

2

LINES, LETTERING AND DIMENSIONING

2.1. INTRODUCTION

The drawing of an object includes lines. Each line of a drawing has a definite meaning and is drawn in a certain way to define and specify the shape and size of the object. A set of lines required for different purposes in the drawing may properly be called an "Alphabet of lines".








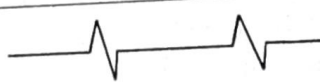
2.2. TYPES OF LINES

Three types of lines, thick, medium and thin, are recommended for general engineering drawing. Extra thick line is also recommended for special purpose. The thickness of the lines may vary according to the size and type of the drawing made in pencil or ink. The thickness should be as great as the accuracy and character of the drawing permit. The thinnest line that a draftsman is able to draw is 0.20 mm in thickness. This line will breakdown if reduced more than one-half in reproduction.

All lines should be so dense, clean and black that the drawing may have good appearance, neatness and cleanliness. If the line work is clear and correct, the drawing will also be clear and correct. Hence care must be taken to improve the line work. Construction lines should be drawn with a medium, hard and sharp pencil such as H or 2H, outlines with a hard and sharp pencil such as 2H to 4H and medium lines with a medium grade sharp pencil such as 2H. Freehand sketching and lettering should be done with H pencil. Pencil of different grades are used for different types of work but different types of lines must have difference between them. All thin lines must be thin but dark.

For general engineering drawings, the types of lines shown in Table 2.1 should be used. The thickness of the lines should be chosen according to the types and size of drawing.

Table 2.1. Application of Various Types of Lines in Engineering Drawing.

S.No.	Type of Line	Representation	Applications
1.	A Continuous thick line		Visible outlines, visible edges
2.	B Continuous thin line		Dimension lines, leader lines extension lines, construction lines, outlines of adjacent parts, hatching and revolved section
3.	C Continuous thin-wavy line		Irregular boundary lines, short break lines
4.	D Short dashes line		Hidden outlines, hidden edges
5.	E Long chain thin line (long-dashed dotted thin line)		Centre lines, locus lines, lines of symmetry, pitch circle of gears, pitch circle of holes.
6.	F Long chain thick at ends and thin elsewhere line		Cutting plane lines
7.	G Long chain thick line		To indicate surfaces which are to receive additional treatments
8.	H Ruled line and short Zigzag thin line.		Long break lines

2.3. THICK LINES

There is mainly one type of line which comes under thick lines category, *i.e.*, object line or outline.

2.4. MEDIUM LINES

There are three types of lines which come under this category

1. Dotted Lines
2. Hidden Line
3. Ditto Line

2.5. THIN LINES

The following types of lines come under thin lines category,

1. Centre Line
2. Locus line
3. Extension Line
4. Dimension Line
5. Short Break Line
6. Long Break Line
7. Projections Line
8. Construction Line
9. Section Line.

These are shown by dotted lines consisting of small dashes of 3 mm length and gaps of half the dash length. These are medium lines.

2.6. CENTRE LINES

The lines which are drawn in the centre of a symmetrical type of object or drawing are called Centre Lines.

These lines are represented by long and short dashes. These are thin lines.

2.7. LOCUS LINES

A line representing the path of a point is called Locus Line.

This line is represented by long and short dashes like centre line. It is a thin line.

2.8. EXTENSION LINES

extended from points, lines or surfaces to enable the dimension to be shown outside the outline are called Extension Lines. These are generally drawn perpendicular to the feature to be dimensioned. These are thin lines.

2.9. DIMENSION LINE

A line generally placed outside the outline of the object and terminating at each end by an arrow head giving the size or length of the object is called a Dimension Line.

It is a thin line with arrow heads at each end.

2.10. SHORT BREAK LINE

A line drawn free hand and wavy to show the break of an object which extends to a short length of the drawing or to indicate irregular boundary of an object is called a short Break Line.

It is a thin continuous line

2.11. LONG BREAK LINE

A straight line having free hand zigzags at suitable intervals showing the break of an object, extending over a considerable length is called a Long Break Line.

It is a thin line.

For the convenience of students, different types of lines are shown in Table 2.2. It also shows representation and conventions of lines for drawing work.

Table 2.2.

S.No.	Description	Representation	Type
1.	Outline or Object Line	THICK 	Thick Line
2.	Hidden Line	MEDIUM 	Medium Line
3.	Centre Line or Locus Line	THIN 	Thin Line
4.	Construction, Projection & Section Lines	THIN 	Thin Line
5.	Dimension and Extension Lines	THIN 100 	Thin Line
6.	Short Break Line		Thin Line
7.	Long Break Line	THIN 10 TO 25 	Thin Line
8.	Cutting Plane Line	THICK 10 TO 25 	Thin Line
9.	Transmission, Telegram, Telephone and Chain Lines	THIN 10 TO 25 	Thin Line

2.12. PROJECTION LINES

Lines which project or transfer locations from one view to another, for constructing a drawing are called Projection Lines.

These lines are continuous thin and faint lines.

2.13. CONSTRUCTION LINES

Lines which construct an object are called Construction Lines.

These lines do not appear in finished drawing. These are thin lines.

2.14. SECTION LINES

Lines uniformly spaced, generally at an angle of 45° to the horizontal, showing a part in section are called Section Lines.

These lines extend edge to edge of the surface in which they are drawn. Section lines are thin lines.

2.15. USE OF LINES

Typical use of various types of lines, as explained, is shown in Fig. 2.1.

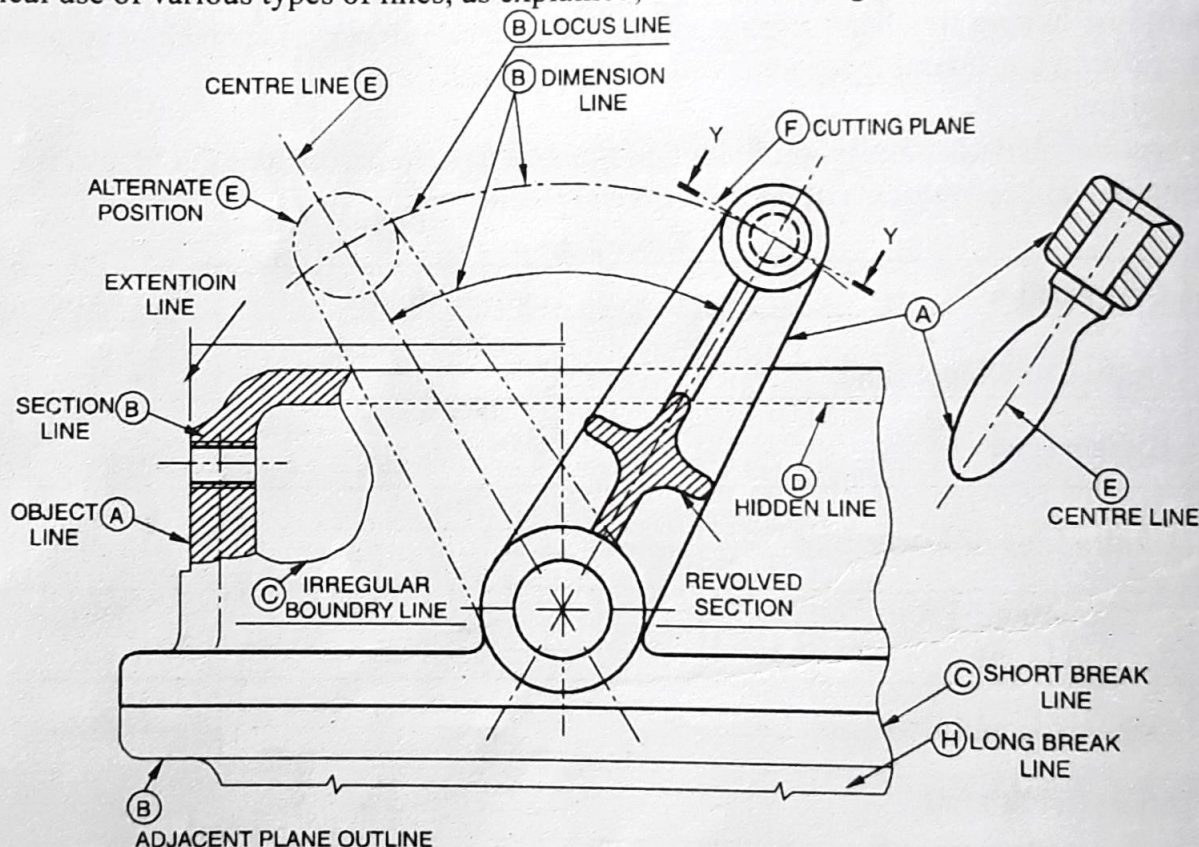


Fig. 2.1. Example for the use of various type of lines.

2.16. LETTERING

Lettering is very important in an engineering drawing to give informations about size, surface finish, etc. A good type of lettering improves the quality of the drawing giving it a good appearance. Freehand lettering should be done on the drawing wherever possible because it takes less time. A good practice of freehand lettering must be achieved. Lettering, not "printing"

(b) Lettering 'B' (refer to table 2.4 and Fig. 2.6)

Table 2.4. Lettering B $\left(d = \frac{h}{10}\right)$.

Characteristic		Ratio	Dimensions (mm)						
Lettering height									
Height of capitals	h	$\left(\frac{10}{10}\right)h$	2.5	3.5	5	7	10	14	20
Height of lower-case letters	c	$\left(\frac{7}{10}\right)h$	—	2.5	3.5	5	7	10	14
Spacing between characters	a	$\left(\frac{2}{10}\right)h$	0.5	0.7	1	1.4	2	2.8	4
Minimum spacing of base lines	b	$\left(\frac{14}{10}\right)h$	3.5	5	7	10	14	20	28
Minimum spacing between words	e	$\left(\frac{6}{10}\right)h$	1.5	2.1	3	4.2	6	8.4	12
Thickness of lines	d	$\left(\frac{1}{10}\right)h$	0.25	0.35	0.5	0.7	1	1.4	2

In lettering 'A' type, the height of the capital letter is divided into 14 parts while in lettering 'B' type it is divided into 10 parts. The height of the letters and numerals for engineering drawing can be selected from 2.5, 3.5, 5, 7, 14 and 20 mm according to the size of drawing. The ratio of height to width varies but in case of most of the letters it is 6 : 5.

Lettering is generally done in capital letters. Different sizes of letters are used for different purposes.

The main titles are generally written in 6 mm to 8 mm size, sub-titles in 3 mm to 6 mm size, while notes, dimension figures etc. in 3 mm to 5 mm size.

The drawing number in the title block is written in numerals of 10 mm to 12 mm size.

Fig. 2.2 shows single-stroke vertical capital letters and figures with approximate proportions.

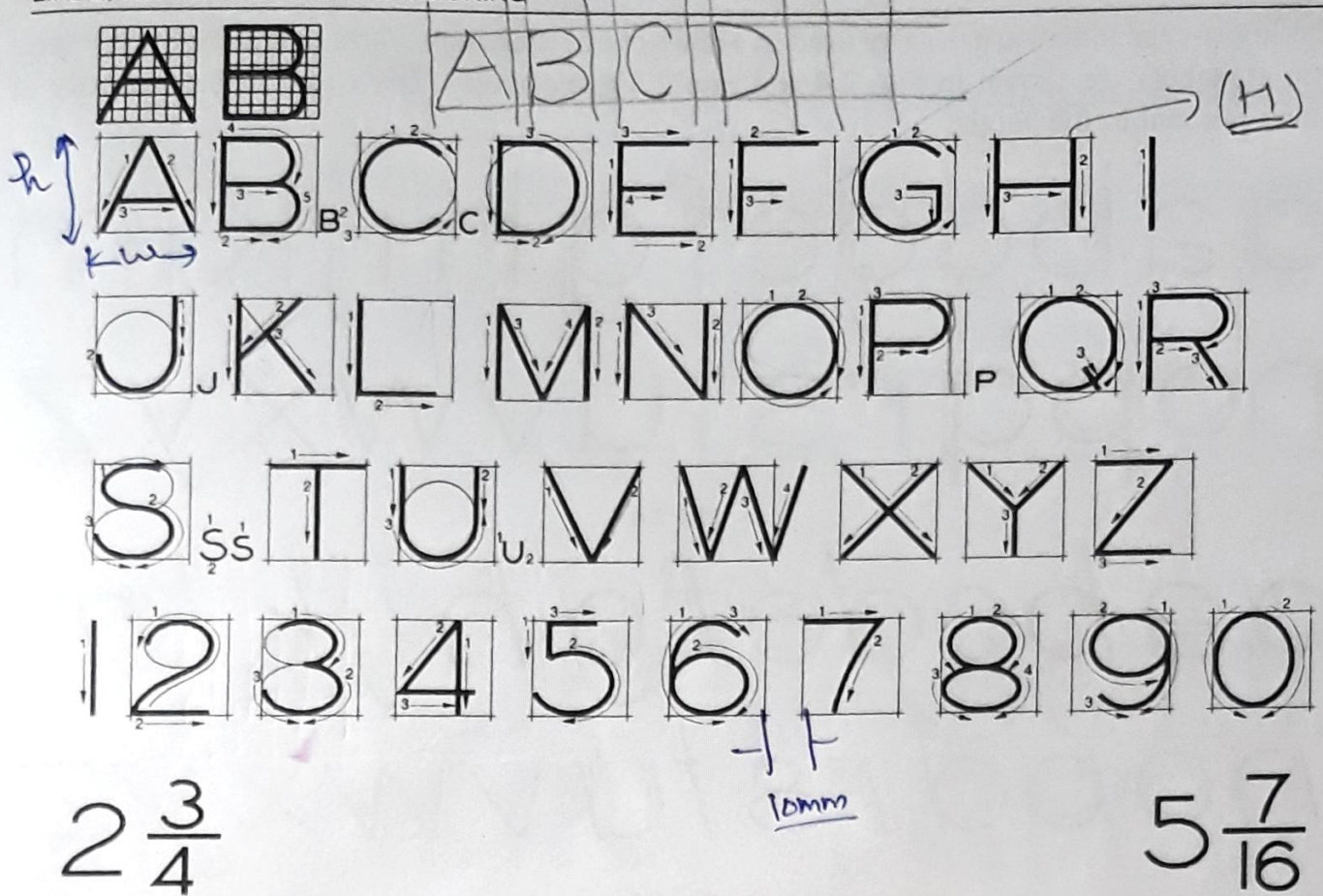


Fig. 2.2.

Single-stroke inclined capital letters and figures are shown in Fig. 2.3.

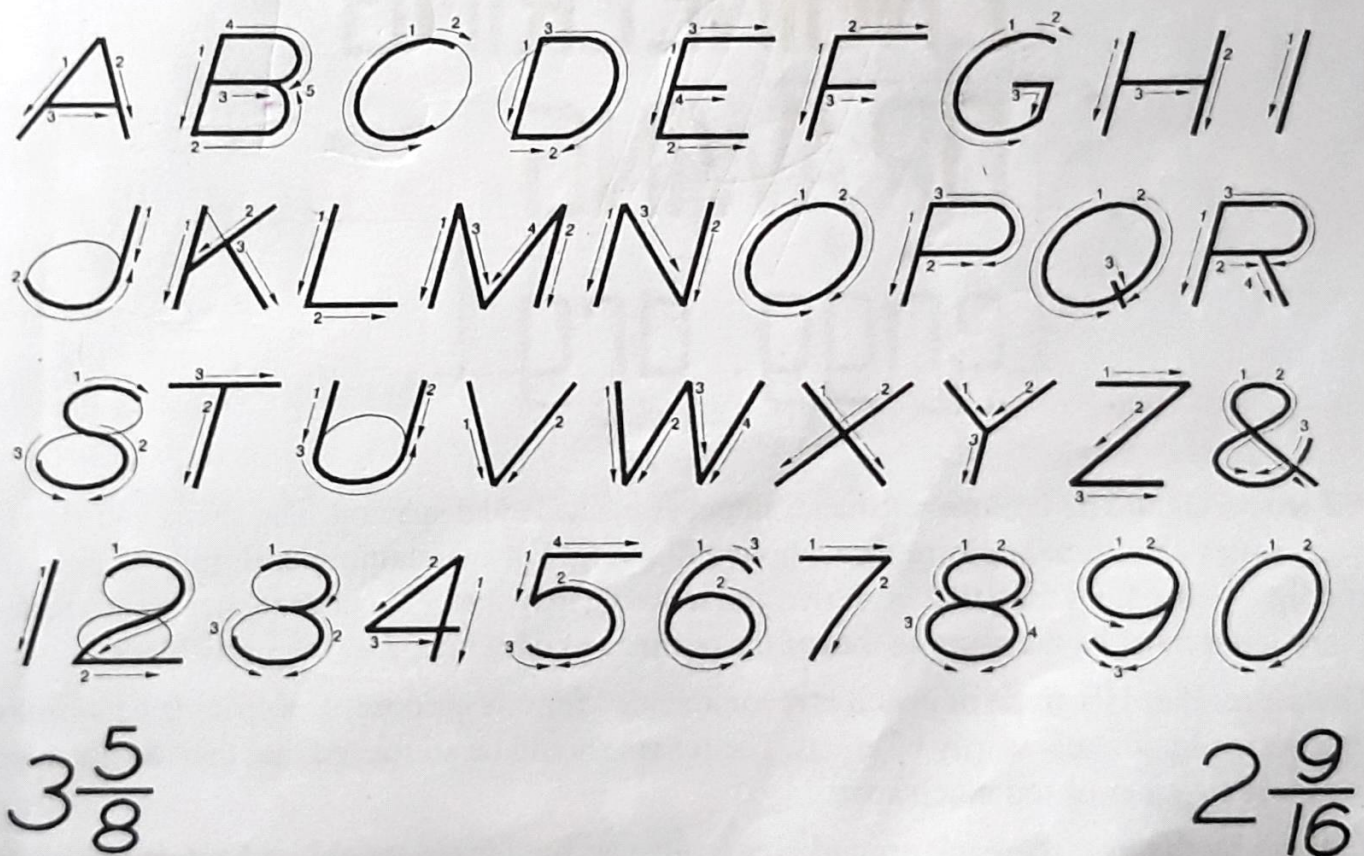


Fig. 2.3.