



Worksheet FB & Training Record Formulas and Fundamentals

Hydraulics Fundamentals

Email:

Course:

Provider:

Expected Outcomes: (20-30mins)

To learn the fundamental principles on which all hydraulic systems are based.

To perform simple calculations to size system pumps and actuators.

Previous Knowledge Required:

Students should have completed worksheet IH 'Introduction to hydraulics' or have a basic understanding of what hydraulics is used for and which components are employed.

Self-driven micro-learning presentation (SDL)

Complete the 'Formulas and Fundamentals' SDL app via www.e4training.com/hydraulic_courses/formula1.php, phone app or CD/download

Date, score & time:

Coursework

Understand the relationship between force, pressure and area:

- Calculate the pressure generated by a load on a cylinder area.
- Calculate the load a pressure can lift.
- Understand how cylinder area affects forces and pressures

Understand the relationship between volume, displacement, pump speed and flow:

- Calculate the flow based on pump displacement and speed.
- Calculate the cylinder speed based on area and flow rate.
- Calculate the motor speed and torque based on displacement.
- Understand how orifice restrictions control the flow.
- Understand the relationship between flow and pressure drop.

Understand the relationship between pressure, flow, power and system efficiencies:

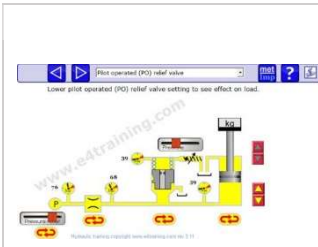
- Calculate the power based on flow and pressure.
- Understand the potential energy losses in a hydraulic system.

Sample calculations

Sample calculations will be submitted later as part of the design project work applicable to your course syllabus.



Interactive experiments



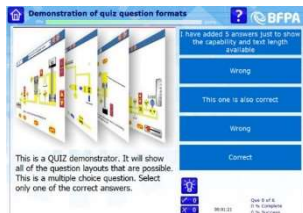
Experiment with the fundamental principles simulation at

www.e4training.com/hyd_formula/valves3.php :

- Change supply pressure, cylinder area and mass to observe effects.
- Select 'constant pressure over an orifice' from drop down menu.
- Change orifice area and observe cylinder speed (flow) changes.
- Change pressure drop across the orifice and observe flow.

App date & duration

Interactive quiz



Complete the 'TBC' Quiz either online at

www.e4training.com/hydraulic_test2.php , phone app, CD or download.

Quiz name, date, score

Additional video and instructional resources



Visit www.e4training.com/hyd_formula/ for additional videos, reading and simulation experiments

Further reading and experiments

Experiment with hydraulic valve design principles

www.e4training.com/hyd_princip/princip1.php & /princip3.php :

- Pressure moves spools against springs.
- Spool movements change orifice area sizes.
- Load pressure changes affect pressure drops and flows.

Dates & durations
(Optional):

Qualification pass requirements:

Students will need to complete and return all worksheets to their registered training provider. Methods of testing and qualification may vary between course providers.



For online certificates students must also post their results at the end of each training module by simply clicking the email button within the app, where available.