Fluids Labs
FALL 2003

PRESSURE MEASUREMENT

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Objectives of the experiment:

- To develop an understanding of fluid pressure, it's measurement and the relationships between the different units of measurement.
- To clearly understand the difference between gauge, absolute and atmospheric pressure, and what makes them unique.
- To demonstrate the different methods used in measuring pressure.

Procedure:

1. Various instruments will be used to measure the pressure. Identify the manometers (different gauge fluids), barometer, bourdon tube gauge, an electronic calibrator, and a pressure transducer.
2. Read and record the barometric pressure.
3. Zero the instruments. Make sure that the gauge, manometers, transducers, etc. read zero. In the case of each manometer, record the deviation from zero and use that value to derive your measured pressure.
4. Connect the system of gages to a source of low air pressure. Ideally, all the pressure-reading devices should be connected so that the measurements can be taken simultaneously. Care should be taken not to exceed the capacity of the manometers and gages. **Caution:** Please keep air pressure less than 5 psig when using the manometers.
5. Subject the system to different levels of pressure in such a way that at least 10 different measurements of pressure can be taken from every device.
6. For each trial, change the pressure by adjusting the small regulating valve on the side of the equipment. This will change the readings for all the instruments.
7. Develop a table of values of pressure in the proper units.
8. Repeat steps 4 through 7 using a source of higher pressure (> 15 psig).
   NOTE: the Bourdon gage will replace the manometers for this portion of the experiment.

LOW PRESSURE						
Trial	Bourdon Gauge (Psig)	10-in Manometer S.G.=	24-in Manometer S.G.=	30-in Manometer S.G.=	Electronic Calibrator	Pressure Transducer
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

HIGH PRESSURE				
Trial	Bourdon Gauge (Psig)	Electronic Calibrator	Digital Gauge	Pressure Transducer
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Questions:

1. Develop a table of pressure values in the standard units. All of the instrument readings must be converted into U.S. & SI Units (Psi and Pa) for all readings.
2. For the pressure transducer, develop a “calibration curve” and obtain a “calibration equation” by fitting the curve. It is expected to obtain a linear correlation.
3. The pressures obtained in question 1 are gauge pressure (also referred to as manometric pressure). Develop a table with the absolute pressures. Make sure the units utilized for this are consistent.
4. Discuss the difference in performance of the vertical manometers.
5. Construct two composite graphs (one for low pressure & one for high pressure), depicting the instruments reading vs. trial number. Discuss each instrument’s value as compared to that of the electronic calibrator.