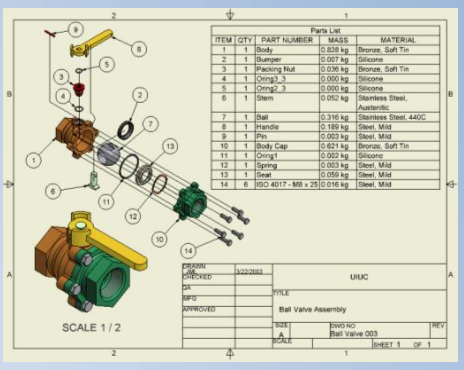
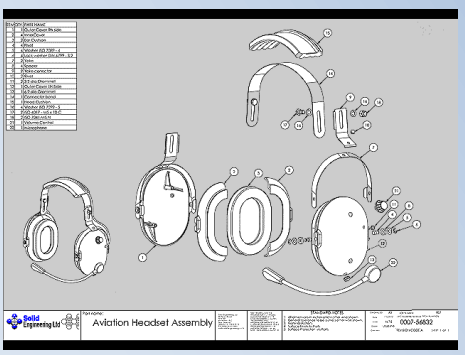
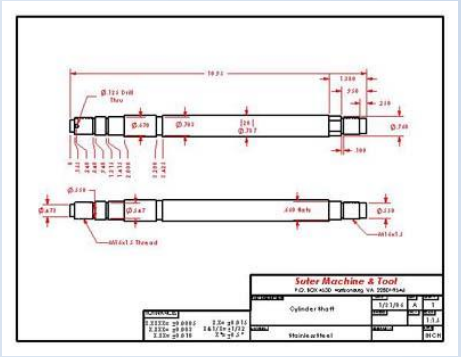
# MEM09005A

## 2013

Perform basic engineering drafting.



# Contents:

# Topic 1 – Assembly Drawings:

## Required Skills:

- Produce an engineering assembly drawing.
- Complete a Material, Parts or Cutting List to match the Assembly Drawing.
- Place overall dimensions and identify the different parts by cross-referencing.

## Required Knowledge:

- The different types of Assembly Drawings.
- An understanding of Orthogonal Projection and the placement of associated views.

## General:

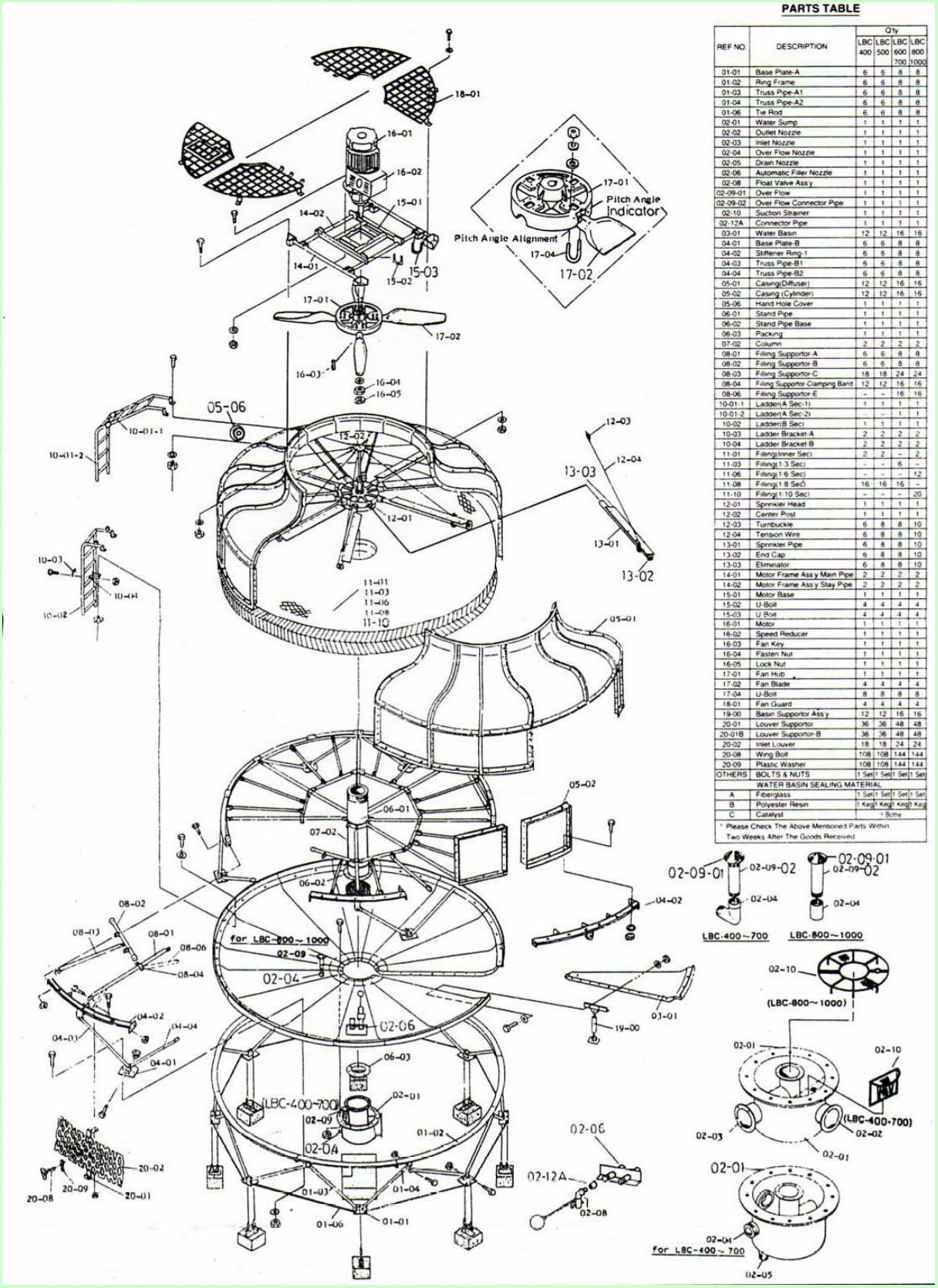
There are a number of drawing types associated with the mechanical engineering design process and include General Arrangement Drawings, Arrangement Drawings, Assembly Drawings, Detail Drawings and Fabrication Drawings.

### General Arrangement Drawings

This drawing shows overall views of the equipment and provides all of the information to produce transportation, layout and installation drawings. The drawing includes a list of the arrangement drawings. The drawing includes overall dimensions, installation details, overall weight/mass, weights of sub systems, and service supply details.

The general arrangement drawing includes references to the design documents. The drawing often also identifies relevant internal and external contract numbers. An example of a typical general arrangement drawing is a roller conveyor system comprising a number of conveyors with independent drives and guards.

The drawn separate assemblies and parts will be identified with leader lines to balloons or a numbering system which include the arrangement reference number linking to the list of arrangement drawings.




| REF NO. | DESCRIPTION | Q'ty LBC 400 | LBC 500 | LBC 600 700 | LBC 800 1000 |
|---|---|---|---|---|---|
| 01-01 | Base Plate-A | 6 | 6 | 8 | 8 |
| 01-02 | Ring Frame | 6 | 6 | 8 | 8 |
| 01-03 | Truss Pipe-A1 | 6 | 6 | 8 | 8 |
| 01-04 | Truss Pipe-A2 | 6 | 6 | 8 | 8 |
| 01-06 | Tie Rod | 6 | 6 | 8 | 8 |
| 02-01 | Water Sump | 1 | 1 | 1 | 1 |
| 02-02 | Outlet Nozzle | 1 | 1 | 1 | 1 |
| 02-03 | Inlet Nozzle | 1 | 1 | 1 | 1 |
| 02-04 | Over Flow Nozzle | 1 | 1 | 1 | 1 |
| 02-05 | Drain Nozzle | 1 | 1 | 1 | 1 |
| 02-06 | Automatic Filler Nozzle | 1 | 1 | 1 | 1 |
| 02-08 | Float Valve Ass'y | 1 | 1 | 1 | 1 |
| 02-09-01 | Over Flow | 1 | 1 | 1 | 1 |
| 02-09-02 | Over Flow Connector Pipe | 1 | 1 | 1 | 1 |
| 02-10 | Suction Strainer | 1 | 1 | 1 | 1 |
| 02-12A | Connector Pipe | 1 | 1 | 1 | 1 |
| 03-01 | Water Basin | 12 | 12 | 16 | 16 |
| 04-01 | Base Plate-B | 6 | 6 | 8 | 8 |
| 04-02 | Stiffener Ring-1 | 6 | 6 | 8 | 8 |
| 04-03 | Truss Pipe-B1 | 6 | 6 | 8 | 8 |
| 04-04 | Truss Pipe-B2 | 6 | 6 | 8 | 8 |
| 05-01 | Casing(Diffuser) | 12 | 12 | 16 | 16 |
| 05-02 | Casing (Cylinder) | 12 | 12 | 16 | 16 |
| 05-06 | Hand Hole Cover | 1 | 1 | 1 | 1 |
| 06-01 | Stand Pipe | 1 | 1 | 1 | 1 |
| 06-02 | Stand Pipe Base | 1 | 1 | 1 | 1 |
| 06-03 | Packing | 1 | 1 | 1 | 1 |
| 07-02 | Column | 2 | 2 | 2 | 2 |
| 08-01 | Filling Supportor-A | 6 | 6 | 8 | 8 |
| 08-02 | Filling Supportor-B | 6 | 6 | 8 | 8 |
| 08-03 | Filling Supportor-C | 18 | 18 | 24 | 24 |
| 08-04 | Filling Supportor Clamping Band | 12 | 12 | 16 | 16 |
| 08-06 | Filling Supportor-E | – | – | 16 | 16 |
| 10-01-1 | Ladder(A Sec-1) | 1 | 1 | 1 | 1 |
| 10-01-2 | Ladder(A Sec-2) | – | – | 1 | 1 |
| 10-02 | Ladder(B Sec) | 1 | 1 | 1 | 1 |
| 10-03 | Ladder Bracket-A | 2 | 2 | 2 | 2 |
| 10-04 | Ladder Bracket-B | 2 | 2 | 2 | 2 |
| 11-01 | Filling(Inner Sec) | 2 | 2 | – | 2 |
| 11-03 | Filling(1.3 Sec) | – | – | 6 | – |
| 11-06 | Filling(1.6 Sec) | – | – | – | 12 |
| 11-08 | Filling(1.8 Sec) | 16 | 16 | 16 | – |
| 11-10 | Filling(1.10 Sec) | – | – | – | 20 |
| 12-01 | Sprinkler Head | 1 | 1 | 1 | 1 |
| 12-02 | Center Post | 1 | 1 | 1 | 1 |
| 12-03 | Turnbuckle | 6 | 8 | 8 | 10 |
| 12-04 | Tension Wire | 6 | 8 | 8 | 10 |
| 13-01 | Sprinkler Pipe | 6 | 8 | 8 | 10 |
| 13-02 | End Cap | 6 | 8 | 8 | 10 |
| 13-03 | Eliminator | 6 | 8 | 8 | 10 |
| 14-01 | Motor Frame Ass'y Main Pipe | 2 | 2 | 2 | 2 |
| 14-02 | Motor Frame Ass'y Stay Pipe | 2 | 2 | 2 | 2 |
| 15-01 | Motor Base | 1 | 1 | 1 | 1 |
| 15-02 | U-Bolt | 4 | 4 | 4 | 4 |
| 15-03 | U Bolt | 4 | 4 | 4 | 4 |
| 16-01 | Motor | 1 | 1 | 1 | 1 |
| 16-02 | Speed Reducer | 1 | 1 | 1 | 1 |
| 16-03 | Fan Key | 1 | 1 | 1 | 1 |
| 16-04 | Fasten Nut | 1 | 1 | 1 | 1 |
| 16-05 | Lock Nut | 1 | 1 | 1 | 1 |
| 17-01 | Fan Hub | 1 | 1 | 1 | 1 |
| 17-02 | Fan Blade | 4 | 4 | 4 | 4 |
| 17-04 | U-Bolt | 8 | 8 | 8 | 8 |
| 18-01 | Fan Guard | 4 | 4 | 4 | 4 |
| 19-00 | Basin Supportor Ass'y | 12 | 12 | 16 | 16 |
| 20-01 | Louver Supportor | 36 | 36 | 48 | 48 |
| 20-01B | Louver Supportor-B | 36 | 36 | 48 | 48 |
| 20-02 | Inlet Louver | 18 | 18 | 24 | 24 |
| 20-08 | Wing Bolt | 108 | 108 | 144 | 144 |
| 20-09 | Plastic Washer | 108 | 108 | 144 | 144 |
| OTHERS | BOLTS & NUTS | 1 Set | 1 Set | 1 Set | 1 Set |
| | WATER BASIN SEALING MATERIAL | | | | |
| A | Fiberglass | 1 Set | 1 Set | 1 Set | 1 Set |
| B | Polyester Resin | 1 Kg | 1 Kg | 1 Kg | 1 Kg |
| C | Catalyst | 1 Bottle | | | |

* Please Check The Above Mentioned Parts Within Two Weeks After The Goods Received

**Figure 1.1 - General Arrangement Drawing**

## Arrangement Drawing

Arrangement drawings represent self contained units used to make up the system drawn on the general arrangement drawing. Examples of arrangement drawings include drawings of assembled conveyers, drive systems, elevating units etc. The drawing should show in, at least three orthographic views, clear details to show all of the components used to make up the equipment items and how the component parts are located and fastened together.

Arrangement drawings include a table (parts list) identifying assemblies, fabrication drawings, detail drawings and proprietary items used to make up the equipment. Arrangement drawings include overall dimension, the weight/mass of the equipment drawn, the lifting points. All information needed to construct, test, lift, transport, and install the equipment should be provided in notes or as referenced documents.
The arrangement drawing may be a standard internal drawing which is repeatedly called up on different system general arrangement drawings.

The drawn separate assemblies and parts will be identified with leader lines to balloons or a numbering system which include the item reference number linking to the parts list.

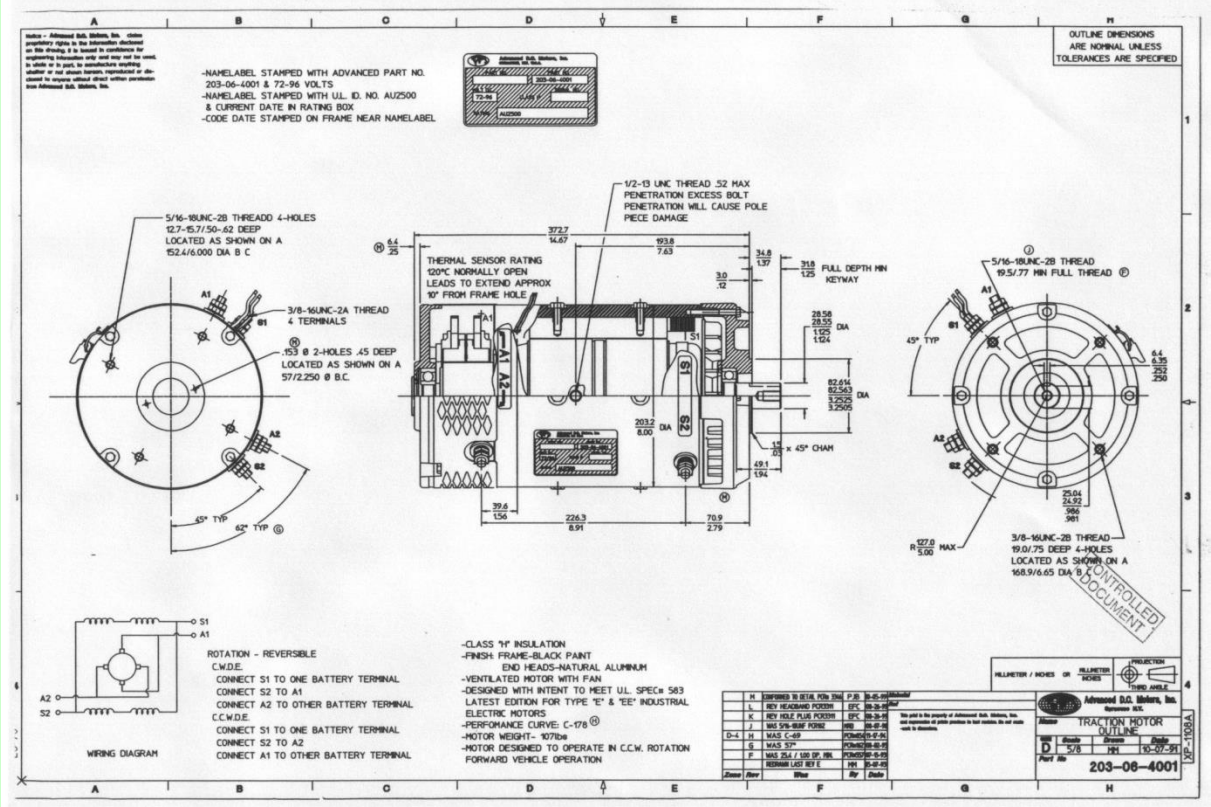



**Figure 1.2 – Arrangement Drawing**

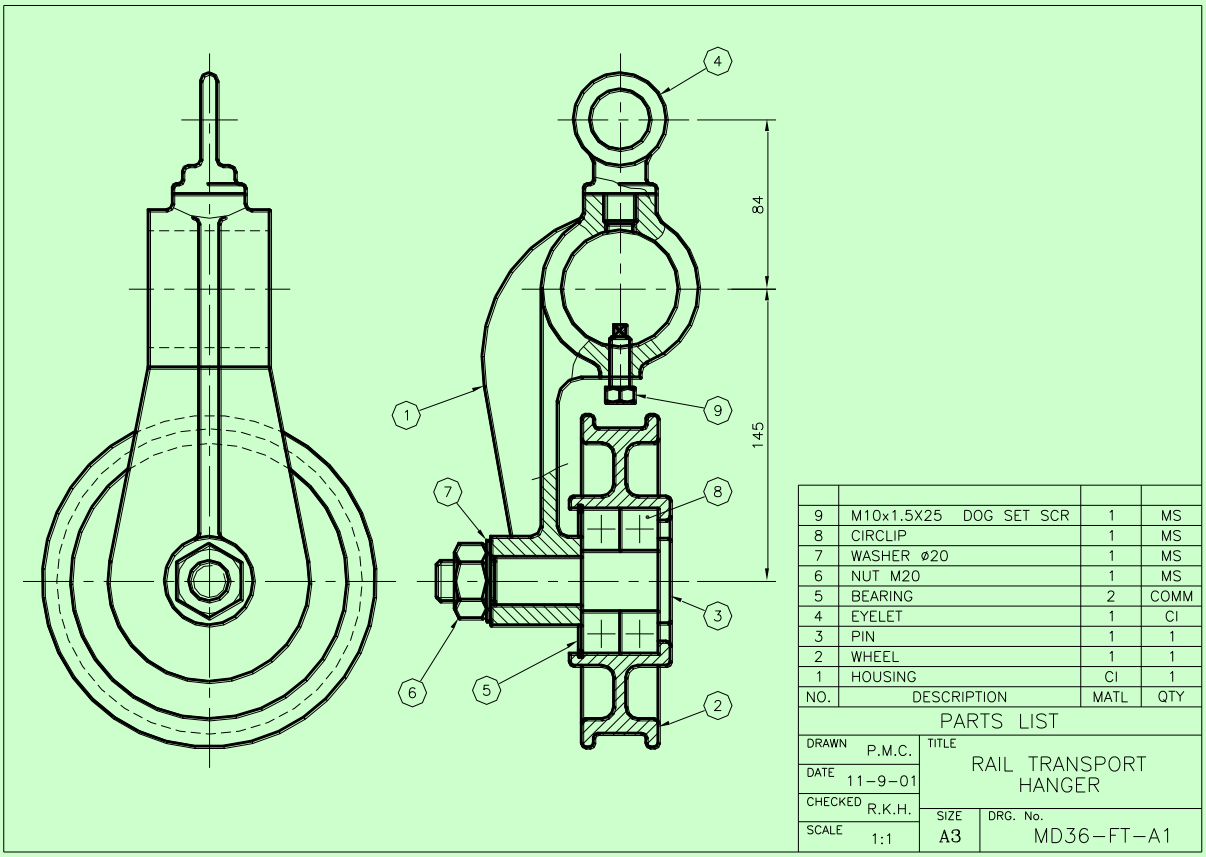
## Assembly Drawings

The assembly /sub-assembly drawings are drawings of discrete sub-systems showing in some detail how the component items fit together. Typical assembly drawings include gearbox drawings, roller drawings, guard system drawings.

The assembly drawing will generally include at least three orthographic views with sections as needed to clearly show all of the details and their relative positions. Overall and detail dimensions will be shown. The weight/mass of the assembly/sub-assembly will be noted. The drawing will include a parts list identifying all of the component details with quantities and materials and supply details. The assembly drawing will include a

list of reference drawings and notes identifying the relevant codes and specifications and testing requirements.

The drawn separate items will be identified with leader lines to balloons or a numbering system which include the item reference number linking to the parts list.




| NO. | DESCRIPTION | MATL | QTY |
|---|---|---|---|
| 9 | M10x1.5X25 DOG SET SCR | 1 | MS |
| 8 | CIRCLIP | 1 | MS |
| 7 | WASHER ø20 | 1 | MS |
| 6 | NUT M20 | 1 | MS |
| 5 | BEARING | 2 | COMM |
| 4 | EYELET | 1 | CI |
| 3 | PIN | 1 | 1 |
| 2 | WHEEL | 1 | 1 |
| 1 | HOUSING | CI | 1 |

PARTS LIST

| | | |
|---|---|---|
| DRAWN P.M.C. | TITLE RAIL TRANSPORT HANGER | |
| DATE 11–9–01 | | |
| CHECKED R.K.H. | SIZE A3 | DRG. No. MD36–FT–A1 |
| SCALE 1:1 | | |

**Figure 1.3 - Assembly Drawing**

## Detail Drawings

All individual items required to produce mechanical equipment need to be described in some detail to ensure that they are manufactured in accordance with the designers requirements. Proprietary items are selected from technical data sheets obtained from manufacturer /supplier. Items manufactured specifically for the application need to be made to detail drawings which include the geometry, material, heat treatment requirements, surface texture, size tolerances, geometric tolerances etc.

The detail drawing should include all of the necessary information to enable procurement, manufacture and should identify all of the relevant codes and standards. The item weight/mass should also be included for reference.

Depending on the level of detail, a detail drawing can comprise one drawing on a sheet or a number of separate drawings on one sheet. It is sometimes possible to combine the detail drawings onto the assembly drawing. The detail drawing must cross reference, both ways, to the parent assembly or arrangement drawing.

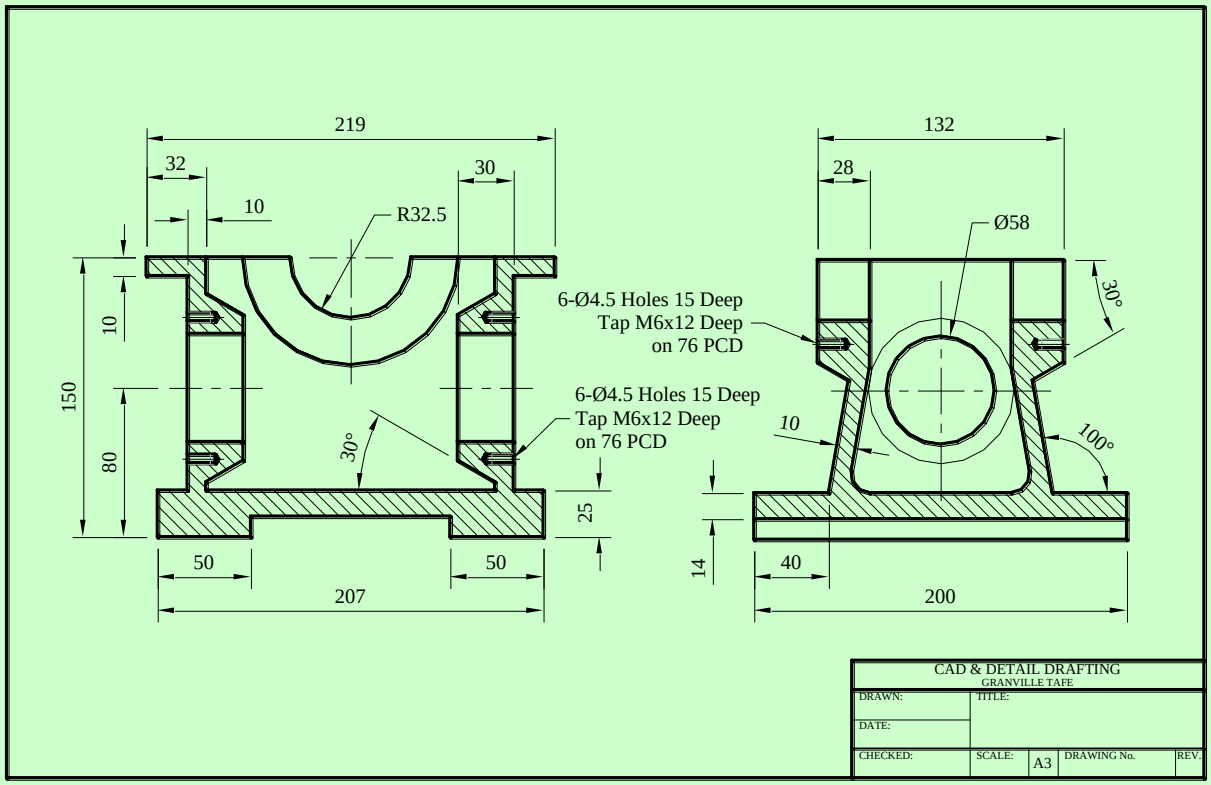



**Figure 1.4 - Detail Drawing**

## Fabrication Drawings

The fabrication drawing is a specific type of detail drawing. Some fabrication drawings are virtually assembly drawing e.g. when a number of items are assembled together as a fabrication. The fabrication drawing generally includes a material parts list identifying all of the materials used to build up the fabrication. All weld details are included using the standard symbolic representation of welds as shown in BS EN 22553. All of the materials should be identified in accordance with the relevant standards and codes.

The fabrication drawing should clearly describe in notes or in referenced documents the heat treatment and stress relieving requirements prior to, during and following the completion of the fabrication processes. The dimensions and relevant linear and geometric tolerances should be indicated.

A fabrication drawing sometimes only includes the fabrication details, the final machining details are then shown on a separate drawing. It is equally acceptable to show all manufacturing information on one drawing.

The items used to make up the fabrication will be identified with leader lines to balloons which include the item reference number linking to the parts list. The listed items on a fabrication drawing do not identify items which can be disassembled, as on assembly and arrangement drawings. The numbering system should reflect this difference. Methods of numbering items on fabrication drawings include using lower case alphabet letters e.g a,b,c or optionally as sub units of the fabrication item number e.g 1/1, 1/2 1/3 ... or 1/a , 1/b, 1/c...

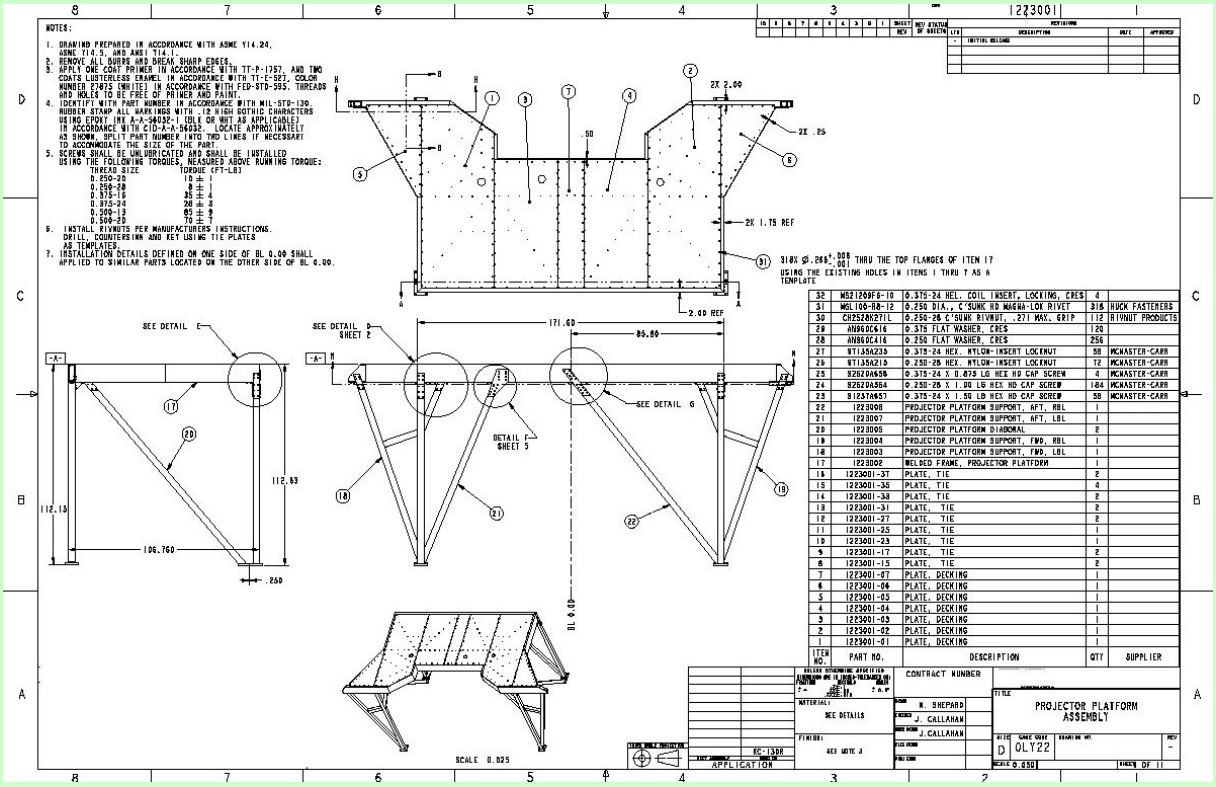



**Figure 1.5 - Fabrication Drawing**

## Item Identification

The method of identifying the parts must be clear and unambiguous. The equipment as represented on the general arrangement drawing and the sub-assemblies as shown on the arrangement and assembly drawing should be clearly identified with plant item numbers. The relevant drawing numbers are obtained by reference to the plant items list. Plant items are annotated by leader lines to a double balloon.

Typically a conveyor may have a plant item number e.g.H1040 and be shown on a drawing e.g. drawing number A0 12500.

The detail drawings are sub items of the arrangement drawings and are identified on the arrangement and assembly drawings. Typically an item say a conveyor frame may be identified from the conveyor plant item number e.g. H1040/3 . Optionally it may be identified using the arrangement drawing number e.g. A0 12500 /3. The frame will also have a discrete detail drawing number e.g A2 12503.

The fabricated items which are based on sub-parts welded together should be identified as details but the individual sub-parts should be identified in a different way to avoid ambiguity. One option is to number the fabricated sub-parts alphabetically e.g a, b, c ...or as a combination of the fabrication detail number and the part number i.e 3/a , 3/b.... These sub-parts do not need to be identified as separate parts because following fabrication they will not exist as separate parts. If the sub-parts are complicated shapes or machined items and they cannot be described in sufficient detail on the fabrication drawing they should be drawn as separate detail drawings but still identified as sub-parts of the fabrication detail.

## Assembly Drawings:

As can be seen in Figure 1.3, an Assembly Drawing shows the relative positions of the different parts. The Assembly drawing also proves the different parts fit together without designed interference and with the correct clearances for moving parts.

Assembly Drawings include preliminary design drawings and layouts, piping plans, unit assemblies, installation diagrams and final drawings. An Assembly Drawing can consist of a series of sub-assemblies; e.g. the gear box is part of the drive system in a motor vehicle, therefore the gear box would be a sub-assembly and would also appear in the final assembly drawing of the motor vehicle with the other sub-assemblies (engine, clutch, steering, suspension and brakes).

In selecting the views for a assembly drawing, the purpose of the drawing must be kept in mind to show how the parts fit together in the assembly and to suggest the function of the entire unit, not to describe the shape of the individual parts. The Assembly Drawing purports to show the *relationships* of different parts, not *shapes*.

In producing an assembly drawing, one line is used to represent the mating surfaces of different components. The lines can be extended or shortened as required; the assembly is gradually built up.

**NB:** *The different parts are **NEVER** drawn as individual parts then moved into place as errors can be made ad the 2 parts not fit together correctly*.

Since assemblies generally have parts fitting into or overlapping other parts, hidden line delineation is normally not required unless it is required to show a special feature such as a tapered pin through 2 parts. If the assembly is so complicated that hidden lines would be required to show the internal detail clearly, one or more sectional views should be drawn instead of the external views. Any type of sectional view can be used to describe the assembly; Full, Half, Broken and Removed sections are the most common types used. Hidden lines are only used when necessary for clearness.

An assembly drawing can be created using CAD software by inserting pre-drawn parts into the drawing and then positioning them as required, or, the parts drawn by extending and/or trimming lines to create the assembly.

## Features of an Assembly Drawing:

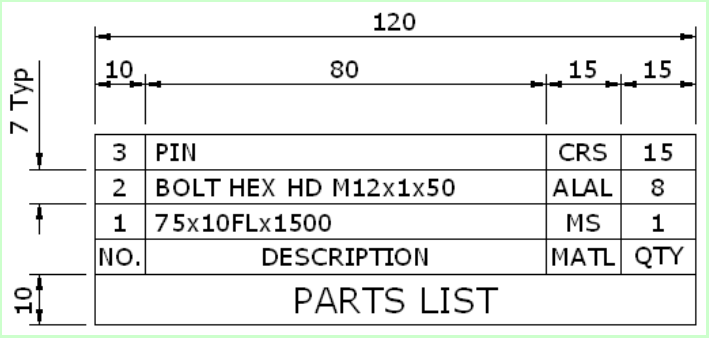
An Assembly Drawing consists of the views (normally 2 or 3), Material/Parts/Cutting List, cross referencing (called balloons) to the Material (or Parts or Cutting List) and notes covering the manufacturing processes required for the assembly; the drawing may also show the overall dimensions to indicate the space required for the assembly if it is to be shipped or fit into a specific area. Dimensions between centre distances may also be included in the case of belt or chain drive systems to assist the technician in building the equipment.

### Parts List:

The Parts List is also known as a Material List or Cutting List depending on the drafting discipline. Parts Lists are commonly used in mechanical disciplines while Material and Cutting Lists are generally used in the construction disciplines. The list is usually placed on the drawing immediately above the Title Block but can also be placed on a separate sheet, especially if there are many components or if the company has a special estimating section that does not require the drawing, only a list of the components.

The Parts List can consist of the basic information (identification number, part name or description, material and quantity) or contain other specific and important information (specification numbers, catalogue numbers, drawing numbers, remarks, stock number, manufacturer and/or supplier) displayed in columns.

The typical layout of a Parts List used in TAFE is shown below:




| NO. | DESCRIPTION | MATL | QTY |
|---|---|---|---|
| 3 | PIN | CRS | 15 |
| 2 | BOLT HEX HD M12x1x50 | ALAL | 8 |
| 1 | 75x10FLx1500 | MS | 1 |

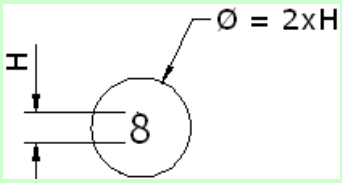
PARTS LIST

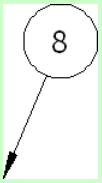
## Balloons or Cross Referencing:

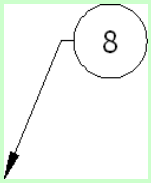
A balloon is a circle that contains a single number, which is connected with a leader line pointing to the part within the assembly. Balloon Guidelines include:

- All balloons on a drawing must be the same size.
- Balloons should be grouped together in an easy to read pattern.
- Balloon numbers must correspond to the item numbers in the Parts List.
- Balloons should not have horizontal or vertical leader lines.

The diameter of the balloon is a direct proportion to the height of the text (2.4xH). The leader should have a short horizontal reference line before the leader, or, the leader end at the balloon and pointing to the centre. The text should be placed (or justified) about the centre of the circle.




## Dimensions:

As a rule, dimensions are not given on assembly drawings since they are given on the detail individual drawings. If dimensions are provided, they are limited to some function of the object as a whole, such as the overall height, width and length of the assembly, the maximum/minimum opening between two components within the assembly, or, the centre-to-centre distances between gears, pulleys and sprockets. Dimensions would be required when the assembly requires surfaces to be machined after the components have been assembled.

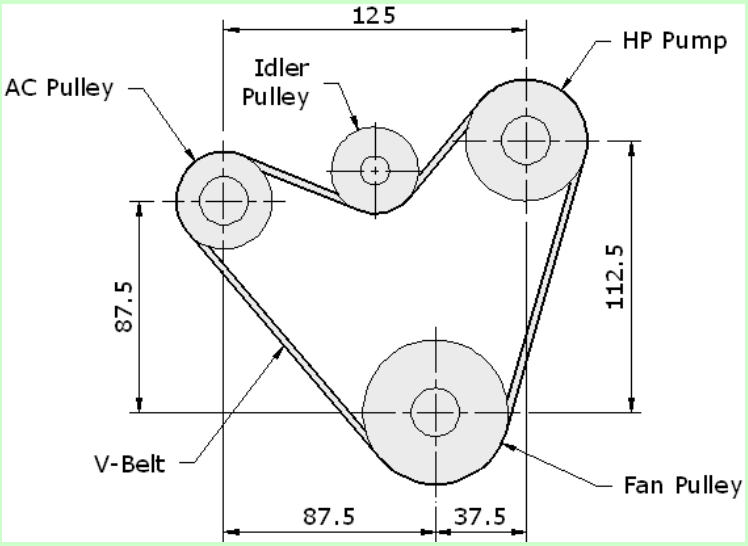



**Figure 1.6**

**Tabulation:**

Tables are used in outline assembly drawings to give the general idea of the exterior shape of a machine or structure and consist of only the principle dimensions as shown in Figure 1.7 referring to the table showing those dimensions. When the drawing is made for catalogues or other illustrative purposes, the dimensions are often omitted.

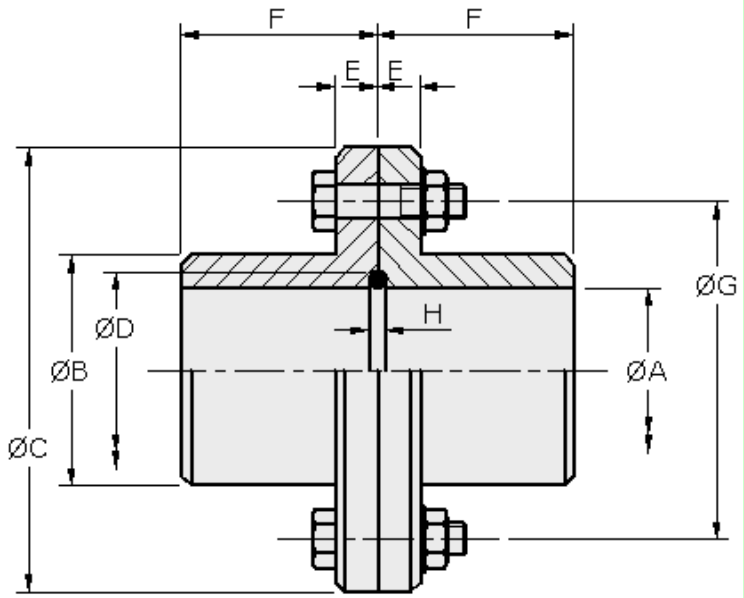


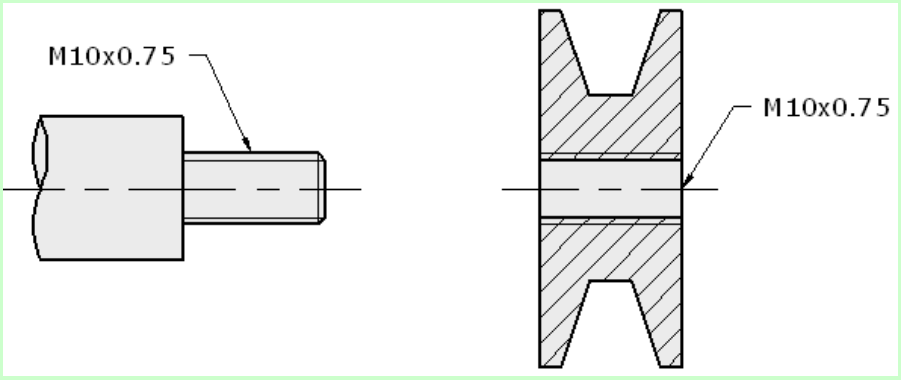

**Figure 1.7**

| Type | Dimensions | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | A max | A min | B | C | D | E | F | G | H |
| RSC-1 | 42 | 15 | 70 | 146 | 58 | 12 | 56 | 108 | 6 |
| RSC-2 | 48 | 21 | 82 | 171 | 76 | 17 | 61 | 127 | 6 |
| RSC-3 | 58 | 21 | 97 | 198 | 76 | 17 | 68 | 145 | 6 |
| RSC-4 | 70 | 21 | 117 | 216 | 110 | 17 | 76 | 167 | 8 |
| RSC-5 | 78 | 25 | 127 | 254 | 110 | 30 | 68 | 190 | 8 |
| RSC-6 | 85 | 28 | 147 | 279 | 135 | 30 | 100 | 213 | 8 |
| RSC-7 | 105 | 34 | 180 | 330 | 160 | 30 | 117 | 255 | 8 |

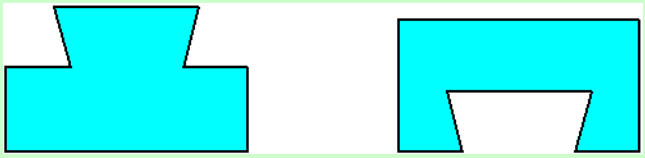
## How Do The Parts Fit Together?

The draftsperson should be competent in being able to identify from the engineer's sketches, the way the different components fit together to form the assembly. The secret is to look for similar or matching dimensions and features including:

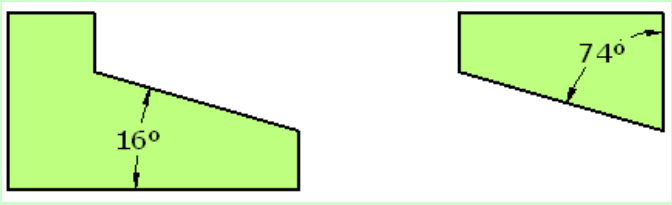
Threads: A shaft could have a threaded end which screws onto a mating pulley or fastening. e.g. **M10x0.75**




Shape: A component could have a dovetailed feature which would over another matching dovetail.

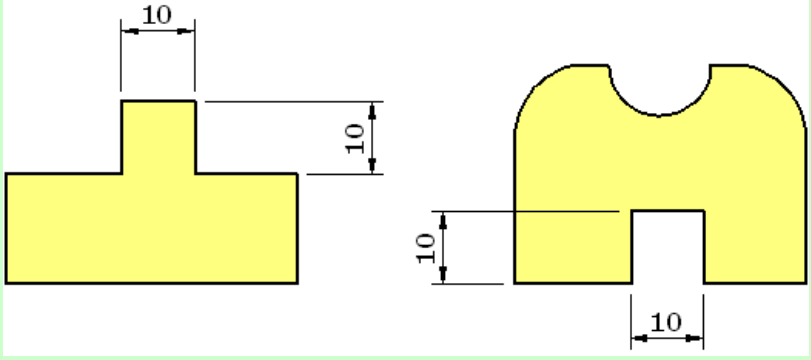


Taper or Angle: A taped face on one object will almost certainly fit against the face of another angled surface. eg. **16°.**



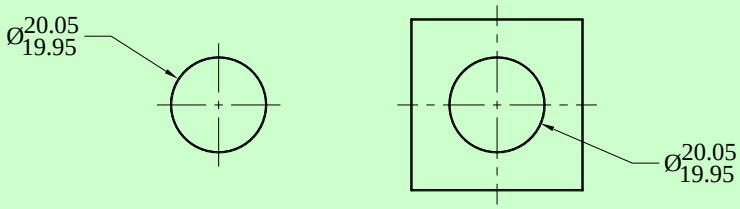

In the above example the two angular dimensions form the same angle to the horizontal, the 16° is given from the horizontal while the 74° is given from the vertical; both add up to 90°.

Dimensions: A dimension on one part will probably match up to the same dimension on another part even though the parts may have different shapes.



Toleranced Dimensions:

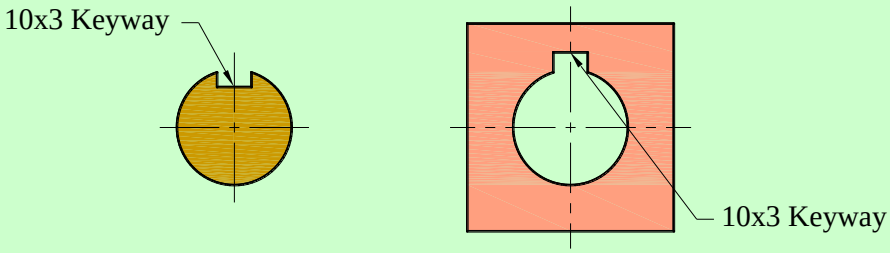
Although the toleranced dimensions of two mating parts may not have the same upper and lower values, they will be very similar with the same basic size.




Keys and Keyways:

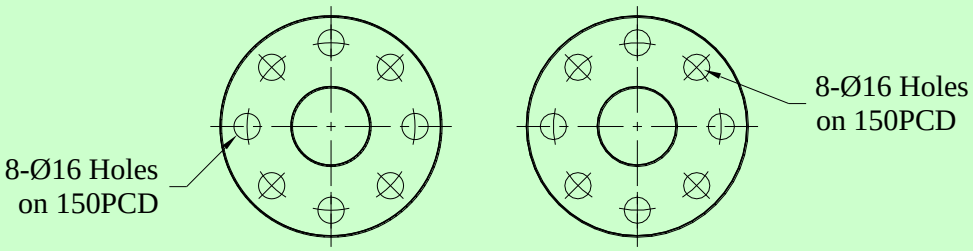
Many shafts and pulleys etc are locked together by keys which are generally a square or rectangular length of metal. On the drawing the keyway is identified by a groove in the shaft and pulley.

eg. **10x3 Keyway**.



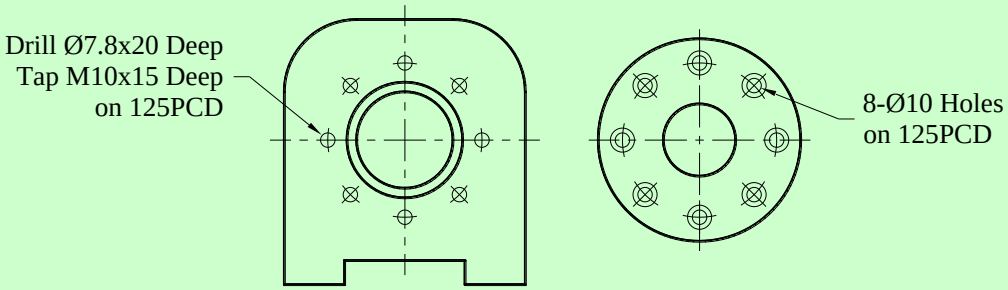

Holes:

Mounting holes in one component generally mate with another set of holes in a second and/or third component. eg. **8-Ø16 Holes on 150PCD** that could match holes with the same PCD.




Fastenings:

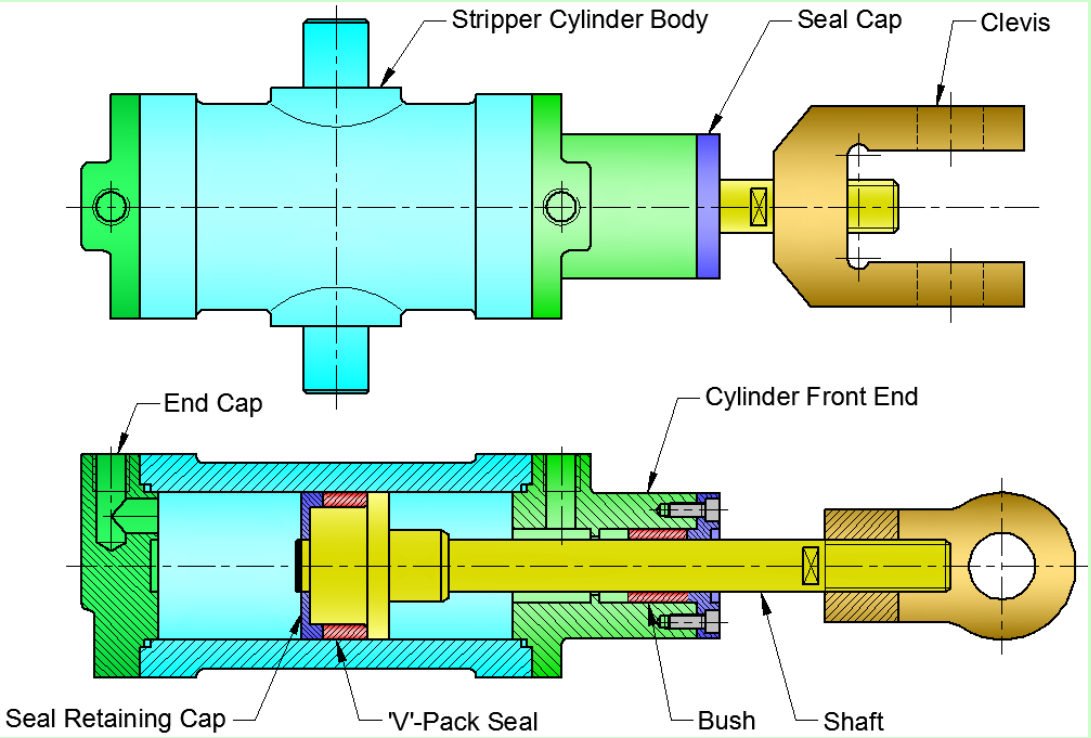
A fastening will probably be threaded which will screw into a mating hole, eg. **M10x15 Deep**. The shape of the head of the fastening may also determine its location with a part, eg. an M10x30 Socket Head Cap Screw would fit into a counterbored hole on one part which would be identified **Drill Ø10 C'bore Ø16x10 deep** with a matching pitch of **125**.



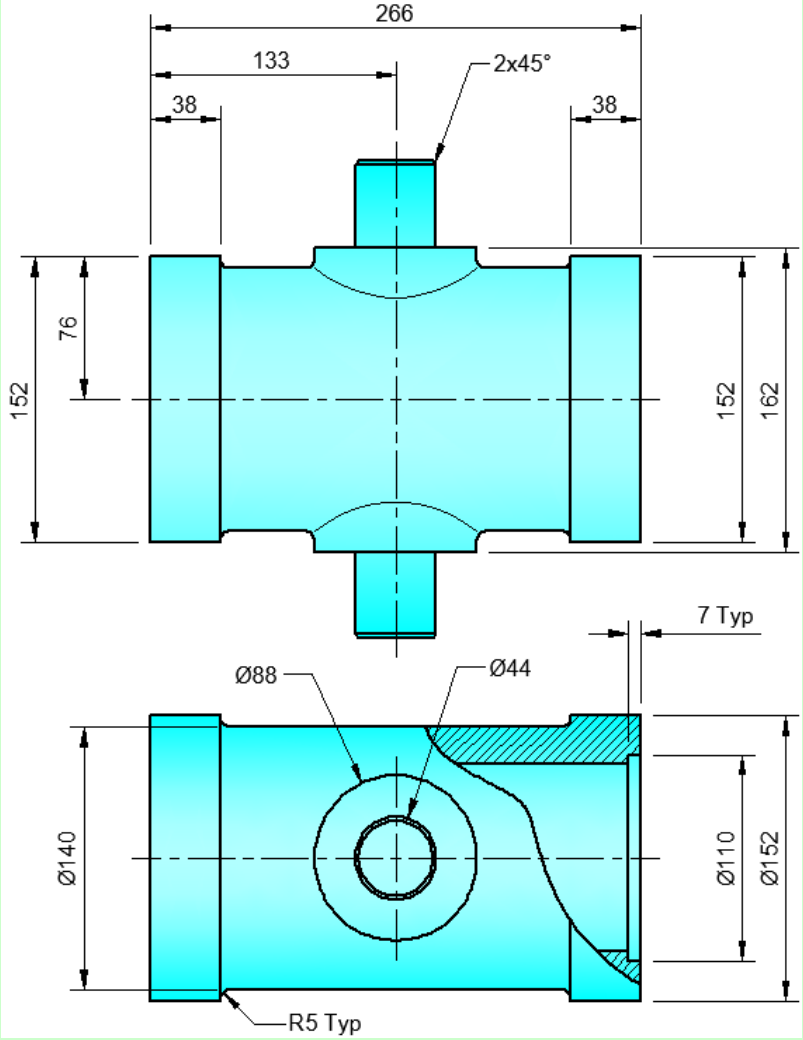
## Skill Practice Exercise

### *Skill Practice Exercise MEM09005-SP-0101*

Create an assembly drawing of the Stripper Cylinder on a standard A2 sheet using the template drawing provided on the network drive called Stripper Cylinder and the details provided below. Include the Front and Top Views with the Front View being fully sectioned. Include a Parts List, overall dimensions and cross-referencing. The drawing files for the Set Screws are stored in the Fastenings folder. Save the drawing to your work area as MEM09005-SP-0101; the drawing number is MEM09005-SP-0101.

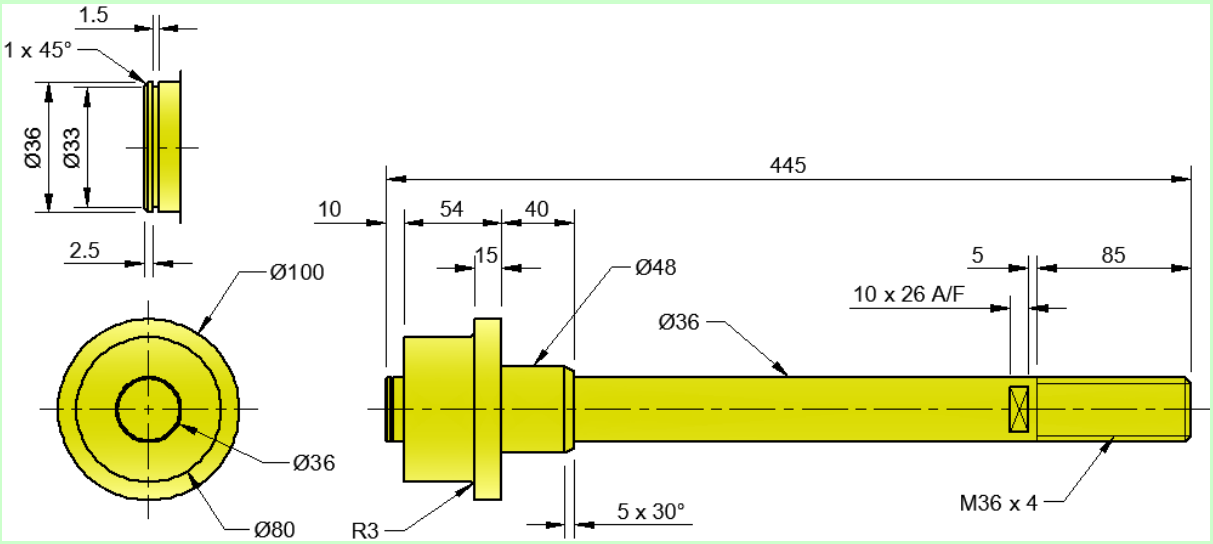



**Stripper Cylinder Assembly**




**Item 1 - Stripper Cylinder Body**

Material – Cast Iron

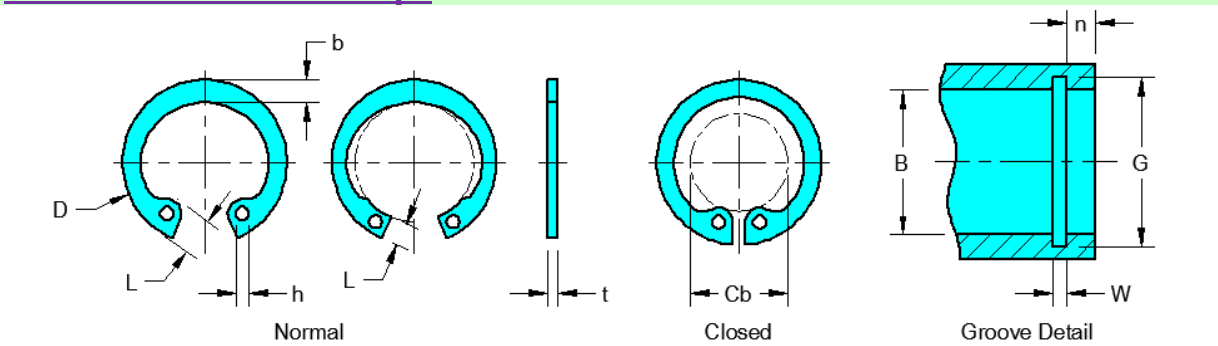



**Item 2 – Piston Rod**

Material – Mild Steel

# Tables

## Table 1 – Internal Circlips




| Most sizes over 170mm are without lugs | | | | | | | | | Measurements are in mm | | | | Code No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bore | Circlip Dimensions | | | | | | | | Groove Dimensions | | | | |
| B | t | Tol | d | Tol | Cb | b | L | h | G | Tol | W | n | |
| 8 | 0.80 | +0.00 -0.05 | 8.7 | +0.36 -0.10 | 3.0 | 1.1 | 2.4 | 1.0 | 8.4 | +0.90 -0.00 | 0.9 | 0.6 | INT0080 |
| 9 | 0.80 | | 9.8 | | 3.7 | 1.3 | 2.5 | 1.0 | 9.4 | | 0.9 | 0.6 | INT0090 |
| 10 | 1.00 | +0.00 -0.06 | 10.8 | | 3.3 | 1.4 | 3.2 | 1.2 | 10.4 | +0.11 -0.00 | 1.0 | 0.6 | INT0100 |
| 11 | 1.00 | | 11.8 | | 4.1 | 1.5 | 3.3 | 1.2 | 11.4 | | 1.1 | 0.6 | INT0110 |
| 12 | 1.00 | | 13.0 | | 4.9 | 1.7 | 3.4 | 1.5 | 12.5 | | 1.1 | 0.8 | INT0120 |
| 13 | 1.00 | | 14.1 | | 5.4 | 1.8 | 3.6 | 1.5 | 13.6 | | 1.1 | 0.9 | INT0130 |
| 14 | 1.00 | | 15.1 | | 6.2 | 1.9 | 3.7 | 1.7 | 14.6 | | 1.1 | 0.9 | INT0140 |
| 15 | 1.00 | | 16.2 | | 7.2 | 2.0 | 3.7 | 1.7 | 15.7 | | 1.1 | 1.2 | INT0150 |
| 16 | 1.00 | | 17.3 | | 8.0 | 2.0 | 3.8 | 1.7 | 16.8 | | 1.1 | 1.2 | INT0160 |
| 17 | 1.00 | | 18.3 | +0.42 -0.13 | 8.8 | 2.1 | 3.9 | 1.7 | 17.8 | | 1.1 | 1.5 | INT0170 |
| 18 | 1.00 | | 19.5 | | 9.4 | 2.2 | 4.1 | 2.0 | 19.0 | +0.13 -0.00 | 1.1 | 1.5 | INT0180 |
| 19 | 1.00 | | 20.5 | | 10.4 | 2.3 | 4.1 | 2.0 | 20.0 | | 1.1 | 1.5 | INT0190 |
| 20 | 1.00 | | 21.5 | | 11.2 | 2.4 | 4.2 | 2.0 | 21.0 | | 1.1 | 1.5 | INT0200 |
| 21 | 1.00 | | 22.5 | | 12.2 | 2.5 | 4.2 | 2.0 | 22.0 | | 1.1 | 1.5 | INT0210 |
| 22 | 1.00 | | 26.5 | | 13.2 | 2.6 | 4.2 | 2.0 | 23.0 | | 1.3 | 1.5 | INT0220 |
| 23 | 1.20 | | 24.6 | +0.42 -0.21 | 14.2 | 2.5 | 4.2 | 2.0 | 24.1 | | 1.3 | 1.5 | INT0230 |
| 24 | 1.20 | | 25.9 | | 14.8 | 2.6 | 4.4 | 2.0 | 25.2 | -0.21 -0.00 | 1.3 | 1.8 | INT0240 |
| 25 | 1.20 | | 26.9 | | 15.5 | 2.7 | 4.5 | 2.0 | 26.2 | | 1.3 | 1.8 | INT0250 |
| 26 | 1.20 | | 27.9 | | 16.1 | 2.8 | 4.7 | 2.0 | 27.2 | | 1.3 | 1.8 | INT0260 |
| 27 | 1.20 | | 29.1 | | 17.1 | 2.9 | 4.7 | 2.0 | 28.4 | | 1.3 | 2.1 | INT0270 |
| 28 | 1.20 | | 30.1 | +0.50 -0.25 | 17.9 | 2.9 | 4.8 | 2.0 | 29.4 | | 1.3 | 2.1 | INT0280 |
| 29 | 1.20 | | 31.1 | | 18.4 | 3.0 | 4.8 | 2.0 | 30.4 | +0.25 -0.00 | 1.3 | 2.1 | INT0290 |
| 30 | 1.20 | | 32.1 | | 19.9 | 3.0 | 4.8 | 2.0 | 31.4 | | 1.3 | 2.1 | INT0300 |
| 31 | 1.20 | | 33.4 | | 20.0 | 3.2 | 5.2 | 2.5 | 32.7 | | 1.3 | 2.6 | INT0310 |
| 32 | 1.20 | | 33.4 | | 20.6 | 3.2 | 5.4 | 2.5 | 33.7 | | 1.3 | 2.6 | INT0320 |
| 33 | 1.20 | | 35.5 | | 21.6 | 3.3 | 5.4 | 2.5 | 34.7 | | 1.3 | 2.6 | INT0330 |
| 34 | 1.50 | | 36.5 | | 22.6 | 3.3 | 5.4 | 2.5 | 35.7 | | 1.6 | 2.6 | INT0340 |
| 35 | 1.50 | | 37.8 | | 23.6 | 3.4 | 5.4 | 2.5 | 37.0 | | 1.6 | 3.0 | INT0350 |
| 36 | 1.50 | | 38.8 | | 24.6 | 3.5 | 5.4 | 2.5 | 38.0 | | 1.6 | 3.0 | INT0360 |

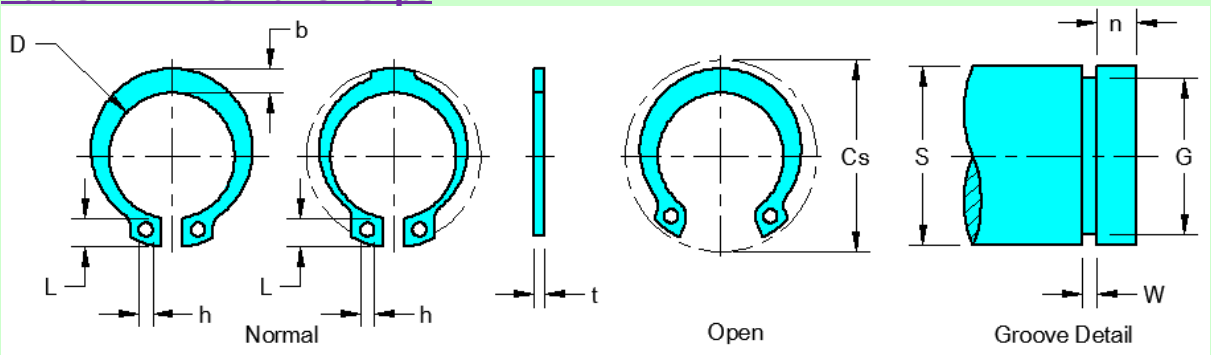
## Tables

| Most sizes over 170mm are without lugs | | | | | | | | | Measurements are in mm | | | | Code No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bore B | Circlip Dimensions | | | | | | | | Groove Dimensions | | | | |
| | t | Tol | d | Tol | Cb | b | L | h | G | Tol | W | n | |
| 37 | 1.50 | | 39.8 | +0.50 -0.25 | 25.4 | 3.6 | 5.5 | 2.5 | 39.0 | | 1.6 | 3.0 | INT0370 |
| 38 | 1.50 | | 40.8 | | 26.4 | 3.7 | 5.5 | 2.5 | 40.0 | | 1.6 | 3.0 | INT0380 |
| 39 | 1.50 | | 42.0 | | 27.2 | 3.8 | 5.6 | 2.5 | 41.0 | | 1.6 | 3.0 | INT0390 |
| 40 | 1.75 | | 43.5 | | 27.8 | 3.9 | 5.8 | 2.5 | 42.5 | | 1.8 | 3.0 | INT0400 |
| 41 | 1.75 | | 44.5 | | 28.6 | 4.0 | 5.9 | 2.5 | 43.5 | +0.25 -0.00 | 1.8 | 3.8 | INT0410 |
| 42 | 1.75 | +0.00 -0.06 | 45.5 | +0.90 -0.39 | 29.6 | 4.1 | 5.9 | 2.5 | 44.5 | | 1.8 | 3.8 | INT0420 |
| 43 | 1.75 | | 46.5 | | 30.6 | 4.2 | 5.9 | 2.5 | 45.5 | | 1.8 | 3.8 | INT0430 |
| 44 | 1.75 | | 47.5 | | 31.4 | 4.2 | 6.0 | 2.5 | 46.5 | | 1.8 | 3.8 | INT0440 |
| 45 | 1.75 | | 48.5 | | 32.0 | 4.3 | 6.2 | 2.5 | 47.5 | | 1.8 | 3.8 | INT0450 |
| 46 | 1.75 | | 49.5 | | 32.7 | 4.4 | 6.3 | 2.5 | 48.5 | | 1.8 | 3.8 | INT0460 |
| 47 | 1.75 | | 50.5 | +1.10 -0.46 | 33.5 | 4.4 | 6.4 | 2.5 | 49.5 | | 1.8 | 3.8 | INT0470 |
| 48 | 1.75 | | 51.5 | | 34.5 | 4.5 | 6.4 | 2.5 | 50.5 | | 1.8 | 3.8 | INT0480 |
| 50 | 2.00 | | 54.2 | | 36.3 | 4.6 | 6.5 | 2.5 | 53.0 | | 2.15 | 4.5 | INT0500 |
| 51 | 2.00 | +0.00 -0.07 | 55.2 | | 37.3 | 4.7 | 6.5 | 2.5 | 54.0 | | 2.15 | 4.5 | INT0510 |
| 52 | 2.00 | | 56.2 | | 37.9 | 4.7 | 6.7 | 2.5 | 55.0 | | 2.15 | 4.5 | INT0520 |
| 53 | 2.00 | | 57.2 | | 38.9 | 4.9 | 6.7 | 2.5 | 56.0 | | 2.15 | 4.5 | INT0530 |
| 54 | 2.00 | | 58.2 | | 39.9 | 5.0 | 6.7 | 2.5 | 57.0 | | 2.15 | 4.5 | INT0540 |
| 55 | 2.00 | | 59.2 | | 40.7 | 5.0 | 6.8 | 2.5 | 58.0 | | 2.15 | 4.5 | INT0550 |
| 56 | 2.00 | | 60.2 | | 41.7 | 5.1 | 6.8 | 2.5 | 59.0 | | 2.15 | 4.5 | INT0560 |
| 57 | 2.00 | | 61.2 | | 42.7 | 5.1 | 6.8 | 2.5 | 60.0 | | 2.15 | 4.5 | INT0570 |
| 58 | 2.00 | | 62.2 | | 43.5 | 5.2 | 6.9 | 2.5 | 61.0 | | 2.15 | 4.5 | INT0580 |
| 60 | 2.00 | | 64.2 | | 44.7 | 5.4 | 7.3 | 2.5 | 63.0 | +0.30 -0.00 | 2.15 | 4.5 | INT0600 |
| 62 | 2.00 | | 66.2 | | 46.7 | 5.5 | 7.3 | 2.5 | 65.0 | | 2.15 | 4.5 | INT0620 |
| 63 | 2.00 | | 67.2 | | 47.7 | 5.6 | 7.3 | 2.5 | 66.0 | | 2.15 | 4.5 | INT0630 |
| 64 | 2.00 | | 68.2 | +1.10 -0.46 | 48.2 | 5.7 | 7.5 | 2.5 | 67.0 | | 2.15 | 4.5 | INT0640 |
| 65 | 2.50 | +0.00 -0.07 | 69.2 | | 49.0 | 5.8 | 7.6 | 3.0 | 68.0 | | 2.65 | 4.5 | INT0650 |
| 67 | 2.50 | | 71.5 | | 50.8 | 6.0 | 7.7 | 3.0 | 70.0 | | 2.65 | 4.5 | INT0670 |
| 68 | 2.50 | | 72.5 | | 51.6 | 6.1 | 7.8 | 3.0 | 71.0 | | 2.65 | 4.5 | INT0680 |
| 70 | 2.50 | | 74.5 | | 53.6 | 6.2 | 7.8 | 3.0 | 73.0 | | 2.65 | 4.5 | INT0700 |
| 72 | 2.50 | | 76.5 | | 55.6 | 6.4 | 7.8 | 3.0 | 75.0 | | 2.65 | 4.5 | INT0720 |
| 75 | 2.50 | | 79.5 | | 58.6 | 6.6 | 7.8 | 3.0 | 78.0 | | 2.65 | 4.5 | INT0750 |
| 77 | 2.50 | | 81.5 | | 60.4 | 6.7 | 7.9 | 3.0 | 80.0 | | 2.65 | 4.5 | INT0770 |
| 78 | 2.50 | | 82.5 | | 60.1 | 6.8 | 8.5 | 3.0 | 81.0 | | 2.65 | 5.3 | INT0780 |
| 80 | 2.50 | | 85.5 | | 62.1 | 7.0 | 8.5 | 3.0 | 83.5 | | 2.65 | 5.3 | INT0800 |
| 82 | 2.50 | | 87.5 | | 64.1 | 7.0 | 8.5 | 3.0 | 85.5 | | 2.65 | 5.3 | INT0820 |
| 85 | 3.00 | | 90.5 | +1.30 -0.54 | 66.9 | 7.2 | 8.6 | 3.5 | 88.5 | +0.35 -0.00 | 2.65 | 5.3 | INT0850 |
| 87 | 3.00 | +0.00 -0.08 | 92.5 | | 68.9 | 7.3 | 8.6 | 3.5 | 90.5 | | 3.15 | 5.3 | INT0870 |
| 88 | 3.00 | | 93.5 | | 69.9 | 7.4 | 8.6 | 3.5 | 91.5 | | 3.15 | 5.3 | INT0880 |
| 90 | 3.00 | | 95.5 | | 71.9 | 7.6 | 8.6 | 3.5 | 93.5 | | 3.15 | 5.3 | INT0900 |
| 92 | 3.00 | | 97.5 | | 73.7 | 7.8 | 8.7 | 3.5 | 95.5 | | 3.15 | 5.3 | INT0920 |

## Tables

| Most sizes over 170mm are without lugs | | | | | | | | | Measurements are in mm | | | | Code No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bore B | Circlip Dimensions | | | | | | | | Groove Dimensions | | | | |
| | t | Tol | d | Tol | Cb | b | L | h | G | Tol | W | n | |
| 95 | 3.00 | +0.00 -0.08 | 100.5 | +1.30 -0.54 | 76.5 | 8.1 | 8.8 | 3.5 | 98.5 | +0.35 -0.00 | 3.15 | 5.3 | INT0950 |
| 97 | 3.00 | | 102.5 | | 78.5 | 8.2 | 8.8 | 3.5 | 100.5 | | 3.15 | 5.3 | INT0970 |
| 98 | 3.00 | | 103.5 | | 79.0 | 8.3 | 9.0 | 3.5 | 101.5 | | 3.15 | 5.3 | INT0980 |
| 100 | 3.00 | | 105.5 | | 80.6 | 8.4 | 9.2 | 3.5 | 103.5 | | 3.15 | 5.3 | INT1000 |
| 102 | 4.00 | | 108.0 | | 82.0 | 8.5 | 9.5 | 3.5 | 106.0 | +0.54 -0.00 | 4.15 | 6.0 | INT1020 |
| 105 | 4.00 | | 112.0 | | 85.0 | 8.7 | 9.5 | 3.5 | 109.0 | | 4.15 | 6.0 | INT1050 |
| 108 | 4.00 | | 115.0 | | 88.0 | 8.9 | 9.5 | 3.5 | 112.0 | | 4.15 | 6.0 | INT1080 |
| 110 | 4.00 | | 117.0 | | 88.2 | 9.0 | 10.4 | 3.5 | 114.0 | | 4.15 | 6.0 | INT1100 |
| 112 | 4.00 | | 119.0 | | 90.0 | 9.1 | 10.5 | 3.5 | 116.0 | | 4.15 | 6.0 | INT1120 |
| 115 | 4.00 | | 122.0 | +1.50 -0.63 | 93.0 | 9.3 | 10.5 | 3.5 | 119.0 | | 4.15 | 6.0 | INT1150 |
| 120 | 4.00 | | 127.0 | | 96.9 | 9.7 | 11.0 | 3.5 | 124.0 | +0.63 -0.00 | 4.15 | 6.0 | INT1200 |
| 125 | 4.00 | | 132.0 | | 101.9 | 10.0 | 11.0 | 4.00 | 129.0 | | 4.15 | 6.0 | INT1250 |
| 130 | 4.00 | | 137.0 | | 106.9 | 10.2 | 11.0 | 4.00 | 134.0 | | 4.15 | 6.0 | INT1300 |
| 135 | 4.00 | | 142.0 | | 111.5 | 10.5 | 11.2 | 4.00 | 139.0 | | 4.15 | 6.0 | INT1350 |
| 140 | 4.00 | | 147.0 | | 116.5 | 10.7 | 11.2 | 4.00 | 144.0 | | 4.15 | 6.0 | INT1400 |
| 145 | 4.00 | | 152.0 | | 121.0 | 10.9 | 11.4 | 4.00 | 149.0 | | 4.15 | 6.0 | INT1450 |
| 150 | 4.00 | | 158.0 | | 124.8 | 11.2 | 12.0 | 4.00 | 155.0 | | 4.15 | 7.5 | INT1500 |
| 155 | 4.00 | | 164.0 | | 129.8 | 11.4 | 12.0 | 4.00 | 160.0 | | 4.15 | 7.5 | INT1550 |
| 160 | 4.00 | | 169.0 | | 132.7 | 11.6 | 13.0 | 4.00 | 165.0 | | 4.15 | 7.5 | INT1600 |
| 165 | 4.00 | | 174.5 | | 137.7 | 11.8 | 13.0 | 4.00 | 170.0 | | 4.15 | 7.5 | INT1650 |
| 170 | 4.00 | | 179.5 | | 141.6 | 12.2 | 13.5 | 4.00 | 175.0 | | 4.15 | 7.5 | INT1700 |
| 175 | 4.00 | | 184.5 | +1.70 -0.72 | 146.6 | 12.7 | 13.5 | 4.00 | 180.0 | | 4.15 | 7.5 | INT1750 |
| 180 | 4.00 | | 189.5 | | 150.2 | 13.2 | 14.2 | 4.00 | 185.0 | +0.72 -0.00 | 4.15 | 7.5 | INT1800 |
| 185 | 4.00 | | 194.5 | | 155.2 | 13.7 | 14.2 | 4.00 | 190.5 | | 4.15 | 7.5 | INT1850 |
| 190 | 4.00 | | 199.5 | | 160.2 | 13.8 | 14.2 | 4.00 | 195.0 | | 4.15 | 7.5 | INT1900 |
| 195 | 4.00 | | 204.5 | | 165.2 | 13.8 | 14.2 | 4.00 | 200.0 | | 4.15 | 7.5 | INT1950 |
| 200 | 4.00 | | 209.5 | | 170.2 | 14.0 | 14.2 | 4.00 | 205.0 | | 4.15 | 7.5 | INT2000 |

## Table 2 – External Circlips




| Most sizes over 170mm are without lugs | | | | | | | | | Measurements are in mm | | | | Code No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shaft | Circlip Dimensions | | | | | | | | Groove Dimensions | | | | |
| | t | Tol | d | Tol | Cs | b | L | h | G | Tol | W | n | |
| 3 | 0.40 | +0.00 -0.05 | 2.7 | +0.04 -0.15 | 7.0 | 0.8 | 1.9 | 1.0 | 2.8 | +0.00 -0.04 | 0.5 | 0.3 | EXT0030 |
| 4 | 0.40 | | 3.7 | | 8.6 | 0.9 | 2.2 | 1.0 | 3.8 | +0.00 - 0.048 | 0.5 | 0.3 | EXT0040 |
| 5 | 0.60 | | 4.7 | | 10.3 | 1.1 | 2.5 | 1.0 | 4.8 | | 0.7 | 0.3 | EXT0050 |
| 6 | 0.70 | | 5.6 | | 11.7 | 1.3 | 2.7 | 1.2 | 5.7 | | 0.8 | 0.5 | EXT0060 |
| 7 | 0.80 | | 6.5 | +0.06 -0.18 | 13.5 | 1.4 | 3.1 | 1.2 | 6.7 | +0.00 -0.06 | 0.9 | 0.5 | EXT0070 |
| 8 | 0.80 | | 7.4 | | 14.7 | 1.5 | 3.2 | 1.2 | 7.6 | | 1.1 | 0.6 | EXT0080 |
| 9 | 0.80 | +0.00 -0.06 | 8.4 | | 16.0 | 1.7 | 3.3 | 1.2 | 8.6 | | 1.1 | 0.6 | EXT0090 |
| 10 | 1.00 | | 9.3 | +0.10 -0.36 | 17.0 | 1.8 | 3.3 | 1.5 | 9.6 | | 1.1 | 0.6 | EXT0100 |
| 11 | 1.00 | | 10.2 | | 18.0 | 1.8 | 3.3 | 1.5 | 10.5 | +0.00 -0.11 | 1.1 | 0.8 | EXT0110 |
| 12 | 1.00 | | 11.0 | | 19.0 | 1.8 | 3.3 | 1.7 | 11.5 | | 1.1 | 0.8 | EXT0120 |
| 13 | 1.00 | | 11.9 | | 20.2 | 2.0 | 3.4 | 1.7 | 12.4 | | 1.1 | 0.9 | EXT0130 |
| 14 | 1.00 | | 12.9 | | 21.4 | 2.1 | 3.5 | 1.7 | 13.4 | | 1.1 | 0.9 | EXT0140 |
| 15 | 1.00 | | 13.8 | | 22.6 | 2.2 | 3.6 | 1.7 | 14.3 | | 1.1 | 1.1 | EXT0150 |
| 16 | 1.00 | | 14.7 | | 23.8 | 2.2 | 3.7 | 1.7 | 15.2 | | 1.1 | 1.2 | EXT0160 |
| 17 | 1.00 | | 15.7 | | 25.0 | 2.3 | 3.8 | 1.7 | 16.2 | | 1.1 | 1.2 | EXT0170 |
| 18 | 1.00 | | 16.5 | | 26.2 | 2.4 | 3.9 | 2.0 | 17.0 | | 1.3 | 1.5 | EXT0180 |
| 19 | 1.00 | | 17.5 | | 27.2 | 2.5 | 3.9 | 2.0 | 18.0 | | 1.3 | 1.5 | EXT0190 |
| 20 | 1.00 | | 18.5 | +0.13 -0.42 | 28.4 | 2.6 | 4.0 | 2.0 | 19.0 | +0.00 -0.21 | 1.3 | 1.5 | EXT0200 |
| 21 | 1.00 | | 19.5 | | 29.6 | 2.7 | 4.0 | 2.0 | 20.0 | | 1.3 | 1.5 | EXT0210 |
| 22 | 1.00 | | 20.5 | | 30.8 | 2.8 | 4.2 | 2.0 | 21.0 | | 1.3 | 1.5 | EXT0220 |
| 23 | 1.20 | | 21.5 | | 32.0 | 2.9 | 4.3 | 2.0 | 22.0 | | 1.3 | 1.5 | EXT0230 |
| 24 | 1.20 | | 22.2 | +0.21 -0.42 | 33.2 | 3.0 | 4.4 | 2.0 | 22.9 | | 1.3 | 1.7 | EXT0240 |
| 25 | 1.20 | | 23.2 | | 34.2 | 3.0 | 4.4 | 2.0 | 23.9 | | 1.3 | 1.7 | EXT0250 |
| 26 | 1.20 | | 24.2 | | 35.5 | 3.1 | 4.5 | 2.0 | 24.9 | | 1.3 | 1.7 | EXT0260 |
| 27 | 1.20 | | 24.9 | | 36.7 | 3.1 | 4.6 | 2.0 | 25.6 | | 1.3 | 2.1 | EXT0270 |
| 28 | 1.20 | | 25.9 | | 37.9 | 3.2 | 4.7 | 2.0 | 26.6 | | 1.6 | 2.1 | EXT0280 |

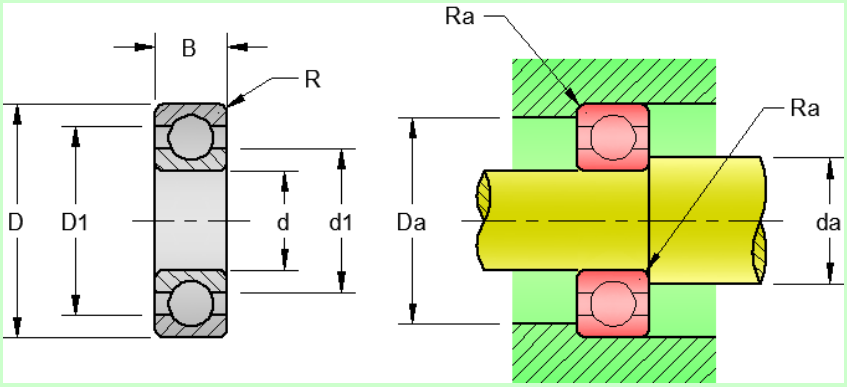
## Tables

| Most sizes over 170mm are without lugs | | | | | | | | | Measurements are in mm | | | | Code No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shaft | Circlip Dimensions | | | | | | | | Groove Dimensions | | | | |
| | t | Tol | d | Tol | Cs | b | L | h | G | Tol | W | n | |
| 29 | 1.20 | | 26.9 | +0.21 -0.42 | 39.1 | 3.4 | 4.8 | 2.0 | 27.6 | +0.00 -0.21 | 1.6 | 2.1 | EXT0290 |
| 30 | 1.20 | | 27.9 | | 40.5 | 3.5 | 5.0 | 2.0 | 28.6 | | 1.6 | 2.1 | EXT0300 |
| 31 | 1.20 | | 28.6 | | 41.5 | 3.5 | 5.0 | 2.5 | 29.3 | | 1.6 | 2.6 | EXT0310 |
| 32 | 1.20 | | 29.6 | | 43.0 | 3.6 | 5.2 | 2.5 | 30.3 | | 1.6 | 2.6 | EXT0320 |
| 33 | 1.20 | | 30.5 | | 44.0 | 3.7 | 5.2 | 2.5 | 31.3 | | 1.6 | 2.6 | EXT0330 |
| 34 | 1.50 | | 31.5 | | 45.5 | 3.8 | 5.4 | 2.5 | 32.3 | | 1.6 | 2.6 | EXT0340 |
| 35 | 1.50 | | 32.2 | | 46.8 | 3.9 | 5.6 | 2.5 | 33.0 | | 1.6 | 3.0 | EXT0350 |
| 36 | 1.50 | | 33.2 | +0.25 -0.50 | 47.8 | 4.0 | 5.6 | 2.5 | 34.0 | | 1.85 | 3.0 | EXT0360 |
| 37 | 1.50 | | 34.2 | | 49.0 | 4.1 | 5.7 | 2.5 | 35.0 | | 1.85 | 3.0 | EX370T0 |
| 38 | 1.50 | +0.00 -0.06 | 35.2 | | 50.2 | 4.2 | 5.8 | 2.5 | 36.0 | | 1.85 | 3.0 | EXT0380 |
| 39 | 1.50 | | 36.0 | | 51.4 | 4.3 | 5.9 | 2.5 | 37.0 | | 1.85 | 3.8 | EXT0390 |
| 40 | 1.75 | | 36.5 | | 52.6 | 4.4 | 6.0 | 2.5 | 37.5 | | 1.85 | 3.8 | EXT0400 |
| 41 | 1.75 | | 37.5 | | 54.1 | 4.5 | 6.2 | 2.5 | 38.5 | | 1.85 | 3.8 | EXT0410 |
| 42 | 1.75 | | 38.5 | | 55.7 | 4.5 | 6.5 | 2.5 | 39.5 | +0.00 -0.25 | 1.85 | 3.8 | EXT0420 |
| 43 | 1.75 | | 39.5 | | 56.7 | 4.6 | 6.6 | 2.5 | 40.5 | | 1.85 | 3.8 | EXT0430 |
| 44 | 1.75 | | 40.5 | | 57.9 | 4.6 | 6.7 | 2.5 | 41.5 | | 1.85 | 3.8 | EXT0440 |
| 45 | 1.75 | | 41.5 | | 59.1 | 4.7 | 6.7 | 2.5 | 42.5 | | 1.85 | 3.8 | EXT0450 |
| 46 | 1.75 | | 42.5 | +0.39 -0.90 | 60.1 | 4.8 | 6.8 | 2.5 | 43.5 | | 1.85 | 3.8 | EXT0460 |
| 47 | 1.75 | | 43.5 | | 61.3 | 4.9 | 6.9 | 2.5 | 44.5 | | 1.85 | 3.8 | EXT0470 |
| 48 | 1.75 | | 44.5 | | 62.5 | 5.0 | 6.9 | 2.5 | 45.5 | | 1.85 | 3.8 | EXT0480 |
| 50 | 2.00 | | 45.8 | | 64.5 | 5.1 | 6.9 | 2.5 | 47.0 | | 2.15 | 4.5 | EXT0500 |
| 51 | 2.00 | | 46.8 | | 65.7 | 5.2 | 7.0 | 2.5 | 48.0 | | 2.15 | 4.5 | EXT0510 |
| 52 | 2.00 | | 47.8 | | 66.7 | 5.2 | 7.0 | 2.5 | 49.0 | | 2.15 | 4.5 | EXT0520 |
| 53 | 2.00 | +0.00 -0.07 | 48.8 | | 68.0 | 5.3 | 7.1 | 2.5 | 50.0 | | 2.15 | 4.5 | EXT0530 |
| 54 | 2.00 | | 49.8 | +0.46 -1.10 | 69.0 | 5.3 | 7.1 | 2.5 | 51.0 | +0.00 -0.30 | 2.15 | 4.5 | EXT0540 |
| 55 | 2.00 | | 50.8 | | 70.2 | 5.4 | 7.2 | 2.5 | 52.0 | | 2.15 | 4.5 | EXT0550 |
| 56 | 2.00 | | 51.8 | | 71.6 | 5.5 | 7.3 | 2.5 | 53.0 | | 2.15 | 4.5 | EXT0560 |
| 57 | 2.00 | | 52.8 | | 72.4 | 5.5 | 7.3 | 2.5 | 54.0 | | 2.15 | 4.5 | EXT0570 |
| 58 | 2.00 | | 53.8 | | 73.6 | 5.6 | 7.3 | 2.5 | 55.0 | | 2.15 | 4.5 | EXT0580 |
| 60 | 2.00 | | 55.8 | | 75.6 | 5.8 | 7.4 | 2.5 | 57.0 | | 2.15 | 4.5 | EXT0600 |
| 62 | 2.00 | | 57.8 | | 77.8 | 6.0 | 7.5 | 2.5 | 59.0 | | 2.15 | 4.5 | EXT0620 |
| 63 | 2.00 | | 58.8 | | 79.0 | 6.2 | 7.6 | 2.5 | 60.0 | | 2.15 | 4.5 | EXT0630 |
| 65 | 2.50 | | 62.5 | | 81.4 | 6.3 | 7.8 | 3.0 | 62.0 | | 2.65 | 4.5 | EXT0650 |
| 67 | 2.50 | +0.00 -0.07 | 63.5 | +0.46 -1.10 | 83.6 | 6.4 | 7.9 | 3.0 | 64.0 | +0.00 -0.30 | 2.65 | 4.5 | EXT0670 |
| 68 | 2.50 | | 63.5 | | 84.4 | 6.5 | 8.0 | 3.0 | 65.0 | | 2.65 | 4.5 | EXT0680 |
| 70 | 2.00 | | 65.5 | | 87.0 | 6.6 | 8.1 | 3.0 | 67.0 | | 2.65 | 4.5 | EXT0700 |
| 72 | 2.00 | | 67.5 | | 89.2 | 6.8 | 8.2 | 3.0 | 69.0 | | 2.65 | 4.5 | EXT0720 |
| 75 | 2.00 | | 70.5 | | 92.7 | 7.0 | 8.4 | 3.0 | 72.0 | | 2.65 | 4.5 | EXT0750 |
| 77 | 2.00 | | 72.5 | | 94.9 | 7.2 | 8.5 | 3.0 | 74.0 | | 2.65 | 4.5 | EXT0770 |
| 78 | 2.50 | | 73.5 | | 96.1 | 7.3 | 8.6 | 3.0 | 75.0 | | 2.65 | 4.5 | EXT0780 |

## Tables

| Most sizes over 170mm are without lugs | | | | | | | | | Measurements are in mm | | | | Code No. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Shaft | Circlip Dimensions | | | | | | | | Groove Dimensions | | | | |
| | t | Tol | d | Tol | Cs | b | L | h | G | Tol | W | n | |
| 80 | 2.50 | +0.00 -0.07 | 74.5 | +0.46 -1.10 | 98.1 | 7.4 | 8.6 | 3.0 | 76.5 | +0.00 -0.30 | 2.65 | 5.3 | EXT0800 |
| 82 | 3.00 | | 76.5 | | 100.3 | 7.6 | 8.7 | 3.0 | 78.5 | | 2.65 | 5.3 | EXT0820 |
| 85 | 3.00 | +0.00 -0.08 | 79.5 | | 100.3 | 7.8 | 8.7 | 3.5 | 81.5 | +0.00 -0.35 | 3.15 | 5.3 | EXT0850 |
| 87 | 3.00 | | 81.5 | +0.54 -1.30 | 105.5 | 7.9 | 8.8 | 3.5 | 83.5 | | 3.15 | 5.3 | EXT0870 |
| 88 | 3.00 | | 82.5 | | 106.5 | 8.0 | 8.8 | 3.5 | 84.5 | | 3.15 | 5.3 | EXT0880 |
| 90 | 3.00 | | 84.5 | | 108.5 | 8.2 | 8.8 | 3.5 | 86.5 | | 3.15 | 5.3 | EXT0900 |
| 92 | 3.00 | | 86.5 | | 111.0 | 8.4 | 9.0 | 3.5 | 88.5 | | 3.15 | 5.3 | EXT0920 |
| 95 | 3.00 | | 89.5 | | 114.8 | 8.6 | 9.4 | 3.5 | 91.5 | | 3.15 | 5.3 | EXT0950 |
| 97 | 3.00 | | 91.5 | | 116.8 | 8.8 | 9.4 | 3.5 | 93.5 | | 3.15 | 5.3 | EXT0970 |
| 98 | 3.00 | | 92.5 | | 118.0 | 9.0 | 9.5 | 3.5 | 94.5 | | 3.15 | 5.3 | EXT0980 |
| 100 | 3.00 | | 94.5 | | 120.2 | 9.0 | 9.6 | 3.5 | 96.5 | | 3.15 | 5.3 | EXT1000 |
| 102 | 4.00 | +0.00 -0.10 | 95.0 | | 122.4 | 9.2 | 9.7 | 3.5 | 98.0 | +0.00 -0.54 | 4.15 | 6.0 | EXT1020 |
| 105 | 4.00 | | 98.0 | | 125.8 | 9.3 | 9.9 | 3.5 | 101.0 | | 4.15 | 6.0 | EXT1050 |
| 108 | 4.00 | | 101.0 | | 129.0 | 9.5 | 10.0 | 3.5 | 104.0 | | 4.15 | 6.0 | EXT1080 |
| 110 | 4.00 | | 103.0 | | 131.2 | 9.6 | 10.1 | 3.5 | 106.0 | | 4.15 | 6.0 | EXT1100 |
| 112 | 4.00 | | 105.0 | | 133.7 | 9.7 | 10.3 | 3.5 | 108.0 | | 4.15 | 6.0 | EXT1120 |
| 115 | 4.00 | | 108.0 | | 133.7 | 9.8 | 10.6 | 3.5 | 111.0 | | 4.15 | 6.0 | EXT1150 |
| 120 | 4.00 | | 113.0 | | 143.1 | 10.2 | 11.0 | 3.5 | 116.0 | | 4.15 | 6.0 | EXT1200 |
| 125 | 4.00 | | 118.0 | | 149.0 | 10.4 | 11.4 | 4.0 | 121.0 | +0.00 -0.63 | 4.15 | 6.0 | EXT1250 |
| 130 | 4.00 | | 123.0 | +0.63 -1.50 | 154.4 | 10.7 | 11.6 | 4.0 | 126.0 | | 4.15 | 6.0 | EXT1300 |
| 135 | 4.00 | | 128.0 | | 159.8 | 11.0 | 11.8 | 4.0 | 131.0 | | 4.15 | 6.0 | EXT1350 |
| 140 | 4.00 | | 133.0 | | 165.2 | 11.2 | 12.0 | 4.0 | 136.0 | | 4.15 | 6.0 | EXT1400 |
| 145 | 4.00 | | 138.0 | | 170.6 | 11.5 | 12.2 | 4.0 | 141.0 | | 4.15 | 6.0 | EXT1450 |
| 150 | 4.00 | | 142.0 | | 177.3 | 11.8 | 13.0 | 4.0 | 145.0 | | 4.15 | 6.0 | EXT1500 |
| 155 | 4.00 | | 146.0 | | 182.3 | 12.0 | 13.0 | 4.0 | 150.0 | | 4.15 | 7.5 | EXT1550 |
| 160 | 4.00 | | 151.0 | | 188.0 | 12.2 | 13.3 | 4.0 | 155.0 | | 4.15 | 7.5 | EXT1600 |
| 165 | 4.00 | | 155.5 | | 193.4 | 12.5 | 13.5 | 4.0 | 160.0 | | 4.15 | 7.5 | EXT1650 |
| 170 | 4.00 | | 160.5 | | 198.4 | 12.9 | 13.5 | 4.0 | 165.0 | | 4.15 | 7.5 | EXT1700 |
| 175 | 4.00 | | 165.5 | | 203.4 | 12.9 | 13.5 | 4.0 | 170.0 | | 4.15 | 7.5 | EXT1750 |
| 180 | 4.00 | | 170.5 | | 210.0 | 14.0 | 14.2 | 4.0 | 175.0 | | 4.15 | 7.5 | EXT1800 |
| 185 | 4.00 | | 175.5 | | 215.0 | 14.0 | 14.2 | 4.0 | 180.0 | | 4.15 | 7.5 | EXT1850 |

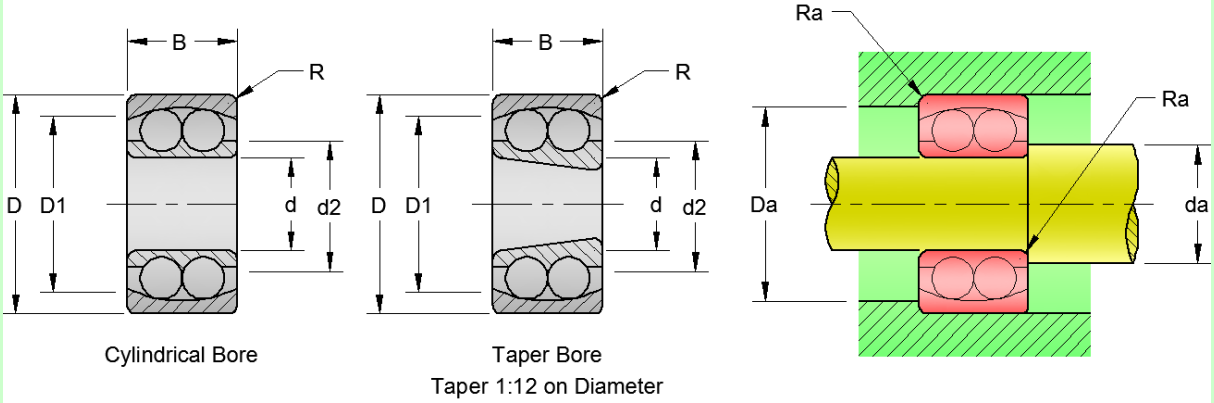
## Table 3 – Deep Groove Ball Bearings




| Principal Dimensions | | | Mass | Part No. | Dimensions | | | Abutment & Fillet Dimensions | | |
|---|---|---|---|---|---|---|---|---|---|---|
| mm | | | kg | | mm | | | mm | | |
| d | D | B | | | d1 | D1 | r | da | Da max | Ra Max |
| 17 | 26 | 5 | 0.0082 | 61803 | 20.2 | 23.2 | 0.3 | 19 | 24 | 0.3 |
| | 35 | 8 | 0.032 | 16003 | 22.8 | 29.5 | 0.3 | 19 | 33 | 0.3 |
| | 35 | 10 | 0.039 | 6003 | 22.8 | 29.5 | 0.3 | 19 | 33 | 0.3 |
| | 40 | 12 | 0.065 | 6203 | 2402 | 32.9 | 0.6 | 21 | 36 | 0.6 |
| | 47 | 14 | 0.12 | 6303 | 26.5 | 37.6 | 1 | 22 | 42 | 1 |
| | 62 | 17 | 0.27 | 6403 | 32.4 | 47.4 | 1.1 | 23.5 | 55.5 | 1 |
| 20 | 32 | 7 | 0.018 | 61804 | 24 | 28.3 | 0.3 | 22 | 30 | 0.3 |
| | 42 | 8 | 0.050 | 16004 | 27.2 | 34.6 | 0.3 | 22 | 40 | 0.3 |
| | 42 | 12 | 0.069 | 6004 | 27.2 | 35.1 | 0.6 | 24 | 38 | 0.6 |
| | 47 | 14 | 0.11 | 6204 | 28.5 | 38.7 | 1 | 25 | 42 | 1 |
| | 52 | 15 | 0.14 | 6304 | 30.3 | 42.1 | 1.1 | 26.5 | 45.5 | 1 |
| | 72 | 19 | 0.40 | 6404 | 37.1 | 55.6 | 1.1 | 26.5 | 65.5 | 1 |
| 25 | 37 | 7 | 0.022 | 61805 | 29 | 33 | 0.3 | 27 | 35 | 0.3 |
| | 47 | 8 | 0.060 | 16005 | 33.3 | 40.7 | 0.3 | 27 | 45 | 0.3 |
| | 47 | 12 | 0.080 | 6005 | 32 | 40.3 | 0.6 | 29 | 43 | 0.6 |
| | 52 | 15 | 0.13 | 6205 | 34 | 44.2 | 1 | 30 | 47 | 1 |
| | 62 | 17 | 0.23 | 6305 | 36.6 | 50.9 | 1.1 | 31.5 | 55.5 | 1 |
| | 80 | 21 | 0.53 | 6405 | 45.4 | 63.8 | 1.5 | 33 | 72 | 1.5 |
| 30 | 52 | 7 | 0.026 | 61806 | 33.8 | 38.2 | 0.3 | 32 | 40 | 0.3 |
| | 55 | 9 | 0.085 | 16006 | 38 | 47.3 | 0.3 | 32 | 53 | 0.3 |
| | 55 | 13 | 0.12 | 6006 | 38.2 | 47.1 | 1 | 35 | 50 | 1 |
| | 62 | 16 | 0.20 | 6206 | 40.3 | 52.1 | 1 | 35 | 57 | 1 |
| | 72 | 19 | 0.35 | 6306 | 44.6 | 59.9 | 1.1 | 36.5 | 65.5 | 1 |
| | 90 | 23 | 0.74 | 6406 | 50.3 | 70.7 | 1.5 | 38 | 82 | 1.5 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 35 | 47 | 7 | 0.030 | 61807 | 38.8 | 43.2 | 0.3 | 37 | 45 | 0.3 |
| | 62 | 9 | 0.11 | 16007 | 44 | 53.3 | 0.3 | 37 | 60 | 0.3 |
| | 62 | 14 | 0.16 | 6007 | 43.7 | 53.6 | 1 | 40 | 57 | 1 |
| | 72 | 17 | 0.29 | 6207 | 46.9 | 60.6 | 1.1 | 41.5 | 65.5 | 1 |
| | 80 | 21 | 0.46 | 6307 | 49.5 | 66.1 | 1.5 | 43 | 72 | 1.5 |
| | 100 | 25 | 0.95 | 6407 | 57.4 | 80.6 | 1.5 | 43 | 92 | 1.5 |
| 40 | 52 | 7 | 0.034 | 61808 | 43.8 | 48.2 | 0.3 | 42 | 50 | 0.3 |
| | 68 | 9 | 0.13 | 16008 | 49.4 | 57 | 0.3 | 42 | 66 | 0.3 |
| | 68 | 15 | 0.19 | 6008 | 49.2 | 59.1 | 1 | 45 | 63 | 1 |
| | 80 | 18 | 0.37 | 6208 | 52.6 | 67.9 | 1.1 | 46.5 | 73.5 | 1 |
| | 90 | 23 | 0.63 | 6308 | 56.1 | 74.7 | 1.5 | 48 | 82 | 1.5 |

## Table 4 – Self Aligning Ball Bearings

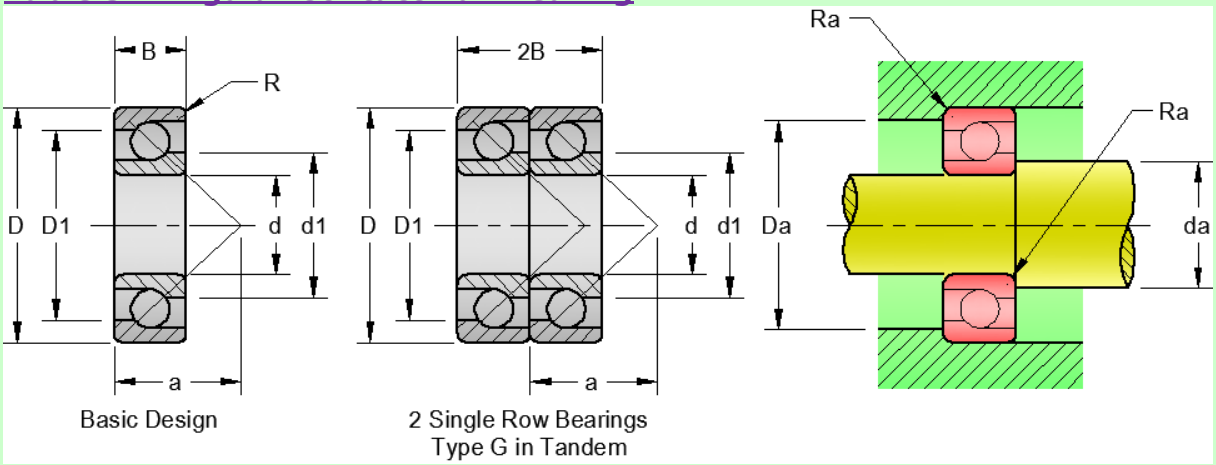



| Boundary Dimensions | | | Mass | Part Number | | Dimensions | | | Abutment & Fillet Dimensions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | | Cyl. Bore | Taper Bore | d2 | D1 | R Min | da Min | Da max | Ra max |
| mm | | | kg | | | mm | | | mm | | |
| 17 | 40 | 12 | 0.16 | 1203 | - | 24.2 | 33.7 | 1 | 21 | 36 | 0.6 |
| | 40 | 16 | 0.19 | 2203 | - | 23.5 | 34.3 | 1 | 21 | 36 | 0.6 |
| | 47 | 14 | 0.29 | 1303 | - | 26.4 | 38.3 | 1.5 | 22 | 42 | 1 |
| | 47 | 19 | 0.35 | 2303 | - | 25.8 | 39.4 | 1.5 | 22 | 42 | 1 |
| 20 | 47 | 14 | 0.26 | 1204 | - | 28.9 | 39.1 | 1.5 | 25 | 42 | 1 |
| | 47 | 18 | 0.31 | 2204 | - | 28.0 | 40.4 | 1.5 | 25 | 42 | 1 |
| | 52 | 15 | 0.35 | 1304 | - | 31.3 | 43.6 | 2 | 26.5 | 45.5 | 1 |
| | 52 | 21 | 0.46 | 2304 | - | 28.8 | 43.7 | 2 | 26.5 | 45.5 | 1 |
| 25 | 52 | 15 | 0.31 | 1205 | 1205K | 33.1 | 44.9 | 1.5 | 30 | 47 | 1 |
| | 52 | 18 | 0.35 | 2205 | 2205K | 33.0 | 44.7 | 1.5 | 30 | 47 | 1 |
| | 62 | 17 | 0.57 | 1305 | 1305K | 37.8 | 52.5 | 2 | 31.5 | 55.5 | 1 |
| | 62 | 24 | 0.75 | 2305 | 2305K | 35.2 | 52.5 | 2 | 31.5 | 55.5 | 1 |
| 30 | 62 | 16 | 0.48 | 1206 | 1206K | 40.1 | 53.2 | 1.5 | 35 | 57 | 1 |
| | 62 | 20 | 0.57 | 2206 | 2206K | 40.0 | 53.0 | 1.5 | 35 | 57 | 1 |
| | 72 | 19 | 0.86 | 1306 | 1306K | 44.9 | 60.9 | 2 | 36.5 | 65.5 | 1 |
| | 72 | 27 | 1.10 | 2306 | 2306K | 41.7 | 60.9 | 2 | 36.5 | 65.5 | 1 |

Tables

| Boundary Dimensions | | | Mass | Part Number | | Dimensions | | | Abutment & Fillet Dimensions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | | Cyl. Bore | Taper Bore | d2 | D1 | R Min | da Min | Da max | Ra max |
| mm | | | kg | | | mm | | | mm | | |
| 35 | 72 | 17 | 0.71 | 1207 | 1207K | 47.5 | 60.7 | 2 | 41.5 | 65.5 | 1 |
| | 72 | 23 | 0.88 | 2207 | 2207K | 46.0 | 62.2 | 2 | 41.5 | 65.5 | 1 |
| | 80 | 21 | 1.10 | 1307 | 1307K | 51.5 | 69.5 | 2.5 | 43 | 72 | 1.5 |
| | 80 | 31 | 1.50 | 2307 | 2307K | 46.5 | 68.4 | 2.5 | 43 | 72 | 1.5 |
| 40 | 80 | 18 | 0.93 | 1208 | 1208K | 53.6 | 68.8 | 2 | 46.5 | 73.5 | 1 |
| | 80 | 23 | 1.10 | 2208 | 2208K | 52.4 | 68.8 | 2 | 46.5 | 73.5 | 1 |
| | 90 | 23 | 1.60 | 1308 | 1308K | 57.5 | 76.8 | 2.5 | 48 | 82 | 1.5 |
| | 90 | 33 | 2.05 | 2308 | 2308K | 53.5 | 76.8 | 2.5 | 48 | 82 | 1.5 |

## Table 5 - Angular Contact Ball Bearing

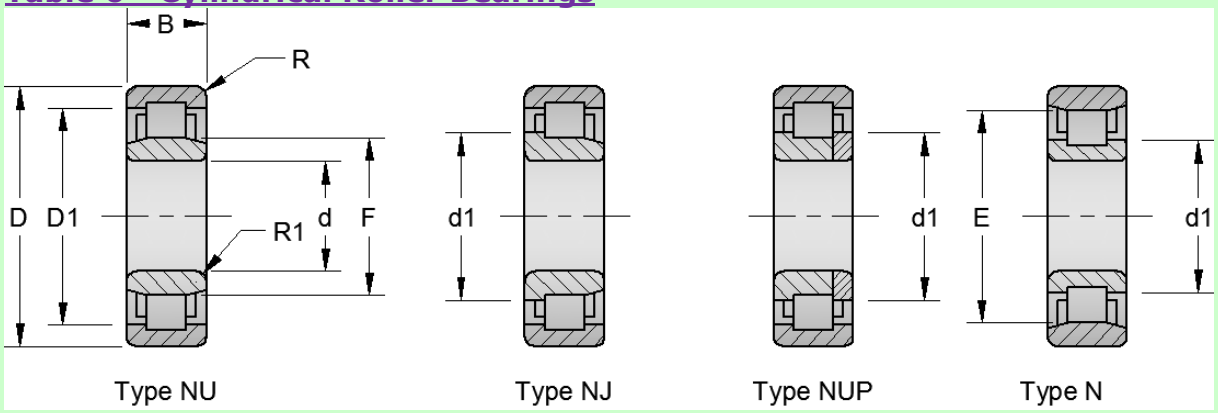



| Principal Dimensions | | | Mass | Part No. | Dimensions | | | | Abutment & Fillet Dimensions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | B | | | d1 | D1 | R | a | da | Da max | Ra max |
| mm | | | kg | | mm | | | | mm | | |
| 20 | 42 | 12 | 0.33 | 7004 C | 26.9 | 35.1 | 1 | 10 | 25 | 37 | 0.6 |
| | 42 | 24 | 0.68 | 2 x 7004 CG | 26.9 | 35.1 | 1 | 10 | 25 | 37 | 0.6 |
| | 47 | 14 | 0.48 | 7204 C | 29.1 | 38.7 | 1.5 | 12 | 26 | 41 | 1 |
| | 47 | 14 | 0.58 | 7204 B | 30.7 | 36.7 | 1.5 | 21 | 26 | 41 | 1 |
| | 47 | 28 | 0.97 | 2 x 7204 CG | 29.1 | 38.7 | 1.5 | 12 | 26 | 41 | 1 |
| | 47 | 28 | 1.08 | 2 x 7024 BG | 30.7 | 36.7 | 1.5 | 21 | 26 | 41 | 1 |
| | 52 | 15 | 0.73 | 304 B | 32.7 | 39.9 | 2 | 23 | 27 | 45 | 1 |
| | 52 | 30 | 1.45 | 2 x 7304 BG | 32.7 | 39.9 | 2 | 23 | 27 | 45 | 1 |
| 25 | 47 | 12 | 0.40 | 7005 C | 31.9 | 40.1 | 1 | 11 | 30 | 42 | 0.6 |
| | 47 | 24 | 0.77 | 2 x 7005 CG | 31.9 | 40.1 | 1 | 11 | 30 | 42 | 0.6 |
| | 52 | 15 | 0.57 | 7205 C | 34.1 | 43.7 | 1.5 | 13 | 31 | 46 | 1 |
| | 52 | 15 | 0.68 | 7205 B | 36.3 | 42.3 | 1.5 | 24 | 31 | 46 | 1 |
| | 52 | 30 | 1.17 | 2 x 7205 CG | 34.1 | 43.7 | 1.5 | 13 | 31 | 46 | 1 |
| | 52 | 30 | 1.36 | 2 x 7205 BG | 36.3 | 42.3 | 1.5 | 24 | 31 | 46 | 1 |
| | 62 | 17 | 1.17 | 7205 B | 39.6 | 48 | 2 | 27 | 32 | 55 | 1 |
| | 62 | 34 | 2.31 | 2 x 7305 BG | 39.6 | 48 | 2 | 27 | 32 | 55 | 1 |

Tables

| Principal Dimensions | | | Mass | Part No. | Dimensions | | | | Abutment & Fillet Dimensions | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| D | d | B | | | d1 | D1 | R | a | da | Da max | Ra max |
| mm | | | kg | | mm | | | | mm | | |
| 30 | 55 | 13 | 0.57 | 7006 C | 38.1 | 46.9 | 1.5 | 12 | 36 | 49 | 1 |
| | 55 | 26 | 1.17 | 2 x 7006 CG | 38.1 | 46.9 | 1.5 | 12 | 36 | 49 | 1 |
| | 62 | 16 | 0.92 | 7206 C | 40.3 | 51.7 | 1.5 | 14 | 36 | 56 | 1 |
| | 62 | 16 | 1.01 | 7206 B | 42.7 | 49.9 | 1.5 | 27 | 36 | 56 | 1 |
| | 62 | 32 | 1.85 | 2 x 7206 CG | 40.3 | 51.7 | 1.5 | 14 | 36 | 56 | 1 |
| | 62 | 32 | 2.05 | 2 x 7206 BG | 42.7 | 49.9 | 1.5 | 27 | 36 | 56 | 1 |
| | 72 | 19 | 1.74 | 7306 B | 47.7 | 57 | 2 | 31 | 37 | 65 | 1 |
| | 72 | 38 | 3.52 | 2 x 7306 BG | 47.7 | 57 | 2 | 31 | 37 | 65 | 1 |
| 35 | 62 | 14 | 0.77 | 7007 C | 43.7 | 53.3 | 1.5 | 14 | 41 | 56 | 1 |
| | 62 | 28 | 1.56 | 2 x 7007 CG | 43.7 | 53.3 | 1.5 | 14 | 41 | 56 | 1 |
| | 72 | 17 | 1.32 | 7207 C | 47 | 60 | 2 | 16 | 42 | 65 | 1 |
| | 72 | 17 | 1.45 | 7207 B | 49.6 | 58 | 2 | 31 | 42 | 65 | 1 |
| | 72 | 34 | 2.64 | 2 x 7207 CG | 47 | 60 | 2 | 16 | 42 | 65 | 1 |
| | 72 | 34 | 2.86 | 2 x 7207 BG | 49.6 | 58 | 2 | 31 | 42 | 65 | 1 |
| | 80 | 21 | 2.31 | 7307 B | 52.8 | 63 | 2.5 | 35 | 44 | 71 | 1 |
| | 80 | 42 | 4.62 | 2 x 7307 BG | 52.8 | 63 | 2.5 | 35 | 44 | 71 | 1 |

## Table 6 - Cylindrical Roller Bearings




| Principal Dimensions | | | | Part Number | | | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | kg | NU | NJ | NUP | N | d1 | D1 | E | F | R | R1 |
| mm | | | | | | | | | | | | | |
| 12 | 22 | 8 | 0.11 | NU 1204 E | - | - | - | - | 18.6 | 19.5 | 13.5 | 0.5 | 0.25 |
| | 22 | 10 | 0.13 | NU 124 | NJ 124 | NUP 124 | N 124 | 14 | 18.6 | 19.5 | 13.5 | 0.5 | 0.25 |
| | 28 | 12 | 0.16 | - | NJ 124 E | NUP 1204 E | - | 17.8 | 23.7 | 25 | 16 | 0.5 | 0.25 |
| | 30 | 12 | 0.18 | NU 1204 | NJ 1204 | - | N 1204 | 19.1 | 25.4 | 27 | 17 | 0.5 | 0.25 |
| 14 | 28 | 8 | 0.15 | NU 1404 E | - | - | - | - | 23.7 | 25 | 17 | 0.5 | 0.25 |
| | 30 | 10 | 0.18 | NU 144 | NJ 144 | NUP 144 | N 144 | 19.1 | 25.4 | 27 | 18.5 | 0.5 | 0.25 |
| | 36 | 12 | 0.22 | - | NJ 1404 E | NUP 1404 E | - | 22.9 | 30.4 | 32 | 22 | 0.5 | 0.25 |
| | 37 | 12 | 0.24 | NU 1404 | NJ 1404 | - | N 1404 | 23.6 | 31.2 | 33 | 23 | 0.5 | 0.25 |
| 16 | 30 | 8 | 0.19 | NU 1604 E | - | - | - | - | 25.4 | 27 | 18 | 0.5 | 0.25 |
| | 32 | 10 | 0.22 | NU 1604 | NJ 164 | NUP 164 | N 164 | 20.4 | 27.0 | 28.5 | 19.5 | 0.5 | 0.25 |
| | 36 | 10 | 0.25 | - | NJ 1604 E | NUP 1604 E | - | 22.9 | 30.4 | 32 | 22 | 0.5 | 0.25 |
| | 36 | 12 | 0.29 | NU 164 | NJ 1604 | - | N 1604 | 22.9 | 30.4 | 32 | 22 | 0.5 | 0.25 |
| 18 | 32 | 10 | 0.28 | NU 1804 | - | - | - | - | 27.0 | 28.5 | 19.5 | 0.5 | 0.25 |
| | 36 | 10 | 0.32 | NU 1804 E | NJ 184 | NUP 184 | N 184 | 22.9 | 30.4 | 32 | 20 | 0.5 | 0.25 |
| | 40 | 12 | 0.40 | - | NJ 1804 E | NUP 1804 E | - | 25.5 | 33.8 | 37.5 | 24.5 | 0.5 | 0.25 |
| | 40 | 13 | 0.41 | NU 184 | NJ 1804 | - | N 1804 | 25.5 | 33.8 | 37.5 | 24.5 | 0.5 | 0.25 |
| 20 | 42 | 14 | 0.44 | NU 2004 E | - | - | - | - | 35.5 | 37.5 | 25.5 | 1 | 0.5 |
| | 47 | 14 | 0.53 | NU 204 | NJ 204 | NUP 204 | N 204 | 30 | 37.3 | 40 | 27 | 1.5 | 1 |
| | 47 | 14 | 0.53 | - | NJ 204 E | NUP 204 E | - | 29.7 | 38.8 | 41.5 | 26.5 | 1.5 | 1 |
| | 47 | 18 | 0.68 | NU 2204 | NJ 2204 | - | - | 30 | 37.3 | 40 | 27 | 1.5 | 1 |
| | 47 | 18 | 0.72 | - | NJ 2204 E | - | - | 29.7 | 38.8 | 41.5 | 26.5 | 1.5 | 1 |
| | 52 | 15 | 0.72 | NU 304 | NJ 304 | NUP 304 | N 304 | 31.8 | 40.5 | 44.5 | 28.5 | 2 | 1 |
| | 52 | 15 | 0.77 | NU 304 E | NJ 304 E | - | - | 31.2 | 42.4 | 45.5 | 27.5 | 2 | 1 |
| | 52 | 21 | 1.01 | NU 2304 | NJ 2304 | NUP 2304 | - | 31.8 | 40.5 | 44.5 | 28.5 | 2 | 1 |
| | 52 | 21 | 1.01 | NU 2304 E | NJ 2304 E | NUP 2304 E | - | 31.2 | 42.4 | 45.5 | 27.5 | 2 | 1 |

Tables

| Principal Dimensions | | | | Part Number | | | | Dimensions | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| d | D | B | kg | NU | NJ | NUP | N | d1 | D1 | E | F | R | R1 |
| mm | | | | | | | | | | | | | |
| 25 | 47 | 12 | 0.42 | NU 1005 | - | - | - | - | 38.8 | 41.5 | 30.5 | 1 | 0.5 |
| | 52 | 15 | 0.64 | NU 205 | NJ 205 | NUP 205 | N 205 | 35 | 42.3 | 45 | 32 | 1.5 | 1 |
| | 52 | 15 | 0.68 | NU 205 E | NJ 205 E | NUP 205 E | - | 34.7 | 43.8 | 46.5 | 31.5 | 1.5 | 1 |
| | 52 | 18 | 0.77 | NU2205 | NJ 2205 | NUP 2205 | - | 35 | 42.3 | 45 | 32 | 1.5 | 1 |
| | 52 | 18 | 0.81 | NU 2205 E | NJ 2205 E | NUP 2205 E | - | 34.7 | 43.8 | 46.5 | 31.5 | 1.5 | 1 |
| | 62 | 17 | 1.17 | NU 305 | NJ 305 | NUP 305 | N 305 | 39 | 48.7 | 53 | 35 | 2 | 2 |
| | 62 | 17 | 1.21 | NU 305 E | NJ 305 E | NUP 305 E | - | 38.2 | 50.7 | 54 | 34 | 2 | 2 |
| | 62 | 24 | 1.65 | NU 2305 | NJ 2305 | NUP 2305 | - | 39 | 48.7 | 53 | 35 | 2 | 2 |
| | 62 | 24 | 1.69 | NU 2305 E | NJ 2305 E | NUP 2305 E | - | 38.2 | 50.7 | 54 | 34 | 2 | 2 |
| 30 | 55 | 13 | 0.57 | NU 1006 | - | - | - | - | 45.6 | 48.5 | 36.5 | 1.5 | 0.8 |
| | 62 | 16 | 0.97 | NU 206 | NJ 206 | NUP 206 | N 206 | 41.8 | 49.8 | 53.5 | 38.5 | 1.5 | 1 |
| | 62 | 16 | 1.01 | NU 206 E | NJ 206 E | NUP 206 E | - | 41.2 | 51.9 | 55.5 | 37.5 | 1.5 | 1 |
| | 62 | 20 | 1.25 | NU 2206 | NJ 2206 | NUP 2206 | - | 41.8 | 49.8 | 53.5 | 38.5 | 1.5 | 1 |
| | 62 | 20 | 1.32 | NU 2206 E | NJ 2206 E | NUP 2206 E | - | 41.2 | 52.5 | 55.5 | 37.5 | 1.5 | 1 |
| | 72 | 19 | 1.74 | NU 306 | NJ 306 | NUP 306 | N 306 | 45.9 | 57.4 | 62 | 42 | 2 | 2 |
| | 72 | 19 | 1.80 | NU 306 E | NJ 306 E | NUP 306 E | - | 44.9 | 58.9 | 62.5 | 40.5 | 2 | 2 |
| | 72 | 27 | 2.42 | NU 2306 | NJ 2306 | NUP 2306 | - | 45.9 | 57.4 | 62 | 42 | 2 | 2 |
| | 72 | 27 | 2.53 | NU 2306 E | NJ 2306 E | NUP 2306 E | - | 45.1 | 58.9 | 62.5 | 40.5 | 2 | 2 |
| | 90 | 23 | 3.63 | NU 406 | NJ 306 | NUP 306 | - | 50.5 | 66.6 | 73 | 45 | 2.5 | 2.5 |
| 35 | 62 | 14 | 0.88 | NU 1007 | - | - | - | - | 51.8 | 55 | 42 | 1.5 | 0.8 |
| | 62 | 17 | 1.01 | NU 2007 E | - | - | - | - | 54.1 | 56.5 | 41.5 | 1.5 | 0.8 |
| | 72 | 17 | 1.41 | NU 207 | NJ 207 | NUP 207 | N 207 | 47.6 | 57.5 | 61.8 | 43.8 | 2 | 1 |
| | 72 | 17 | 1.50 | NU 207 E | NJ 207 E | NUP 207 E | - | 48.3 | 60.7 | 64 | 44 | 2 | 1 |
| | 72 | 23 | 1.94 | NU 2207 | NJ 2207 | NUP 2207 | - | 47.6 | 57.5 | 61.8 | 43.8 | 2 | 1 |
| | 72 | 23 | 1.98 | NU 2207 E | NJ 2207 E | NUP 2207 E | - | 48.3 | 60.7 | 64 | 44 | 2 | 1 |
| | 80 | 21 | 3.30 | NU 307 | NJ 307 | NUP 307 | N 307 | 50.8 | 63.2 | 68.2 | 46.2 | 2.5 | 2 |
| | 80 | 21 | 2.42 | NU 307 E | NJ 307 E | NUP 307 E | - | 51 | 66.3 | 70.2 | 46.2 | 2.5 | 2 |
| | 80 | 31 | 3.41 | NU 2307 | NJ 2307 | NUP 2307 | - | 50.8 | 63.2 | 68.2 | 46.2 | 2.5 | 2 |
| | 80 | 31 | 3.52 | NU 2307 E | NJ 2307 E | NUP 2307 E | - | 51 | 66.3 | 70.2 | 46.2 | 2.5 | 2 |
| | 100 | 25 | 4.84 | NU 407 | NJ 407 | NUP 407 | - | 59 | 76 | 83 | 53 | 2.5 | 2.5 |