



Expertise – Passion – Automation

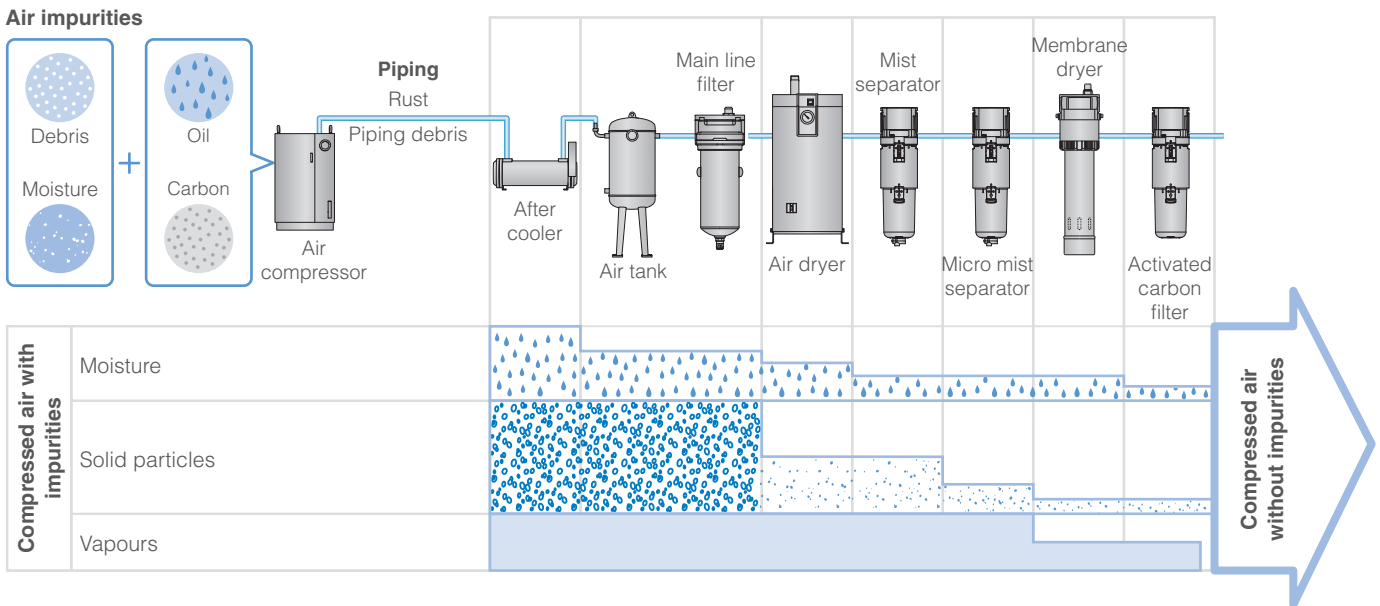


Air treatment guide

Choose your path to the right quality

Atmospheric air contains pollution that remains in the system unless it's removed. Furthermore, not all contamination sources are external, others are added during the compression and supply of the air.

The following table shows how different substances can be removed with the right product for each purpose.



Most common problems in pneumatic systems

If not correctly removed, this foreign matter can result in many different problems, depending on the component and the type of substance.

<p>Moisture and oil Wash out of grease</p>	<p>Swelling of rubber seals</p>	<p>Solidification of powder</p>	<p>Water droplets Contamination of air blow</p>
<p>Rust Piping: stuck auto drains</p>	<p>Devices: corroded pistons and spools</p>	<p>Debris Seal damage</p>	<p>Weather and seasonal problems Over processing due to increased humidity</p>

Effect of substances			
Device	Moisture	Oil	Particles
Solenoid valve	- Malfunction by grease washed out - Stuck valve due to rust - Swollen rubber valve - Reduced service life	- Swollen rubber valve - Reduced service life	- Stuck valve
Air cylinder rotary actuator	- Malfunction by running grease - Stuck valve due to rust - Seized component - Reduced service life	- Reduced service life	- Poor piston rod sealing performance - Reduced service life - Stuck piston rod
Regulator pneumatic relay	- Performance reduction or failure - Reduced service life due to rust	- Performance reduction or failure	- Stuck valve
Pneumatic instrumentation equipment	- Reduced service life due to rust - Malfunction	- Malfunction	
Piping	- Rust formed inside a pipe	- Contamination	
Air duster	- Contamination		
Air motor(Air driver/Air turbine)	- Decreased revolutions - Reduced service life due to rust	- Decreased revolutions or failure	- Failure by seized component
Air blow	- Water droplets generated	- Contamination	
Air micrometer	- Instrumentation error or failure		

Understanding ISO quality air

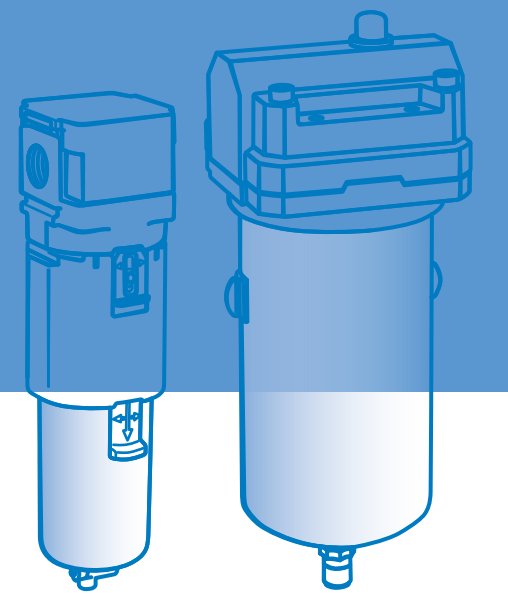
There are no rules to define what air grade is suitable for each application, but ISO 8573-1 sets a scale depending on the concentration of each substance in the air. It uses three numbers in its classification, in order to set limits on particulate matter, moisture and oil contamination. Class 1, 1, 1 represents the cleanest, purest air under the standard, while -, -, - would represent air too contaminated to make the scale.

ISO 8573-1 air quality classification chart

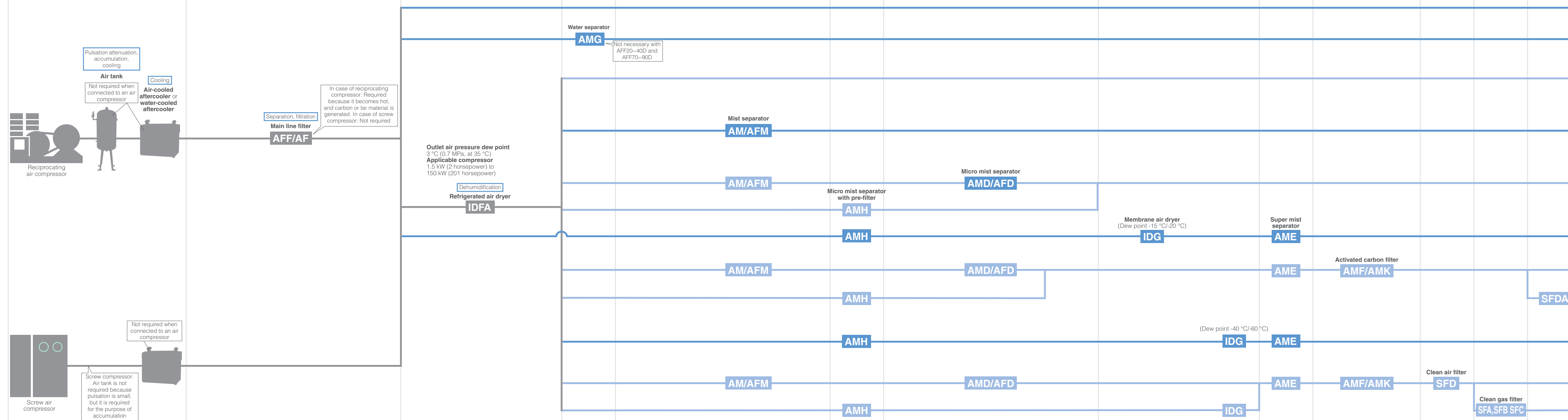
Class	Solid particles, particle size, d(mm)			Humidity and liquid water		Oil	
	Maximum number of particles per cubic meter as a function of particle size d [µm]			Mass concentration Cp	Pressure dew point	Concentration of liquid water Cw	Concentration of total oil
	0.10 <d ≤0.5	0.5 <d ≤1.0	1.0 <d ≤5.0	[mg/m ³]	[°C]	[g/m ³]	[mg/m ³]
0	As specified by the equipment user or supplier and more stringent than class 1						
1	≤20000	≤400	≤10	—	≤-70	—	≤0.01
2	≤400000	≤6000	≤100	—	≤-40	—	≤0.1
3	—	≤90000	≤1000	—	≤-20	—	≤1
4	—	—	≤10000	—	≤3	—	≤5
5	—	—	≤100000	—	≤7	—	—
6	—	—	—	0 <Cp ≤5	≤10	—	—
7	—	—	—	5 <Cp ≤10	—	Cw ≤0.5	—
8	—	—	—	—	—	0.5 <Cw ≤5	—
9	—	—	—	—	—	5 <Cw ≤10	—
x	—	—	—	Cp >10	—	Cw >10	>5

Product name	Sub line							Local line																					
	Main line filter				Refrigerated air dryer			Water separator	Mist separator				Micro mist separator with pre-filter	Micro mist separator			Membrane air dryer	Super mist separator	Activated carbon filter	Clean air filter	Clean gas filters	Bacteria removal filter							
Model																													
Air flow [l/min (ANR)]	300 to 1500	1500 to 5300	2200 to 6000	7000 to 14500	200 to 2000	3400 to 13500	14300 to 22300	300 to 12000	200 to 1000	300 to 1500	2200 to 6000	7000 to 14500	200 to 12000	120 to 600	300 to 1500	2000 to 6000	7000 to 14500	50 to 1000	200 to 12000	300 to 1500	2000 to 12000	100 to 500	26 to 300	500					
Maximum inlet air temperature	60 °C				50 °C	65 °C	60 °C	60 °C														50 °C/55 °C		60 °C			45 °C	80 °C, 120 °C	45 °C
Nominal filtration degree (filtering efficiency)	1 µm (99 %) Water droplet removal rate: 99 %	5 µm	3 µm (99 %)	1 µm (99 %) Water droplet removal rate: 99 %	—			Water droplet removal rate: 99 %	0.3 µm (99.9 %)	0.1 µm (99.9 %)	3 µm (99.9 %)	0.1 µm (99.9 %)	0.01 µm (with 0.3 µm pre-filter)	0.01 µm (99.9 %)				—	0.01 µm (99.9 %)	—	0.01 µm (99.9 %)	0.01 µm (99.9 %)			—				
Outlet oil mist concentration: max. ¹⁾	—				—			1.0 mg/m ³ (ANR) [0.8 ppm]				0.1 mg/m ³ (ANR) [0.08 ppm]			—		0.01 mg/m ³ (ANR) [0.008 ppm]	0.003 mg/m ³ [0.0025 ppm]	0.004 mg/m ³ (ANR) [0.0032 ppm]	—			—						
Outlet ISO purity grade ²⁾	5:4:4	6:4:4	Not rated	5:4:4	—			Not rated	3:4:3	2:4:3	Not rated	2:4:3	Not rated	1:4:2		Not rated	1:4:2	—		1:4:1			—						
Pressure dew point	—				3 °C (Inlet pressure 0.7 MPa)			—														-15 °C, -20 °C (Inlet temperature 25 °C, inlet pressure atmospheric pressure)		-40 °C, -60 °C (Inlet temperature 25 °C, inlet pressure atmospheric pressure)			—		

This table is a guide to choose the path to the right air quality for different industrial applications. Start by specifying the particle, water and oil parameters that you wish to achieve in your system or by selecting your application and seeing which components can help you fulfil your purpose. For further product information, please visit www.smc.eu.



Note 1) When the oil mist concentration (compressor discharge concentration) on the inlet side is approx. 30 mg/m³ (ANR) or less.
 Note 2) Refers to the compressed air quality based on ISO 8573-1:2010 with an inlet air quality [7:4:4].
 Note 3) This describes the grade of compressed air quality based on ISO 8573-1:2010 (JIS B8392-1:2012), which is the maximum quality grade for the system. It varies, however, depending on the inlet air conditions.
 Note 4) Inlet air should be adjusted so the products deliver the right quality.



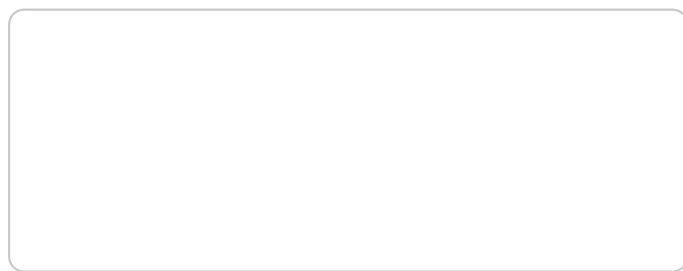
System	Application example	Recommended ISO Air quality class for the application ⁴⁾	Maximum number of particles per m ³ as a function of particle size d [µm]	Humidity and liquid water		Oil	
				Dew point	Water concentration [g/m ³]	Oil concentration [mg/m ³]	Odour removed
A	Water droplets removed air	5:7:—	1.0 < d ≤ 5.0 µm: ≤100000	—	7	>5	
	- Air blowing (Simple removal of particles) - General pneumatic tools - Pilot air	4:7:—					
B	Dry air	4:6:—	1.0 < d ≤ 5.0 µm: ≤10000	≤10 °C	—	>5	
	- General pneumatic equipment with large temperature drops	4:5:— 4:4:—		≤7 °C ≤3 °C			
C	Dry air	2:6:3	1.0 < d ≤ 5.0 µm: ≤100 0.5 < d ≤ 1.0 µm: ≤6000 0.1 < d ≤ 0.5 µm: ≤400000	≤10 °C	—	≤1	No
	- Conveying air for textile and paper industry - General pneumatic equipment - General spray painting	2:5:3 2:4:3		≤7 °C ≤3 °C			
D	Dry & Clean air	1:6:2		≤10 °C	—	≤0.1	
	- High grade painting - Sequence control - Instrumentation - Drying and cleaning of precision parts - Pneumatic bearings	1:5:2 1:4:2		≤7 °C ≤3 °C			
E	Dry & Clean air	1:6:1		≤10 °C	—	≤0.01	
	- Built-in with equipment (With machine tools, 3-D measurement device, etc.)	1:5:1		≤7 °C			
F	Deodorised air	1:5:1		≤7 °C	—	≤0.004	Yes
	- Stirring, transporting - Packaging machines - CD production - Blowing air onto food products	1:4:1	1.0 < d ≤ 5.0 µm: ≤10 0.5 < d ≤ 1.0 µm: ≤400 0.1 < d ≤ 0.5 µm: ≤20000	≤3 °C			
G	Low dew point clean air	1:3:1		≤-20 °C	—	≤0.01	No
	- Drying electric and electronic parts - Drying a filling tank - Transporting powders - Ozone generators - Optical displacement encoders - Low temperature environments	1:2:1		≤-40 °C			
H	Low dew point clean air (for clean room)	1:1:1		≤-70 °C	—	≤0.004	Yes
	- Blowing semiconductors - Clean room applications	1:1:1					



Expertise – Passion – Automation

SMC Corporation

Akihabara UDX 15F, 4-14-1
Sotokanda, Chiyoda-ku, Tokyo 101-0021, JAPAN
Phone: 03-5207-8249
Fax: 03-5298-5362



Austria	+43 (0)2262622800	www.smc.at	office@smc.at
Belgium	+32 (0)33551464	www.smc.be	info@smc.be
Bulgaria	+359 (0)2807670	www.smc.bg	office@smc.bg
Croatia	+385 (0)13707288	www.smc.hr	office@smc.hr
Czech Republic	+420 541424611	www.smc.cz	office@smc.cz
Denmark	+45 70252900	www.smc.dk.com	smc@smc.dk.com
Estonia	+372 6510370	www.smc.pneumatics.ee	smc@info@smc.ee
Finland	+358 207513513	www.smc.fi	smc@info@smc.fi
France	+33 (0)164761000	www.smc-france.fr	info@smc-france.fr
Germany	+49 (0)61034020	www.smc.de	info@smc.de
Greece	+30 210 2717265	www.smc.hellas.gr	sales@smc.hellas.gr
Hungary	+36 23513000	www.smc.hu	office@smc.hu
Ireland	+353 (0)14039000	www.smc.automation.ie	sales@smc.automation.ie
Italy	+39 03990691	www.smc.italy.it	mailbox@smc.italy.it
Latvia	+371 67817700	www.smc.lv	info@smc.lv

Lithuania	+370 5 2308118	www.smc.lt	info@smc.lt
Netherlands	+31 (0)205318888	www.smc.nl	info@smc.nl
Norway	+47 67129020	www.smc-norge.no	post@smc-norge.no
Poland	+48 222119600	www.smc.pl	office@smc.pl
Portugal	+351 214724500	www.smc.eu	apoioclientept@smc.smces.es
Romania	+40 213205111	www.smcromania.ro	smcromania@smcromania.ro
Russia	+7 (812)3036600	www.smc.eu	sales@smcru.com
Slovakia	+421 (0)413213212	www.smc.sk	office@smc.sk
Slovenia	+386 (0)73885412	www.smc.si	office@smc.si
Spain	+34 945184100	www.smc.eu	post@smc.smces.es
Sweden	+46 (0)86031240	www.smc.nu	smc@smc.nu
Switzerland	+41 (0)523963131	www.smc.ch	info@smc.ch
Turkey	+90 212 489 0 440	www.smc.pnomatik.com.tr	info@smc.pnomatik.com.tr
UK	+44 (0)845 121 5122	www.smc.uk	sales@smc.uk

South Africa +27 10 900 1233 www.smcza.co.za zasaes@smcza.co.za