MIT WORLD PEACE UNIVERSITY

Basic Mechanical Engineering
First Year B. Tech, Trimester 1

TRIAL ON RECIPROCATING COMPRESSOR

EXPERIMENT NUMBER 7
PRACTICAL REPORT

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Contents

1 Objective

To calculate the compression ratio for the reciprocating Air-compressor

2 Theory

In two stages compressor air is partially compressed in low-pressure cylinder this air is passed through between the first stage and the second stage so that air at the inlet of the second stage is at lower temperature than the first stage outlet. This is done to reduce the work of compressor in second stage. Final compression is completed in the second stage. Also the compressors are provided with clearance volume, two stage compressors can achieve higher volumetric efficiency than a single stage compressor because of lower compression per stage. As the compressed air is used in a wide range in industrial, domestic, aeronautics Fields, etc. so compressors are applied in a wide range. Compressors are used where the air is required at high pressure

2.1 About the Compressor

An Air compressor is a device, which sucks the air from the atmosphere and compresses it and delivers it to a reservoir tank. It compresses the air by the means of a reciprocating piston, which reciprocates inside a cylinder. It can be single stage or multi stage. It can be single acting or double acting. Two-stage air compressor test rig consists of two cylinders and pistons and a reservoir tank. An A.C motor drives it. Thermometers are provided at inlets and outlets. To find out the inlet volume of air an orifice is provided. To stream line the intake a diaphragm base manifold is provided. Pressure gauge is provided at reservoir tank. Safety valve and auto power switch is provided for the safety factor.

2.2 Specifications of the Compressor

MOTOR	3 H.P
TYPE	AB 7.75
COMPRESSOR	DOUBLE STAGE SINGLE ACTING
CLYINDER NO 1	DIAMETER 93.5mm, STROKE 78mm
ENERGY METER	3200 PULSES/kWh CONSTANT (EMC)

2.3 Utilities Required

The four processes in a theoretical Vapour Compression Cycle are:
A. Electric Supply: Single Phase 220V AC, 50 Hz
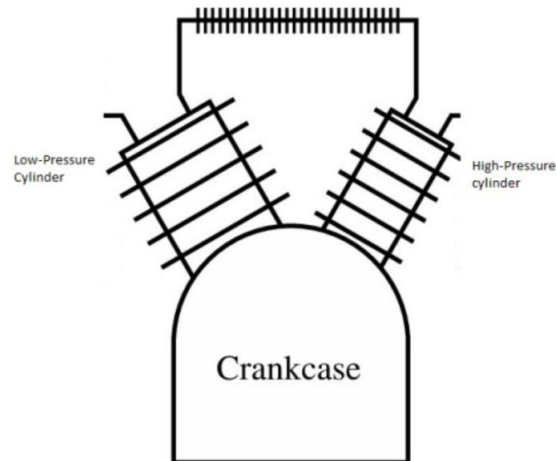B. Space Required: 2.5 * 1.5 * 3.0 m

Figure 1: Basic Components of a reciprocating compressor

3   Procedure

1. Close the outlet valve of tank and start compressor

2. Let the receiver pressure rise up to 2 Kg/cm2, now open the delivery valve so that constant delivery pressure is achieved

3. Wait for some time and see that delivery pressure remains constant, now note down the pressure.

4. Record the energy meter pulses/time to find out the input power.

5. Record the manometer reading to find out the volume of air input.

6. Record the temperature of inlet and before second stage and after second stage

7. Find out the rpm of compressor with the help of rpm indicator.

8. Find out the volumetric efficiency and isothermal power by given formulae

9. Repeat the procedure for different delivery pressures

4   Conclusion

The compression ratio of compressor is given by:

$$r = \frac{(\text{Gauge pressure} + \text{atmospheric pressure})}{\text{Atmospheric pressure}}$$