

Engineering Graphics

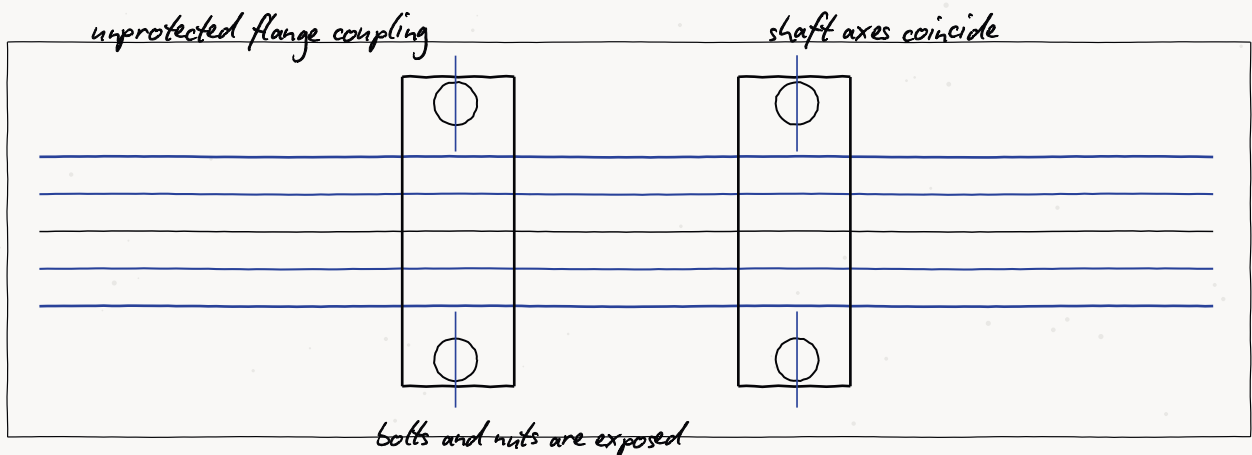
Shaft Couplings

These Class 12 handwritten notes revise machine drawing of shaft couplings from the NCERT Engineering Graphics chapter.

Focus: unprotected and protected flange couplings.

Keep axes, holes, keys, section side and titles clean.

Exam anchor: assembly and disassembly views are the scoring tasks.



Revision map

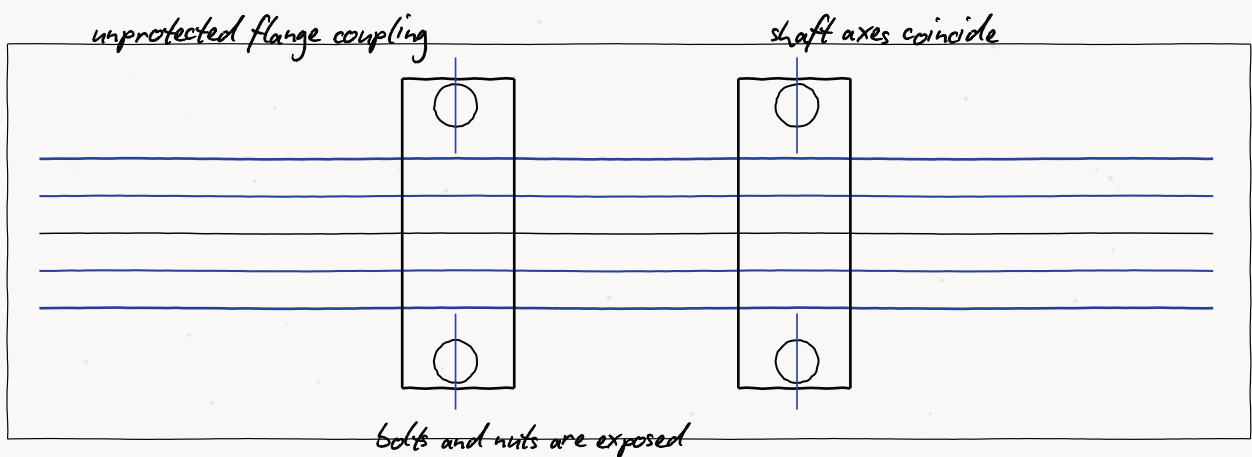
- * Purpose: join two co-axial shafts for power transmission
- * Main parts: shafts, flanges, keys, bolts and nuts
- * Views: front section, side view, assembly and disassembly
- * Safety idea: protected shroud covers exposed bolts

WHY SHAFT COUPLINGS ARE USED

A shaft coupling joins two separate shafts so rotation and power pass from one shaft to the next.

It is used when one long shaft is not practical. The two shafts must remain co-axial and properly keyed.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

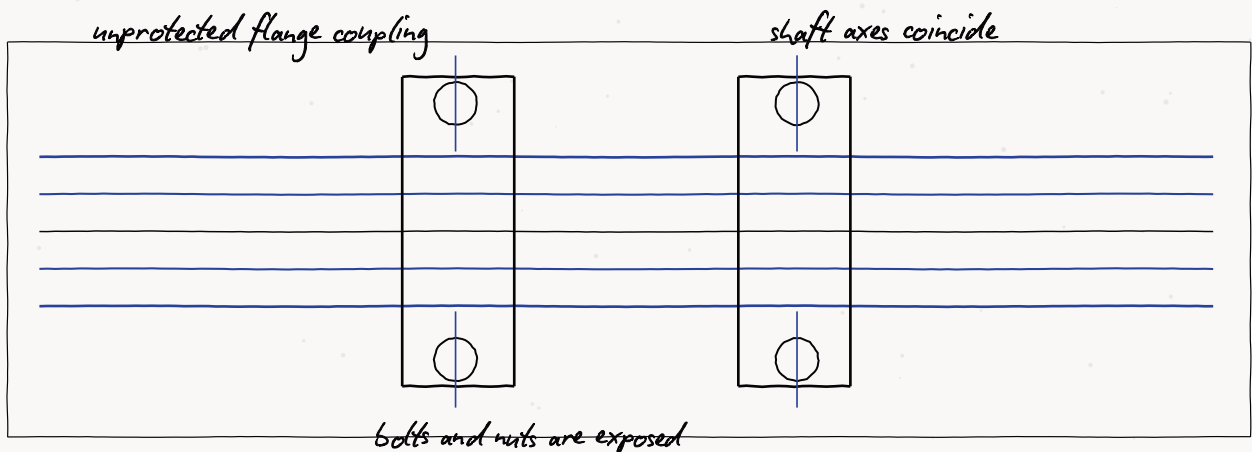
- * joins two shafts
- * transmits torque
- * keeps both axes in one straight line

BASIC FLANGE COUPLING IDEA

A flange is a circular plate fixed at the end of a shaft.
Two flanges meet face to face.

Bolts and nuts clamp the flanges. Keys lock each flange to its shaft so torque can pass safely.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

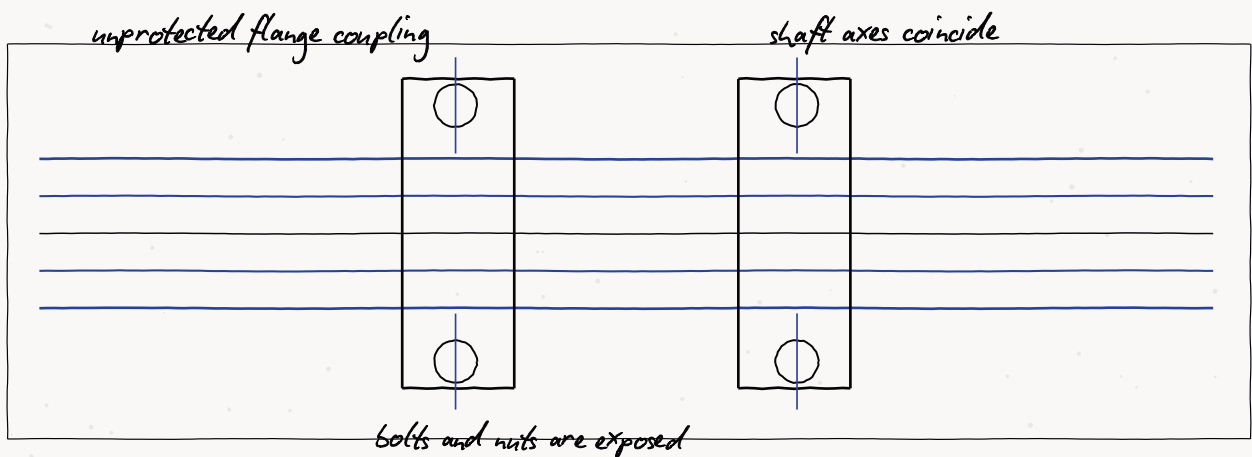
- * flange fixed to shaft
- * bolts clamp both flanges
- * keys prevent slipping

UNPROTECTED COUPLING

In an unprotected flange coupling, bolt heads and nuts remain outside the flange rim.

During rotation, exposed bolts can catch clothes or injure a worker. That is why it is called unprotected.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

- * Bolt heads are exposed
- * nuts are exposed
- * unsafe near rotating shafts

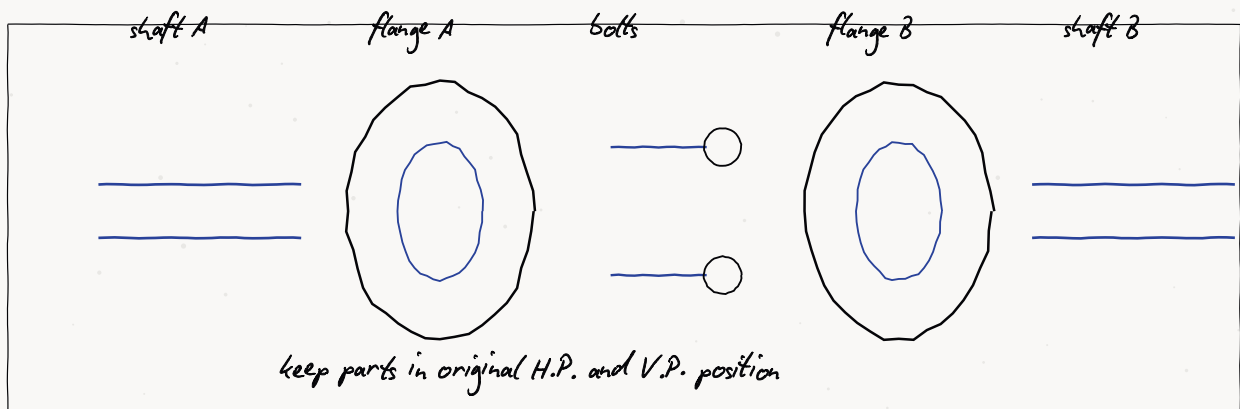
TEXTBOOK PARTS LIST

The NCERT examples show two shafts, two flanges, two keys and four or more bolts with nuts.

Exam note: direction words decide the final view.

The flanges are cast iron. Shafts, keys, bolts and nuts are usually mild steel in school drawing notes.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

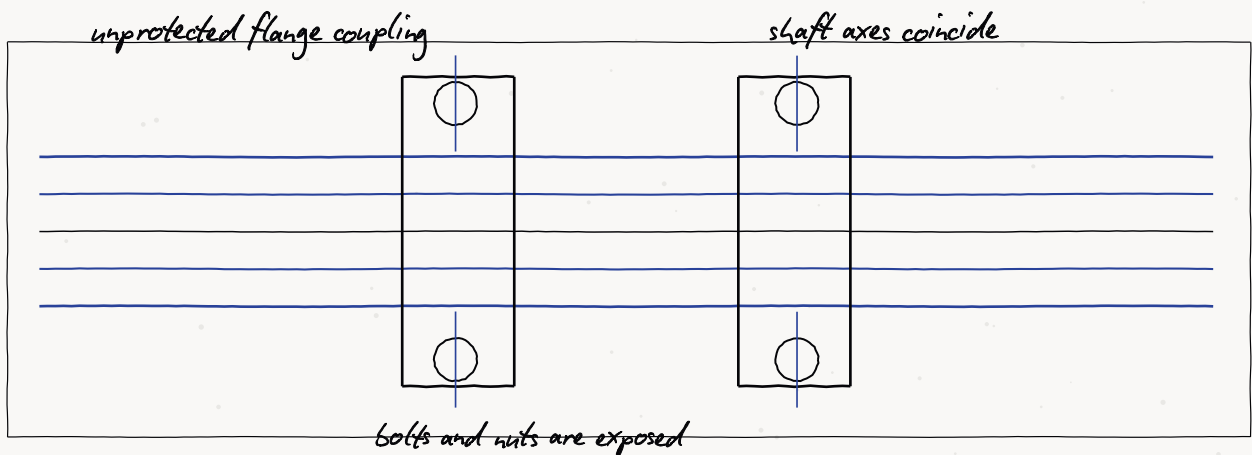
- * C.I. flanges
- * M.S. shafts and keys
- * M.S. bolts and nuts

COMMON AXIS RULE

Start every assembly with one long centre line. Both shafts, both bosses and both flanges share this axis.

If the axis breaks, the whole answer looks wrong even when small dimensions are correct.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

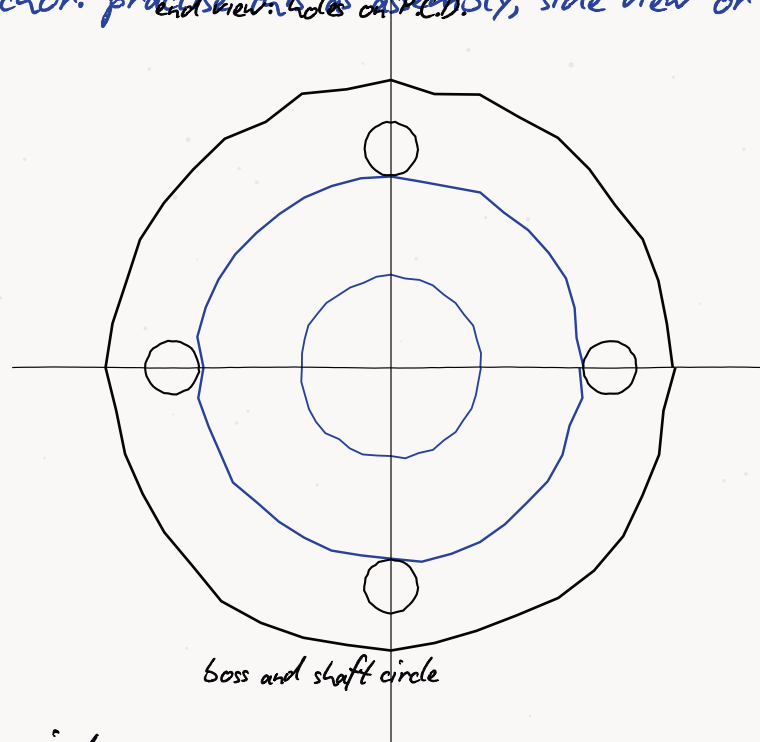
- * draw centre line first
- * place both shafts on it
- * project side view from this line

BOSS AND FLANGE SHAPE

The boss is the thick central hub around the shaft. The flange is the broad circular plate at the end.

In front view, boss and shaft look like long cylinders. In side view, they become concentric circles.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

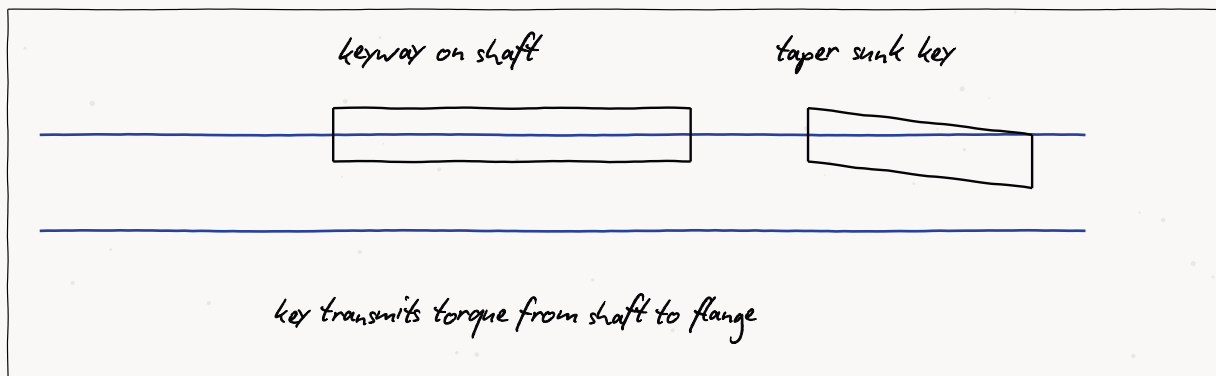
- * boss is thicker
- * flange has larger diameter
- * side view shows circles

KEY AND KEYWAY

A rectangular sunk taper key fits partly in the shaft and partly in the flange hub.

The key prevents relative rotation. In disassembly questions, key views must stay in the same position as the assembly.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

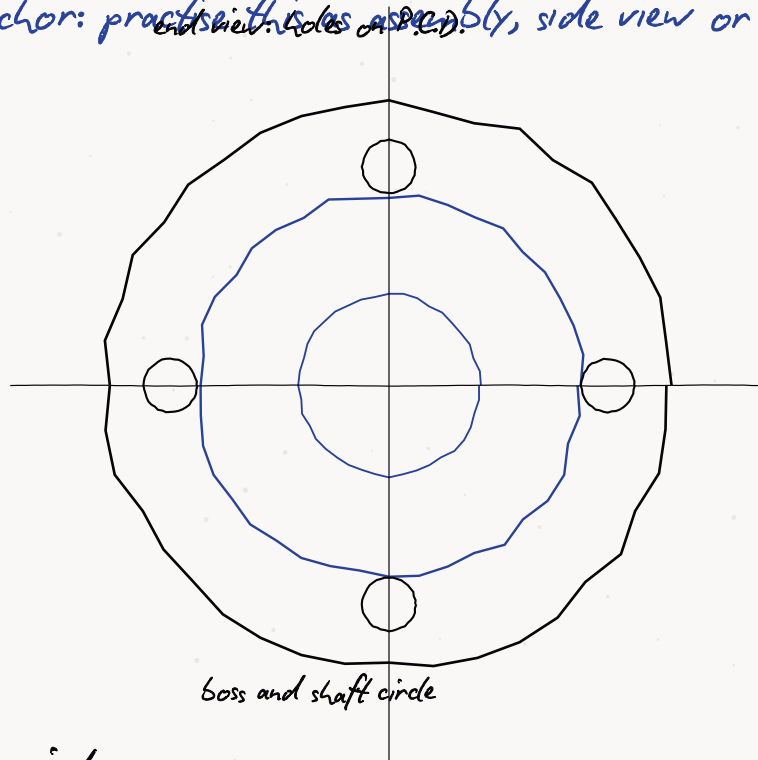
- * key transmits torque
- * keyway is cut in shaft
- * taper is usually 1 in 100

BOLTS ON P.C.D.

Bolts are placed on a pitch circle diameter. Four bolts are commonly shown at right angles.

In side view, mark equal angular spacing. Unequal holes make a neat answer look careless.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

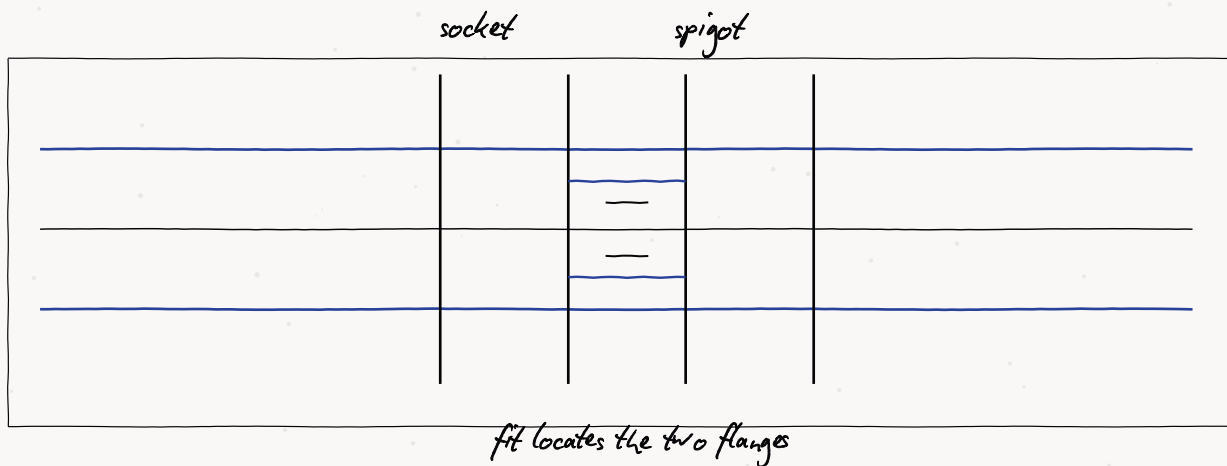
- * use P.C.D. circle
- * space holes equally
- * show four holes clearly

SOCKET AND SPIGOT FIT

Some unprotected couplings use socket and spigot arrangement between the flanges.

The socket and spigot help locate the flanges accurately before bolts are tightened.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

- * spigot enters socket
- * faces still meet squarely
- * small clearance may be given

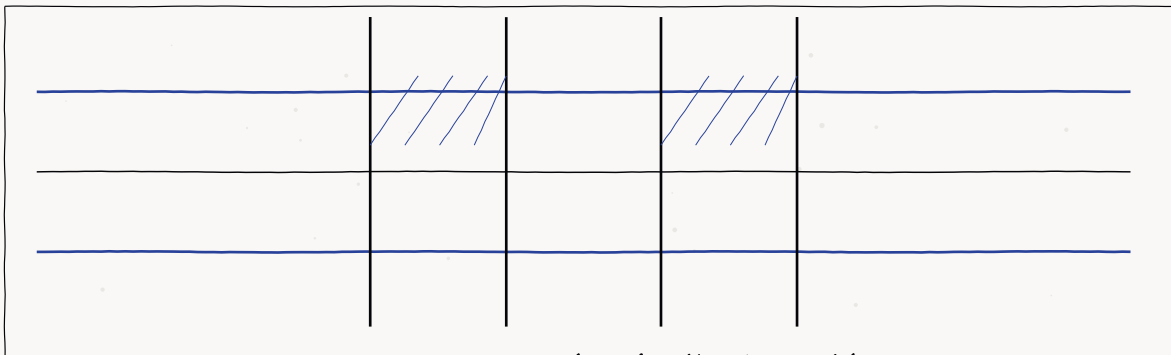
UPPER HALF SECTION

When the question asks upper half in section, imagine only the upper half cut by the vertical plane.

Hatch cut solid metal only. Shaft hole, bolt holes and keyway spaces must remain blank.

Exam anchor: practise this as assembly, side view or disassembly work.

hatch only cut solid metal



shaft hole and bolt holes stay blank

Quick points

- * upper side gets hatching
- * lower side stays outside view
- * holes are not hatched

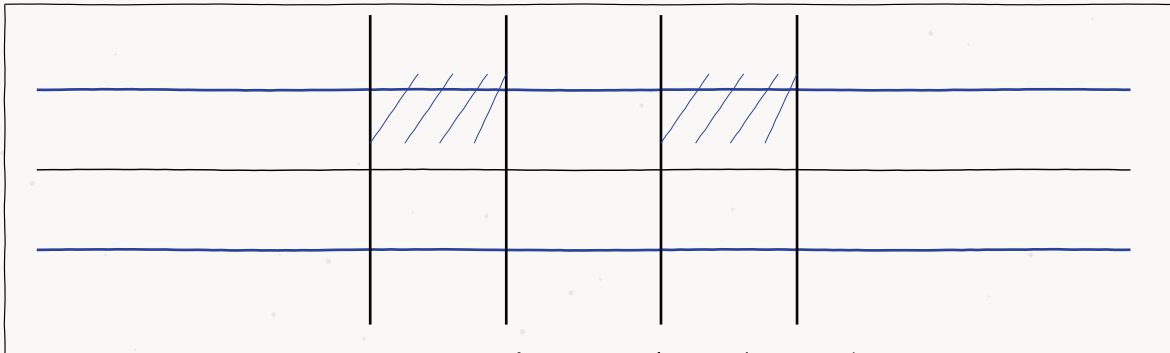
LOWER HALF SECTION

Lower half section follows the same rule, but the lower part is sectioned instead.

Exam note: direction words decide the final view.

Do not copy the upper half answer by habit. The section side is a direct instruction in the question.

Exam anchor: practise this as assembly, side view or disassembly work.
hatch only cut solid metal



shaft hole and bolt holes stay blank

Quick points

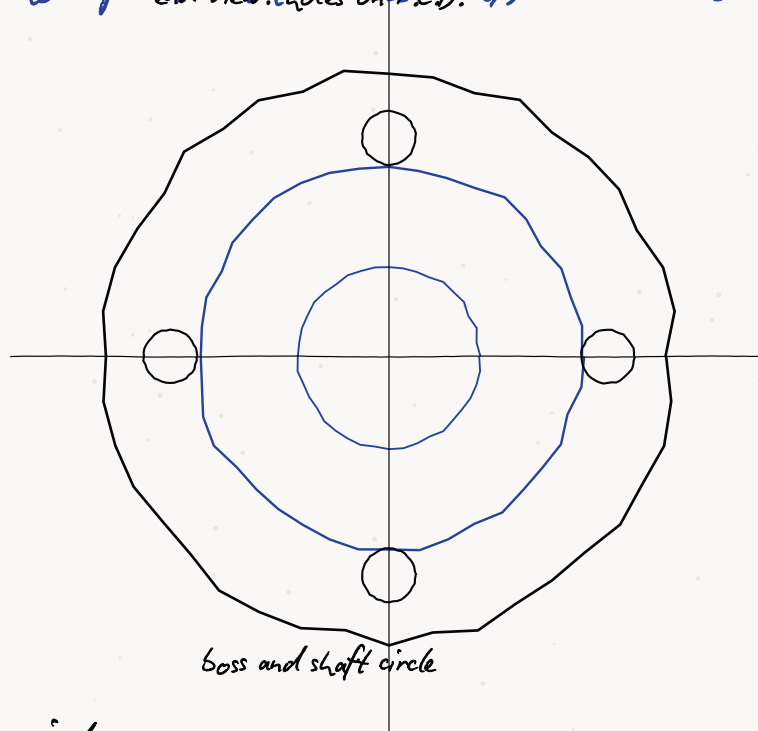
- * read upper or lower carefully
- * keep the axis common
- * hatch the correct half

SIDE VIEW METHOD

The side view shows outer flange circle, boss circle, shaft circle and holes on the pitch circle.

Choose left or right side exactly as asked. Direction words carry marks in this chapter.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

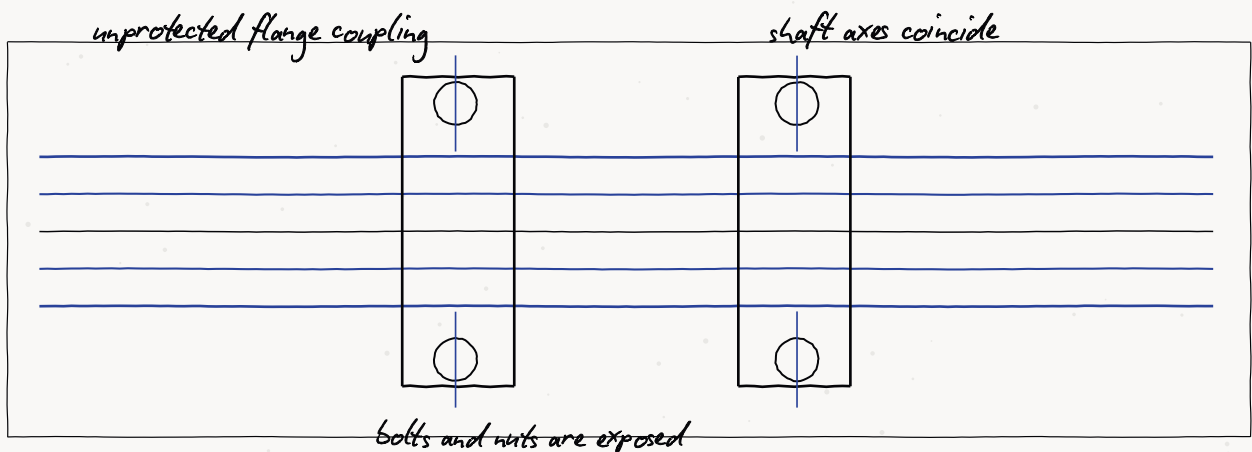
- * outer circle first
- * boss circle next
- * hole circle last

ASSEMBLY DRAWING STEPS

First draw the common axis, then shafts, bosses, flange plates, socket-spigot fit if any, bolts and nuts.

Do the hatching and dimensions after checking that the side view projects correctly.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

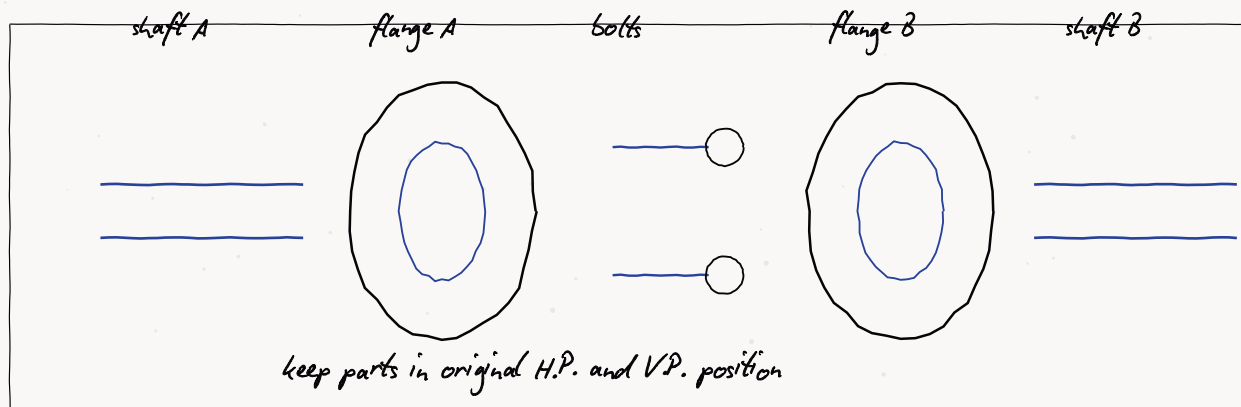
- * axis
- * shafts
- * flanges
- * bolts
- * hatching

DISASSEMBLY DRAWING

Disassembly questions give an assembled coupling and ask views of selected parts.

Keep each part in its original position with respect to H.P. and V.P. Do not rotate it for convenience.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

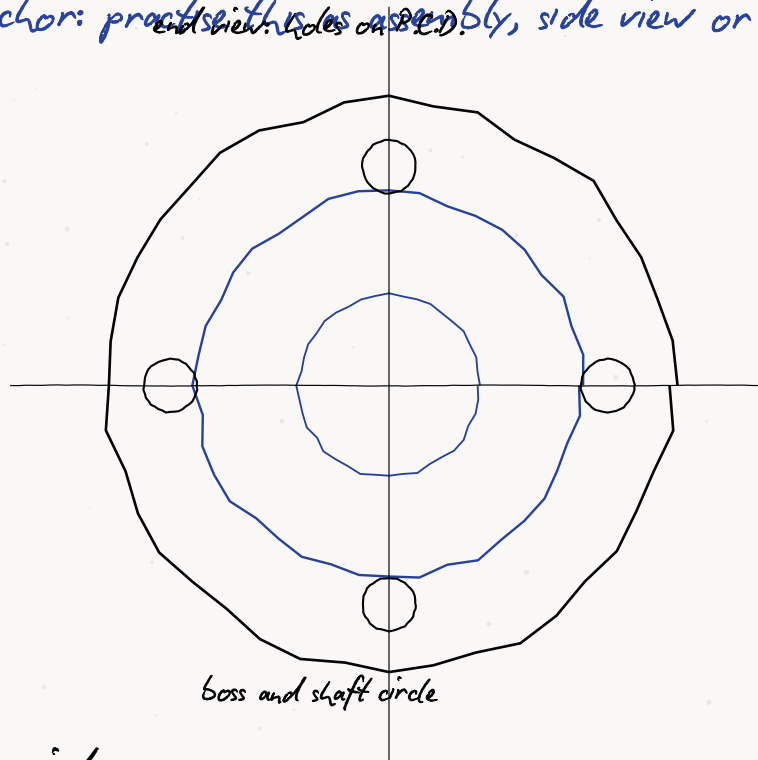
- * separate only asked parts
- * retain orientation
- * copy key position correctly

FLANGE A OR FLANGE B

The question may ask for Flange A or Flange B only. Read the label before starting the drawing.

A flange view usually needs a sectional front view and a side view with bolt holes.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

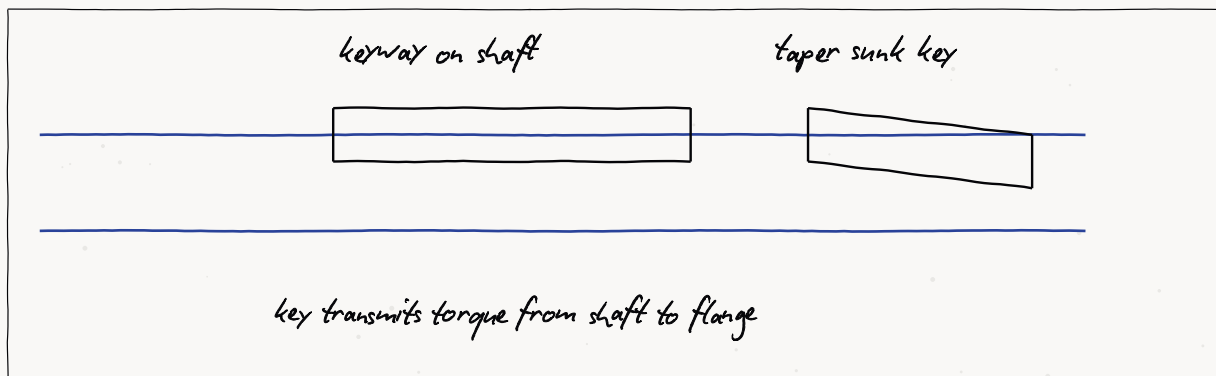
- * read A or B
- * show correct side
- * draw holes on P.C.D.

KEY VIEWS

A key may be asked separately in front view, top view and side view.

Show its taper in the long view. Keep thickness and width consistent with the assembly.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

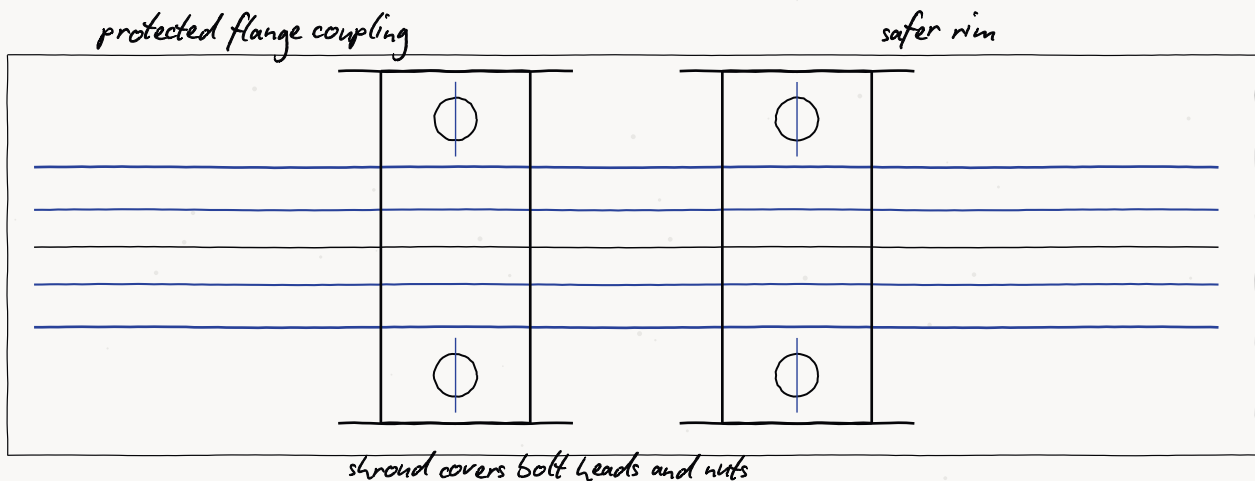
- * front view shows length
- * top view shows width
- * side view shows thickness

PROTECTED COUPLING

A protected flange coupling changes the flange shape by adding a projecting rim or shroud.

The shroud covers bolt heads and nuts, so the rotating coupling becomes safer near workers.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

- * same basic parts
- * extra protective rim
- * bolts are covered

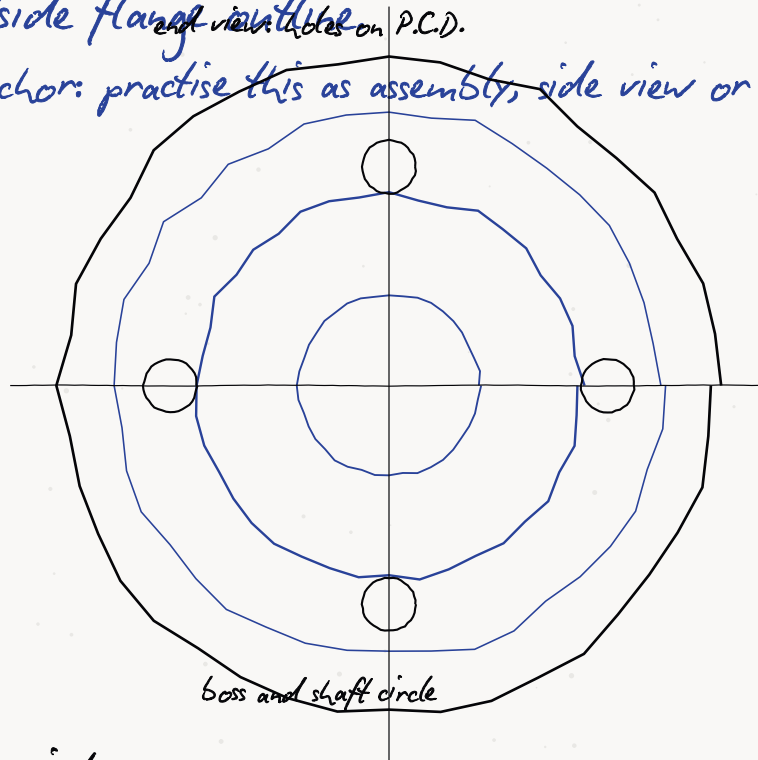
SHROUD DETAIL

The shroud is the outer projected ring of the protected flange. It overhangs the bolt region.

Exam note: direction words decide the final view.

It does not change the main assembly logic. It only changes the outside flange outline.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

- * outer rim is wider
- * bolt heads sit inside cover
- * side view has extra circle

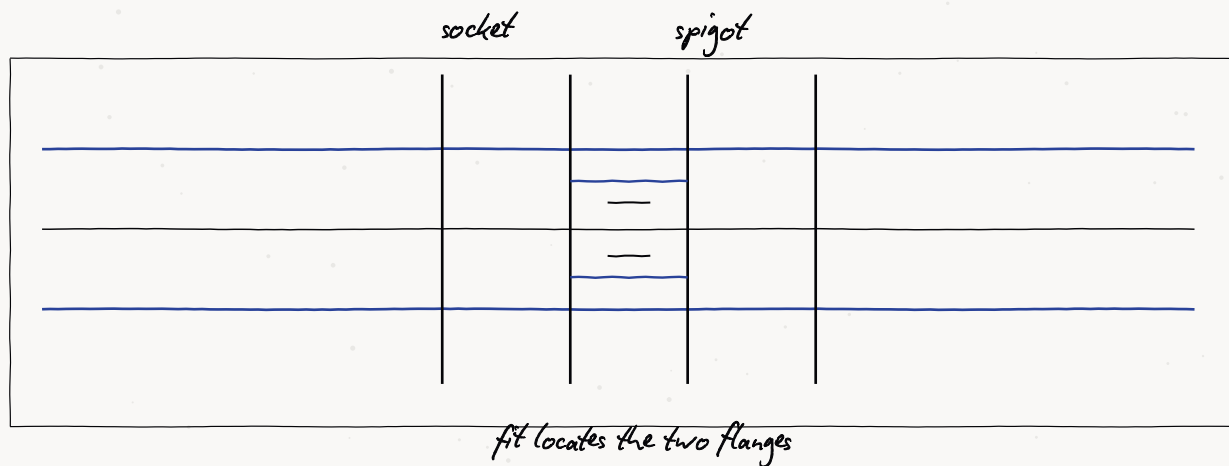
PROTECTED SOCKET CLEARANCE

The protected example may show small clearance between socket and spigot faces.

Do not close this gap if the textbook drawing gives it.

Small gaps are real dimensions, not drawing mistakes.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

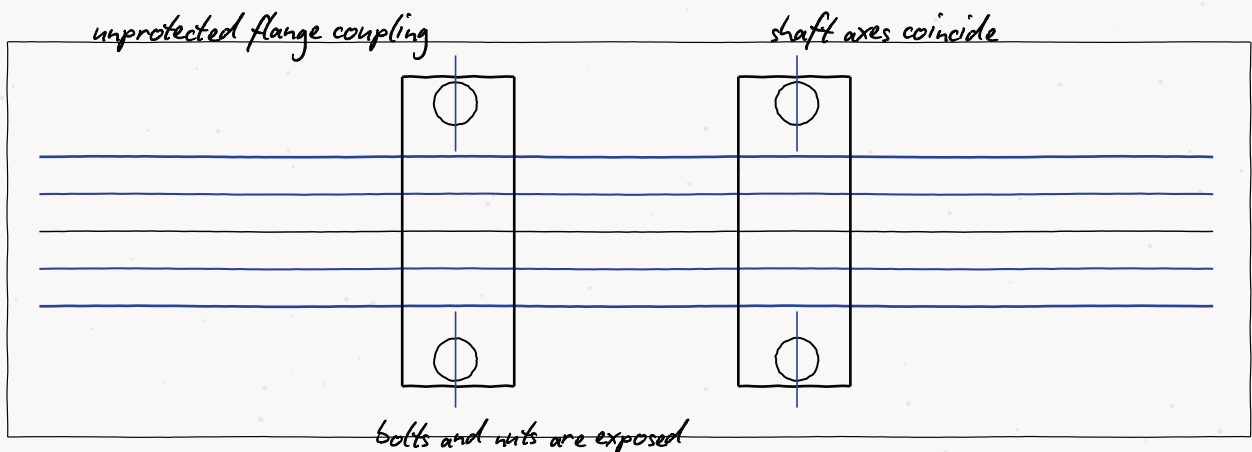
- * copy given clearance
- * keep socket concentric
- * show spigot inside

BOLT AND NUT CHECK

Bolts must be exact fits in the holes, because power passes from one flange to the other through them.

In a school drawing, show bolt axes straight and nuts aligned with bolt centres.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

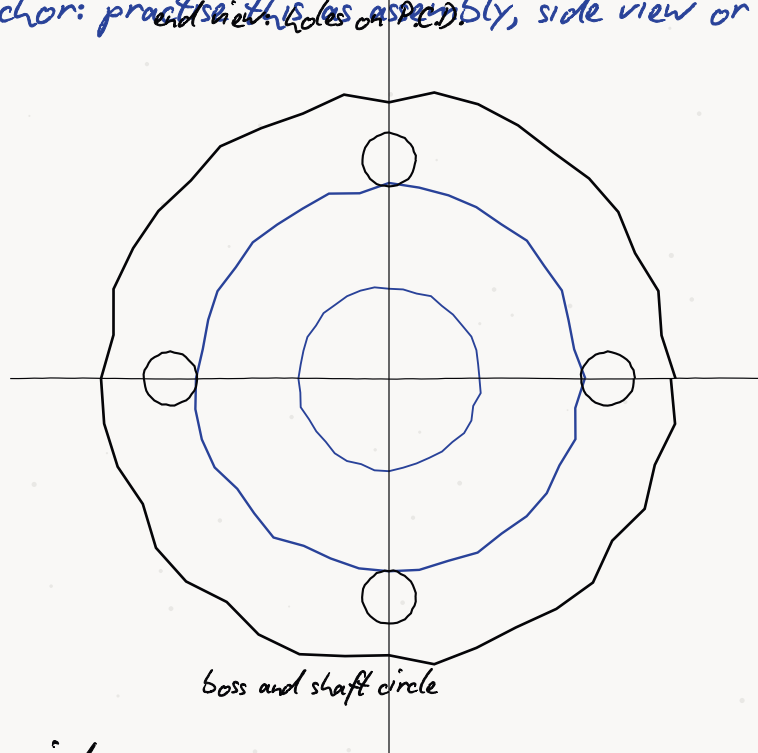
- * bolt axes parallel
- * heads and nuts equal
- * holes match both flanges

DIMENSIONING PRIORITIES

Give important dimensions, not every tiny construction mark.
Main diameters, P.C.D., hole size, shaft diameter and lengths matter most.

Place dimensions outside the views where possible. Avoid crossing dimension lines through hatching.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

- * overall length
- * flange and boss diameter
- * shaft diameter
- * P.C.D. and holes

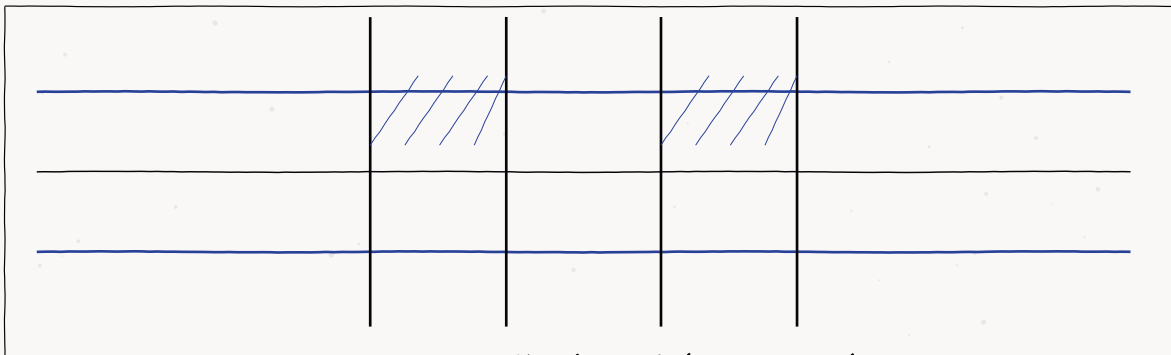
SECTIONING ERRORS

The most common error is hatching the shaft hole, keyway or bolt holes.

Another error is hatching both halves when only upper or lower half section is asked.

Exam anchor: practise this as assembly, side view or disassembly work.

hatch only cut solid metal



shaft hole and bolt holes stay blank

Quick points

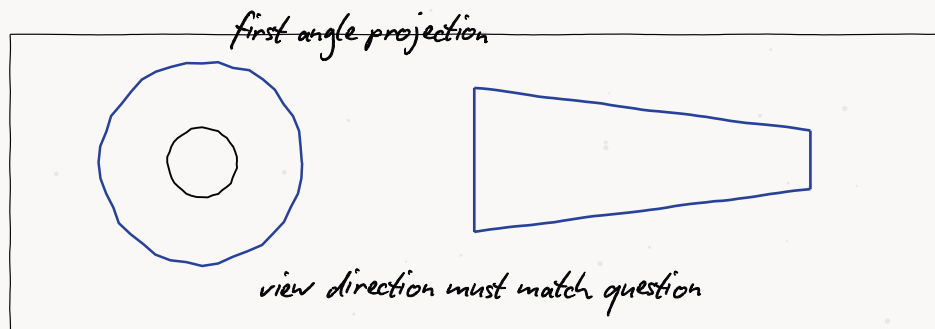
- * blank holes stay blank
- * one half only if asked
- * hatch directions stay even

PROJECTION SYMBOL

After the required views are complete, add title, scale and first angle projection symbol if asked.

Do not leave the symbol for the last minute if the sheet is crowded. Reserve a clean corner.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

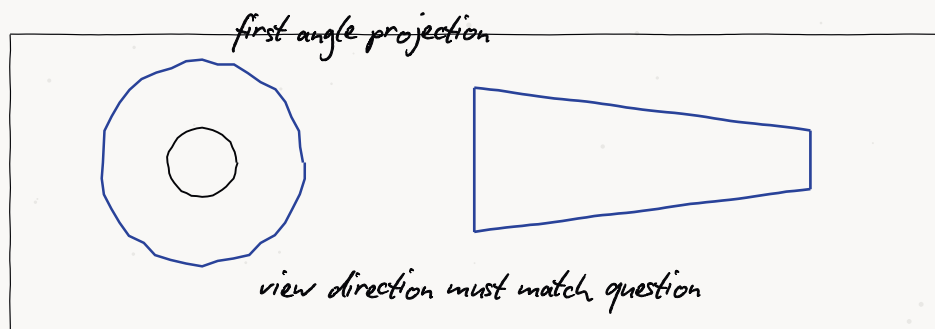
- * title in block letters
- * scale 1:1 when given
- * projection symbol clear

EXAM READING CHECKLIST

Underline the required part name, view direction, section half, scale and dimension instruction.

Most wrong answers in this chapter start from misreading left side as right side or upper half as lower half.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

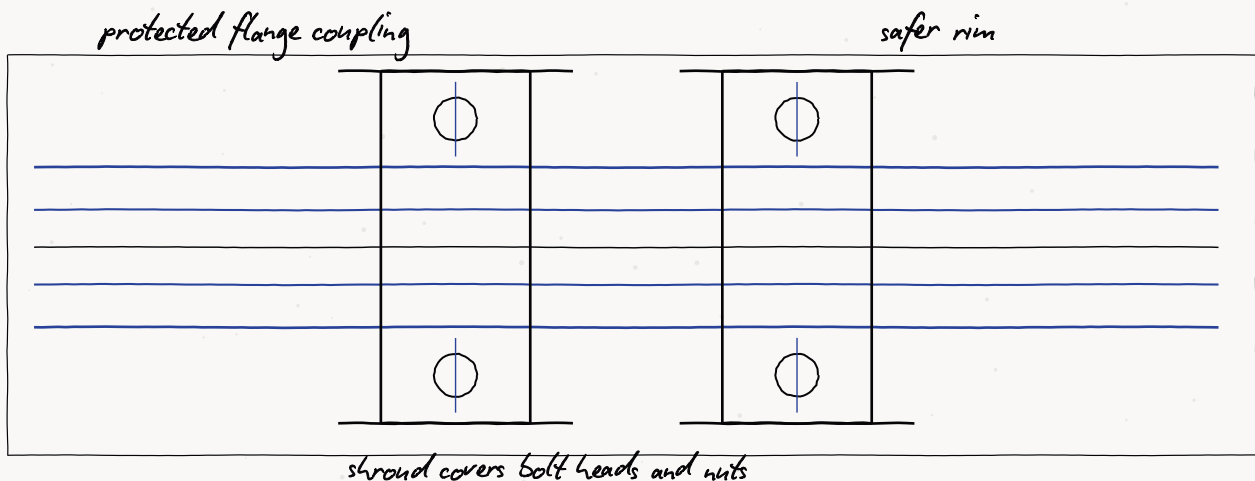
- * part name
- * view direction
- * section half
- * scale
- * dimensions

LAST MINUTE REVISION

Before submitting, compare each view with the assembly logic. Shafts must be co-axial, holes equal and shroud outline correct.

Then check safety logic: unprotected has exposed bolts, protected has a shroud around them.

Exam anchor: practise this as assembly, side view or disassembly work.



Quick points

- * axis straight
- * holes equally spaced
- * shroud outline present
- * protected rim present