

# COMPRESSORS AND COMPRESSED AIR SYSTEMS

## QUESTION

In an automobile industry a Free Air Delivery test and leakage tests were conducted for a 1000 cfm compressor, by operating the compressors with all equipment that use compressed air turned off.

The results of the Free Air Delivery test showed that the compressor delivers 90% output of the rated capacity.

The results of the leakage test were:

- Compressor was on load for 8 minutes
- Compressor was unloaded for 48 minutes
- Compressor was consuming 144 kW

Calculate the following:

1. Free air delivery or the output of the compressor
2. Specific power consumption
3. % leakage in the compressed air system
4. Quantity of compressed air leakage
5. Power lost due to leakage

## **SOLUTION**

### **1. Calculate the free air delivery or the output of the compressor**

Free air delivery  
= 90% of rated capacity  
= 0.90 x 1000 cfm  
= 900 cfm

### **2. Calculate the specific power consumption**

Specific power consumption  
= actual output / actual consumption  
= 900 cfm / 144 kW  
= 6.25 cfm/ kW

### **3. Calculate the % leakage in the compressed air system**

% leakage in the system  
$$= \frac{T}{(T + t)} \times 100$$
$$= \frac{08}{(08 + 48)} \times 100$$
  
  
= 14.2%

### **4. Calculate the quantity of compressed air leakage**

Leakage quantity  
= percentage leakage x actual output  
= 0.142 x 900 cfm  
= 127.8 cfm

### **5. Calculate the power lost due to leakage**

Power lost due to leakage  
= Leakage quantity / specific energy  
= 127.8 cfm / 6.25 kW per cfm  
= 20.45 kW