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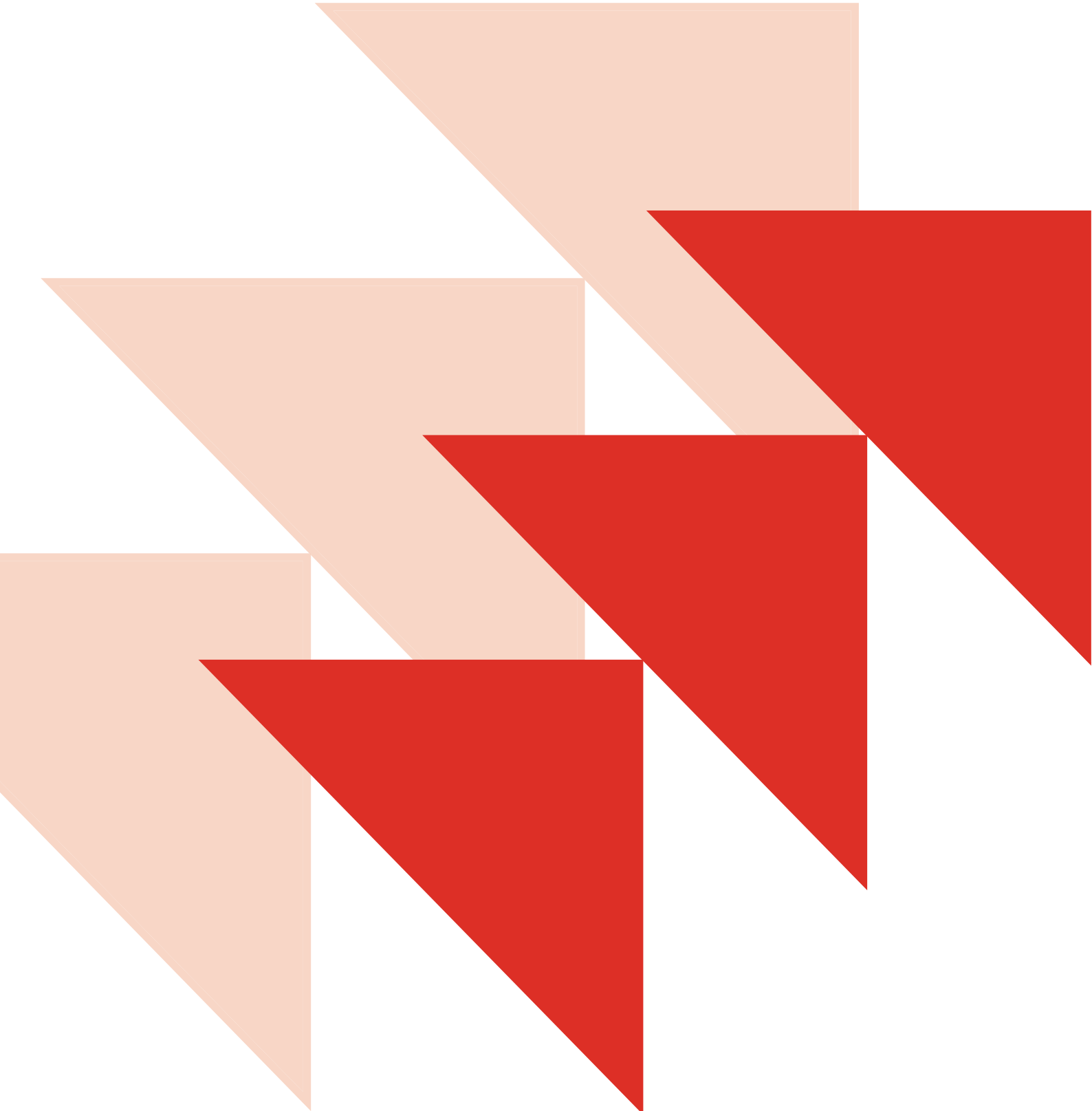
SPECIFYING AIR QUALITY



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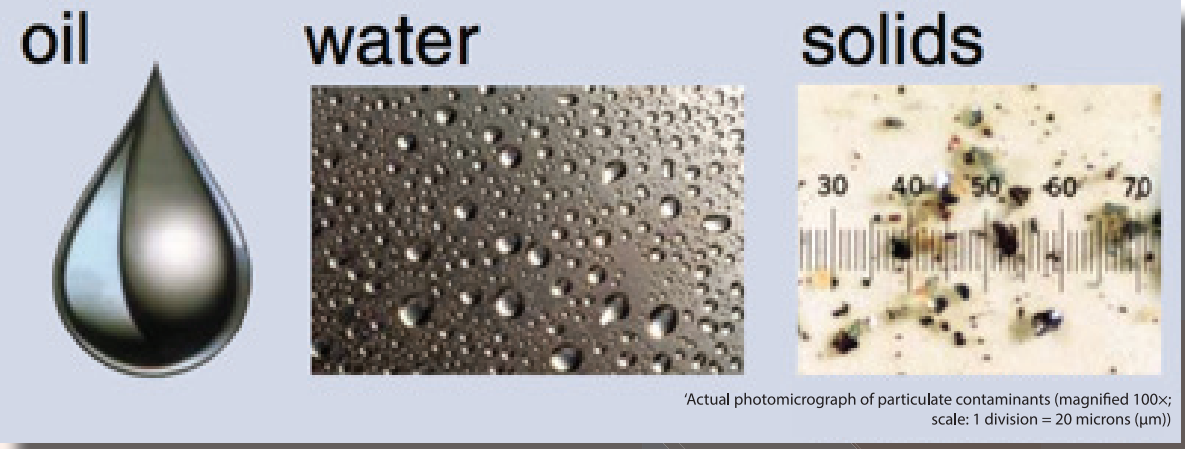
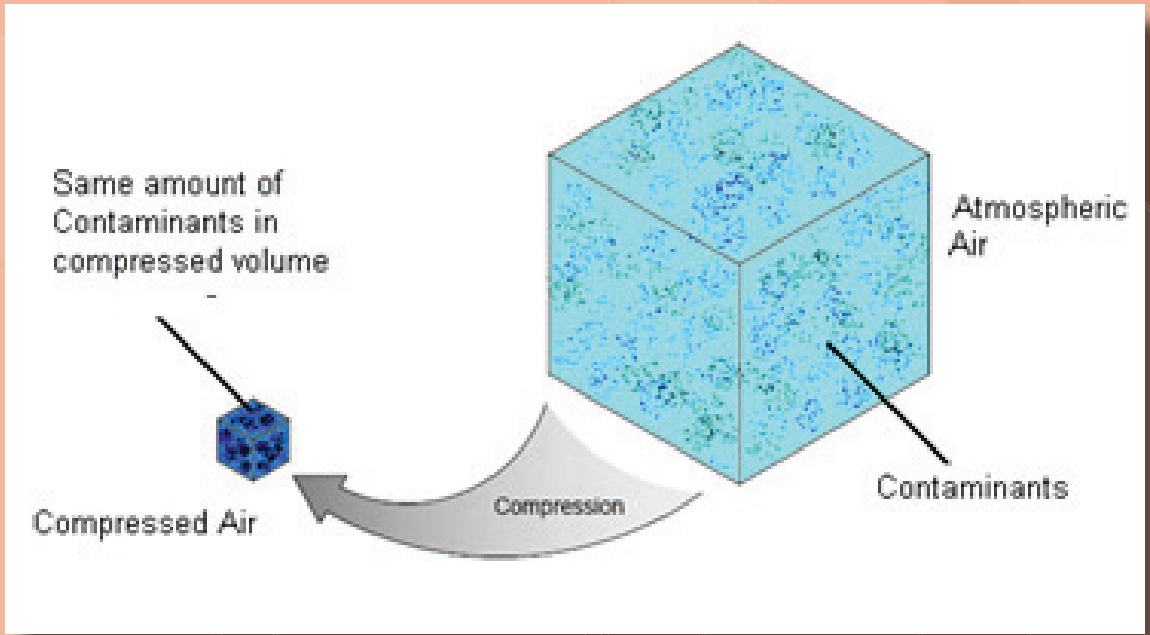
The air delivered by any air compressor inherently contains dust particles, water droplets and oil. Some of these contaminants may be present in the intake air itself, whereas others may get introduced into the air during the compression process in the compressor.

PURITY IS IMPORTANT



Contaminants that are commonly present in compressed air.



Contaminants present in intake air get concentrated because of compression.

The presence of contaminants can lead to problems, depending on the level of contamination and the nature of the application. For instance, pneumatic tools may malfunction and pipe lines may get corroded.

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The compressed air used in blow moulding of PET items must be dry and free of contaminants.

The purity of the compressed air used is more important in some applications than in others. An example is provided by the PET blow moulding process. The compressed air used in this application must be dry and uncontaminated. Contaminants, particularly moisture, can lead to the moulded products having a cloudy appearance and having poor strength.

The use of dryers and filters is the most common method of removing contaminants from compressed air and making it suitable for an application.

Air used in the food processing industry must be free of contaminants.

The use of dryers and filters is the most common method of removing contaminants from compressed air and making it suitable for an application.

The purity of the air used for breathing, such as in hospitals, is critical.

The purity of the air is even more critical in some applications where the compressed air comes into contact with food and medicines. In other such applications, the air is used for breathing.

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STANDARDS AND COMPRESSED AIR

The International Organization for Standardization (ISO) has drawn up standards for compressed air quality. Conformance to the standards provides users the assurance that the air is sufficiently pure for their applications. Three standards drawn up by the ISO are commonly used for specifying compressed air quality and for testing: These are the ISO 8573 series, the ISO 12500 series and ISO 7183.

Which of the three standards does one use? The answer depends on the objective:

Purpose	Standard to be used
Specifying the purity of compressed air required at a particular point in a compressed air system	ISO8573-1:2010
Testing a compressed air system for one or more specific contaminants	ISO8573:2007 Parts 2–9
Verifying the performance of compressed air purification equipment	For filters, one uses the ISO12500:2009 series; for dryers, ISO 7183:2007
Benchmarking the performance of compressed air purification equipment	The ISO12500:2009 series is applicable to filters and ISO 7183:2007 to dryers

The most commonly used standard is the ISO 8573 series. It comprises nine separate parts:

ISO 8573-1:2010	This specification relates to the amount of contaminant allowable in each cubic metre of compressed air.
ISO 8573-2:2007	This specifies the test method to be used for determining the oil aerosol content in the compressed air.
ISO 8573-3:1999	This standard specifies the test method to be used for measuring humidity.
ISO 8573-4:2001	This specifies the test method for determining the solid particle content.
ISO 8573-5:2001	This standard specifies the test method used for determining the oil vapour and organic solvent content.
ISO 8573-6:2003	This relates to the test method used for determining the gaseous contaminant content.
ISO 8573-7:2003	This specifies the test method to be used for the viable microbiological contaminant content.
ISO 8573-8:2004	This specifies the test to be used for determining the solid particle content by mass concentration
ISO 8573-9:2004	This is the standard dealing with the test method for determining the liquid water content.

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THE ISO 8573 CLASSES

ISO 8573-1:2010, specifying the quality requirements of compressed air, is particularly widely used. It specifies the amount of contaminant allowed in each cubic metre of compressed air. ISO 8573-1 specifies various classes for the main contaminants (namely solid particulates, water and oil) separately. The classes differ in the maximum permissible amount of the respective contaminant.

Solid Particulate Classes

The limits of the solid particulate classes are listed in this table:

Class	Maximum number of particles per m^3			Mass concentration (mg/m^3)
	0.1–0.5 micron	0.5–1 micron	1–5 micron	
0	As specified by the equipment user or supplier and more stringent than Class 1			
1	≤20,000	≤400	≤10	—
2	≤400,000	≤6000	≤100	—
3	—	≤90,000	≤1000	—
4	—	—	≤10,000	—
5	—	—	≤100,000	—
6	—	—	—	≤5
7	—	—	—	5–10
8	—	—	—	—
9	—	—	—	—
X	—	—	—	>10

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Water Content Classes

This table presents the limits of the water content classes:

Class	Vapour pressure dewpoint	Liquid water (g/m³)
0	As specified by the equipment user or supplier and more stringent than Class 1	
1	≤-70°C	—
2	≤-40°C	—
3	≤-20°C	—
4	≤+3°C	—
5	≤+7°C	—
6	≤+10°C	—
7	—	≤0.5
8	—	0.5–5
9	—	5–10
X	—	>10

Oil Content Classes

The ISO 8573 oil classes are specified simply on the basis of the total oil content (as aerosol, liquid and vapour) of the compressed air:

Class	Total oil (mg/m³)
0	As specified by the equipment user or supplier and more stringent than Class 1
1	0.01
2	0.1
3	1
4	5
5	—
6	—
7	—
8	—
9	—
X	>10

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Oil carryover increases with temperature. The ISO 8573 standards recommend that removal of oil from compressed air be effected through the use of high-efficiency filters.

Different purity classes can be selected for the three contaminants when specifying the purity of air required at the standard reference conditions. The purity is specified by referencing the standard and writing the three classes together, separated by decimal points, for example ISO 8573-1:2010 Class 2.1.2. The first digit after the word 'Class' refers to the particulate class, in this case Class 2. The second digit, 1, of the example indicates that the purity required in terms of water content is Class 1. The third digit indicates that the oil purity class is Class 2.

Compressed air that comes into contact with food or medicines or is used for breathing typically needs to be of Class 2.1.1 or Class 2.2.1.

A FEW WORDS ABOUT CLASS 0

Air of Class 0 is not necessarily free of contaminants. The contaminant levels of Class 0 are agreed upon by the equipment manufacturer and user. The specification must be documented in writing. The contamination levels agreed on should be within the measurement capabilities of the test equipment and methods specified in ISO 8573 Parts 2–9.

Air delivered by oil-free compressors may conform to Class 0 specifications under test conditions, as claimed by various manufacturers. The claim may not be valid if the equipment is tested under typical urban or working environments. Purification equipment will needed both at the compressor intake and at the point of use for air of Class 0 purity to be delivered to the application.

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