AIR TREATMENT

Why Air Treatment?

Proper air treatment helps to prevent faults in pneumatic components.
It increases the service life of the components and reduces machine failures and downtime, thereby increasing process reliability.
Compressed air contains contaminants in the form of: particles, water and oil.

Water and oil can be in liquid or gaseous form and change from one state to another within the compressed air system.
An actual compressed air system will not have any of these contaminants in their pure form; they will occur in a mixture.
The composition of this mixture can vary greatly at different times in different places in the system. For example, water can collect in branch lines or particles can become deposited in empty spaces over time, and then be propelled along at one stroke by a pressure surge.

Poorly prepared compressed air causes faults such as:

- Accelerated wearing of seals
- Oil-fouled valves in the control section
- Dirty silencers

Possible effects for the user and machine:

- Reduced machine availability
- Higher energy costs due to leakages
- Higher maintenance costs
- Shorter component and system service life

Compressed air quality in use

Designation to ISO 8573-1:2010
[particle:water:oil]

The class that can be achieved with compressed air preparation depends on the quality of the compressed air downstream of the compressor.
The specifications apply to typical compressed air systems (this list is not exhaustive).

Central air preparation		Air distribution	Decentralised air preparation		Typical applications
Component	Class	Class	Component	Class[3]	
Compressor	[–:–:–]	[–:–:–]	Water separator	[–:7:4]	All applications where the compressed air must be virtually free from condensate. No defined particle filtering.
Compressor + pre-filter + air dryer	[7:4:4][1]	[–:4:–][2]	Filter 40 µm	[7:4:4]	Operating medium for valves, cylinders, secondary packaging (standard)
			Filter 5 µm	[6:4:4]	Servopneumatic positioning using proportional directional control valves, compressed air tools
			Filter 5 + 1 µm	[5:4:3]	Applications with a residual oil content < 0.5 mg/m³, textile industry, pneumatic spinning machines, paper industry
			Filter 5 + 1 + 0.01 µm	[1:4:2]	Applications with a residual oil content < 0.01 mg/m³, e.g. air bearings, painting, powder coating
			Filter 5 + 1 + 0.01 µm + activated carbon filter	[1:4:1]	Applications with a residual oil content < 0.003 mg/m³, reduction of oil vapours and odours, optical instruments, sealing air for precision glass scales/ lasers, primary packaging
			Filter 5 + 1 + 0.01 µm + activated carbon filter + membrane dryer	[1:3:1]	Semiconductor industry, pharmaceutical products
			Filter 5 + 1 µm + adsorption dryer	[2:2:2]	Applications in the low-temperature range, dry process air, powder transportation, food production [1:2:1]

1) Much higher classes are possible with suitable air preparation downstream of the compressor.
2) Pipe systems can increase the particle content of the compressed air (chips, rust, ...), liquid oil can accumulate in some lines of the compressed air distribution system. Specifications apply at normal room temperature. If parts in the compressed air system are subject to lower temperatures, the humidity class must be chosen so that the pressure dew point is 10 K below the minimum expected temperature.
3) Class according to ISO 8573-1:2010 at room temperature (20 °C).

Definition of the compressed air purity class to ISO 8573-1:2010

The quality of the compressed air is determined by
- solid contaminants (particles),
- humidity and water, and
- oil content.

The air purity class is specified as follows:
A = Particles
B = Humidity
C = Oil content

Example:
ISO 8573-1:2010 [–:7:–]
Particles: Not defined
Humidity: ≤ 0.5 g/m³
Oil content: Not defined

Purity classes for particles to ISO 8573-1:2010			
Class	Maximum number of particles per m³ as a function of particle size d		
	0.1 µm < d ≤ 0.5 µm	0.5 µm < d ≤ 1.0 µm	1.0 µm < d ≤ 5.0 µm
0	As stipulated by the user or supplier of the equipment, stricter requirements than class 1		
1	≤ 20,000	≤ 400	≤ 10
2	≤ 400,000	≤ 6,000	≤ 100
3	Not specified	≤ 90,000	≤ 1,000
4	Not specified	Not specified	≤ 10,000
5	Not specified	Not specified	≤ 100,000

Class	Mass concentration C_p [mg/m³]
6[1)]	$0 < C_p \leq 5$
7[1)]	$5 < C_p \leq 10$
X	$C_p > 10$

1) Air cleaned using universal filters designed for particle sizes of 5 µm (class 6) and 40 µm (class 7) is normally used for the compressed air supply to industrial tools and pneumatic machines. These designs have been used for many years, before the latest systems for measuring particle sizes were developed, and have enabled satisfactory operation while minimising pressure (and therefore performance) losses.
These filters are not 100% efficient; they offer an efficiency of at least 95% based on the specified particle size, i.e. for class 6, 95% of all particles of the size 5 µm are filtered; for class 7, 95% of all particles of the size 40 µm are filtered (measured as per ISO 125003).

Purity classes for humidity and liquid water to ISO 8573-1:2010	
Class	Pressure dew point [°C]
0	As stipulated by the user or supplier of the equipment, stricter requirements than class 1
1	≤ –70
2	≤ –40
3	≤ –20
4	≤ +3
5	≤ +7
6	≤ +10

Class	Concentration of liquid water C_w [g/m³]
7	$C_w \leq 0.5$
8	$0.5 < C_w \leq 5$
9	$5 < C_w \leq 10$
X	$C_w > 10$

Purity classes for total oil content to ISO 8573-1:2010	
Class	Total concentration of oil (liquid, aerosol and vapour) [mg/m³]
0	As stipulated by the user or supplier of the equipment, stricter requirements than class 1
1	≤ 0.01
2	≤ 0.1
3	≤ 1
4	≤ 5
X	> 5

DPC®

LF Series Air Filter

Working Pressure : 0 ~ 1.6MPa

FESTO TYPE

Ordering Code

LF - 1/4 - □ - MINI - □

Model

Port Size
M5
M7
G1/8"
G1/4"
G3/8"
G1/2"
G3/4"
G1"

Manometer
Blank: 12bar
7:7bar

Size
迷你型/MINI
中长型/MIDI
最大型/MAXI
细小型/MICRO

Condensate Drain
Blank: Turned Manually
H: Semi-automatic
A: Fully Automatic

LFR Series Filter & Regulator

Working Pressure : 0.5 ~ 1.2MPa

FESTO TYPE

Ordering Code

LFR - 1/4 - □ - □ - MINI - □

Model

Port Size
M5
M7
G1/8"
G1/4"
G3/8"
G1/2"
G3/4"
G1"

Grade of Filtration
空白 Blank: 40μm
5M:5μm

Manometer
空白 Blank: 12bar
7:7bar

Size
MINI
MIDI
MAXI
MICRO

Condensate Drain
Blank: Turned Manually
H: Semi-automatic
A: Fully Automatic

LOE Series Lubricator

Working Pressure : 0 ~ 1.6MPa

FESTO TYPE

Ordering Code

LOE - 1/4 - MINI

Model

Port Size
M5
M7
G1/8"
G1/4"
G3/8"
G1/2"
G3/4"
G1"

Size
MINI
MIDI
MAXI
MICRO

QTYH Series High Pressure Regulator

Working Pressure: 0.05 ~ 3.0MPa

Ordering Code

QTYH - 15

Specification Code
QTYH High pressure regulator

Port Size
08: G1/4
10: G3/8
15: G1/2
20: G3/4
25: G1