ORTHOGRAHIC PROJECTION

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ORTHOGRAHIC PROJECTION

Orthographic or Orthogonal Projection or sometimes called Working Drawing is a system of drawings obtained in which the object is viewed at right angle and projected on to a perpendicular plane. (In Greek : "Orthos" = right and "Graphic" = I write).

FORMS OF ORTHOGRAPHIC PROJECTION.

There are two forms of Orthographic Projection

a) First Angle Projection

- A traditional British form in which the reference planes are placed behind the object.

- The object is viewed as though one is seeing a film show where the image is directly shown on the screen behind the object or it may be termed approximately as ‘Viewing the Shadow’ however all internal features are included in this shadow.

b) Third Angle Projection

- An American form (and adopted also by various Continental countries) in which the reference planes are placed in front of the object.

- The object is viewed as though one is window shopping, where the glass plane lies in between the object and the viewer. The image of course must be traced into the glass. This is much practical approach as when tracing of a view is needed, the tracing paper is placed on top of the object rather than behind.
The main difference between two methods of projection lies in the position of the views relative to each other; i.e. the actual drawing will not differ only their position.

In order to avoid any confusion, the method of projection used should always be indicated on the finish drawing, either by words or by the appropriate symbol. The projection symbols shown above are as stated in the British Standard (BS) 308.

The viewing side is always drawn with smaller end; and looking from the left so that the end view appears to the right in the first angle projection, and to the left in the third angle projection.

The size of the symbols can be depended upon that of the drawing sheet. A good size for general use is usually:

- 5mm and 10mm for the diameters of the circles, and
- 10mm for the length along the centre line of the other view.

Possible Projections of an Object

To every object there are actually six different views but it tends to be redundant to have all the six views in order to comprehend the object.
At least two views are necessary to fully represent the component. Usually, however, three views are shown to fully describe or to clarify the internal and external details. They are:

1. **Front View/Elevation.** This is the view obtained by looking at the object from the front.

2. **End or Side View/Elevation.** This is the view obtained by looking at the object from the side.

3. **Plan or Top View/Elevation.** This is the view obtained by looking down at the object from above.

**REFERENCE PLANES - 2 Principal Planes of Projection.**

Reference Planes are derived from two Principal Planes of Projection, namely, the:

- **Vertical Plane**
- **Horizontal Plane.**

These intersect at right angle.

In practice, the **Vertical Plane** remains stationary while the **Horizontal Plane** rotates in clockwise direction only.
First Angle Projection

In First Angle Projection, the Horizontal Plane rotates clockwise and downwards. Hence, the Horizontal Plane is always below the Vertical Plane.

Third Angle Projection

In Third Angle Projection, the Horizontal Plane rotates clockwise again, but has to be upwards. Hence, the Horizontal Plane is always above the Vertical Plane.
VP : Vertical Plane (Front View, Elevation), usually selected on the “best view” of the object.
HP : Horizontal Plane (Plan View)
SVP : Side Vertical Plane (Side View)

REFERENCE PLANES - 3 Principal Planes of Projection.
ORTHOGRAPHIC PROJECTION mod-7-
ON THE DRAWING PAPER

The method of projection for either of the angle of projection are done as follows –

Steps : 

1. The ground line XY is first drawn.

2. Either the Front Elevation or Plan is first drawn and projected perpendicularly across XY to complete both the Front Elevation and the Plan.

3. Lines are projected from the Front Elevation and Plan, perpendicularly to the edge line (PP).

4. (a) Line intersection of the ground line (XY) and edge line (PP') gives a pivot point (0). With 0 as centre the lines from the Plan may be rebated to the XY line again and projected to intersect lines from Front Elevation.

   (b) An alternative method to rebating is to use 45° set square. This is a faster method and is done on the basis of isosceles triangle as shown.

![Diagram showing steps of projection]

Draughtsmanship

A network of unintelligible lines will be drawn unless emphases are placed on the following items so as to obtain quality work in draughting:

a. layout,
b. linework,
c. dimensioning,
d. centre lines for circles and arcs,
hidden lines techniques.

Layout

Layout refers to the arrangements of drawings. These arrangements may be divided into:

i. location of the individual answer in relation to the reference planes, and

ii. location of the answers as a whole in relation to the drawing paper.

In the first case, it concerns with the distances from the reference planes and on the drawing paper, it refers to the distances from the ground line (XY) and the edge line (PP'). Unless specified, any suitable distance may be taken, e.g. 25mm. Thus:

When specified, object is
- 25mm above H.P.
- 30mm in front of V. P.
- 50mm away from S.V.P.

When not specified, any suitable measurement may be used.