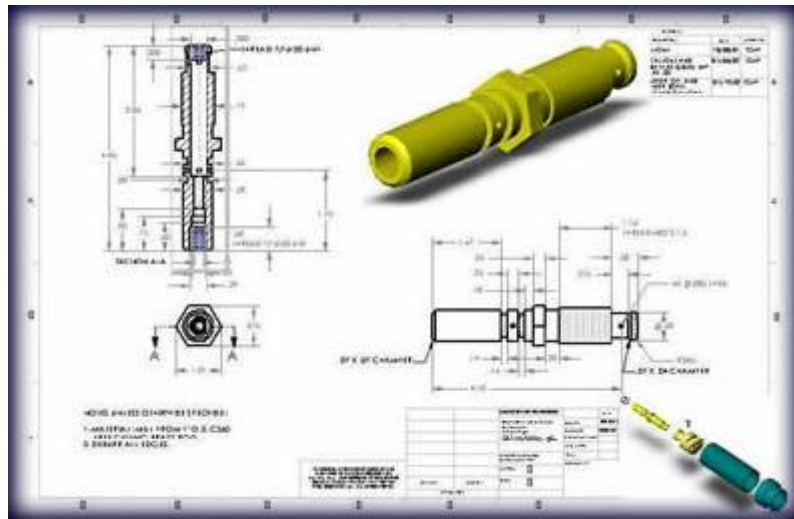


# Guide To British Standards



Higher Graphic Communication

## CONTENTS

	page
TITLE BLOCK	2
DRAWING SCALES	2
LINE TYPES	3
ORTHOGRAPHIC PROJECTION	4
SECTIONAL VIEWS	4
SCREW THREADS & COMPONENTS	7
INTERUPTED VIEWS & PARTIAL VIEWS	9
DIMENSIONING	10
TOLERANCES	13

## Title Blocks


Title Blocks should be at the bottom of any drawing sheet and extend to the lower right-hand corner of the page.

REVISIONS		DATE	APPD
NO	DESCRIPTION		
1	M12 WAS 1/2 WHT.	14-10-78	AWB

4			
3			
2			
1	A2323 VALVE BODY		1
0	DRG OF DESCRIPTION		HTS
	PART NO		

UNLESS OTHERWISE STATED ALL DIMENSIONS IN MILLIMETRES (TOLERANCES ANGULAR)		DRN 1:1:78 JKL CKD 2:1:78 WJM APPD 3:1:78 AWD ISSUED 4:2:78 PFP	(NAME OF FIRM) (TITLE OF DWG.) SIZE A4 SCALE 1:2
DRAFTING STANDARD AS 1100	MATERIAL CAST STEEL FINISH AS MACHINED		DRG NO A24481 SHEET 1 OF 1

Information that should be contained in a **title block** is the following:-

- Name
- Projection Symbol
- Title
- Date
- Original Scale
- Drawing Number
- Dimensional Tolerance

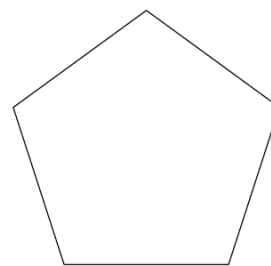
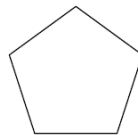
## Drawing Scales

Every technical drawing needs to be drawn in an accurate proportion, also known as **scale**, which is given in ratio format. It is crucial that you are aware of the following scales within the Higher course.

**Full Size** - 1:1

**Reduction Scales** - 1:2, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200, 1:500 & 1:1000

**Enlargement Scales** - 2:1, 5:1, 10:1, 20:1 & 50:1




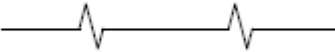
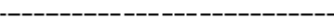


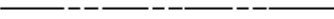


**Reduction (1:2)**

**Full Size (1:1)**

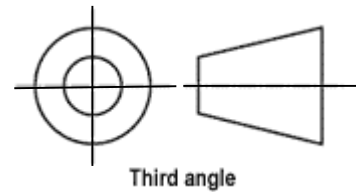
**Enlargement (2:1)**

## Line Types

Line	Description	Application
	Continuous thick	Visible outlines and edges.
	Continuous thin	Dimensions, projection and leader lines, hatching, outlines of revolved sections, short centre lines, imaginary intersections.
	Continuous thin irregular	Limits of partial or interrupted views and sections if the limit is not an axis.
	Continuous thin with straight zigzags	Limits of partial or interrupted views and sections if the limit is not an axis.
	Dashed thin	Hidden outlines and edges.
	Chain thin	Centre lines, lines of symmetry, trajectories, loci, pitch lines and pitch circles.
	Chain thin thick at ends and changes directions	Cutting planes.
	Double dashed chain thin	Outlines and edges of adjacent parts, outlines and edges of alternative and extreme positions of movable parts, initial outlines prior to forming, bend lines on developed blanks or patterns

## Orthographic Projection

Orthographic drawings are usually created using a projection method, such as **FIRST ANGLE** and **THIRD ANGLE** projection. Of the two methods the most widely used is **Third angle** orthographic projection.



The symbol for **Third angle** is shown above.

## Sectional Views

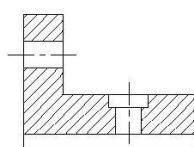
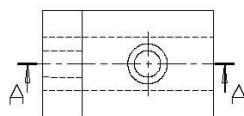
There are many types of sectional views that are used to aid the understanding of production drawings. The following is a list of the various types of sectional views for showing detail in more complex engineered objects.

The various types of sectional views are:-

- Full section
- Half section
- Stepped section
- Part section
- Revolved section
- Removed section

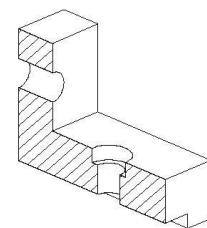
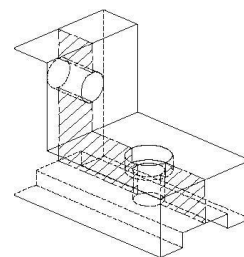
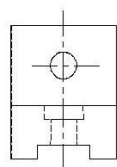
### FULL SECTION

This is the normal way of cutting a section. The cutting plane lies on a single plane and passes through the entire object. Half of the object is removed to show the internal detail.



SECTION A-A

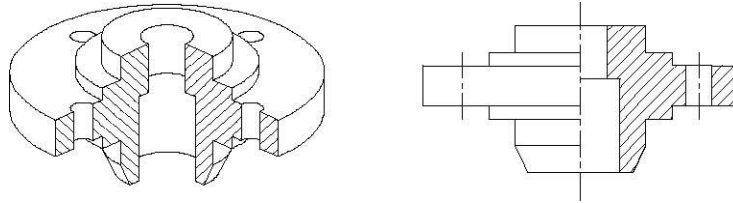
**Full Section**



**Isometric View of Section A-A**

## **HALF SECTION**

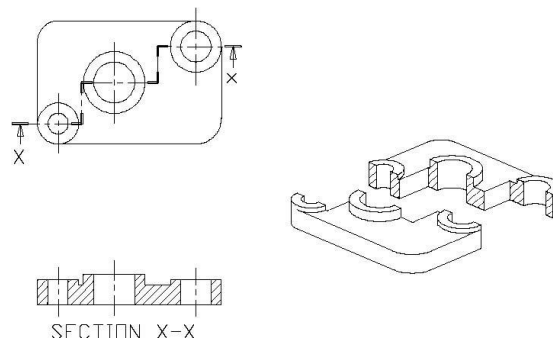
This technique is used to show the exterior and interior of a symmetrical object in a single projection view. The cutting plane cuts halfway to the axis or centre of the object. A quarter of the object is imagined to be removed. The resulting drawing view is a half outside and half section view.



***Example of a Half Section***

## **STEPPED SECTION**

If the important internal features of an object are not lying on a single plane, a full section may not be able to show all the details. Stepped section is a technique whereby the cutting plane offsets to pass through various features that would otherwise be missed by a full section. Thick lines should be used at the change of direction of the cutting plane.



***Example of a Stepped Section***

## **PART SECTION**

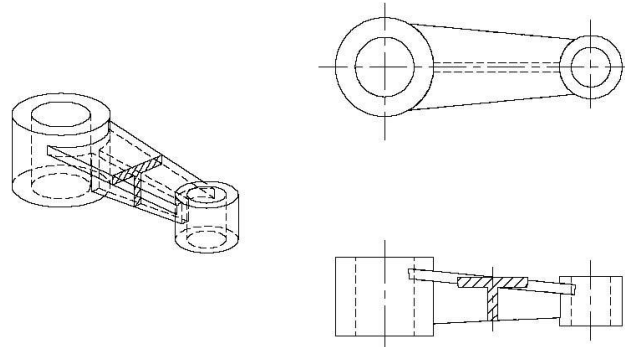
Part section is a technique that is used to expose a small part of the interior of an object by removing a small part of the object. The view is basically an outside view with a small portion removed. The break line is illustrated with irregular thin continuous lines.



***Example of a Part Section***

## **REVOLVED SECTION**

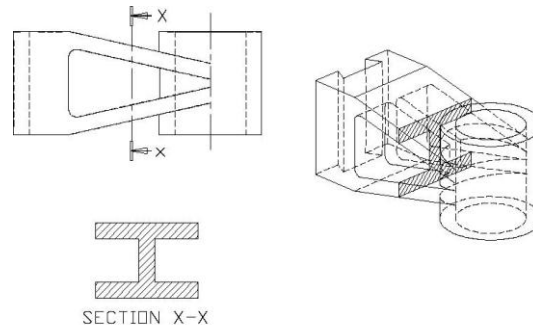
Revolved section shows only the features on the cut plane. It is used to depict the section of an elongated object without the need to show the entire sectional view. Instead of projecting the section onto an adjacent view, the resulting section obtained from the cutting is revolved 90° and is placed on the same view.



***Example of a Revolved Section***

## **REMOVED SECTION**

Removed section is similar to revolved section in that only the cut plane is shown. However, the section is placed elsewhere on the drawing.



***Example of a Removed Section***

## **PARTS NOT SECTIONED**

To improve clarity, standard parts will not be section-lined even though the cutting plane passes them.

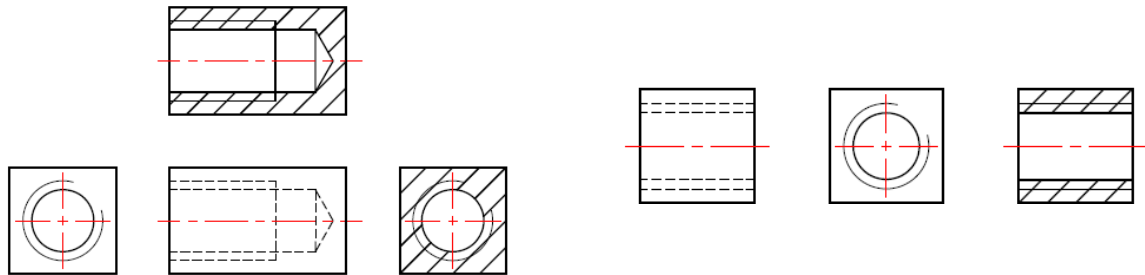
These standard parts are:-

- Solid shafts
- Bolts and Nuts
- Ribs
- Spokes of wheels / Axles of Wheels
- Webs

## Screw Threads & Other Components

With assembled drawings you made be asked to draw a sectional view of an assembled component that might include a fixing such as a screw, bolt etc...

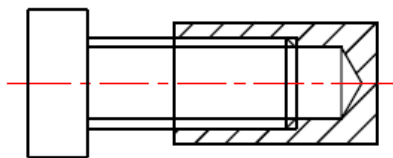
Below are the symbols which represent each possible component:-



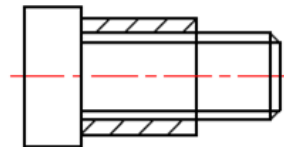
***Internal Thread (Blind Hole)***

***Internal Thread (Through hole)***

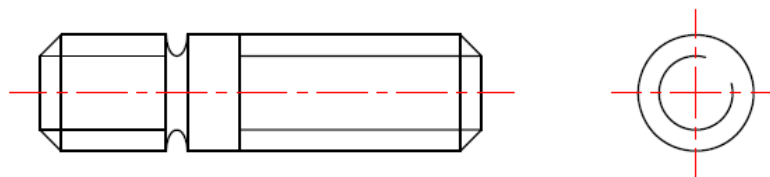
When screws or bolts are inserted the sectioning changes, you only section to the **outside line** not inside as the drawings above show.



***Bolt within Blind Hole***



***Bolt with Through Hole***

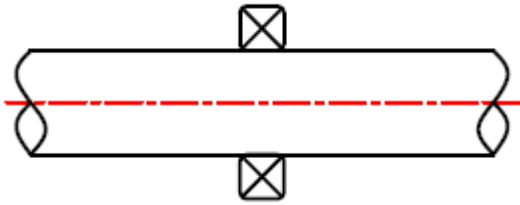


***External Thread (Notice that cut circle on inside)***

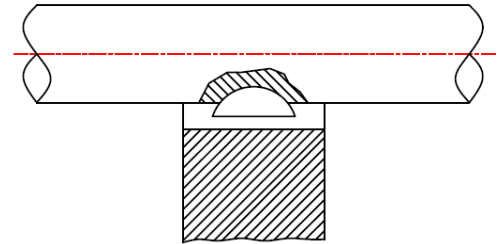


## Other Components

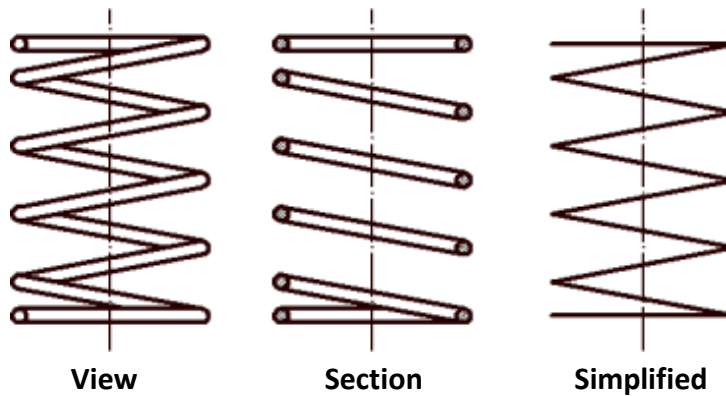
**Roller Bearing**



**Key**



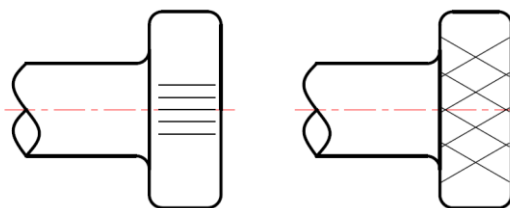
**Springs**



## Knurling

Knurling is the name given to the texture that is sometimes found on metal controls, this process allows the metal to have a specific pattern cut into the bar to give it greater grip control.

The BS standard for this process is represented below:-

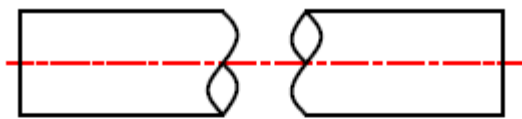


**Straight Knurling**

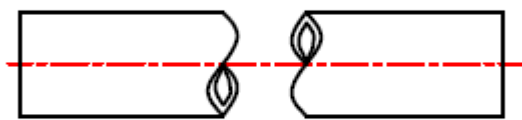
**Diamond Knurling (Drawn at 30°)**

## Interrupted Views & Partial Views

Drawings can be made to fit a sheet or computer screen more easily using **interrupted views**. These views only show portions of a long or large object that are necessary to define it. They are drawn close to each other and break lines are used to define edges of the section that has been removed as shown below:-



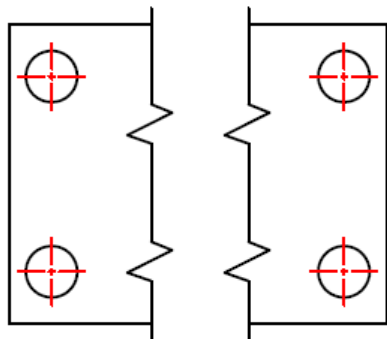
Conventional Break lines for **Solid Shaft**.



Conventional Break lines for **Hollow Shaft**.



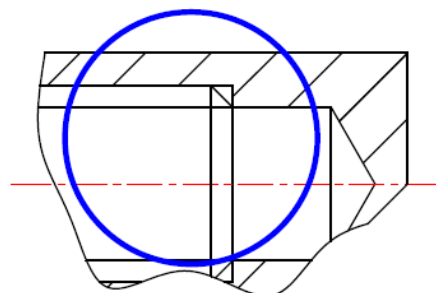
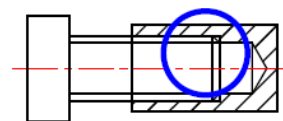
General Break Lines.



Break lines of Object that **doesn't** have an **Axis**

## Partial Views

Sometimes it is not ideal to have a full view enlarged, these are the cases in which a partial view maybe more suitable. This allows you to enlarge a detail and improve clarity.



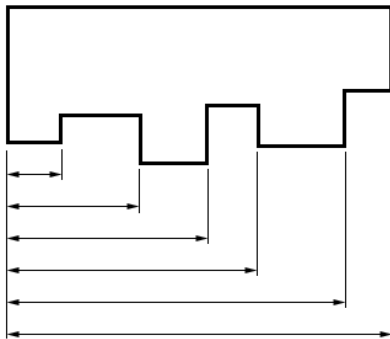
## Dimensioning

Dimensioning is an integral part of Graphic Communication, the method of dimensioning currently used in Higher is the same standard currently used in the UK is set by the British Standards Institution in their document BS 8888.

Dimensioning Rules:-

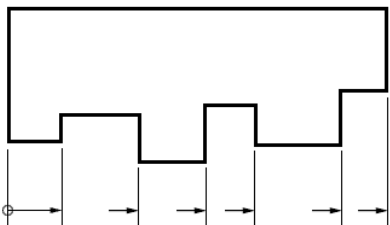
- All measurements should be in **mm** unless stated in the **Title Block**.
- Crossing of projection / leader lines should be avoided if possible.
- There should be no repeated dimensions as not to clutter the drawing.

Below are the various ways in which dimensions may appear on a drawing:-



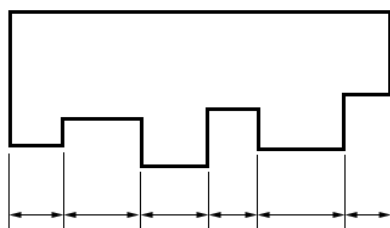
### ***Parallel Dimensioning***

Parallel dimensioning consists of a number of dimensions that originate from a specific edge (Datum Edge).



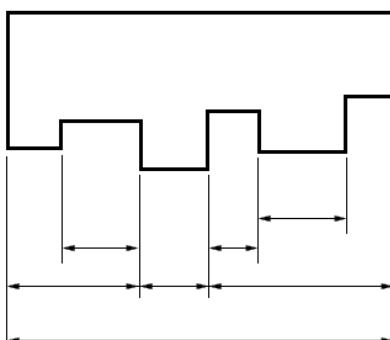
### ***Running Dimensioning***

Running dimensioning is a simplified form of parallel dimensioning that can be used when space is limited.



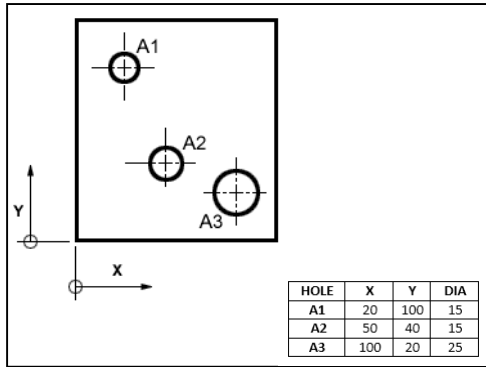
### ***Chain Dimensioning***

Chain dimensioning consists of a chain of dimensions. This method can lead to an accumulation of tolerances that will affect the function of the part.



### ***Combined Dimensioning***

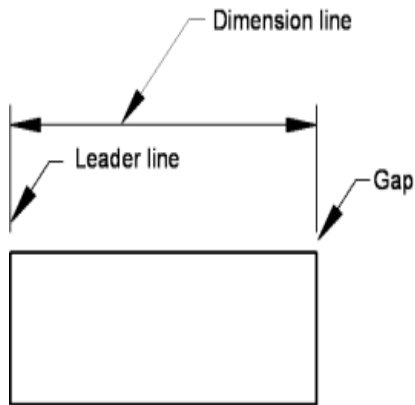
Combined dimensioning is a combination of both parallel and chain dimensioning that can be used when space is limited or when the drawing is very complex.



### Dimensioning by Coordinates

Dimensioning by coordinates uses **running** dimensioning in two directions at right angles, the common origin can be from any datum point stated. This makes it clearer to read and less cluttered on the drawing.

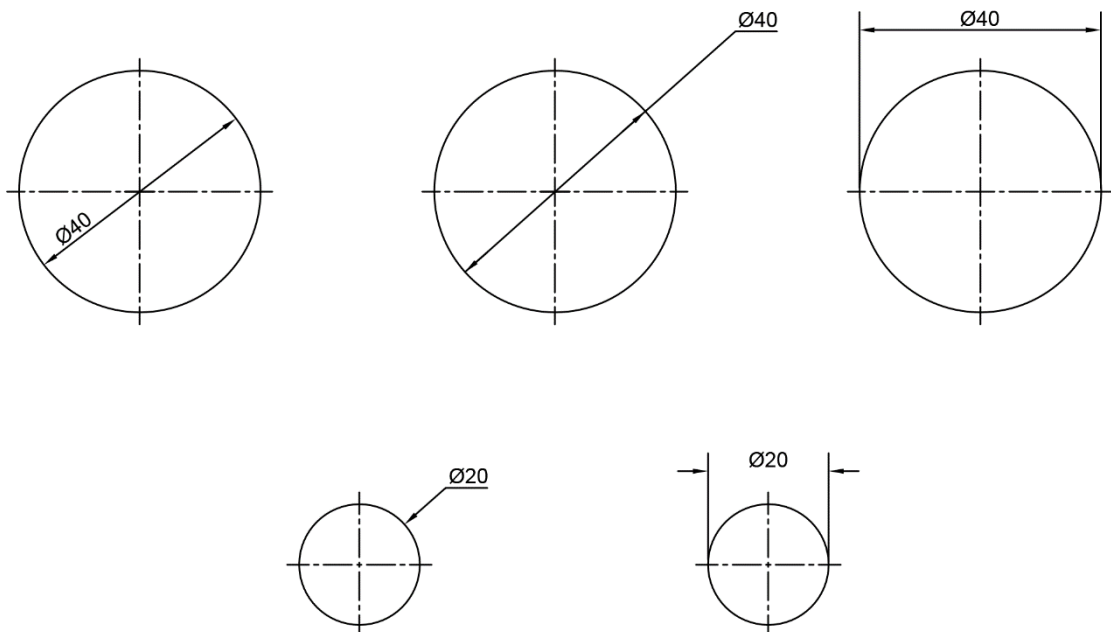
### Dimension Key Points



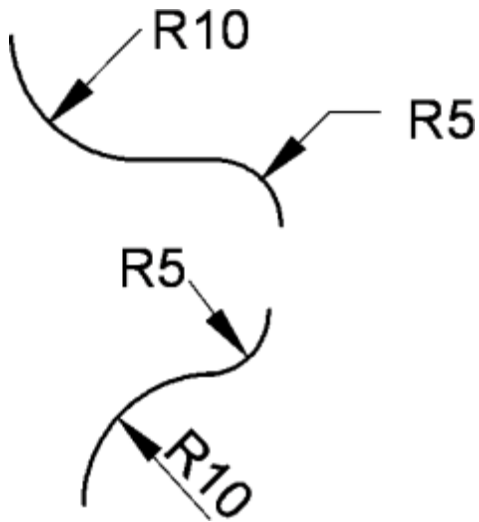
### Leader Line

Narrow lines which lead from points on a view to the arrowhead dimension lines. A small gap should be left between the view and the leader line.

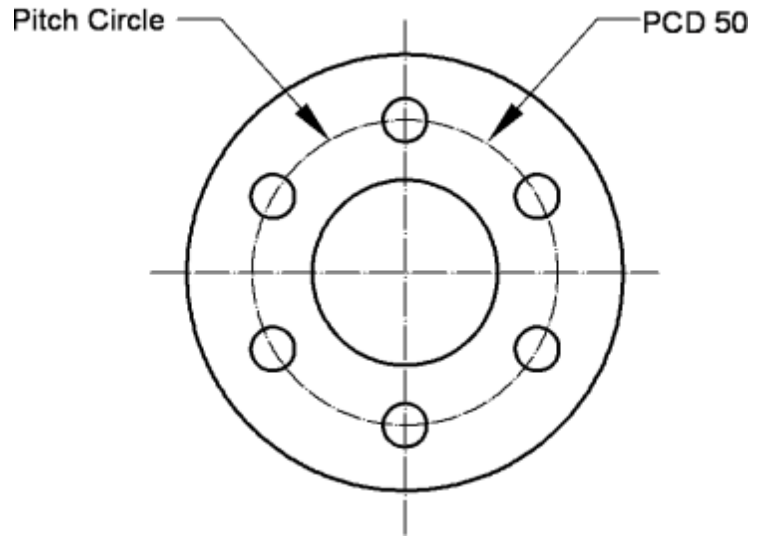
### Diameters



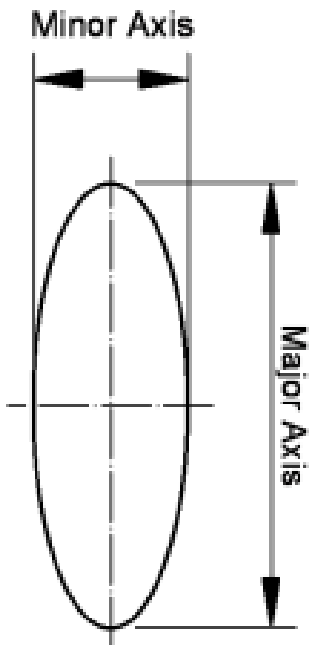
Radial



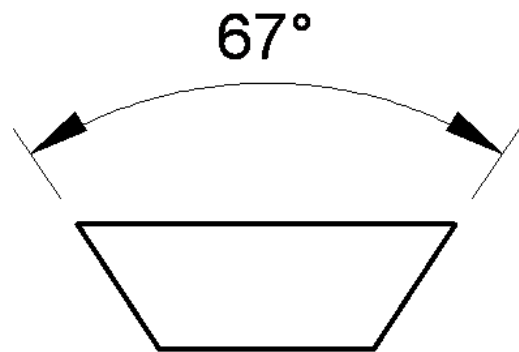
Pitch Circle Diameter



Major & Minor Axis



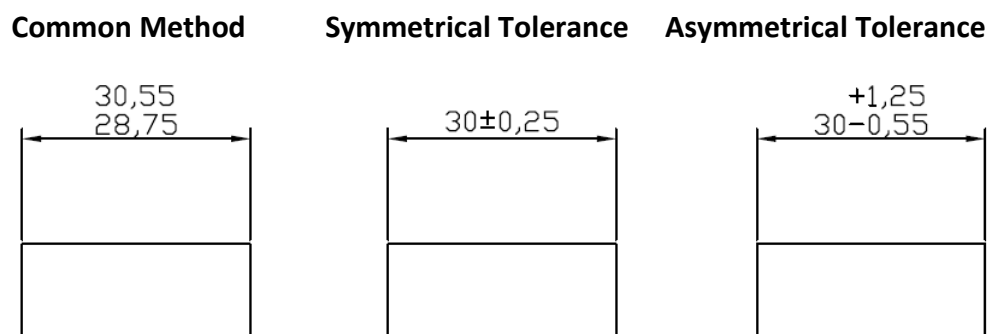
Angular



## Tolerances

When products are manufactured in industry due to manufacturing processes it is very difficult to achieve absolute accuracy in the size of the finished item. This creates problems when manufactured items have to **fit accurately with other parts** and also possibly the **function of the product**.

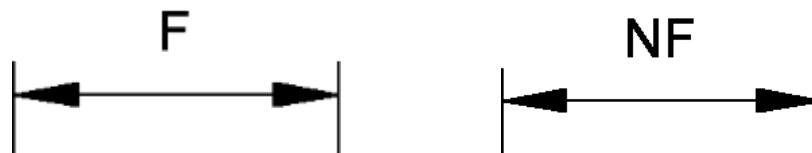
When individual component parts are manufactured in batches of thousands or more, it is **not economic** to accept parts that do not fit and so cannot be assembled. To overcome this problem, items are manufactured with an acceptable margin of dimensional error called **Tolerance**.



**Common Method** Shows the upper limit of size placed above the lower limit.

**Symmetrical** Shows the additional size for both upper and lower which are the same.

**Asymmetrical** Shows the additional size for both upper and lower limits which might be different sizes.



**Functional** A dimension that is **essential** to the function of a component or space and should be kept to the required dimension.

**Non Functional** A dimension that is **not essential** to the function of a component or space but may be altered without causing issue with component.