

Fundamentals of Drafting - Third Angle Orthographic Projection

Objectives:

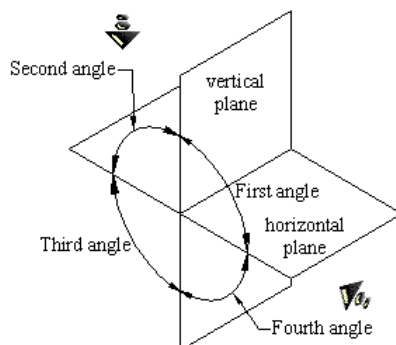


1. To explain with the aid of drawings the principle of Third Angle Orthographic Projection in terms of:
 - (a) positioning of the viewing object
 - (b) principal planes and auxiliary vertical plane
2. To identify and draw the views of an object projected on to the principal planes and the auxiliary vertical plane in Third Angle Orthographic Projection.
3. To recognise the symbol for Third Angle Orthographic Projection.
4. To apply the principle of Third Angle Orthographic Projection to engineering drawing problems.
5. To differentiate between First Angle and Third Angle Orthographic Projection.

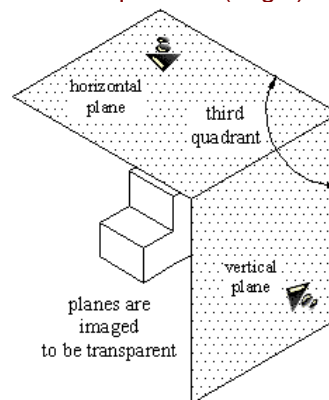
The principle

The object is positioned in the third quadrant between the principal planes. Similar to First Angle Orthographic Projection, a system of parallel projectors from the object boundaries is projected on to the principal planes in Third Angle Orthographic Projection.

Principal planes forming
4 quadrants (angles)

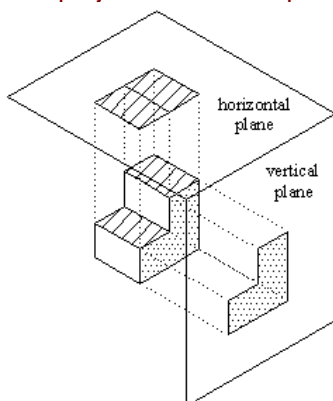


Object in the
third quadrant (angle)

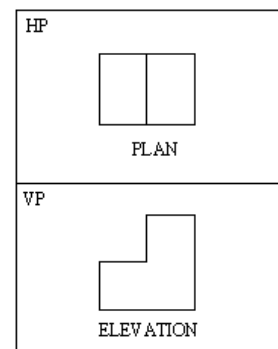


Since the principal planes come between the observer and the object, **it is imaged that the planes are to be transparent**, and the object is viewed through the planes (i.e. the views are projected back to the principal planes)

Views projected on to the planes



Opening out the horizontal plane



The name of the view projected on to the principal planes are:

- (i) on the vertical plane: **ELEVATION**
 (also known as **FRONT VIEW**, **FRONT ELEVATION**)
- (ii) on the horizontal plane: **PLAN**
 (also known as **PLAN VIEW**)

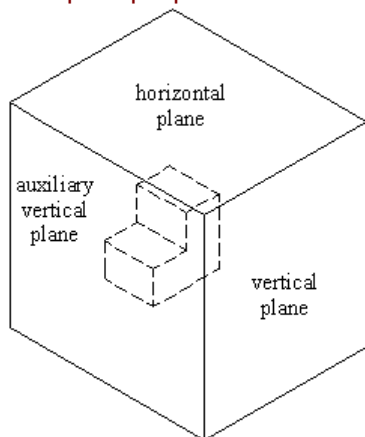
Auxiliary vertical plane

The views projected on to the principal planes (VP and HP) in Third Angle Orthographic Projection are not always sufficient to describe an object clearly and completely. Therefore a third view projected on to an auxiliary vertical plane (AVP) is drawn.

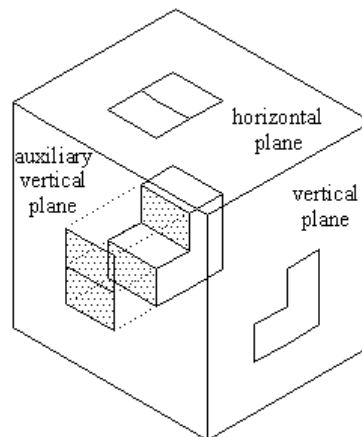
This plane is at right angle to both the vertical and horizontal planes. It may be placed in either side of the vertical plane. The choice of the AVP depends on which face of the object is the more important.

Similar to the principal planes, a view of the object is projected by drawing parallel lines from the object to the AVP.

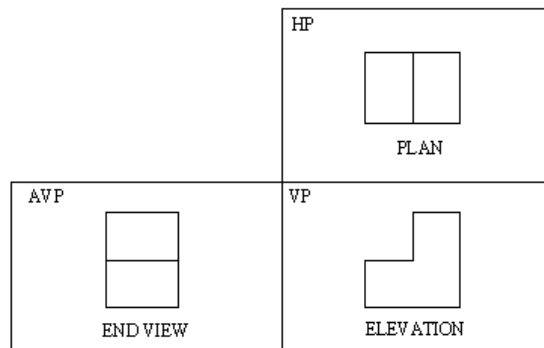
Third Angle Projection of a solid with principal planes and AVP



Third Angle Projection of a solid on to the AVP



When opening out the horizontal plane and the auxiliary vertical plane, the three views appear in the positions as shown below.



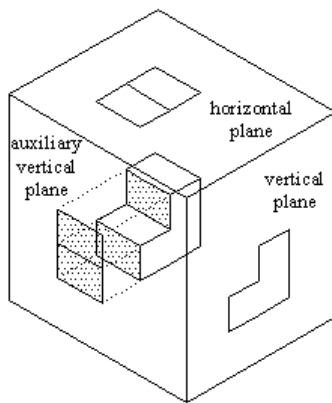
The names of the views projected on to the three planes are:

- (i) on the vertical plane **ELEVATION**
 (also known as **FRONT VIEW, FRONT ELEVATION**)
- (ii) on the horizontal plane: **PLAN**
 (also known as **PLAN VIEW**)
- (iii) on the auxiliary vertical plane: **END VIEW**
 (also known as **END ELEVATION, SIDE VIEW, SIDE ELEVATION**)

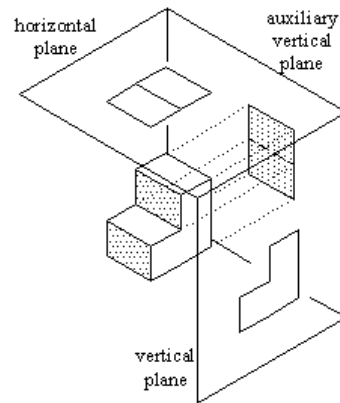
Principal views

Third Angle Orthographic Projection can be used to describe even complex objects fully and clearly. A number of views are projected on to the principal planes and an auxiliary vertical plane. In some cases, it may be necessary to draw views on both the AVPs.

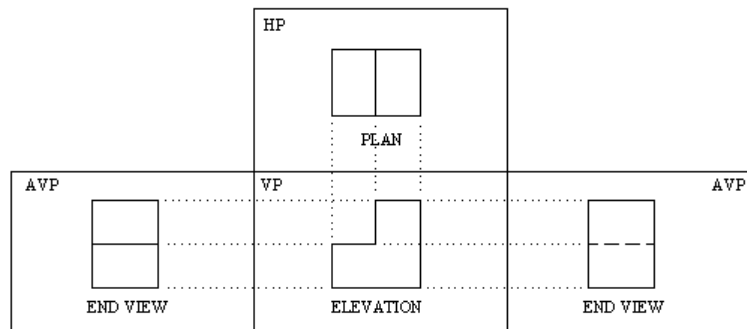
Third angle projection of a solid on to the left AVP



Third angle projection of a solid on to the right AVP



When the two AVPs are opened out with the horizontal plane, the four views appear in the positions as shown below.



When drawing these views, it should be noted that:

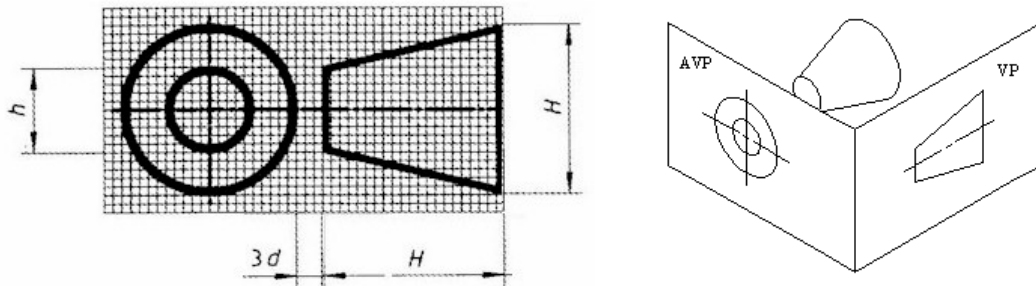
- (i) Allow enough space for the required views before beginning.
- (ii) Use a minimum number of views to describe the object completely.
- (iii) Heights in the elevation and end views are equal and drawn at the same level.
- (iv) Plan view is obtained by viewing the elevation from the top and projecting upward, keeping the corresponding points on the same vertical line.
- (v) Depth in the plan is equal to the width in end views.
- (vi) Each view shows what would be seen by looking on the **near side** of an adjacent view (i.e. on the same side of the viewing direction).
 e.g. When viewing the elevation from the left hand side, then the end view is drawn on the left hand side of the elevation

- (vii) It is the principle of third angle orthographic projection to position the views in a fixed pattern. Do not draw the views in other ways.
- (viii) Draw in short dashed lines to represent those hidden outlines and edges.
- (ix) Build up all the views together to avoid making measurement on two or more views separately.

Third angle projection symbol

The system of projection used on a drawing should be indicated by an appropriate symbol.

Third angle projection symbol (BS EN ISO 5456-2)

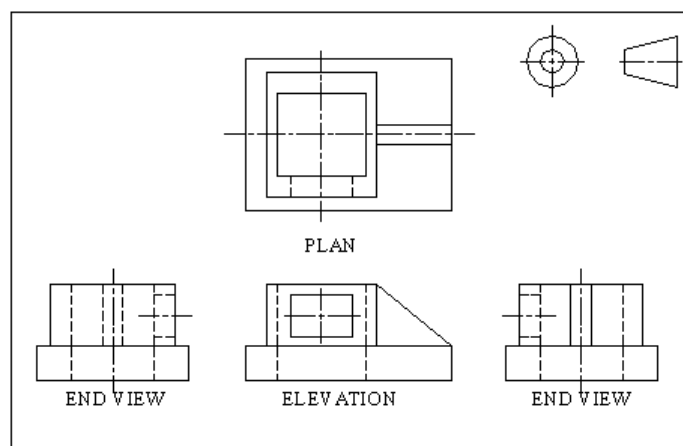
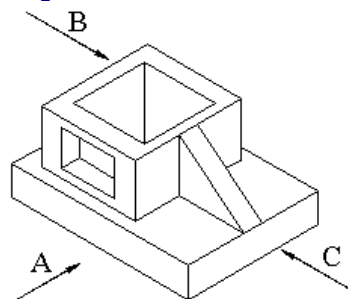


The symbol is derived from projecting a circular taper on to the VP and AVP, so that it shows a front view and a left end view of the circular taper.



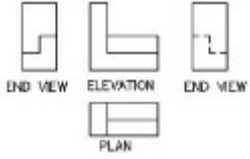
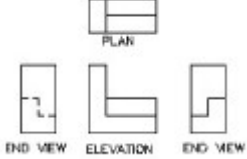

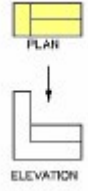
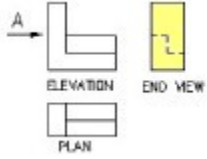
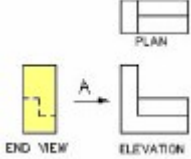
Worked example

Draw in Third Angle Orthographic Projection the following views of the detail shown below.

- (a) Elevation in the direction of arrow A
- (b) Plan view projected from view (a)
- (c) End view in the direction of arrow B
- (d) End view in the direction of arrow C



Comparison of 1st and 3rd Angle Projection

The object		
Projection	First angle projection	Third angle projection
Projection symbol		
Position of principal views		
Plan view looking from top		
End view looking from arrow A		
Sectional views	<p>Sectional views are drawn in the same principle of orthographic projection, e.g. Sectional elevation is drawn in the position of elevation. Sectional plan is drawn in the position of plan view. Sectional end view is drawn in the same position of end view.</p>	

Drawing practice

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Question No. 1 (Referring to Figure 5.17)

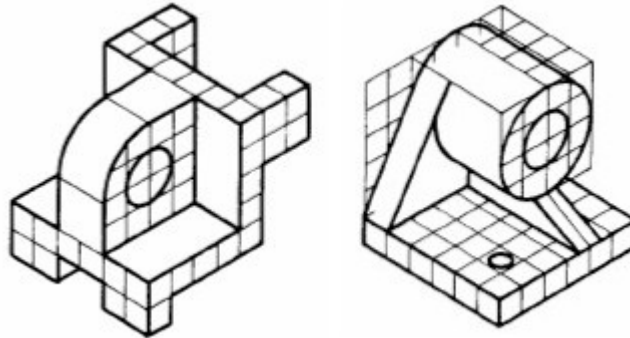
Figure 5.17 shows components A, B, C, D, E, and F in pictorial projection. The direction of viewing indicated by the arrows corresponds to the front views.

Select from the given orthographic views 1 to 18 the relevant front views, end views and plan views, and insert your answers in a table like the one provided.

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Question No. 3 (Referring to Figure 5.19)

Draw in Third Angle Projection the components shown below. Each construction square represents a 10 mm measurement.



Follow your tutor's instruction to draw the three views (elevation, plan and end view) as required.

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Question No. 5 (Referring to Figure 5.21)

Complete the third view for each object shown in third angle projection in Figure 5.21. Squared or tracing paper may be used.