

“Study of Internal Dry in the Performance of a Compressor”

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Abstract - This study investigates the effect of internal drying on the performance and reliability of a compressor used in refrigeration applications. During industrial training at GMCC India Pvt. Ltd., Supa, the compressor manufacturing and performance-related processes were studied. Internal moisture and residual water vapour inside a refrigeration compressor can adversely affect the refrigeration oil, electrical insulation, lubrication system, and internal components. Proper drying helps remove moisture and contaminants before the compressor is sealed and tested. The study focuses on the relationship between internal drying and important compressor performance parameters such as operating temperature, current consumption, power consumption, vibration, noise, and reliability. The observations indicate that effective internal drying is an important manufacturing and quality-control step for maintaining stable compressor performance and reducing the possibility of corrosion, oil deterioration, and electrical problems.

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1.INTRODUCTION

A compressor is one of the most important components of a refrigeration and air-conditioning system. Its main function is to compress low-pressure refrigerant vapour and deliver it at high pressure to the condenser.

During compressor manufacturing, moisture may remain inside the compressor because of atmospheric exposure, cleaning processes, components, oil, or manufacturing conditions. If this moisture is not properly removed, it can affect compressor performance and long-term reliability.

Internal drying is therefore an important process before final sealing and performance testing. The purpose of drying is to reduce the moisture content inside the compressor to an acceptable level. A properly dried compressor provides better lubrication, electrical insulation and resistance to corrosion.

This research study examines the importance of internal drying and its possible effect on compressor performance.

2. Company Profile

GMCC India Pvt. Ltd., Supa is a manufacturing company involved in the production of refrigeration and air-conditioning compressors. The company focuses on compressor manufacturing, quality inspection, performance testing and reliability. During industrial training, practical knowledge was gained about compressor production, internal drying, oil charging, quality inspection and performance testing

3. Background of the Study

A hermetic refrigeration compressor contains several critical components within a sealed housing. These may include:

- Electric motor
- Stator and rotor
- Crankshaft
- Bearings
- Cylinder
- Piston/scroll mechanism, depending on compressor design
- Lubricating oil
- Refrigerant passages
- Suction and discharge components
- Electrical terminals

Because the compressor housing is sealed, contaminants trapped inside during manufacturing can remain within the system throughout its operating life.

Moisture is particularly undesirable in refrigeration systems. Depending on refrigerant, oil and operating conditions, moisture can contribute to:

- Corrosion
- Oil degradation
- Refrigerant decomposition
- Ice formation at expansion devices under certain conditions
- Electrical insulation deterioration
- Reduced reliability
- Increased maintenance requirements

Consequently, manufacturing processes must be designed to minimize moisture entry and remove residual moisture before sealing the compressor.

3. Problem Statement

The presence of residual moisture inside a compressor can negatively influence its performance and long-term reliability. During manufacturing, moisture may enter through components, ambient exposure, lubricating oil, assembly operations or inadequate drying and evacuation.

Therefore, the research problem can be stated as:

“To study the effect of internal dryness/moisture condition on compressor performance and to understand the manufacturing and quality-control practices used to minimize internal moisture in compressors

3.Objectives of the Study

1. To study the internal drying process of a compressor.
2. To understand the effect of moisture on compressor performance.
3. To study the effect of drying on compressor oil and internal components.
4. To analyze performance parameters such as temperature, current, power and vibration.
5. To study the importance of internal drying in improving compressor reliability and service life.
6. To suggest suitable methods for improving the drying process and product quality.

4. Research Methodology

4.1 Research Design

The research uses a **descriptive and observational methodology** based on industrial-training observations.

4.2 Primary Data

Primary information can be obtained through:

- Direct observation of manufacturing operations
- Discussions with production engineers
- Discussions with quality engineers
- Observation of drying processes
- Observation of assembly processes
- Observation of compressor testing
- Study of approved work instructions, where available

4.3 Secondary Data

Secondary information can be collected from:
Refrigeration and air-conditioning textbooks
Compressor engineering literature
Quality-management references
Manufacturer-approved technical information
Research papers
Standards and technical publications

5. Concept of Internal Dryness

Internal dryness refers to maintaining a sufficiently low level of **residual moisture inside the compressor/refrigeration system**.

A compressor should be free from unnecessary moisture before final sealing because moisture can affect several aspects of compressor operation.

The concept can be represented as:

Moisture Entry → Drying → Evacuation → Moisture Control → Sealing → Testing

The objective is to prevent moisture from remaining inside the compressor after manufacturing.

6.Drying Process

Drying is an important step for removing moisture from components before assembly.

A generalized drying process is:

Component Cleaning → Drying → Inspection → Controlled Storage → Assembly

The exact drying method, temperature, duration and equipment should be taken from the actual GMCC manufacturing process rather than assumed in the research paper.

5. CONCLUSIONS: The study concludes that internal drying is an important process in compressor manufacturing. Proper removal of moisture helps protect the compressor oil, electrical insulation and internal components from moisture-related problems. Effective drying can improve the reliability, stability and service life of the compressor. The study also shows that controlling drying parameters such as vacuum pressure, temperature and drying time is important for achieving consistent compressor quality and performance..

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