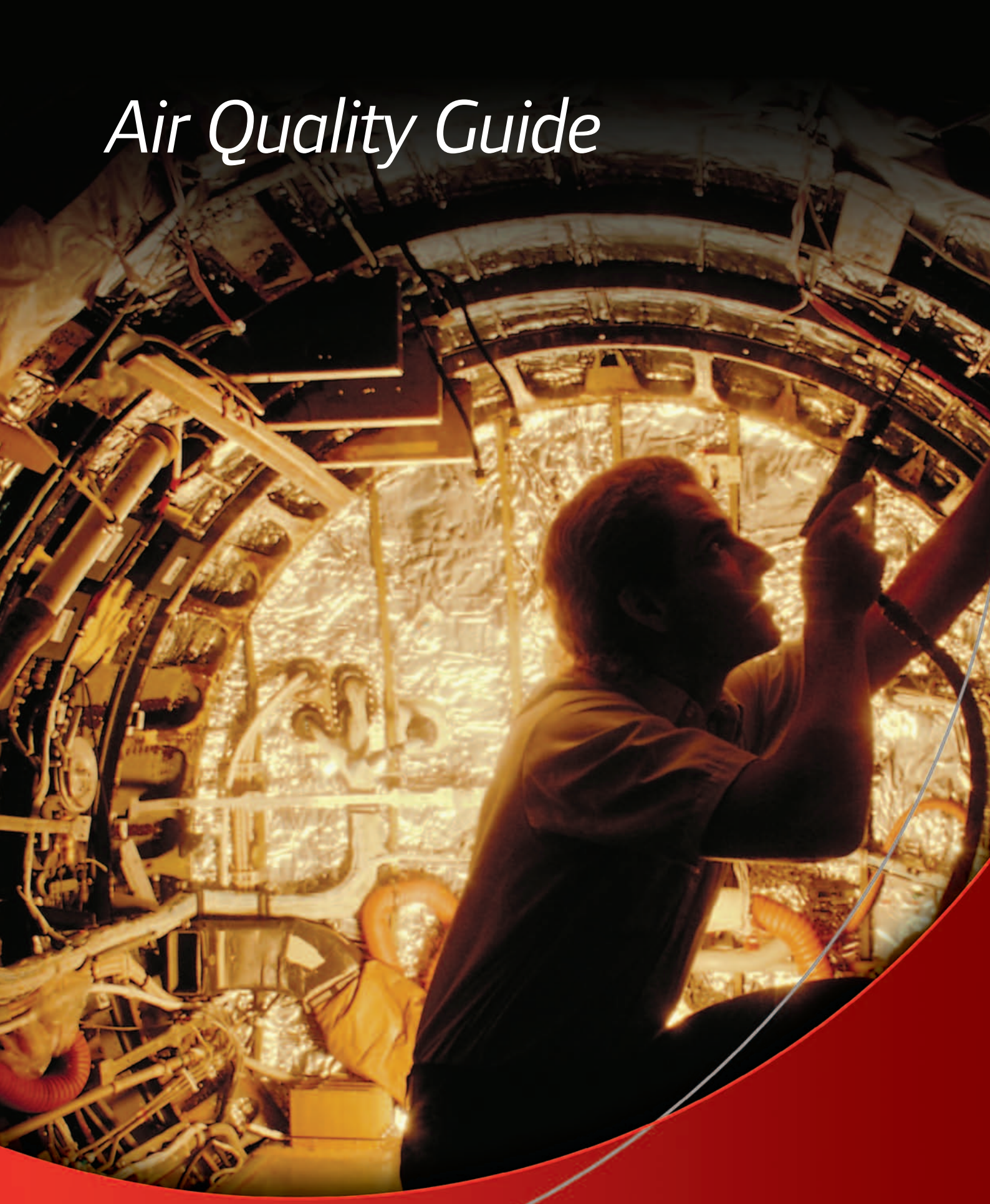
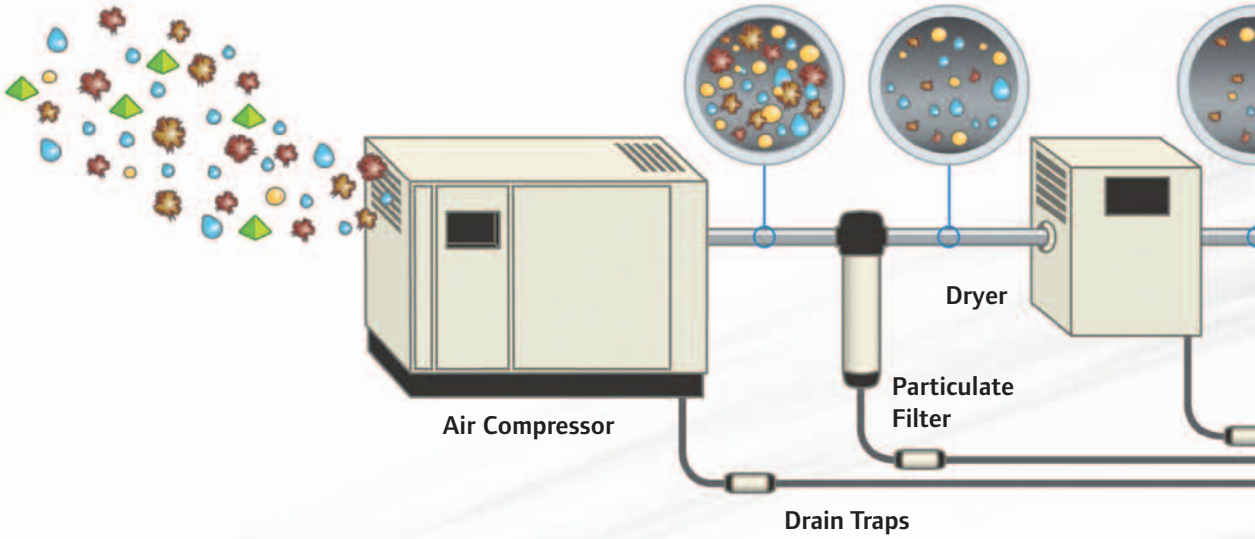
Air Quality Guide

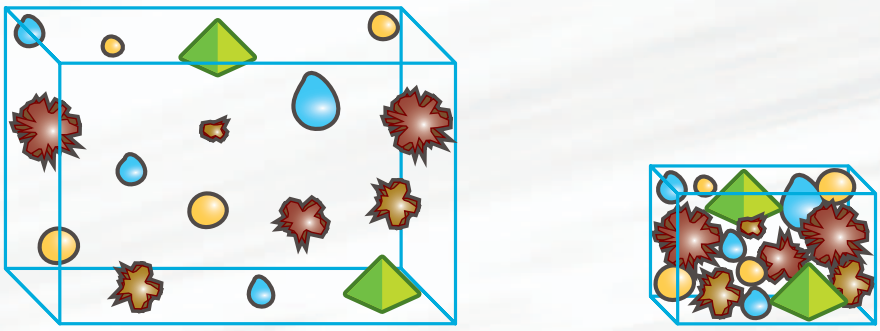


Ingersoll Rand
Industrial Technologies

The Importance of Air Quality

Air Quality



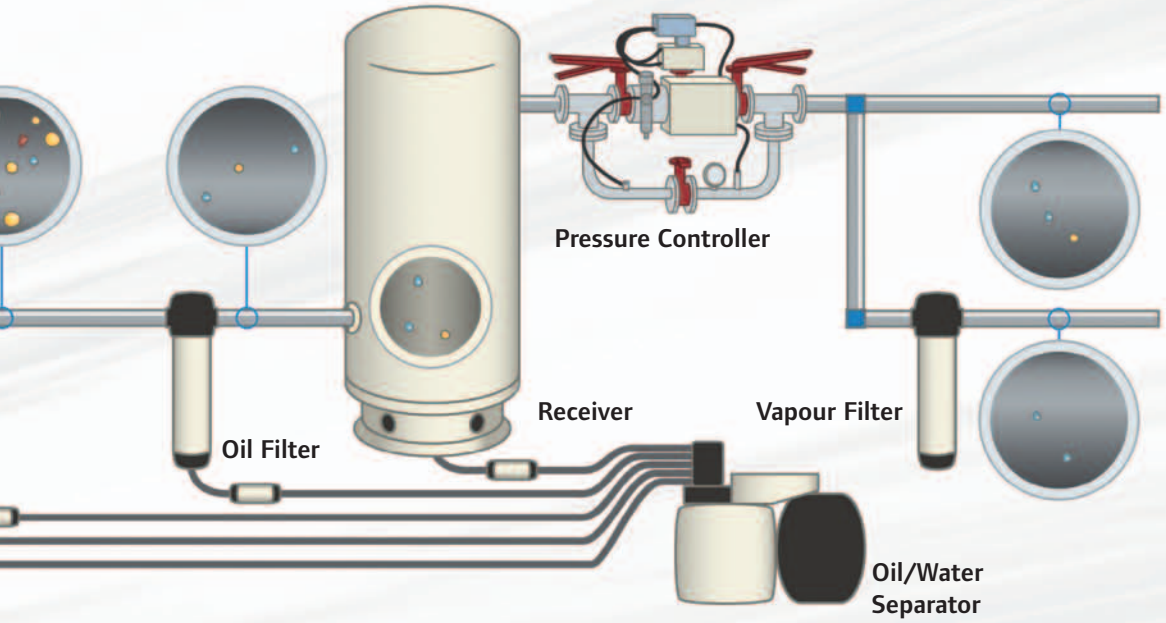


The act of compressing atmospheric air to 7 bar(g) creates an 800% increase in the concentration of contaminants.

What Influences Your Compressed Air Quality?

Dirt, moisture and oil are everywhere. But they shouldn't be in your compressed air supply.

- Dust, dirt, pollen, microorganisms, smoke, exhaust emissions and other particulates
- Moisture in the form of water vapour
- Oil, unburned hydrocarbons from the ambient air and compressor coolant carryover
- Caustic gases such as sulfur oxides, nitrogen oxides and chlorine compounds



The Results of Contaminated Compressed Air

The problems created by contaminated compressed air in your system can range from annoyance to wreaking havoc on your equipment and your end products.

- Premature wearing and scoring of surfaces
- Rust and corrosion in tools, piping and equipment
- Damaged instruments
- Spoiled paint surfaces
- Increased scrap rate
- Unsafe or unpleasant work environment

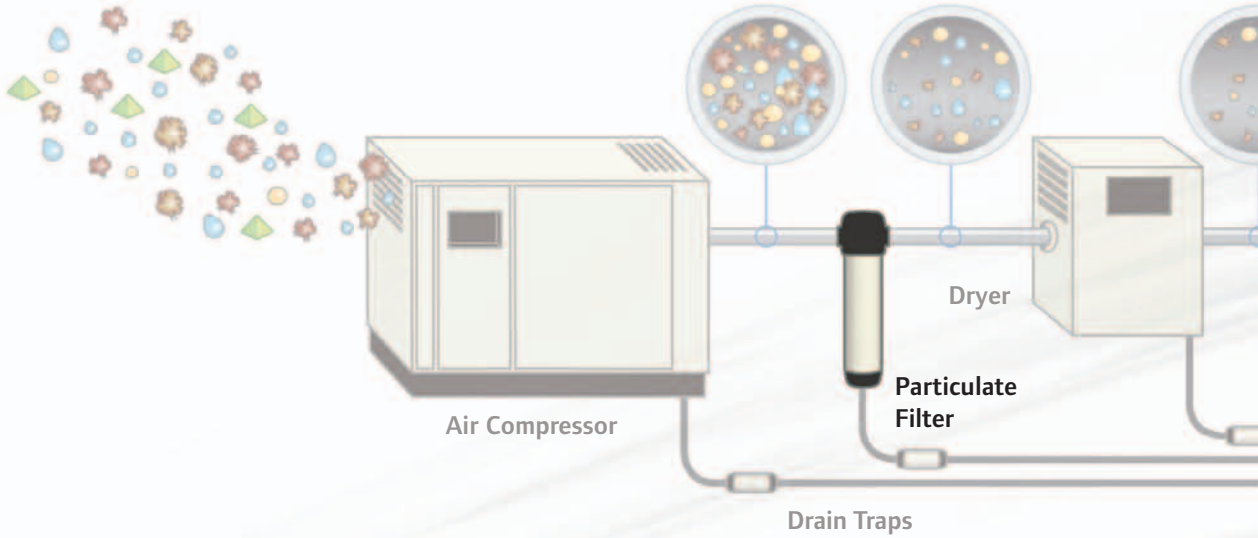
ISO 8573-1 Air Quality Classes

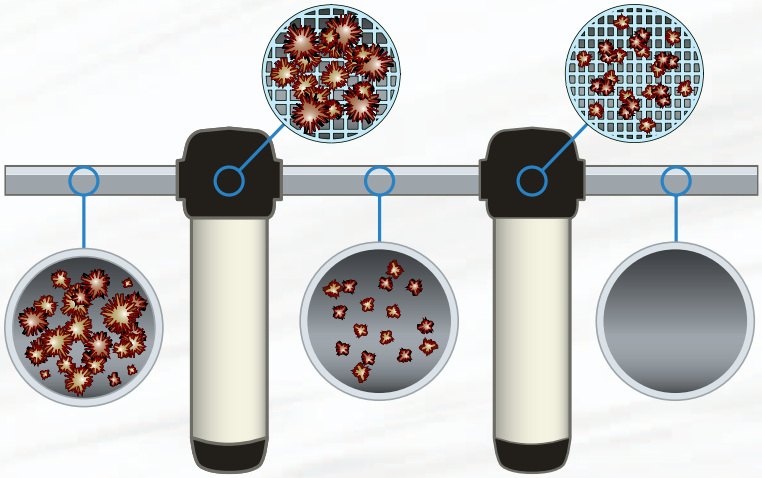
Maintaining air quality is so important that the International Standards Organisation (ISO) developed six compressed air quality classes, as defined by ISO 8573-1. To determine which industry classification you require, ask yourself these simple questions:

- Does compressed air quality affect my production process and the quality of my end products?
- Will poor compressed air quality decrease my productivity, cost savings and product quality standards?
- What internal and external ambient conditions affect the quality of my compressed air produced by my system?

Removing Particulate Contamination

Air Quality





The first filter removes larger particles.

The second filter removes smaller particles.

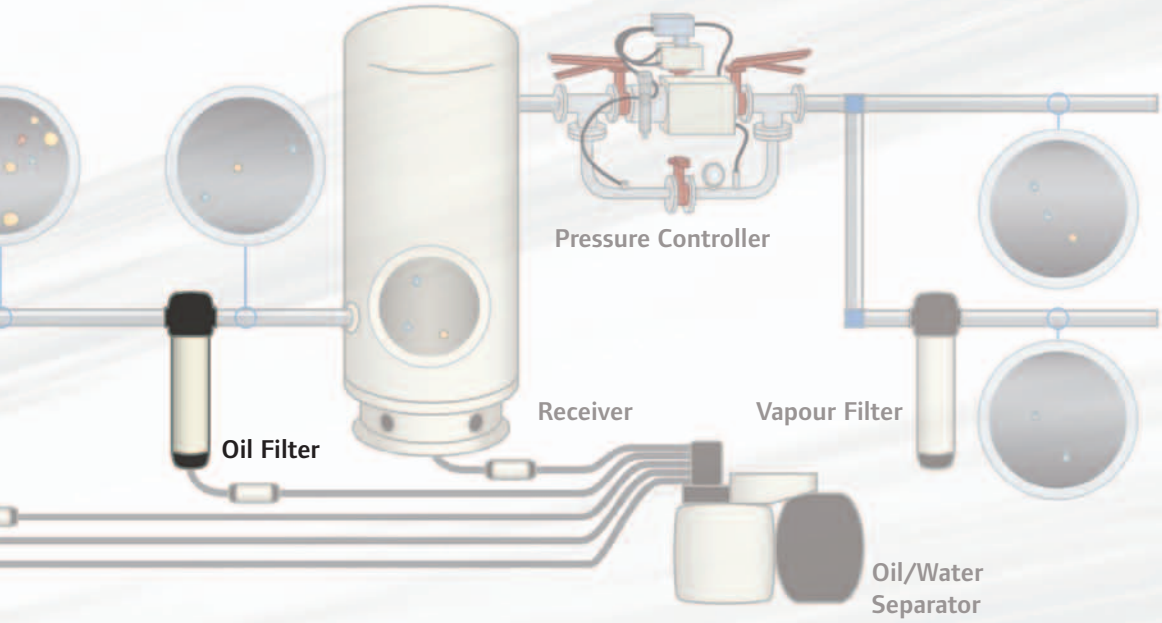
For sensitive or critical applications more than one set of filters may be required at the "point-of-use".

Always precede fine filters with a coarser grade.

Contaminants Can Destroy a Compressed Air System

Think of it as a mini dust storm at 7 bar(g). The particulates scattered almost invisibly throughout the ambient air become a concentrated force for damage and destruction of your air-operated tools, equipment and instruments.

- Systems are damaged and products are spoiled
- Scoring and uneven wear patterns ruin tools and instruments
- Volatile, hazardous compounds are produced
- Production shuts down, productivity and quality suffer



General Manufacturing
Assembly
Conveying
Air Tool Use

Advanced Pneumatics
Instrument Quality
Food Grade

Compressed Air Quality ISO 8573-1:2001

Quality Class	SOLIDS Max Number of Particles Per m³ 0.1 – 0.5 micron	0.5 – 1 micron	1 – 5 micron	WATER Pressure Dew Point °C	OIL & OIL VAPOUR mg/m³	Quality Class
0	As specified by the end-user or manufacturer, and more stringent than Class 1					0
1	100	1	0	-70	0.01	1
2	100,000	1000	10	-40	0.1	2
3	N/A	10,000	500	-20	1	3
4	N/A	N/A	1,000	3	5	4
5	N/A	N/A	20,000	7	N/A	5
6	N/A	N/A	N/A	10	N/A	6

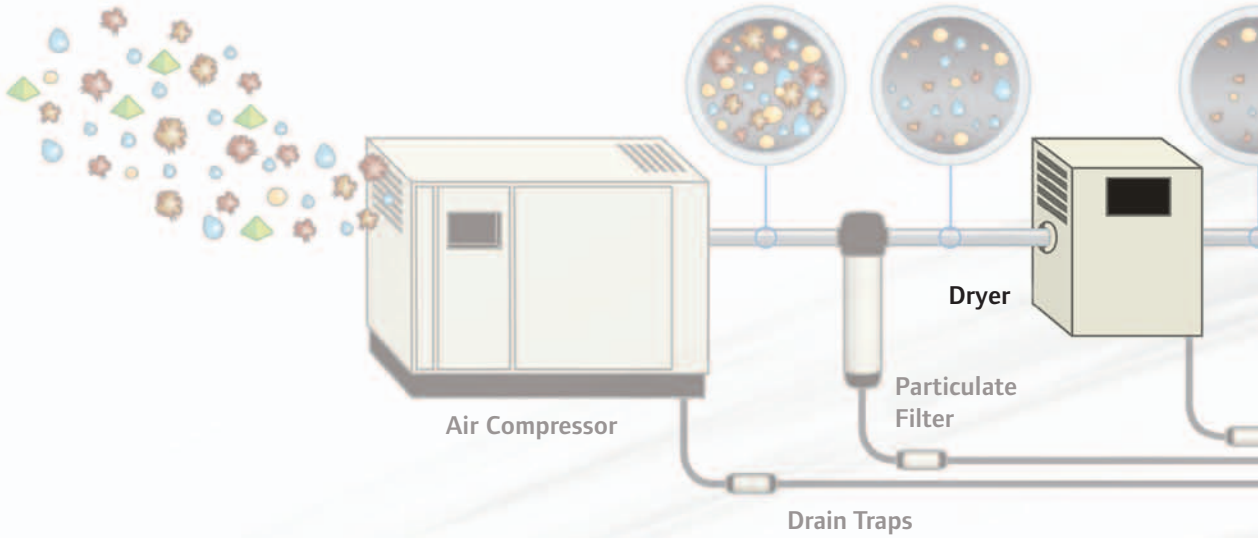
Dual Filters Eliminate Dirt and Problems

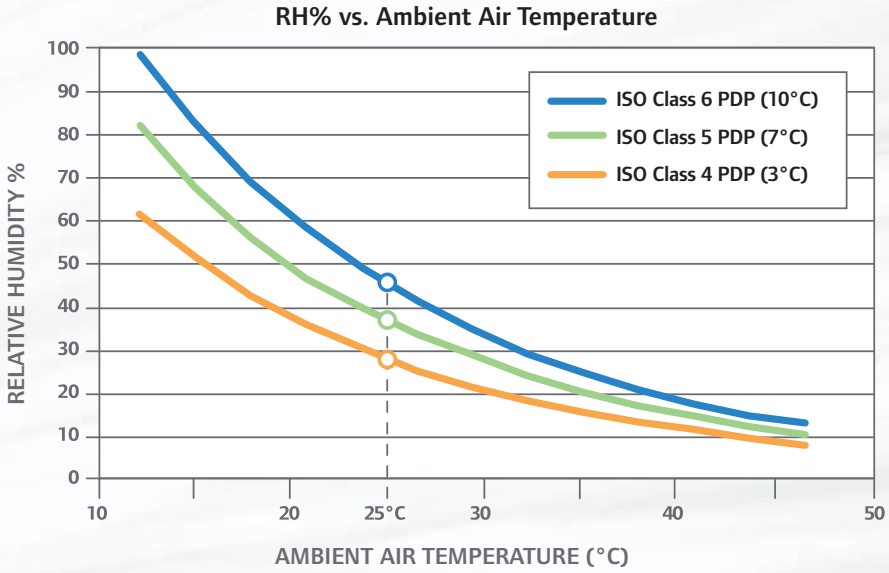
Eliminating the "sandblast" effect of particulates in your compressed air stream gets rid of:

- Premature wear
- Scored surfaces
- Clogged orifices
- Ruined finishes and instruments

Removing Moisture

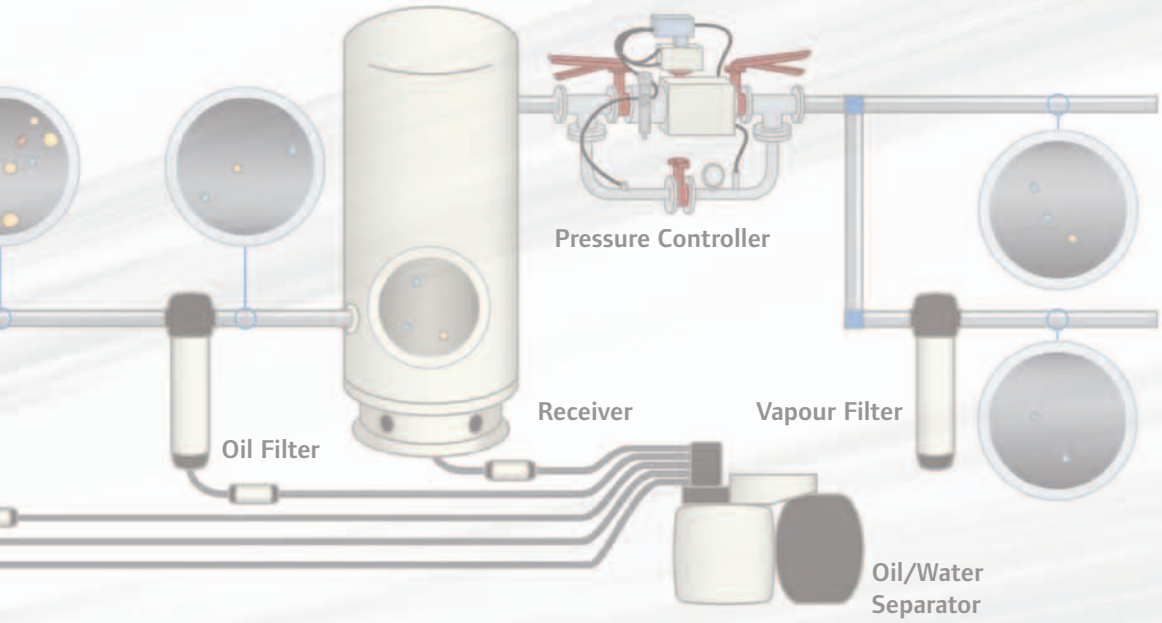
Air Quality





How To Compare Relative Humidity In ISO Standard

- ISO classifies a constant pressure dewpoint at a specific ambient air temperature (25°C).
- As illustrated in the graph, when pressure dewpoint (PDP) is held constant (represented by the colour curves) and ambient air temperature changes, the relative humidity (RH) will increase or decrease.
- When a constant relative humidity is maintained, your air system's performance will be consistent and reliable.



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4	N/A	N/A	1,000	**3**	5	**4**
5	N/A	N/A	20,000	**7**	N/A	**5**
6	N/A	N/A	N/A	**10**	N/A	**6**

Why Is Relative Humidity Important?

Moisture Contamination Has The Following Effects:-

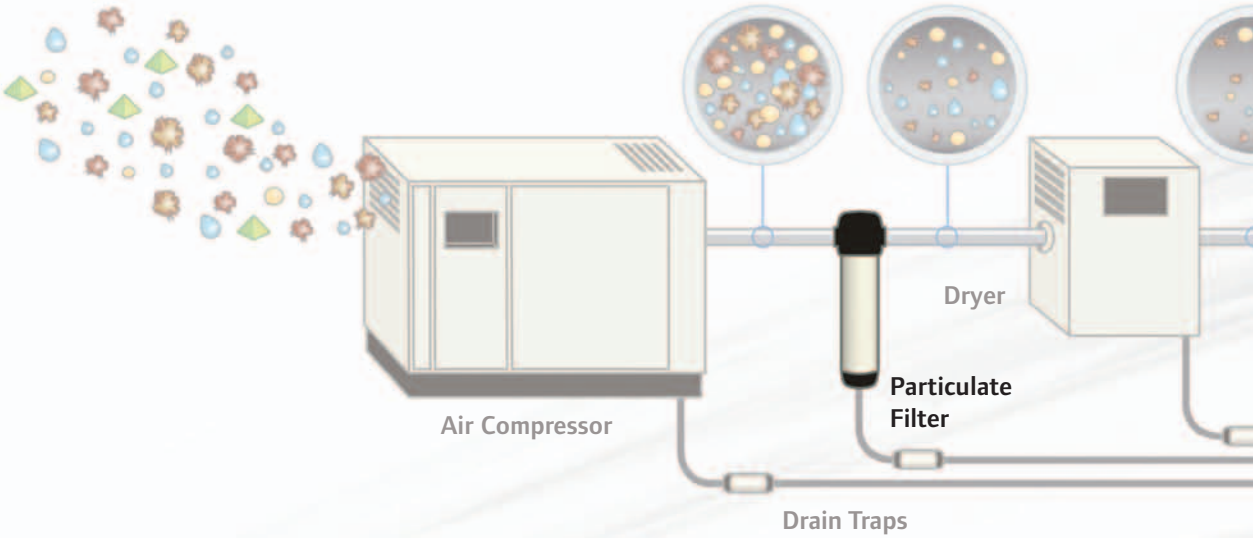
- Rust and corrosion in the air system piping
- Inadequate air tool lubrication
- Damage to labelling, packaging and the finished goods
- Productivity losses throughout your operation

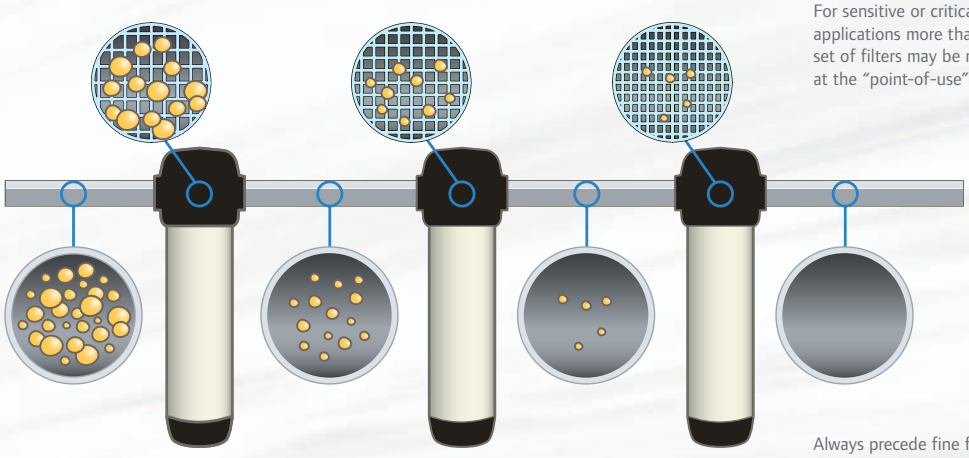
Refrigerated air dryers are capable of maintaining less than 50% relative humidity in most industrial plant ambient environments.

Processes that require ultra-dry air (ISO Class 1, 2 or 3) will need an advanced solution using non-refrigerated dryer technology.

Removing Oil

Air Quality





For sensitive or critical applications more than one set of filters may be required at the "point-of-use".

Always precede fine filters with a coarser grade.

The first filter removes large oil droplets.

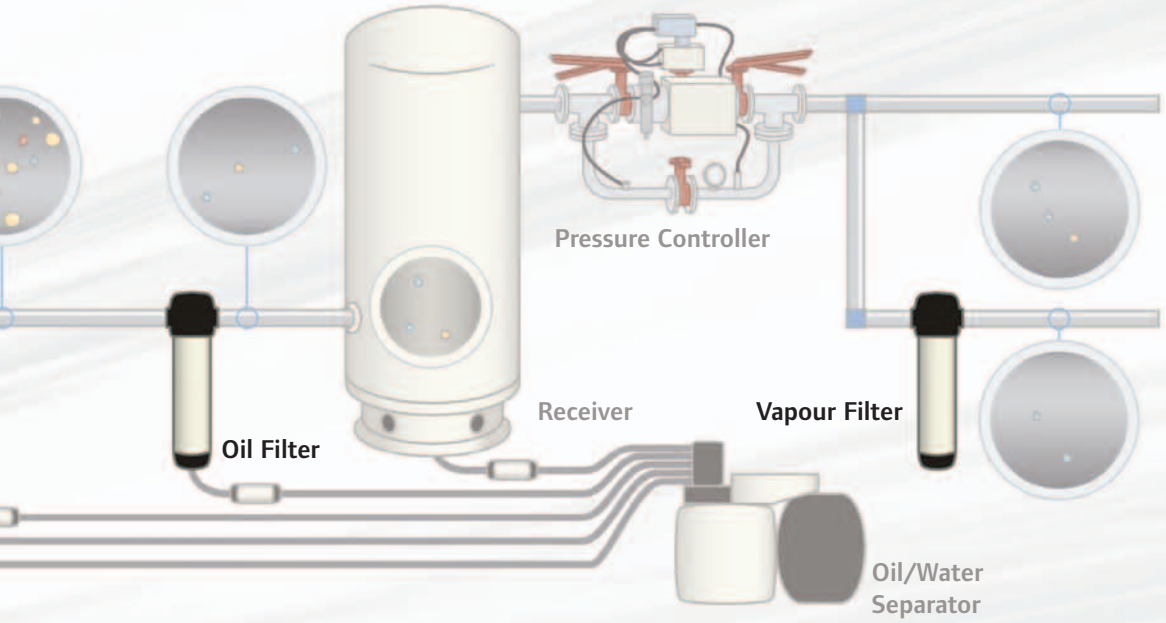
The second filter removes fine oil droplets.

The third filter removes oil vapours, providing odour-free air.

Oil in Compressed Air Affects Products and the Work Environment

Oil, unburned hydrocarbons and compressor coolant become highly concentrated during compression.

- These contaminants enter the air flow as entrained droplets and will pass through the compressed air system into the production process unless they are removed.
- The built-in air/oil separator on all rotary screw air compressors will remove a portion of the oil, but this is not sufficient for most applications.
- Oil contamination will cause batch spoilage, poor quality in finished goods, unwanted colouring in finished goods and a messy or hazardous work environment.



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4	N/A	N/A	1,000	3	5	4
5	N/A	N/A	20,000	7	N/A	5
6	N/A	N/A	N/A	10	N/A	6

Proper Filtration Removes Unwanted Oil from the Air Stream

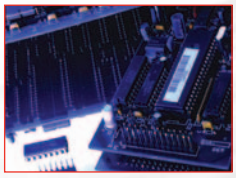
Removing oil from the compressed air stream provides some real benefits.

- Longer air tool life
- Ensures high quality of finished goods
- No unwanted odours
- Safer workplace

Totally oil-free compressed air can only be achieved by installing an oil-free air compressor. However, particulate filtration and moisture removal are still necessary.

Ingersoll Rand Industry Classifications

Air Quality

Class	Description	Applications	
IN1 Instrument Grade Air: ISO Class 2.1.1	Efficient removal of solid particulates and oil. ISO Class 1 Pressure Dewpoint will be maintained.	Instrumentation, process, oil and gas, chemical, electronics.	
IN1 Odour-Free Instrument Grade Air: ISO Class 2.1.1 odour free	Efficient removal of solid particulates and oil, and oil vapour. ISO Class 1 Pressure Dewpoint will be maintained.	Pharmaceutical, food and beverage, clean rooms.	
IN2 Instrument Grade Air: ISO Class 2.2.1	Efficient removal of solid particulates and oil. ISO Class 2 Pressure Dewpoint will be maintained.	Instrumentation, process, oil and gas, chemical, electronics.	
IN2 Odour Free Instrument Grade Air: ISO Class 2.2.1 odour free	Efficient removal of solid particulates and oil, and oil vapour. ISO Class 2 Pressure Dewpoint will be maintained.	Pharmaceutical, food and beverage, clean rooms.	
IG4 Industrial Grade Air: ISO Class 2.4.1	Efficient removal of solid particulates and oil. ISO Class 4 Pressure Dewpoint or a 30% (or less) Relative Humidity (RH) will be maintained.	General manufacturing, metal stamping, air tool use, forging, assembly, painting and finishing.	
IG4 Odour Free Industrial Grade Air: ISO 2.4.1 odour free	Efficient removal of solid particulates and oil, and oil vapour. ISO Class 4 Pressure Dewpoint or a 30% (or less) Relative Humidity (RH) will be maintained.	Food and beverage, raw material mixing.	
IG6 Industrial Grade Air: ISO 2.6.1	Efficient removal of solid particulates and oil. ISO Class 6 Pressure Dewpoint or a 50% (or less) Relative Humidity (RH) will be maintained.	Sand blasting, home use, construction.	

Symptom … diagnosis … prescription

Ingersoll Rand can improve the health of your air system

A doctor wouldn't write a prescription without first making a diagnosis. Similarly, in terms of compressed air, fixing a troublesome system without first diagnosing the true problem is a hit or miss proposition based on guesswork. This can lead to production stoppages, extended downtime, and even product spoilage. Ingersoll Rand eliminates the guesswork by providing proven air system auditing services that not only ensure air system efficiency, but reduce operating costs to improve bottom lines.

Using an innovative tool — known as Intellisurvey — we non-intrusively monitor a compressed air system to determine the root causes of symptoms. With Intellisurvey, our experts analyse the many components of an air system, as well as flow, pressure, supply utilisation, and power costs, to determine an optimised system that generates improvements in repeatability, efficiency, and plant productivity.

AirCare Advantage

We understand that uptime is critical to your operation. That's why we offer AirCare Advantage — a responsive, flexible contract maintenance program custom-designed to provide factory-authorised scheduled maintenance that ensures increased system reliability. AirCare Advantage helps eliminate unscheduled downtime and relieves you of costly investments in monitoring equipment and ongoing training. The program also provides a thorough knowledge of compressor technology.

Ingersoll Rand
Industrial Technologies

Ingersoll Rand Industrial Technologies provides products, services and solutions to enhance the efficiency and productivity of our commercial, industrial and process customers. Our innovative products include air compressors, air systems components, tools, pumps, material and fluid handling systems and microturbines.

air.ingersollrand.com

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