DIESEL MECHANIC

MINING QUALIFICATIONS AUTHORITY

CODE: MDF

DRILL A FLANGE

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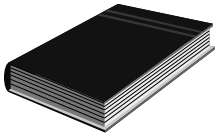
INDEX

The following elements are contained in this learning guide:



SOURCE REFERENCES

Training video : Use Hand Tools Part 2

PLEASE NOTE:

Modules MDM and MPD are prerequisites that must be completed before doing this module.

OBJECTIVE

You will be learning towards the outcome “Drill a flange”. Whilst learning towards the outcome you will be required to achieve the following:

- Mark off and drill a flange.

On completion of this module, the learner must be able to:

- Mark off a flange from a given drawing.
- Drill the flange, using a pedestal drill.

During this process you must adhere to certain specified requirements as listed in the Module.

ASSESSMENT AND EVALUATION CRITERIA

You will be assessed, when you are confident that you may achieve the outcomes as listed, to determine your competence as measured against the required criteria. This assessment will be in line with accepted best practices regarding assessment.

- A practical assessment will be set at the end of the module and must be completed without using reference other than the drill speed tables.
- The learner will be given a drawing of a flange containing all the required sizes, and must mark off and drill the flange in accordance with the following standards:
  - The flange must be marked off correctly as specified in the drawing.
  - The flange must be securely clamped on the drill table.
  - The flange must fit the gauge with pins 0.5mm smaller than the drill size specified on the drawing.
  - The sizes measured from the apex of the holes to the outside of the flange must not differ by more than 0.25mm.
  - The diameters of the holes must not be more than 0.1mm bigger than the drill diameter.
  - All the holes must be deburred
  - There must not be any damage to the tools and equipment.
- All safety procedures pertaining to drilling must be adhered to.

HAZARD IDENTIFICATION AND CONTROL (HIAC) FORM

MDF

DRILL A FLANGE

STEPS IN OPERATION / PROCESS	POTENTIAL ACCIDENT / INCIDENT	CONTROLS (BY RESPONSIBLE PERSON)
1. Use a pedestal drill.	• Eye injuries due to flying particles.	• Use appropriate safety goggles.
	• Injury due to rotating chuck.	• Always allow chuck to stop before changing drills or making adjustments. Do not stop chuck by hand. Allow it to stop of own accord. • No loose clothing or loose long hair when operating the machine.
	• If workpiece rotates, it can cause injuries.	• Securely clamp workpiece in place.
	• Burrs and swarfs can cause hand injuries.	• Remove burrs from drilled holes, using the correct tools. • Clean away swarf with a brush. Do not use unprotected hands.

NOTE: Before doing the practical work contained in this module, the learner must study the content of the above HIAC form again and then sign the statement below.

The above risks, which will be encountered in this module, are fully understood and will be controlled during the practical work.

Signature of learner: _____

Signature of Training Officer: _____

Date: _____

1. MARKING OFF THE FLANGE

ITEM / TASK: Introduction.

DESCRIPTION:

A. To plan any drilling job you need to know the following:
   - The shape and size of the job.
   - The type of material to use.
   - The type of drilling to be done.

B. All of the above information can be obtained from studying the drawing. After obtaining all the information you must do the following:
   - Select the right type and size of material.
   - Determine the method of clamping the material on the drilling machine table. *Refer to Module MDM if necessary.*
   - Select all the drills you will require to do the drilling.
   - Select the marking off and measuring tools you will need to mark off the workpiece, i.e. marking blue, scriber, dividers, Vernier callipers, etc. *Refer to Module MPD if necessary.*

ITEM / TASK: Example of a drawing.

DESCRIPTION:

Refer to the drawing of a flange shown in the Self Test on the next page and note the following in respect of Flange A:

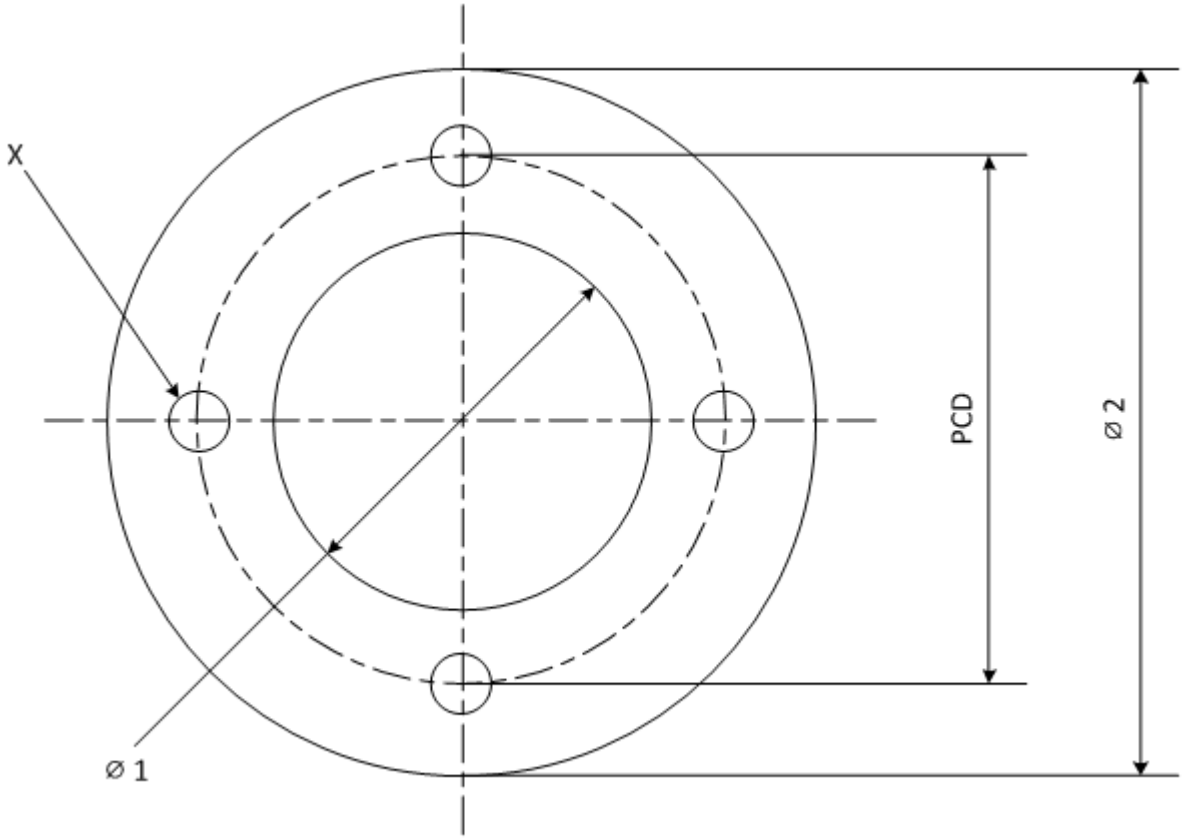
Diameter of flange	=	132mm
Bore of flange	=	35mm
Thickness of material	=	10mm
Type of material	=	mild steel plate
PCD of flange holes	=	105mm
Number of holes in flange	=	4
Hole size	=	10mm

DO SELF TEST ON THE NEXT PAGE BEFORE MARKING OFF THE FLANGE.

SELF TEST

Study the drawing below and fill in all the details for each of the four flanges in the table on the next page.

Flange	Ø1	Ø 2	PCD	X	Thickness & type of material
A	35	132	105	4 x 10	10mm Mild Steel Plate
B	40	137	110	6 x 12	12mm Mild Steel Plate
C	45	145	115	4 x 15	16mm Mild Steel Plate
D	60	170	130	6 x 16	20mm Mild Steel Plate



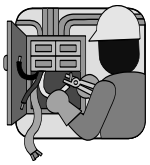
1. Ø = Diameter
2. PCD = Pitch circle diameter
3. X = Number and size of hole
4. All sizes in millimetres unless otherwise stated

Drawing No:	FDCM - 1
Title:	Pipe Flange
Drawn by:	Unknown
Scale:	NTS

	FLANGE A	FLANGE B	FLANGE C	FLANGE D
Diameter				
Bore				
Thickness				
Material				
PCD				
Number of holes				
Hole size				

Ask your Training Officer to check your work and if it is correct, to sign below and then go on to the next section.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :



ITEM / TASK: Mark off the flange.

DESCRIPTION:

A. Study the drawing of the flange that you have to mark off.

B. Select the correct material.

Note:

In this exercise and in the final test you will be given a piece of square material to mark off and drill.

C. Prepare the flange for marking off.

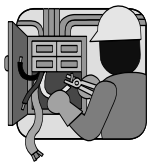
D. Mark off the flange to the drawing sizes.

REMEMBER to follow the correct procedures learnt in the prerequisite Modules MDM and MPD.

NB:

Ask your Training Officer to check your flange before you prepare to drill it.

2. DRILL A FLANGE



ITEM / TASK: Prepare for drilling.

DESCRIPTION:

A. Clamp the flange firmly onto the drilling machine table. Refer to Module MDM for methods of clamping if necessary.
B. Select all the drills, sockets and drill chucks required to drill the flange.
C. Check and make sure that the drills issued to you are the correct size and are sharpened correctly.

NB:

The size of the drill is normally stamped on the shank of a straight shank drill and on the neck of a taper shank drill. Frequently the identification of the size is difficult because the markings have become faint or obliterated. If this is the case, then the drill must be measured to determine the size.

D. Measure the drill diameter with an outside micrometer across the margins on a new drill, or on the section immediately behind the flutes if the drill is worn. See Fig 1.

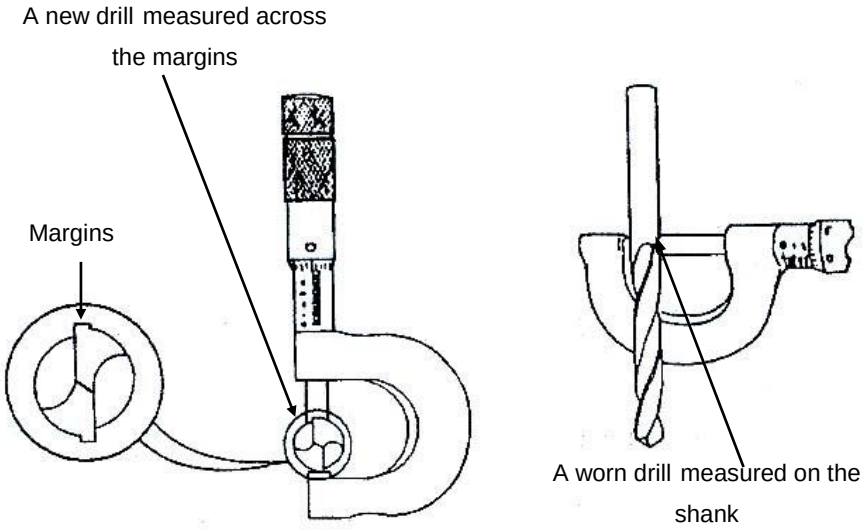
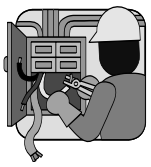


FIG 1.



ITEM / TASK: Drill a flange.

DESCRIPTION:

A. Line up the marked off holes with a centre fitted into the machine spindle as described in module MDM.

NB:

Drill pilot holes if necessary as explained in Module MDM.

B. Adapt the drill to drill the full size holes, into the machine spindle.

NB:

The procedure for adapting drills into the machine spindle was explained in detail in Module MDM.

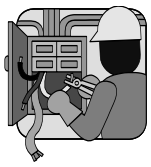
C. Drill all the holes in the flange, following the correct and safe operating procedures.

NB:

Remember to wear safety goggles.

D. Unclamp the flange and deburr all the holes.
E. Remove, clean and replace all the tools.
F. Clean the machine and work area.

DO THE PRACTICE ON THE NEXT PAGE.



PRACTICE

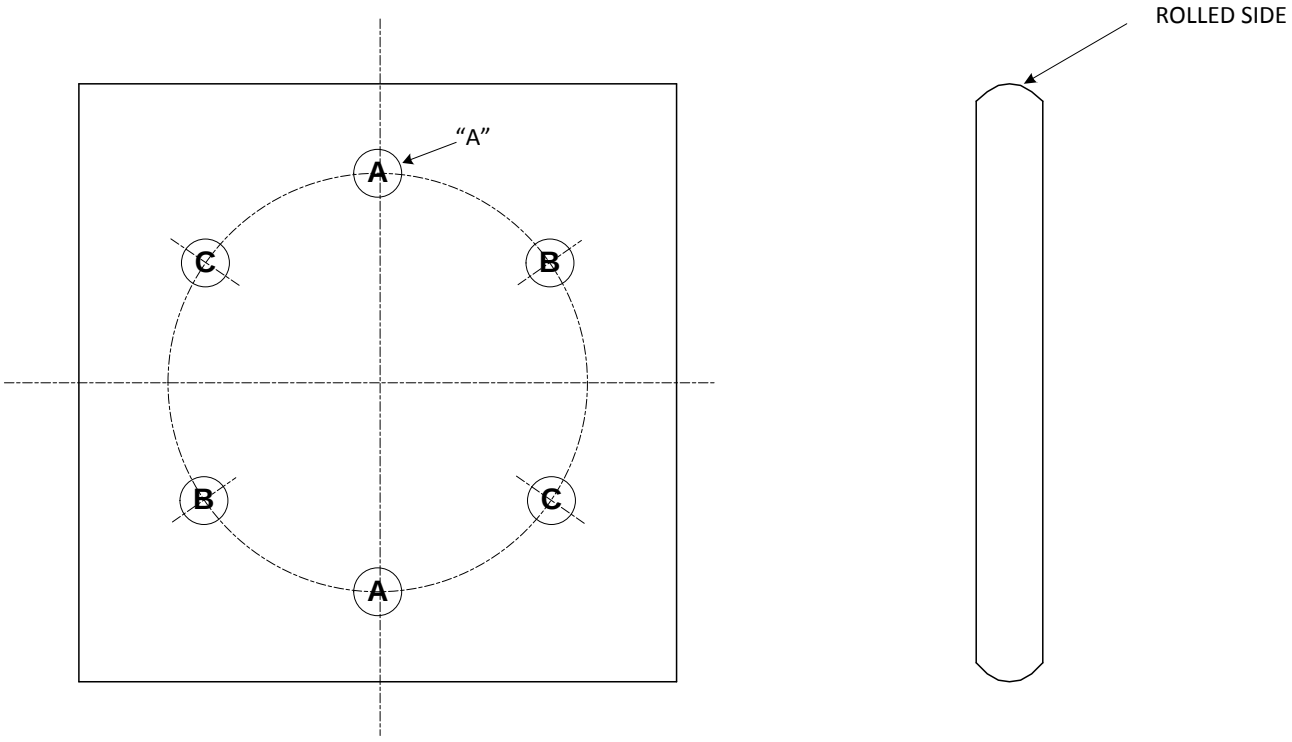
Mark off and drill a flange as specified on the drawing below.

- Remember that the sizes measured from the apex of the holes to the outside of the flange may not differ by more than 0.25mm and that the diameters of the holes may not be more than 0.1mm bigger than the drill diameter.
- Distances between the drilled holes may not vary by more than 0.5mm.
- PCD Tolerance: ± 0.3mm.

PCD : _____

Drill Diameter : _____

NOTE : "A" MUST BE ON ROLLED SIDE



Ask your Training Officer to check your work and if it is correct, to sign below.

LEARNER	TRAINING OFFICER
DATE :	DATE :
SIGNATURE :	SIGNATURE :

REMEMBER ALWAYS WORK SAFE

Once you have passed the entire practices and self test, you are now at liberty to request a Formative Assessment from your Assessor.