

# ***Pre-course Review for Those Considering Attending Hydraulics Programmes at the NFPC***

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**Introduction**

**This series of questions are at Stage 1 level and can be used in the following ways:**

1. They can be used to assess your existing knowledge and understanding of fluid power (hydraulics) at a Stage 1 level. This will allow you or your employer to make a decision on your current knowledge level and training needs.
2. If you have already attended the NFPC Stage 1 course and are thinking of advancing your knowledge to the stage 2 level, this series of questions will provide an excellent refresher together with your course notes before attending the next stage.
3. If you are considering a Stage 2 or bespoke course and believe that based upon your present knowledge you need not attend a Stage 1 hydraulics programme and will be able to complete the next stage without difficulty, these questions will be a measure of your current status.

*If you are in doubt, then complete the questions and return your answers for my attention at the National Fluid Power Centre and we will provide you with our feedback.*



*Thank you John R Savage*

*Director NFPC*

*Please provide you full contact details if you return your answers:*

*Name.....*

*Contact Address.....*

*.....*

*Position.....*

*Tel No.....*

*Email .....*

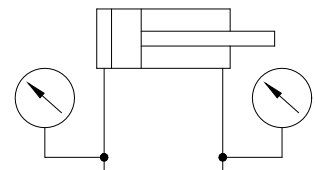
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*Any Other Relevant Information*

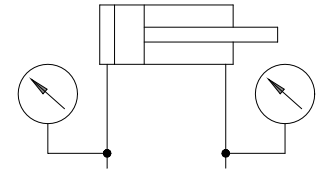
## Pre-Course Review

- 1 The hydraulic pump creates the pressure in the system. TRUE/FALSE
- 2 New oils contain solid contaminants, which could cause system problems. TRUE/FALSE
- 3 A check valve can be used to prevent reverse flow of a fluid. TRUE/FALSE
- 4 When fluid flows through a valve there is always a pressure drop. TRUE/FALSE
- 5 The life expectancy of a mineral oil hydraulic fluid depends upon its rate of oxidation. TRUE/FALSE
- 6 The flow from a fixed displacement pump reduces when the pressure increases. TRUE/FALSE
- 7 A pilot operated check valve should be used to secure the position of a heavily loaded cylinder whilst maintenance work is carried out. TRUE/FALSE
- 8 What is the function of the prime mover in a hydraulic system?
- 9 Name two types of prime mover?
- 10 Referring to a hydraulic pump, explain the term displacement.
- 11 What units is displacement measured in?
- 12 What is flow rate commonly measured in?
- 13 State two common units used for the measurement of pressure.
- 14 Name three types of pumps that are commonly used in hydraulic systems.
- 15 Which types of pumps are available as variable displacement units?
- 16 Hydraulic systems are used to transfer power to ultimately create movement. Name two hydraulic components that create movement in a hydraulic system.
- 17 What ISO standard is used for drawing hydraulic symbols?
- 18 Briefly explain the terms 'meter-in flow control', 'meter-out flow control' and 'bypass/bleed-off flow control'.
- 19 In a pressure compensated flow control valve what does the compensator consist of?
- 20 In a pressure compensated flow control valve what does the compensator do to the pressure drop across the throttle valve part of the valve?
- 21 What is the function of a relief valve?
- 22 What is the function of a pressure reducing valve?
- 23 What happens when the vent connection of a pilot operated/2 stage relief valve is connected to tank?
- 24 Relating to a relief valve, what does the term "cracking pressure" refer to?
- 25 Why does a pressure reducing valve or sequence valve have a drain connection?
- 26 State three methods of operating a direction control valve?

- 27 When comparing the spool of an ordinary direction control valve with the spool of a proportional direction control valve what is the main difference between them?
- 28 State one function of a check valve?
- 29 With an external gear pump, does the flow go through the middle of the gears or around the outside of the gears?
- 30 When setting up a relief valve do you put the pressure gauge before or after the valve?
- 31 When setting up a pressure reducing valve do you put the pressure gauge before or after the valve?
- 32 Why is it important to regularly monitor the output flow rate of a pump at a prescribed pressure and temperature?
- 33 State four causes of pump failure.
- 34 What gas is used to pre-charge an accumulator?
- 35 Before replacing a hydraulic valve on a system containing an accumulator, what procedure must be followed?
- 36 Identify three contaminants likely to be found in a hydraulic system and state a possible source of each contaminant?
- 37 State two reasons why fluids other than mineral oil might be selected for a hydraulic system?
- 38 A hydraulic fluid is referred to as being a HV32. What does the 32 refer to?
- 39 State three functions of the hydraulic fluid.
- 40 When an oil warms up what happens to its viscosity?
- 41 State two factors that relate to the pushing force exerted by a hydraulic cylinder.
- 42 State two factors that relate to the torque outputted by a hydraulic motor.
- 43 The hydraulic cylinder shown has no load on it and equal pressures of 50bar on the gauges. Will the cylinder remain stationary, extend or retract?
- 44 A variable displacement motor has a flow rate of 40 L/min supplied to it at a constant pressure. What happens to the torque and speed output of the motor when the displacement is **increased**?
- 45 A variable displacement motor has a flow rate of 40 L/min supplied to it at a constant pressure. What happens to the torque and speed output of the motor when the displacement is **decreased**?
- 46 What formula can be used to calculate the force exerted by a hydraulic cylinder?
- 47 What formula can be used to calculate the torque outputted by a hydraulic motor?
- 48 What formula can be used to calculate the flow rate of a hydraulic pump?

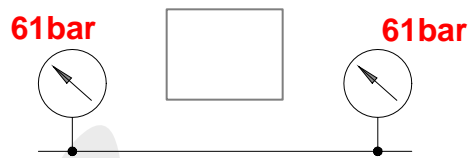
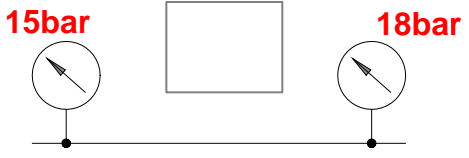


49 The hydraulic cylinder shown is extended and retracted with a flow rate of 25 L/min. Why are the extend and retract speeds different?

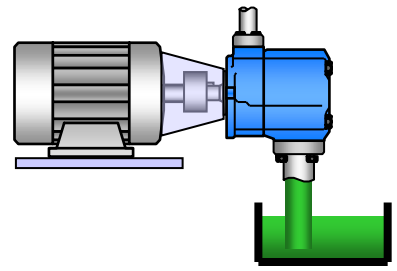


50 Explain why a CETOP 3 direction control valve can only be mounted onto its subplate one way.

51 Observe the pressure gauges below and identify the direction of flow through the pipe. In the boxes on the diagrams below draw an arrow ( $\leftarrow$ ,  $\uparrow$ ,  $\rightarrow$ ,  $\downarrow$ ) to identify the flow direction or a cross (x) if there is no flow.

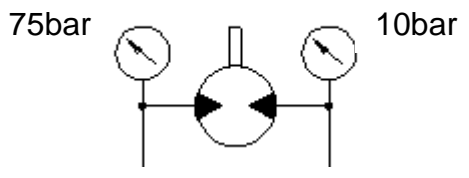


52 A hydraulic pump has a displacement of 25cc/rev and is driven by an electric motor at 1480 rpm. Calculate the theoretical flow rate of the pump in litres per minute.



53 Why would the actual (measured) flow rate of a pump differ from the calculated (theoretical) value?

54 What is the pressure drop across the motor shown?



**The following questions refer to the diagram below.**

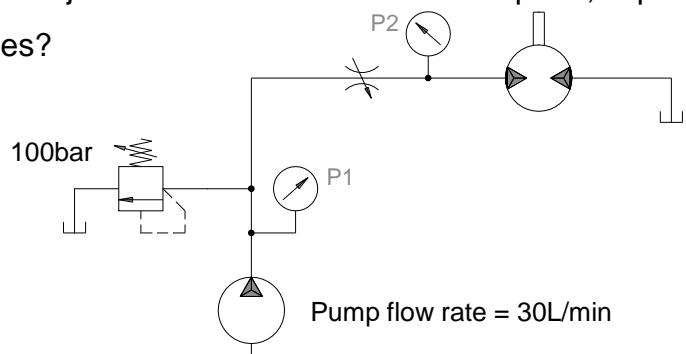
55 When the flow control valve is fully closed, where does the flow from the pump go? and what pressure would you expect to read on P1?

56 When the flow control valve is fully open a pressure of 60bar is read on P2. State two factors that effect the reading of 60bar on P2.

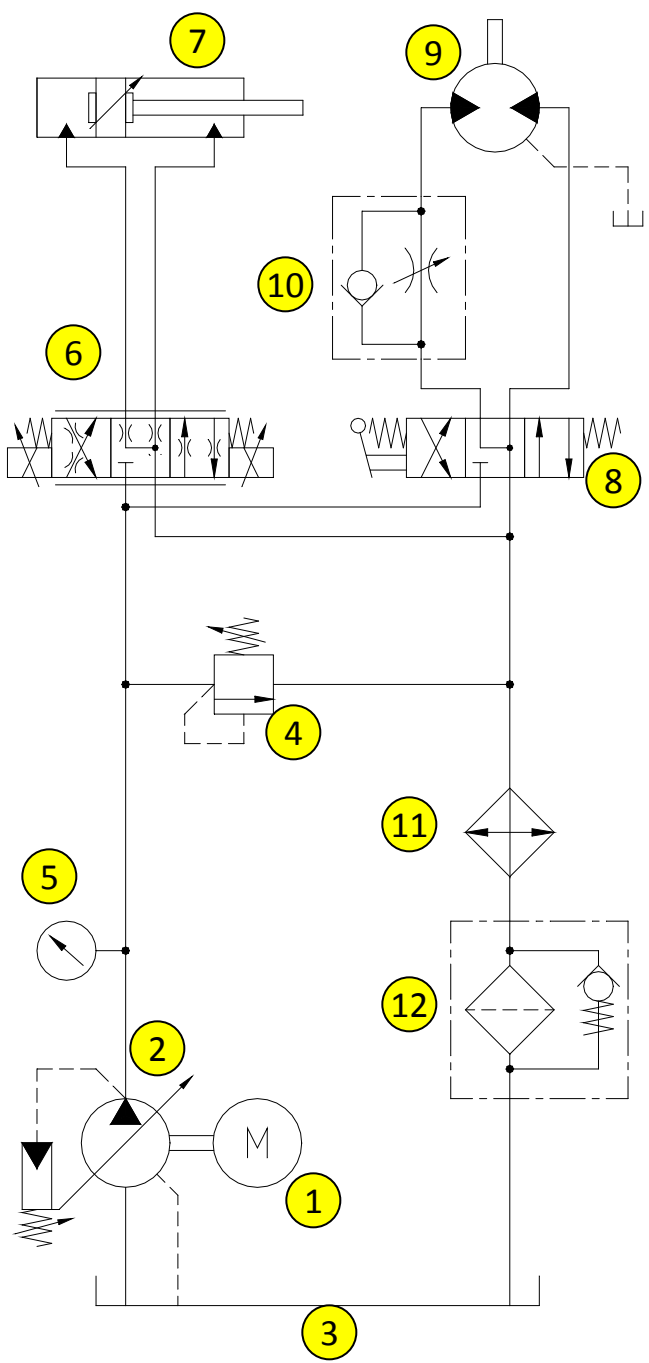
57 When the flow control valve is fully open and the load on the motor is increased what will happen to the pressure reading on P1? and what about the reading on P2?

58 What will happen to the pressure reading on P1 when the flow control valve is gradually closed?

59 The flow control valve is adjusted until the motor is at half speed, explain where the 30L/min from pump goes?



60 Identify the twelve symbols below.



- 1:
- 2:
- 3:
- 4:
- 5:
- 6:
- 7:
- 8:
- 9:
- 10:
- 11:
- 12: