheet vertical, see figure 1(b).

3.2.2 *Trimming marks.* Trimming marks may be provided in the borders at the four corners of the sheet in order to

*Civil and structural engineering and construction services drawings are excluded (see BS 1192). The special discipline aspects of naval architecture and aeronautical lofting are not included.

facilitate trimming. These marks can be in the form of right-angled isosceles triangles or alternatively two short strokes at each corner* (see figure 1).

3.2.3 Borders and frames

3.2.3.1 General. It is recommended that all sheets should include a frame to enclose the drawing area together with the title block and other standard information. The frame should be symmetrical with the edges of the sheet. The minimum widths of the borders are shown in table 1. In the majority of cases the values shown are sufficiently large to allow for gripping during printing. The frame should accommodate such marks as are necessary for microfilming procedures as specified in BS 5536 and other reduced-size reproduction techniques.

3.2.3.2 Frame lining. Lines forming the frame should be continuous and of a minimum thickness of 0.5 mm.

3.2.3.3 Grid system or zoning. The provision of a grid reference system is recommended for all sizes of drawing sheets, in order to permit easy location on the drawing of details, changes, etc.

The number of divisions should be divisible by two and be chosen in relation to the complexity of the drawing. It is recommended that the length of any side of the rectangles comprising the grid should not be less than 25 mm and not more than 75 mm.

The grid reference system lines should be drawn as short lines of 0.5 mm minimum thickness (see figure 1).

The rectangles of the grid should be referenced by means of capital letters down the vertical edges beginning at the top and numerals along the horizontal edges beginning at the left-hand side of the sheet. The references may be repeated on the opposite sides.

The letters and numerals should be placed in the borders, close to the frame at a minimum distance of 5 mm from the edges of the trimmed sheet, and should be written in upright characters (see figure 1).

3.2.3.4 Centring marks. Centring marks should be provided to facilitate positioning of the drawing for reproduction processes including microfilming. They should extend from the edges of the sheet to the frame and beyond by approximately 5 mm (see figure 1 and also BS 5536).

3.2.3.5 Orientation marks. An orientation mark may be provided in the form of a triangular arrowhead located on that centring mark adjacent to and pointing toward the intended position of the drawing user† (see figure 1).

3.2.3.6 Print folding marks. Folding marks, where required, may be indicated according to the method of folding employed.

3.2.3.7 Scale bar. The scale bar should be figure-less, have a minimum length of 100 mm and be divided into 10 mm intervals. It should preferably be located symmetrically about a centring mark, near the frame and in the

border. It should have a maximum width of 5 mm and the continuous strokes should be of 0.5 mm minimum thickness.

3.2.4 Title block

3.2.4.1 General. The title block is that area of the drawing sheet which contains the information required for the identification, administration and interpretation of the drawing and should preferably be placed in the lower right-hand corner of the drawing frame (see figure 1). The drawing number may also appear elsewhere on the drawing sheet for convenience.

3.2.4.2 Basic information. It is recommended that provision be made for basic information such as the following.

- (a) Name of company or organization.
- (b) Drawing number.
- (c) Descriptive title of depicted part or assembly.
- (d) Date of drawing.
- (e) Signature(s), e.g. drawn by, authorized by.
- (f) Original scale.
- (g) Copyright clause.
- (h) Projection symbol.
- (i) Unit of measurement.
- (j) Reference to standards and/or related specifications.
- (k) Sheet number.
- (l) Number of sheets.
- (m) Issue information.

3.2.4.3 Supplementary information. The following list gives additional or supplementary information which should be considered for inclusion in the drawing format. The list is not necessarily comprehensive.

- (a) Material and specification.
- (b) Treatment/hardness.
- (c) Finish.
- (d) Surface texture.
- (e) General tolerances.
- (f) Key to geometrical tolerances.
- (g) Screw thread forms.
- (h) Sheet size.
- (i) First used on.
- (j) Similar to.
- (k) Equivalent part.
- (l) Supersedes.
- (m) Superseded by.
- (n) Tool references.
- (o) Gauge references.
- (p) Warning notes, e.g. 'Do not scale'.

*ISO 5457:1980 originates this option.

†ISO 5457:1980 calls for two orientation marks, the second mark being placed either on the left-hand or the right-hand vertical frame according to whether the sheet is an X (horizontal format) or a Y (vertical format) type respectively.

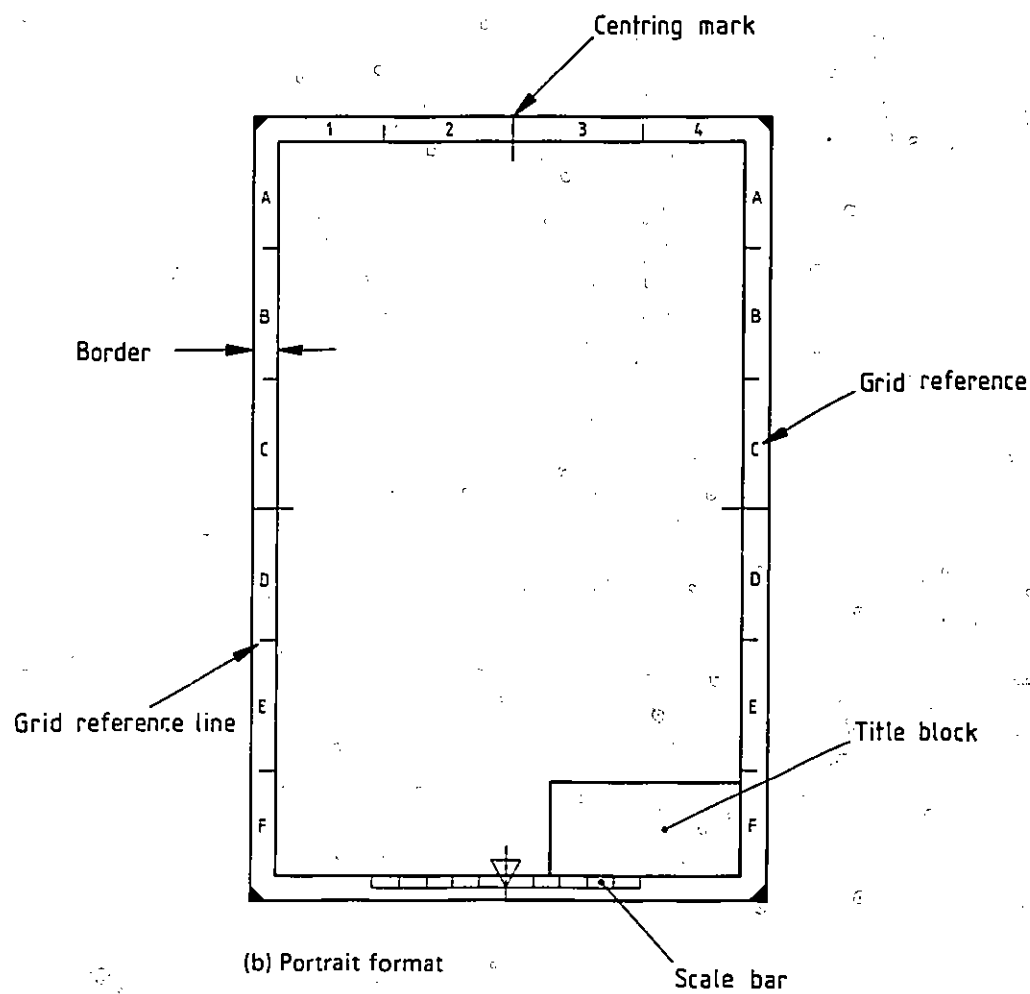
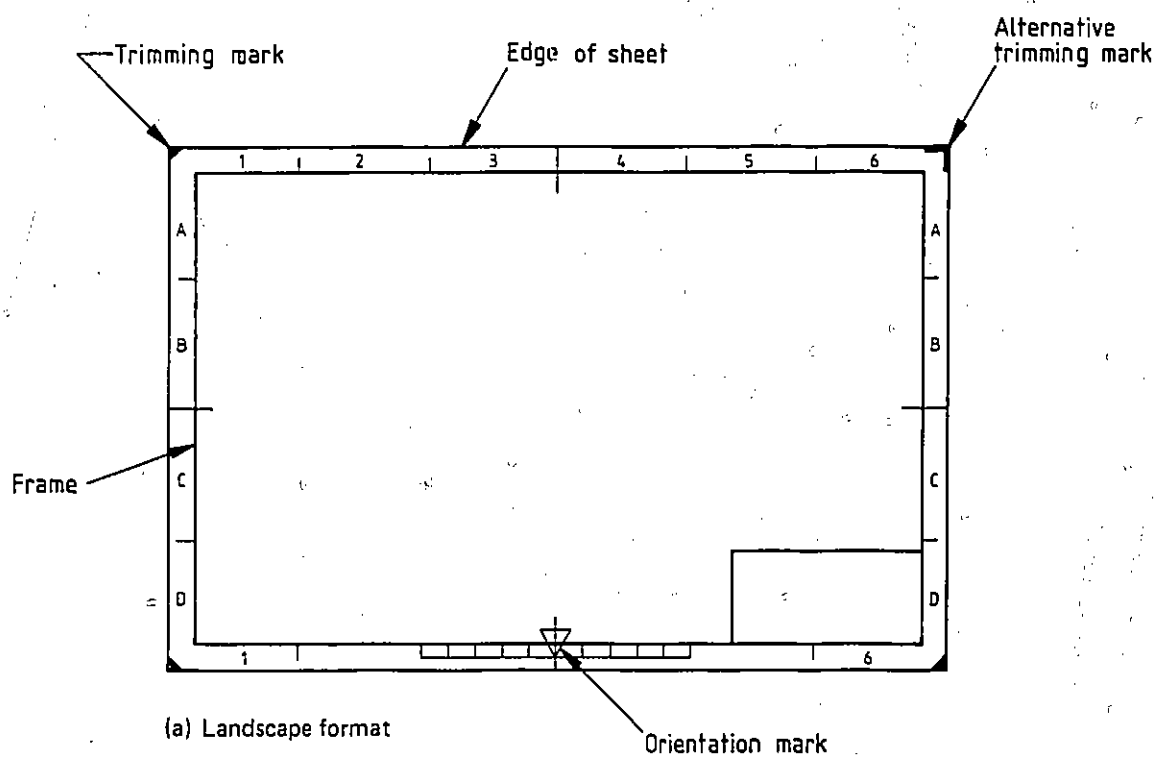


Figure 1. Drawing sheets showing frame, title block and other markings

4 Scales

4.1 General

The scale is determined as the ratio of the linear dimension of an element of an object, as represented in the original drawing, to the real linear dimension of the same element of the object itself.

4.2 Enlargement scale

An enlargement scale is a scale where the ratio is larger than 1:1. It is said to be larger as its ratio increases.

4.3 Reduction scale

A reduction scale is a scale where the ratio is smaller than 1:1. It is said to be smaller as its ratio decreases.

4.4 Indication of scale

Full size should be indicated by '1:1', the ratio of an enlargement scale by 'X:1' and the ratio of a reduction scale by '1:X'.

4.5 Designation of scale

The complete designation of a scale consists of its ratio preceded by the words 'ORIGINAL SCALE ...'.

4.6 Designation of multiple scale

Where it is necessary to use more than one scale on a drawing, each scale has to be clearly identified.

Where a drawing is drawn substantially to one main scale and only subsidiary views are drawn to other scales then that main scale only is entered against 'ORIGINAL SCALE'.

4.7 Recommended scales

Recommended scales should be as follows.

Category	Recommended scales		
Enlargement scales	50:1	20:1	10:1
	5:1	2:1	
Full size			1:1
Reduction scales	1:2	1:5	1:10
	1:20	1:50	1:100
	1:200	1:500	1:1000
	1:2000	1:5000	1:10000

If, for special applications, a larger or smaller scale is needed than those recommended, the range may be extended in either direction, provided that the new scale is derived from a recommended scale by multiplying the numerator or denominator by an integral power of 10.

4.8 Choice of scales

The scale to be chosen for the drawing depends on the size of the drawing sheet and the size of the object to be depicted. The scale should be large enough to permit easy and clear interpretation of the information. Details that are too small for clear dimensioning in the main representation should be shown in a separate view to a larger scale.

5 Lines

5.1 Presentation

5.1.1 All lines should be black and dense. It is important that all the lines on a drawing, including those added in any revision, should be of consistent density and reflectance. The lines on any one drawing sheet should preferably be entirely in pencil or entirely in ink. If a mixture of pencil and ink is used, every effort should be made to ensure that uniform density and reflectance are maintained.

5.1.2 The clear space between lines should be not less than 1 mm. It is accepted that in some cases the scale of the drawing will be violated.

5.2 Thickness

Two thicknesses of line are recommended: thick and thin, which should be in the ratio of 2:1. Thickness should be selected from the range 0.25, 0.35, 0.5, 0.7, 1.0, 1.4 and 2.0 mm.

5.3 Types of line and their application

5.3.1 *General.* Only those types of line shown in table 2 should be used. Examples of their application are shown in figure 2.

5.3.2 *Dashed lines.* Dashed lines should comprise dashes of consistent length and spacing, approximately to the proportion shown in table 2. They should start and end with dashes in contact with the hidden or visible lines from which they originate, except when the hidden line continues a visible line. Dashed lines should also meet with dashes at tangent points and corners.

5.3.3 *Chain lines.* Chain lines should comprise alternate long and short dashes, of consistent length and spacing. They should start and end with a long dash. Where angles are formed in chain lines, long dashes should meet at corners. Where chain lines meet arcs they should join at the tangent point with a long dash.

Centre lines should extend only a short distance beyond the feature unless required for dimensioning or other purposes. In general they should not extend through the spaces between views, except when clarity would be enhanced. They should not terminate at another line of the drawing.

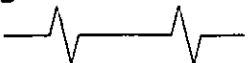
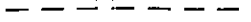
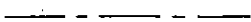
Where centre lines define points or angles they should cross one another at long dash portions of the line.

5.3.4 *Coinciding lines.* When two or more lines of different type coincide, the following order of priority should be observed (see figure 3 and table 2):

- (a) visible outlines and edges (types A);
- (b) hidden outlines and edges (types E or F);
- (c) cutting planes (type H1);
- (d) centre lines, etc. (types G and B7);
- (e) outlines and edges of adjacent parts, etc. (types K);
- (f) projection lines (type B3).

Adjacent outlines of assembled parts should coincide, thin material in section excepted (see figure 20).

Table 2. Types of line

Line	Description	Application
A 	Continuous thick	A1 Visible outlines A2 Visible edges
B 	Continuous thin	B1 Imaginary lines of intersection B2 Dimension lines B3 Projection lines B4 Leader lines B5 Hatching B6 Outlines of revolved sections B7 Short centre lines
C 	Continuous thin irregular	*C1 Limits of partial or interrupted views and sections, if the limit is not an axis
D 	Continuous thin straight with zigzags	†D1 Limits of partial or interrupted views and sections, if the limit is not an axis
E 	Dashed thick	E1 Hidden outlines E2 Hidden edges
F 	Dashed thin‡	F1 Hidden outlines F2 Hidden edges
G 	Chain thin	G1 Centre lines G2 Lines of symmetry G3 Trajectories and loci G4 Pitch lines and pitch circles
H 	Chain thin, thick at ends and changes of direction	H1 Cutting planes
J 	Chain thick	J1 Indication of lines or surfaces to which a special requirement applies (drawn adjacent to surface)
K 	Chain thin double dashed	K1 Outlines and edges of adjacent parts K2 Outlines and edges of alternative and extreme positions of movable parts K3 Centroidal lines K4 Initial outlines prior to forming §K5 Parts situated in front of a cutting plane K6 Bend lines on developed blanks or patterns

NOTE. The lengths of the long dashes shown for lines G, H, J and K are not necessarily typical due to the confines of the space available.

*See also 8.8 and 9.7.

†This type of line is suited for production of drawings by machines.

‡The thin F type line is more common in the UK, but on any one drawing or set of drawings only one type of dashed line should be used.

§ Included in ISO 128-1982 and used mainly in the building industry.

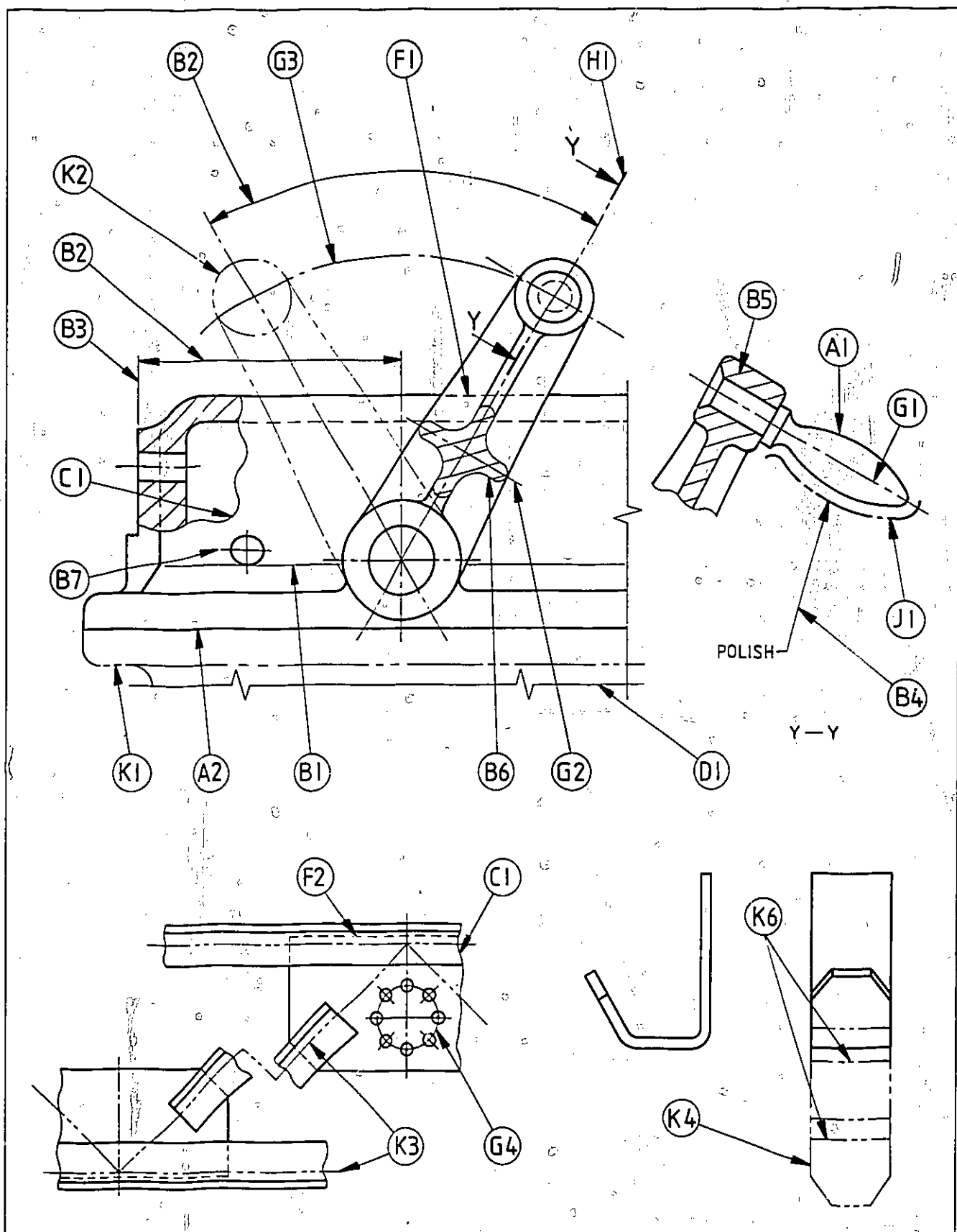


Figure 2. Applications of the various types of line

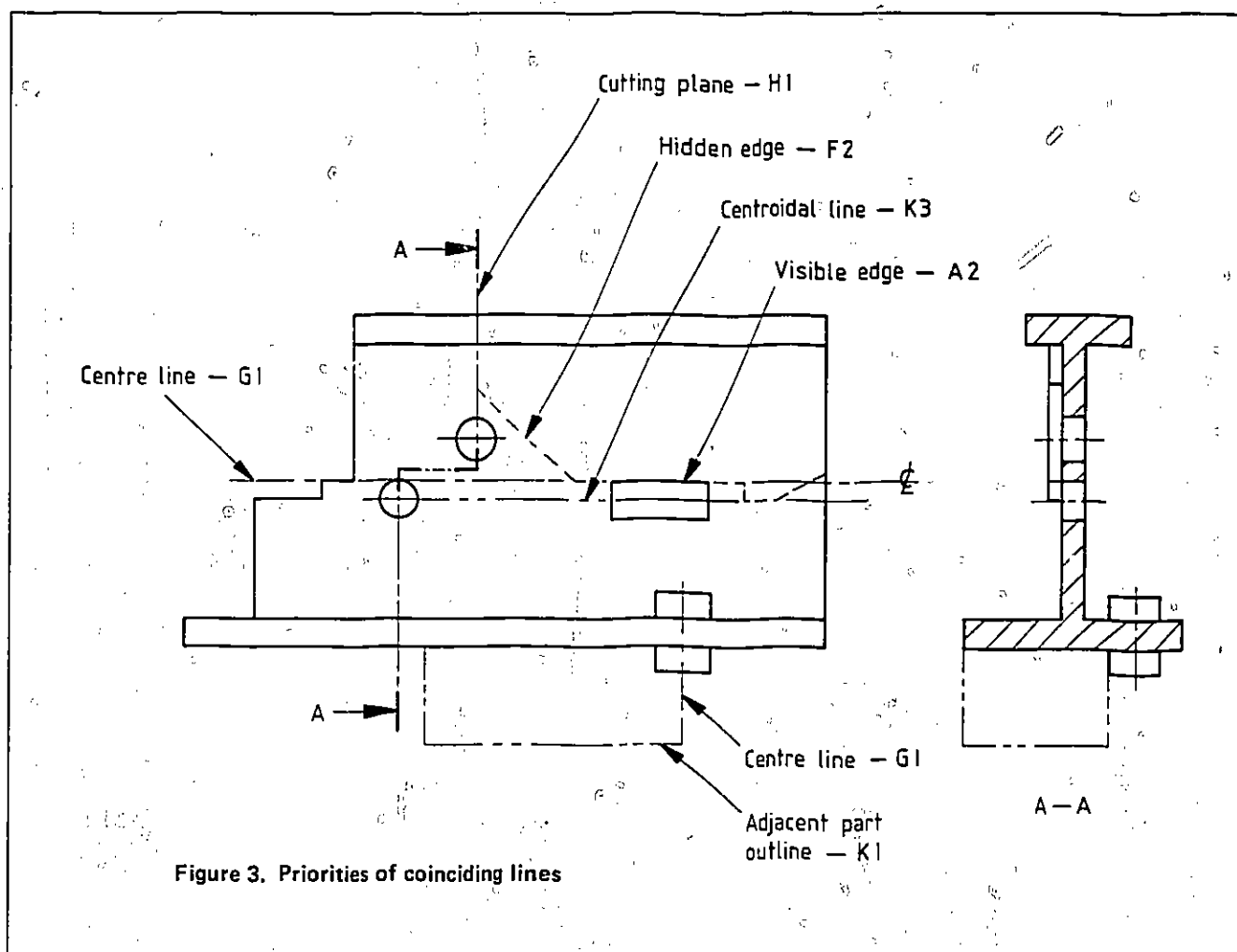


Figure 3. Priorities of coinciding lines

5.3.5 Leader lines. A leader line of type B (see table 2) shows where dimensions, notes, etc. are intended to apply.

A leader line should terminate:

- (a) with a bold dot, if it ends within the outline of an object (see figure 4(a));
- (b) with an arrowhead, if it ends on the outline of an object (see figure 4(b) and 5.4);
- (c) without dot or arrowhead if it ends on a dimension line (see figure 4(c)).

The slope of leader lines for notes, item references, etc. should contrast with that of adjacent lines.

The use of long or intersecting leaders should be avoided. Leader lines should not pass through the intersection of other lines.

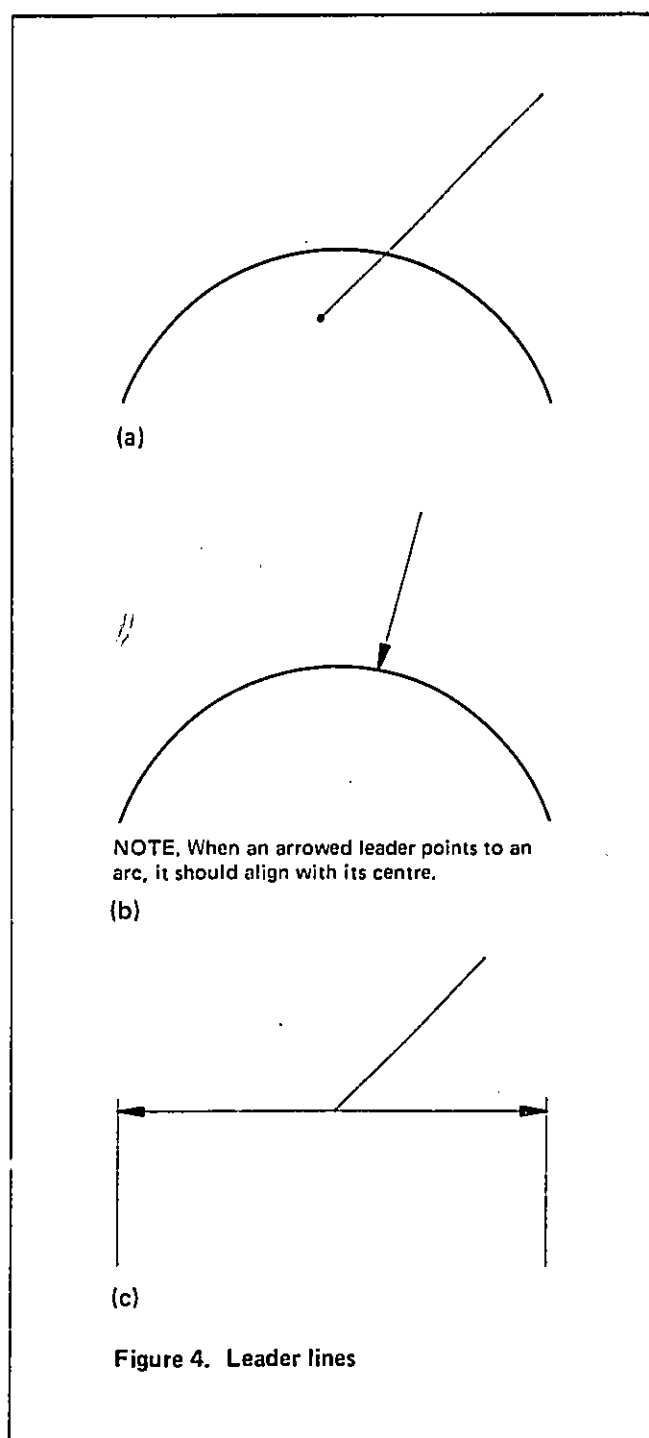
5.4 Arrowheads

5.4.1 General. Arrowheads should be approximately triangular, formed with straight lines and symmetrically placed about the dimension line, leader line, or stem. Arrowheads drawn manually should be filled in*.

NOTE. Arrowheads drawn by machine need not be filled in, in which case they should be drawn with type B lines (see table 2). Care should be taken that unfilled arrowheads are not confused with the symbol for taper.

The point of the arrowhead should touch the projection line, outline, cutting plane line or other limiting line (see figure 4(b) and (c)).

*ISO 129-1984 provides also for open barbed arrowheads with point angles up to 90° as used by the building and construction industry.



5.4.2 Proportions. The length of an arrowhead should be approximately three times its width.

5.4.3 Sizes

5.4.3.1 Dimension and leader lines. Arrowheads on dimension and leader lines should be 3 mm to 5 mm long.

5.4.3.2 Arrows showing direction of viewing. The arrowhead should be 7 mm to 10 mm long. The stem of the arrow should be approximately the same but not less than the length of the arrowhead.

6 Lettering

6.1 General

It is important that characters should be uniform and equally capable of being produced by hand, stencil, machine or other means. The characters on the drawing should remain legible not only in a full size copy but in the form of a reduced copy or as an image on a microfilm viewing screen.

Clarity, style, size and spacing are important, particularly for figures, as unlike letters they rarely fall into identifiable patterns and have to be read individually. Characters should be open form and devoid of serifs and other embellishments. All strokes should be black and of consistent density compatible with the line work. Care should be taken that sufficient space exists between characters and parts of characters to ensure that 'filling in' will not take place during reproduction.

6.2 Style

No particular style of lettering is recommended, the aim should be to produce legible and unambiguous characters. Vertical and sloping characters are both suitable for general use but the presentation should be consistent on any one drawing sheet, i.e. vertical and sloping letters should not be mixed.

NOTE. The examples in figure 5, which have been produced by the use of stencils, are provided as a guide only.

Capital letters are preferred to lower case as they are less congested and are less likely to be misread when reduced in size. It is recommended that lower case letters be restricted to instances where they form part of a standard symbol, code or abbreviation.

6.3 Character height and proportions

6.3.1 Character height. Table 3 lists the minimum recommended heights for upper case characters.

Table 3. Character height		
Application	Drawing sheet size	Minimum character height
Drawing numbers, etc.	A0, A1, A2 and A3	7 mm
	A4	5
Dimensions and notes	A0	3.5
	A1, A2, A3 and A4	2.5

6.3.2 Character proportions. It is stressed that the dimensions given in table 3 are the minimum heights for upper case characters. When lower case characters are used they should be proportioned so that the body height is approximately 0.6 times the upper case height.

ABCDEFGHIJKLMNOPQRSTUVWXYZ
 abcdefghijklmnopqrstuvwxyz
 1234567890

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
1234567890

ABCDEFGHIJKLMNOPQRSTUVWXYZ
 aabcdefghijklmnopqrstuvwxyz
 1234567890

ABCDEFGHIJKLMNOPQRSTUVWXYZ
aabcdefghijklmnopqrstuvwxyz
1234567890

Figure 5. Examples of letters and numerals (see note to 6.2)

The stroke thickness of the character should be approximately 0.1 times the character height and the clear space between characters and parts of characters should be approximately 0.7 mm for 2.5 mm upper case characters, other sizes being in proportion.

The space between lines of lettering should be not less than half the character height but, in the case of titles, closer spacing may sometimes be unavoidable.

6.4 Orientation of lettering

When a landscape format drawing sheet is used with the title block at the bottom right-hand corner (see figure 1(a)) notes should be lettered parallel to the long side of the sheet. When a landscape format drawing sheet is used in portrait

position, the title block should appear at the left-hand side and notes should be lettered perpendicular to the long side of the sheet.

6.5 Location of notes

6.5.1 Notes of a general character should be grouped together and not spread over the drawing.

6.5.2 Notes relating to specific details should appear near the relevant feature, but not so near as to crowd the view.

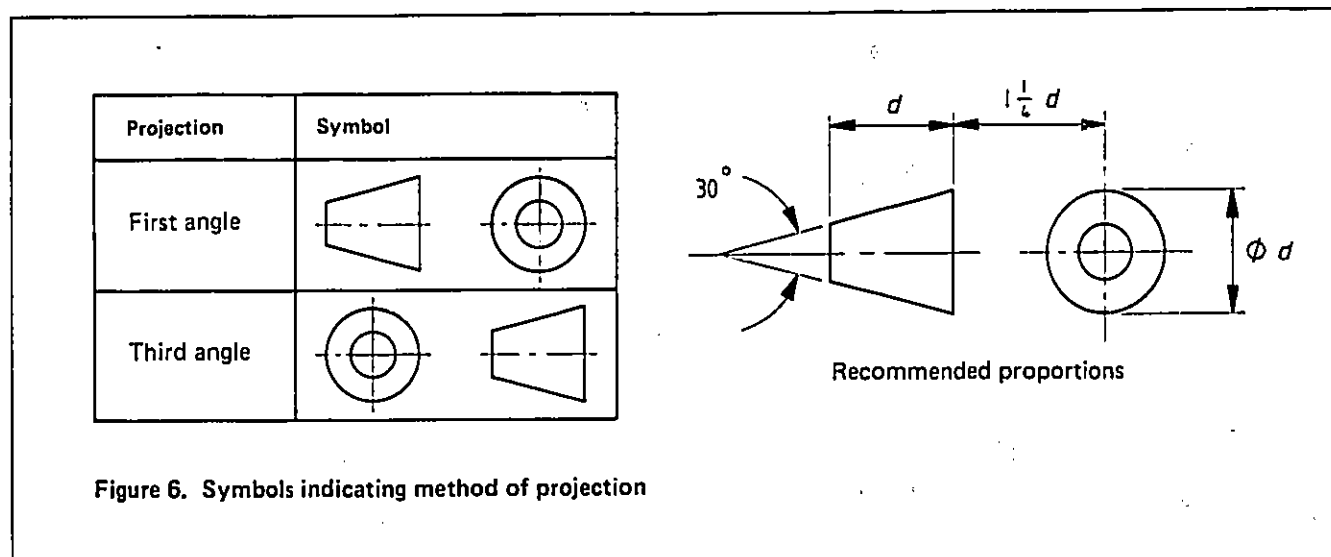
6.6 Underlining

Underlining of notes is not recommended. Where emphasis is required, larger characters should be used.

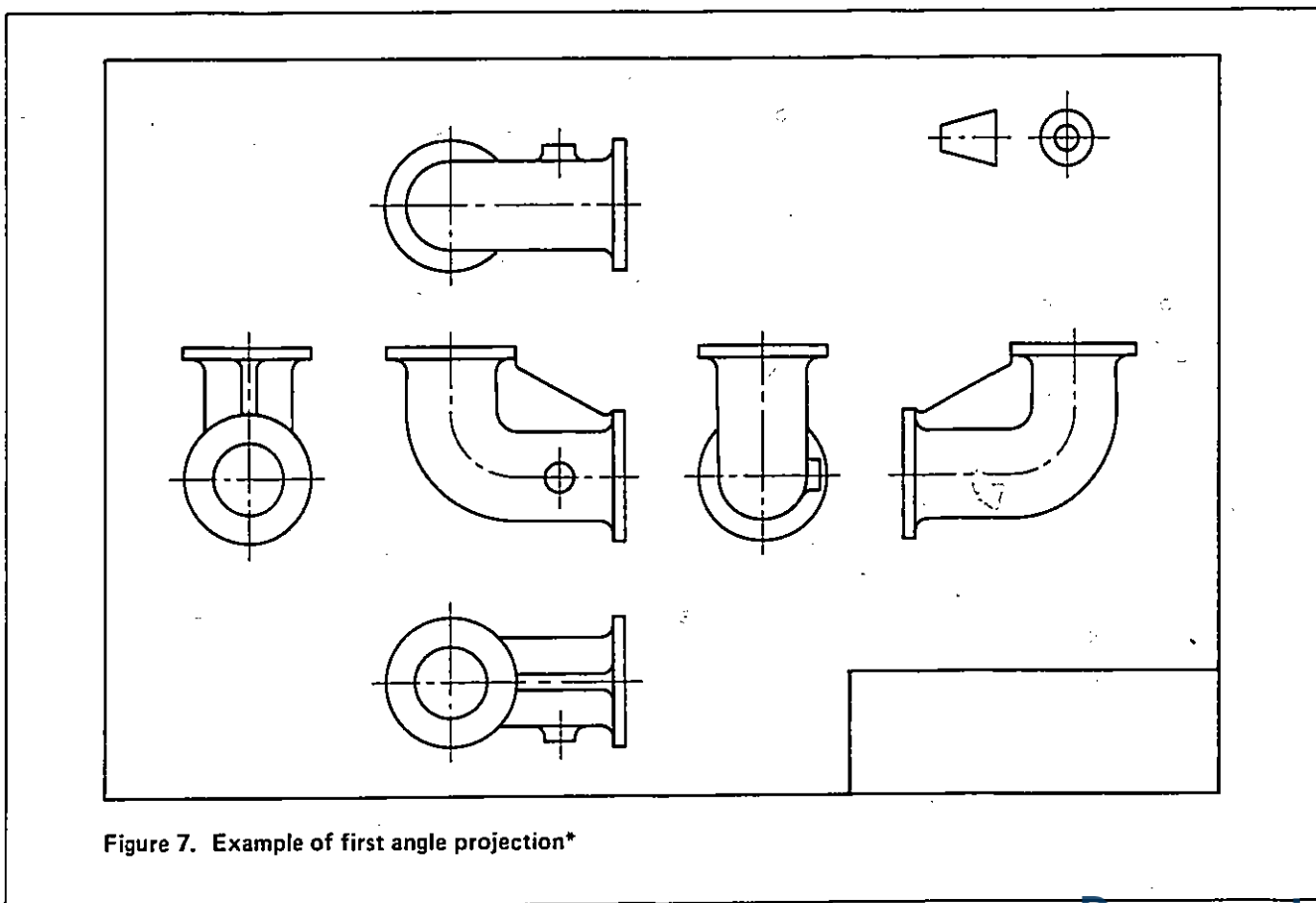
7 Projection

7.1 Systems of projection

7.1.1 Multi-view orthographic projection is predominantly used in engineering drawings. There are two systems, known as FIRST ANGLE and THIRD ANGLE, both based on a framework of planes at right angles. Both are approved internationally and have equal status. The system of projection used on a drawing should be indicated by the appropriate symbol (see figure 6).



7.1.2 In FIRST ANGLE projection each view shows what would be seen by looking on the far side of an adjacent view (see figure 7).



*See note to B.2.

7.1.3 In THIRD ANGLE projection each view shows what would be seen by looking on the near side of an adjacent view (see figure 8).

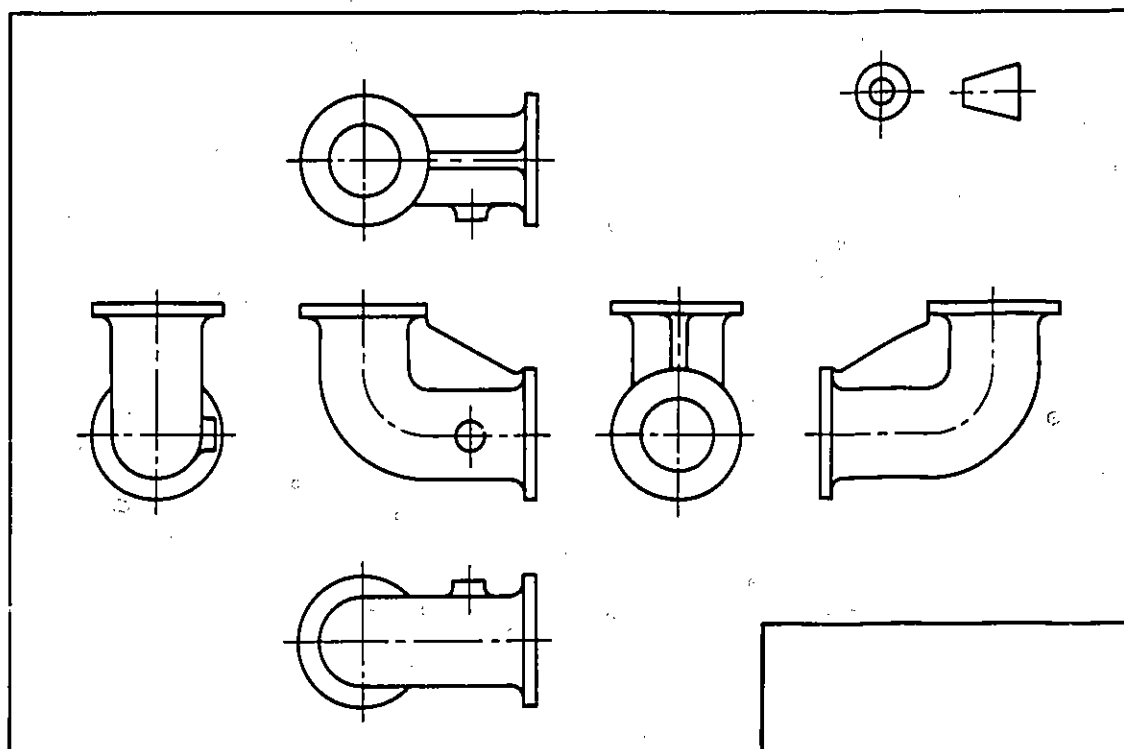


Figure 8. Example of third angle projection*

7.1.4 If, exceptionally, the position of a view cannot conveniently conform to the method indicated by the symbol, the direction of viewing should be clearly shown (see figure 9).

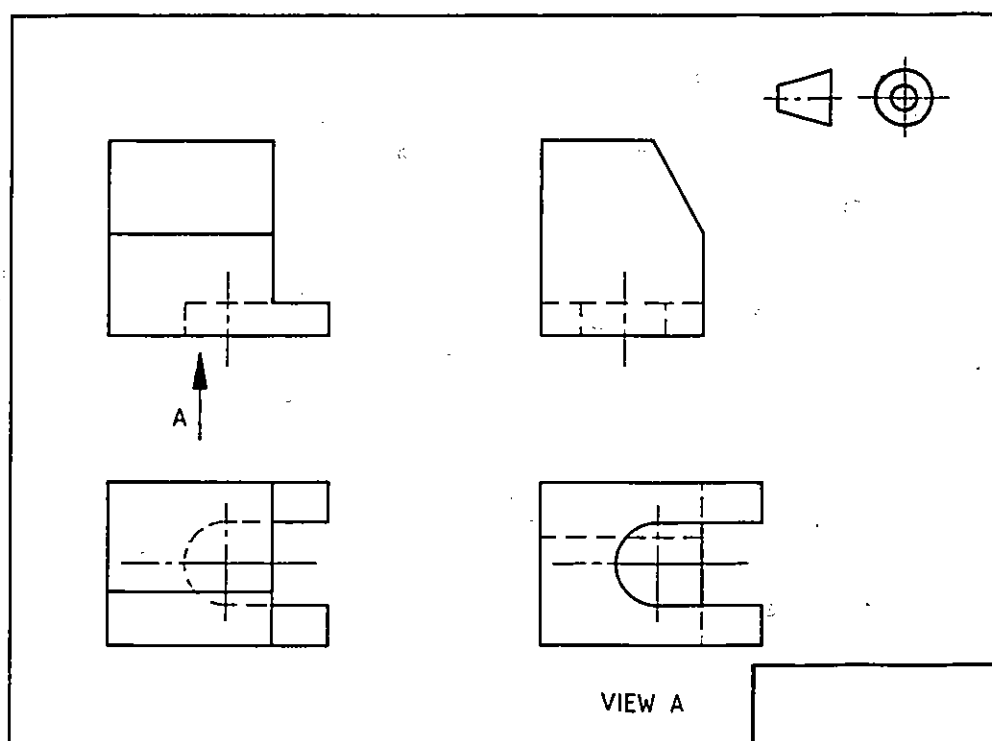


Figure 9. Special arrangement of views

*See note to 8.2