

# SAFETY GOGGLES

- Safety goggles can prevent injuries such as corneal abrasions, chemical burns, and foreign body injuries
- Safety goggles can help improve visibility by reducing glare and distortion
- Safety goggles provide a physical barrier that protects the eyes from dust, debris, chemicals, and other hazardous materials
- Safety goggles are designed to fit comfortably on the face and around the eyes, providing a secure and comfortable fit that does not interfere with vision or cause discomfort.

## SAFETY TIP

## ENERGY PLUS NEWS LETTER

# COMPRESSED AIR SYSTEMS

**Compressed Air System** is one of the major utilities in industrial sector. It is used in process where it comes in contact with the product manufactured and in tools and tackles where it is used to operate pneumatic cylinders and tools.

**Compressed air application can be divided into two stages:**

- Compressed air generation
- Compressed air distribution.

**Compressed air generation:** It is generated by compressors which takes in air form surrounding atmosphere and compresses it to certain pressure Ex: 7 kg / sq cm or 12 kg /sq cm and in some cases to a very high pressure. This is stored in a receiver and in some cases treated to remove moisture and transported to the user location through pipelines.

**There are mainly two types of air compressor:**

- Positive displacement compressor: These type of compressors increases pressure by reducing the volume and they are further classified as reciprocating and rotary compressors.

**These are further divided into:**

- Lubricated compressors
- Non-Lubricated compressors
- Dynamic compressor: These types of compressors increase the air velocity and then convert to increased pressure at the outlet. They are basically centrifugal and axial flow compressors.

**Lubricated and non-lubricated compressors:**

**Lubricated Compressors:** Here the compressed air comes in contact with lubrication oil used in the compressors and some quantity of lubricating oil is carried by the compressed air. Different levels of filters are used to remove the oil traces from the compressed air before being distributed through the pipelines.



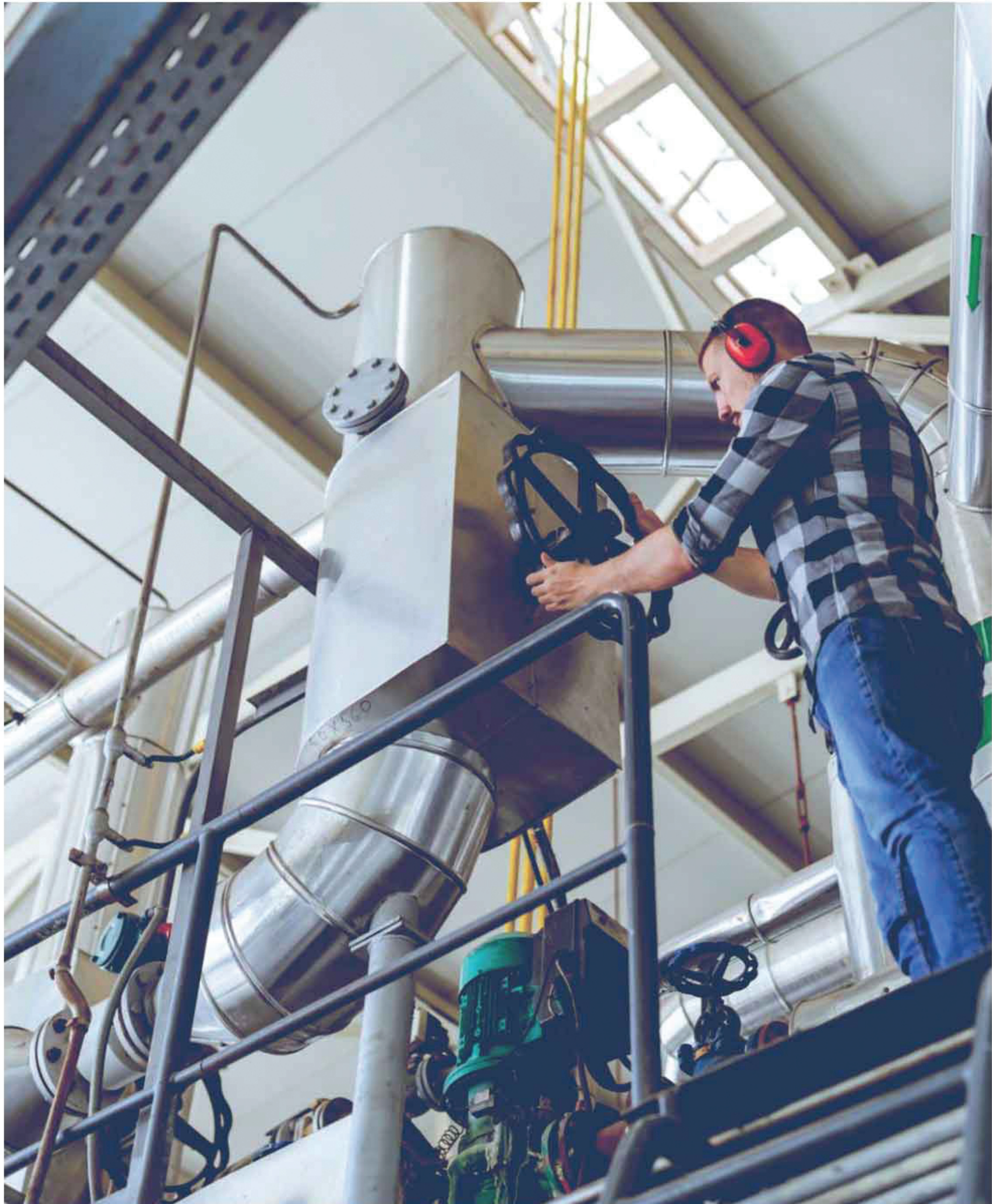
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some amount of oil as lubrication for its operation.

**Non-Lubricated compressors:** Here compressed air during its generation does not come in contact with lubricating oil used in the compressor so the compressed air completely free of lubricating oil. This type of air is used mainly in food processing and pharmaceutical manufacturing industry where the compressed air comes in contact with the product being manufactured.



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**Moisture in compressed air:** Air when compressed its pressure increases, this air at high pressure when cooled the water vapors condenses and separates as water. This water is harmful to product as well as to the compressed air tools and should be removed from the compressed air stream. This is carried out using filters, air dryers like desiccant type or refrigerated type. The dried air is then transported through pipeline to the respective user points.

**Energy is consumed in compressed during two stages.**

- 1) During compressed air generation
- 2) Transportation of compressed air to the user end through pipe lines.

Compressor operates between pressure ranges called as loading (cut-in) and unloading (cut-out) pressures. For example, a compressor operating between pressure setting 6-7 kg /sq cm means compressor unloads at 7kg/sq cm and loads at 6 kg/sq cm. Loading and unloading is done through pressure switch.

For same capacity, a compressor consumes more power at higher pressures, so they should not be operated beyond their optimum operating pressure as this wastes lot of energy. An Increase in pressure of the compressor by 1 bar increases the power consumption by 6- 10 %.

Compressed air is transported through pipelines. If the pipes lines are not sized properly there will be pressure droop and end user will experience lesser pressure. This will force the compressor to generate at higher pressure and waste energy. So the pipeline

### ADVANTAGES OF OUTSOURCING

**Outsourcing the operation and maintenance (O&M) of an air compressor system can offer several benefits, including:**

- 1. Cost Savings:** Outsourcing the O&M of air compressors can help reduce costs by eliminating the need for a dedicated in-house team.
- 2. Expertise and Experience:** Outsourcing to a specialized company can provide access to a team of experts with a wealth of experience in air compressor operation and maintenance.
- 3. Increased Safety:** Regular maintenance and inspections can help identify potential safety hazards before they become serious issues.
- 4. Reduced Downtime:** Outsourcing air compressor O&M can help reduce downtime due to maintenance or repairs.
- 5. Improved Efficiency:** Regular maintenance and servicing can help improve the overall efficiency of the air compressor system.



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Compressed air is transported through pipelines. If the pipes lines are not sized properly there will be pressure droop and end user will experience lesser pressure. This will force the compressor to generate at higher pressure and waste energy. So the pipeline should be adequately sized to avoid pressure loss during transportation. Typical applicable pressure drop in industry is around 0.3 bar in mains and 0.5 bar in distribution system.

**The following table shows the energy wastages if pipes are undersized.**

Typical Energy Wastages Due to smaller pipe size diameter for 170cubic mtr /hr. (100 CFM) flow		
Pipe Nominal bore in mm	Pressure drop (in bar) per 100 mtr	Equivalent power loss (in Kw)
40	1.80	9.5
50	0.65	3.4
65	0.22	1.2
80	0.04	0.2
100	0.02	0.1

Source: Bureau of energy efficiency gov of India.

According to industry estimate 10 % of all energy consumed by industrial sector is used for compressed air. In an air compressor 70 to 90 % of electrical energy used is converted to unused heat energy (source Bureau of Energy Efficiency India) so a properly designed heat recovery can save a lot of energy for heating air or water.

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