TOPRING

COMPRESSED AIR SYSTEM

Series 08

DESIGN GUIDE

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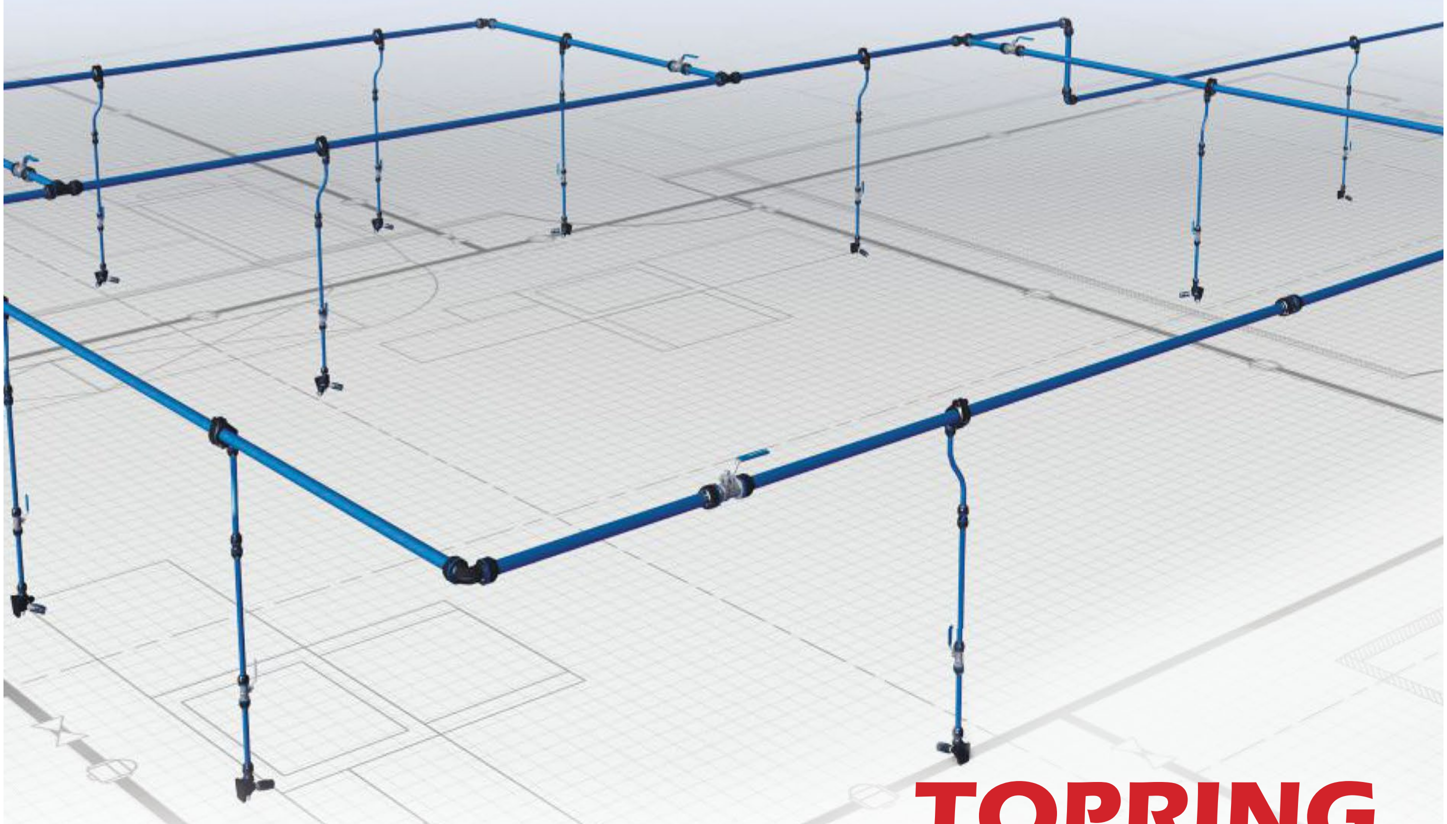
in	1/2	3/4	1	1-1/4	1-1/2	2	2-1/2	3	4	6



TOPRING

Compressed air solutions

96.607 **TOPRING** Version July 2024

DESIGN GUIDE
for an optimal compressed air system

PAGE	CONTENT

This document is also available in French on TOPRING.com.

1. COMPRESSED AIR HAS A COST

Compressed air is a significant source of energy that is used by many different industries. A properly planned compressed air system is energy-efficient and reduces the cost of producing and distributing compressed air. The chart below shows the distribution of costs for a compressed air system.

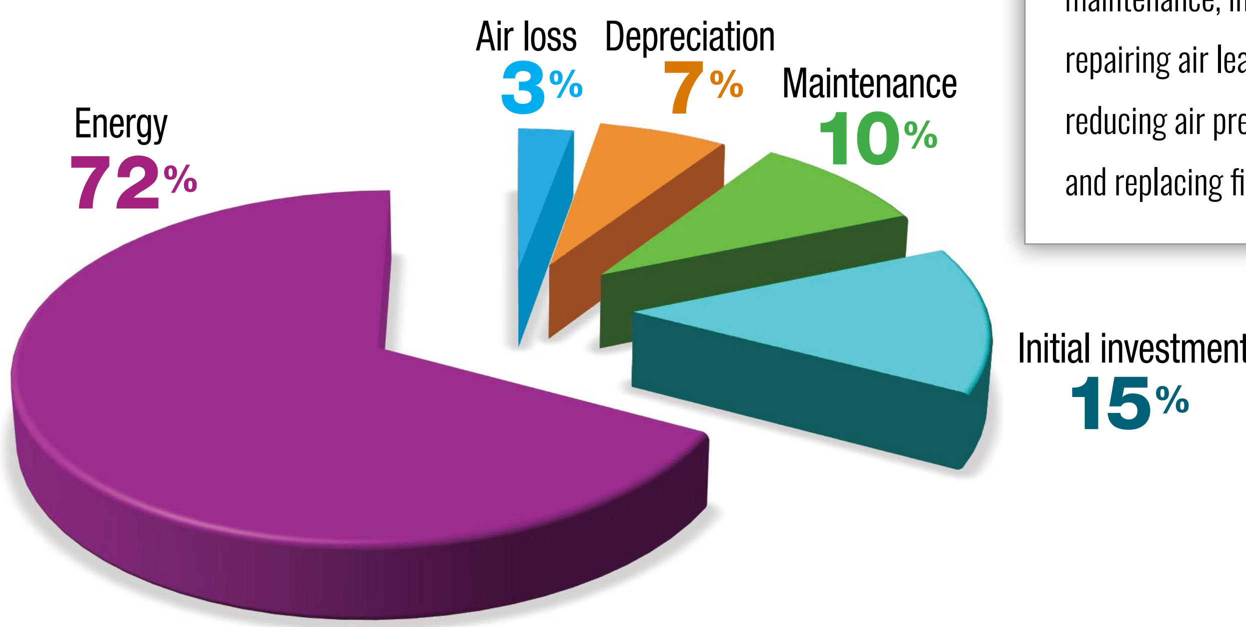
Because energy and maintenance costs can represent up to 90% of total costs, the compressed air system must be leaktight, durable, and built with high-quality materials.

Electricity costs will be 1% higher for every additional 2 PSI maintained in the system.

Breakdown of costs associated to compressed air system over 10 years

- Purchase and installation costs: 15%
- Energy cost: 72%
- Maintenance and repair costs: 10%
- Depreciation and spare parts costs: 7%
- Non-productive compressed air cost: 3%

Significant savings can be achieved by ensuring regular system maintenance, including repairing air leaks, reducing air pressure, and replacing filters.



The **TOPRING** S08 piping system delivers an efficient, durable compressed air system. Its 100% aluminum design makes it corrosion-resistant and leaktight.

This design guide details the elements to consider when building a compressed air system with the **TOPRING** S08 piping system.

2. SYSTEM INSTALLATION

2.1 Rules for installing a compressed air network

Prerequisites before installation

All applications or processes using compressed air require different levels and standards of air quality.
The selection of all components for the air treatment is just as important as the configuration of the compressed air piping system. By consulting the section in point 4 of this document, you will find information on the importance of air quality and in point 5 various solutions for the disposal and treatment of condensates.

These air treatment elements will be found in the compressor room, which will be adequately ventilated and spacious. The machines will be connected to the network by flexible anti-vibration hoses in order to eliminate the risks linked to vibrations and allow easier maintenance. It is important to install bypass sections between each machine, between the tank(s) and the various filters.

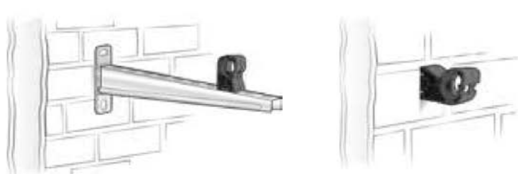
The main line must be installed at a **minimum height of 2.5 m from the ground.** Residual condensate will be evacuated from the main line by direct descents equipped with an automatic drain system.

The diameter of the main line (primary pipe) will be large enough to avoid pressure drops and respond to future extensions. The piping will be fixed with a sufficient number of mounting clips (P04-05) to ensure its stability while allowing the expansion or contraction of the pipe

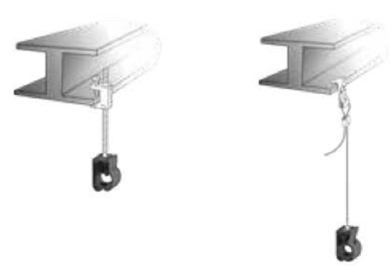
Mounting the network

Mounting options must be selected to best suit the configuration of the workshop. When installing the network, pipes must be perfectly aligned and mounted to a sturdy surface. For correct assembly, a 10 ft (3 m) distance should be left between the two clamps. More details on the mounting brackets in point 3.12 of this manual.

Wall mounting



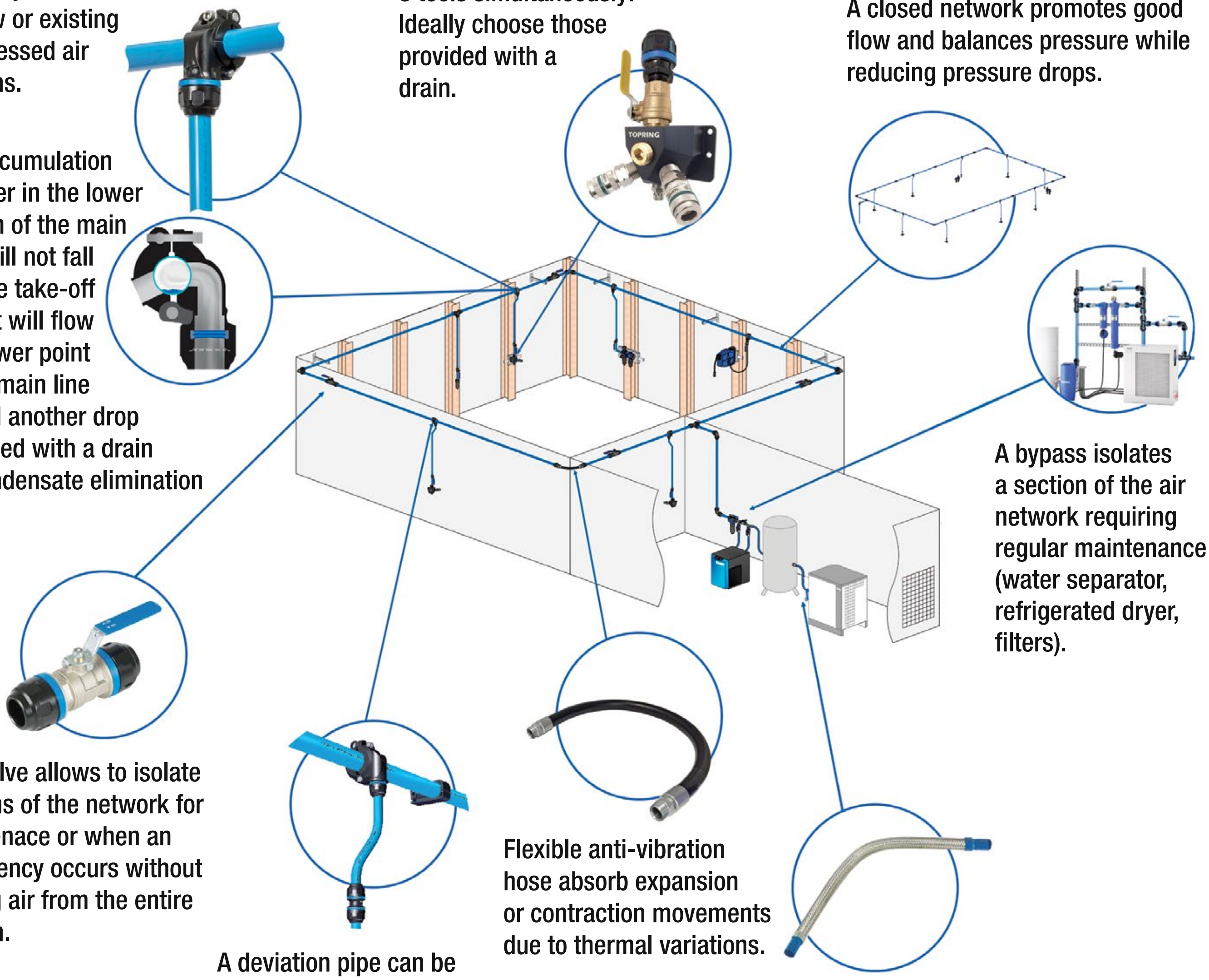
Ceiling mounting



To learn more about fastening products, consult the **TOPRING** S08 catalog available at **TOPRING**.com

2. SYSTEM INSTALLATION

2.2 Basic rules of a compressed air network



The take-off drop couplings are used to install drop legs to supply workstations on new or existing compressed air systems.

The installation of distributors with couplers powers up to 3 tools simultaneously. Ideally choose those provided with a drain.

A closed network promotes good flow and balances pressure while reducing pressure drops.

The accumulation of water in the lower section of the main pipe will not fall into the take-off drop, it will flow to a lower point of the main line toward another drop equipped with a drain for condensate elimination

A bypass isolates a section of the air network requiring regular maintenance (water separator, refrigerated dryer, filters).

Ball valve allows to isolate portions of the network for maintenace or when an emergency occurs without cutting air from the entire system.

A deviation pipe can be used for correcting the alignment between main line and drop legs.

Flexible anti-vibration hose absorb expansion or contraction movements due to thermal variations.

A high temperature anti-vibration hose must always be installed between the compressor and the beginning of the air piping network to protect the air network against vibrations and heat.

Other performance and efficiency products presented in points 6, 7 and 8 of this document

3. SYSTEM PLANNING

3.1 Estimating air requirements by application

Every compressed air system project is unique because user needs vary widely and can be met through a number of configuration options. The first step is to identify the types of applications involved in the project.

1. The number of pneumatic tools and equipment to be used
2. The total air volume required (SCFM)
3. The air quality required
4. The operating conditions of each workstation
5. The choice of compressor

TECH TIP

The volume of air produced by the compressor will affect the choice of pipe diameters for the main system. Typically, a compressor produces about 4 SCFM per HP when air is produced at 100 PSIG.

3.2 Determining the layout of the plant and workstations

A plant layout showing the location of workstations is needed to determine the system's length in linear feet. In addition, the following information must be known:

1. The structure of the building
2. Whether it's a ceiling- or wall-mounted installation
   - If the system is installed on the ceiling, what is its height?
   - If the system is mounted on the walls, are there any obstacles to bypass or avoid (e.g., beams)?
3. The location and the temperature of the compressor room
4. The location of workstations:
5. Is a future expansion planned? If so, at least 25% to 50% extra capacity should be added.

CAUTION

The piping system should never support loads other than its own weight, or be exposed to movement other than the normal expansion of its components.

When planning the layout of a workstation, flexible hoses should be connected through sturdily attached hose reels or manifolds to isolate piping from tool weight and movement.

3. SYSTEM PLANNING

3.3 Choosing the pipe material for a compressed air piping system

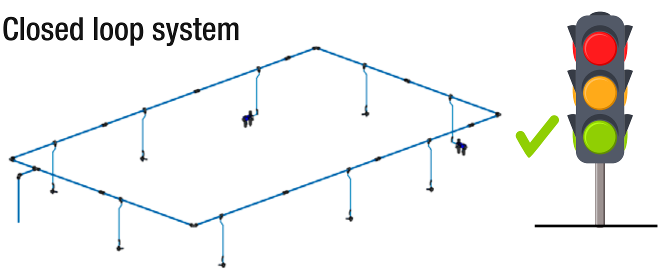
Advantages and / or disadvantages of each material

	Steel	Galvanized Steel	Copper	Aluminum	Stainless Steel
Air quality	Not recommended	Not recommended	Acceptable	Recommended	Recommended
Pressure loss	Not recommended	Not recommended	Recommended	Recommended	Recommended
Quick installation	Not recommended	Not recommended	Not recommended	Recommended	Not recommended
Easy installation	Not recommended	Not recommended	Not recommended	Recommended	Not recommended
Installation tools	Not recommended	Not recommended	Not recommended	Recommended	Not recommended
Disassembly	Not recommended	Not recommended	Not recommended	Recommended	Not recommended
Weight	Not recommended	Not recommended	Acceptable	Recommended	Acceptable
Resistance to corrosion	Not recommended	Not recommended	Acceptable	Recommended	Recommended
Resistance to spread of fire	Recommended	Recommended	Recommended	Recommended	Recommended
Crush proof	Recommended	Recommended	Acceptable	Acceptable	Acceptable
Standardised colour	Not recommended	Not recommended	Not recommended	Recommended	Not recommended

Not recommended
Acceptable
Recommended

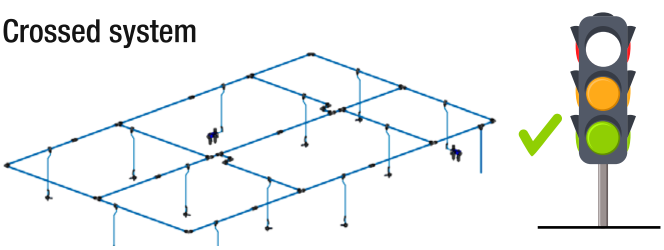
3.4 Configuring the system

Closed loop system



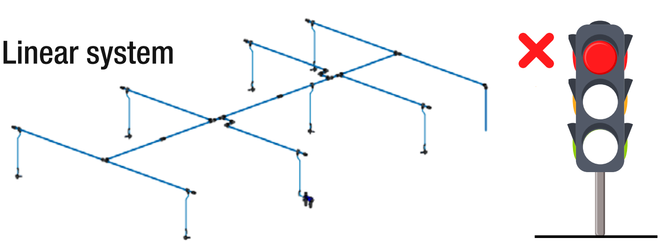
- Provides equivalent air flow and pressure at all points in the network.
- Opportunity to isolate a section using valves.
- Recommended system for all industry applications.

Crossed system



- Provides equivalent air flow and pressure at all points in the network.
- Opportunity to isolate a section using valves.
- Recommended for large companies.

Linear system



- The main line must have a large diameter in order to provide adequate air flow.
- Drops must also have a larger diameter due to their greater length.
- No possibility of isolating a section.

3. SYSTEM PLANNING

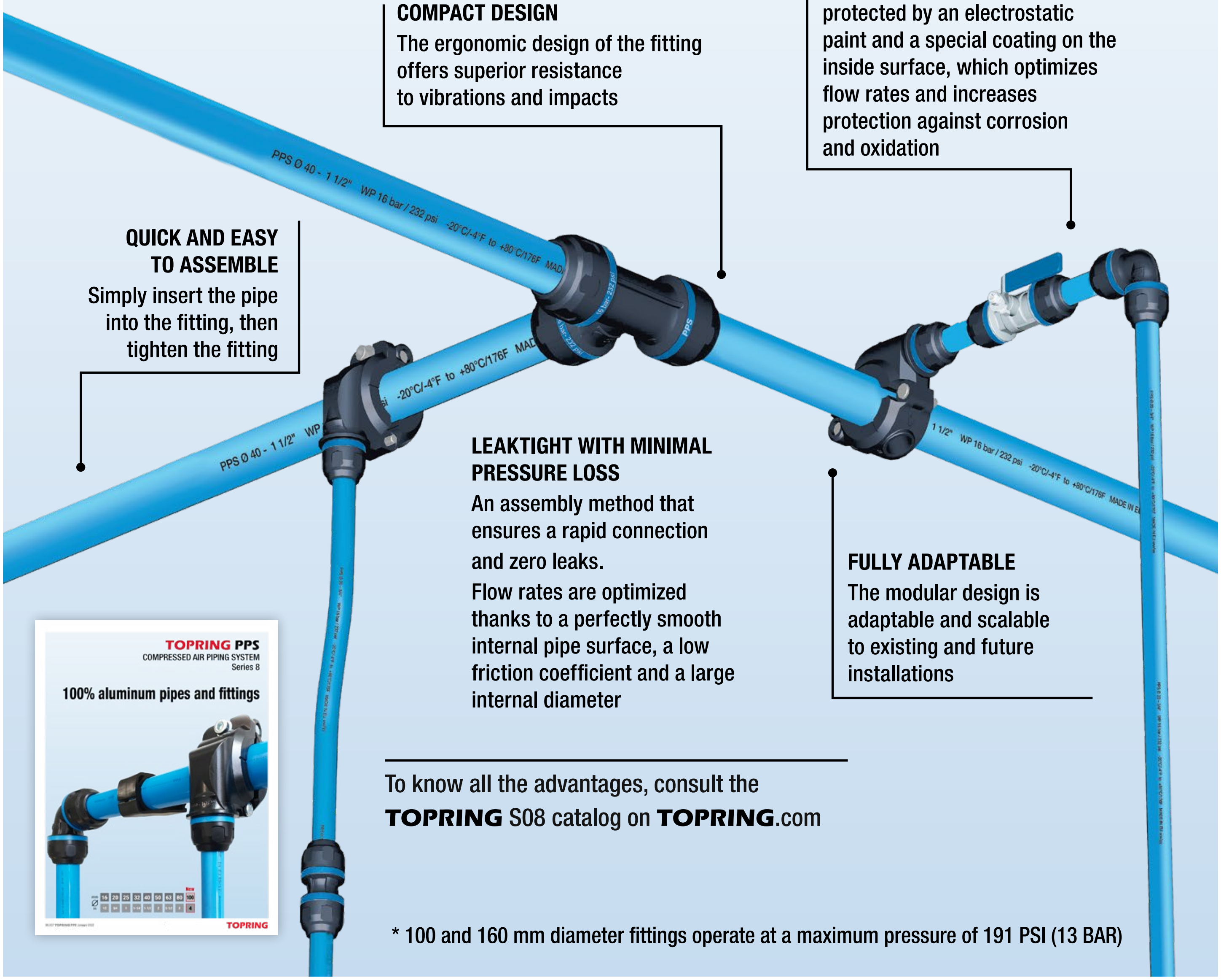
The most advanced compressed air system in the worl

The **TOPRING** compressed air system Series 08 consists of tubes and fittings, lightweight, corrosion resistant and completely made of aluminum. They are quick and easy to install and can be pressurized immediately. The system is durable and can easily be adapted to suit needs and potential expansions.

The **TOPRING** S08 system ensures:

- A maximum working pressure of 232 PSI* (16 BAR) from -20 to 80 °C
- A leaktight network and optimized flow rate
- Clean, top quality air supply

ADVANTAGES



COMPACT DESIGN
The ergonomic design of the fitting offers superior resistance to vibrations and impacts

100% ALUMINUM PIPES AND FITTINGS
The aluminum alloy pipes are protected by an electrostatic paint and a special coating on the inside surface, which optimizes flow rates and increases protection against corrosion and oxidation

QUICK AND EASY TO ASSEMBLE
Simply insert the pipe into the fitting, then tighten the fitting

LEAKTIGHT WITH MINIMAL PRESSURE LOSS
An assembly method that ensures a rapid connection and zero leaks.
Flow rates are optimized thanks to a perfectly smooth internal pipe surface, a low friction coefficient and a large internal diameter

FULLY ADAPTABLE
The modular design is adaptable and scalable to existing and future installations

To know all the advantages, consult the **TOPRING** S08 catalog on **TOPRING**.com

* 100 and 160 mm diameter fittings operate at a maximum pressure of 191 PSI (13 BAR)

3. SYSTEM PLANNING

3.6 Determining the diameter of the pipes

The following information is needed to determine the pipe diameter for the main system and service outlets:

- The total airflow (SCFM) required by pneumatic tools and equipment
- The maximum length between the compressor and application
- The total length of the main line (linear feet)

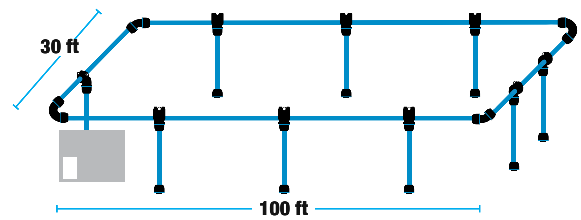
Example of 5-step calculation for pipe diameter sizing

Step 1. Calculate the linear feet for the main line

Example:

Closed loop system with 9 drops in a plant measuring 100 ft x 30 ft

Total length of the line in linear feet
2 x 100 ft and 2 x 30 ft **= 260 ft**

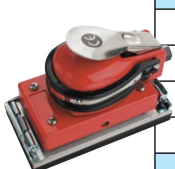


Step 2. Calculate the total airflow required in SCFM

The pipe diameter must be big enough to transport sufficient air at the required pressure to all points of use.
The required number of SCFM is indicated by the manufacturer of the pneumatic tools or equipment. For reference, see tables below with pneumatic tools. The flow rate (SCFM) of each tool is multiplied by their percentage of usage time.

Based on our example:

12 reversible drills / 3/8":	23,8 SCFM x 12 x 50 % usage time	=	142,8 SCFM
9 belt sanders / 10 mm:	18,9 SCFM x 9 x 33 % usage time	=	56,7 SCFM
3 impact guns / 1/2":	28,6 SCFM x 3 x 100 % usage time	=	85,8 SCFM
	Total required airflow	=	285,3SCFM
	Total with extra 25 %*	**=**	**356,6 SCFM**



SANDERS	FLOW SCFM
Sander	9.6
4-1/2" angle grinder	18.4
10 mm belt sander	18.9
7" angle sander	29.6
NAILERS/STAPLERS	
Nailer/Stapler (18 Gauge)	2.5
Stapler (22-18 Gauge)	3.5
Finishing nailer	3.5
Roofing nailer	6.0
Framing nailer	11.0
Industrial nailer	25.0
IMPACT TOOLS	
Miniature 1/4" ratchet	12.5
1/4" impact gun	14.0
3/8" ratchet	19.2
Zip gun	21.9
1/2" impact gun	28.6
3/4" impact gun	34.7
1" impact gun	87.5



POLISHING TOOLS	FLOW SCFM
Orbital polisher	16.6
Oscillating sander	23.0
DRILLS	
3/8" air drill	17.3
3/8" reversible air drill	23.8
1/2" reversible air drill	26.4
OTHER TOOLS	
Riveter	4.0
Grease gun	8.0
Caulking gun	0.1
HVLP paint gun	9.5
Screw driver	9.6
Gravity fed sand blaster	12.0

* It is suggested to add an extra 25% to 50% to accommodate future needs.

Nouvelle longueur totale en pi linéaires = 278,20 pi

3. SYSTEM PLANNING

3.6 Determining the diameter of the pipes / cont.

Step 3. Determine the diameter of the main line

Based on the data on the next page (closed loop system) and our example, a demand of **356,6 SCFM** and a main line measuring **260 linear feet** in length, a diameter of **50 mm** is necessary.

TOTAL LENGTH OF NETWORK (FT)

REQUIRED SCFM	100'	150'	200'	250'	300'	400'	500'	600'
200	32	32	32	32	32	40	40	40
300	32	32	40	40	40	40	40	50
400	40	40	40	40	50	50	50	50
500	40	40	40	50	50	50	50	50
750	50	50	50	50	63	63	63	63
1000	50	50	63	63	63	63	63	63
1500	63	63	63	63	80	80	80	80

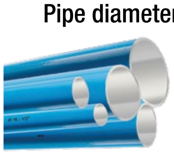
Step 4. Calculate the equivalent lengths (fittings)

System fittings must be considered when calculating the total length of the system in linear feet. Each change in direction and each coupler will cause an additional pressure drop equal to an addition to the total length (see below table).

According to our example of a network which would include 10 x unions and 4 x 90 ° union elbows with our pre-established diameter of 50 mm, we will need to add linear feet to the initial length as follows:

10 unions: 0,5 ft x 10	=	**5,00 ft**
4 unions elbows / 90°: 3,3 ft x 4	=	**13,20 ft**
Equivalent total length	=	**18,20 ft**
+ Main line	=	**260,00 ft**
New total length in linear ft	=	**278,20 ft**

EQUIVALENT LENGTHS OF PPS CONNECTIONS*

Pipe diameter		Union	90° union elbow	45° union elbow	Reverse tee	In line equal tee	Male threaded connector	Female threaded connector	Ball valve
									
16 mm	1/2 in	0,2	1,0	0,5	0,4	1,0	0,3	0,3	0,2
20 mm	3/4 in	0,2	1,3	0,7	0,5	1,3	0,3	0,3	0,2
25 mm	1 in	0,2	1,6	0,8	0,6	1,6	0,4	0,4	0,2
32 mm	1 1/4 in	0,3	2,1	1,0	0,7	2,1	0,5	0,5	0,3
40 mm	1 1/2 in	0,4	2,6	1,3	0,9	2,6	0,7	0,7	0,4
50 mm	2 in	0,5	3,3	1,6	1,1	3,3	0,8	0,8	0,5
63 mm	2 1/2 in	0,6	4,1	2,1	1,4	4,1	1,0	1,0	0,6
80 mm	3 in	0,8	5,2	2,6	1,8	5,2	1,3	1,3	0,8
100 mm	4 in	1,0	6,6	3,3	2,3	6,6	1,6	1,6	1,0

* Reducing unions, tees and drop coupling ar e not listed because the concept of equivalent length does not apply to a fitting which has 2 diameters.

Referring to the data in the table on the next page (closed loop network), the diameter of the main network tube will remain **50 mm** for a length of **300 linear ft** (278,2 rounded) and a consumption of **400 SCFM** (356, 6 rounded).

TOTAL LENGTH OF NETWORK (FT)

REQUIRED SCFM	100'	150'	200'	250'	300'	400'	500'	600'
200	32	32	32	32	32	40	40	40
300	32	32	40	40	40	40	40	50
400	40	40	40	40	50	50	50	50
500	40	40	40	50	50	50	50	50
750	50	50	50	50	63	63	63	63
1000	50	50	63	63	63	63	63	63
1500	63	63	63	63	80	80	80	80

3. SYSTEM PLANNING

3.6 Determining the diameter of the pipes / cont.

Step 5. Determine the diameter for each drop (a descent represents a linear section of a piping system)

Referring to the table below (linear system), we calculate the SCFM according to the number of tools for each drop. In the table we find the pipe diameter according to the total of SCFM.

Example: with a drop leg (25 feet from the ground)

Two 3/8" reversible drills: 23,8 SCFM x 2 = **47,6 SCFM required**
Rounded up to 60 SCFM

The pipe diameter sizing for this drop would then be 20 mm

TUBE LENGTH TO THE TOOL (PI)

SCFM REQUIS	25'	50'	100'	200'
20	16	16	16	16
30	16	16	20	20
40	16	20	20	20
60	20	20	25	25
80	20	25	25	32

Minimum pipe diameter required for a closed loop system

TOTAL LENGTH OF THE NETWORK (FEET)

TOTAL FLOW REQUIRED SCFM / FEET	100	150	200	250	300	400	500	600	700	800	900	1000	1250	1500	2000	2500	3000	4000	5000	6000	7000	8000
5	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	20	20
10	16	16	16	16	16	16	16	16	16	16	16	16	16	16	20	20	20	20	20	20	25	25
15	16	16	16	16	16	16	16	16	16	20	20	20	20	20	20	20	25	25	25	25	25	25
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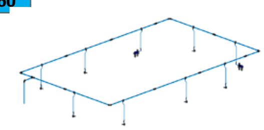
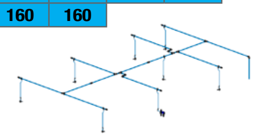
30	16	16	16	20	20	20	20	20	20	25	25	25	25	25	25	25	32	32	32	32	32	32
40	16	20	20	20	20	20	25	25	25	25	25	25	25	25	32	32	32	32	32	40	40	40
60	20	20	20	25	25	25	25	25	25	32	32	32	32	32	32	32	40	40	40	40	40	40
80	20	25	25	25	25	25	32	32	32	32	32	32	32	32	40	40	40	40	50	50	50	50
100	25	25	25	25	32	32	32	32	32	32	32	32	40	40	40	40	40	50	50	50	50	50
125	25	25	32	32	32	32	32	32	40	40	40	40	40	40	40	50	50	50	50	50	50	63
150	25	32	32	32	32	32	40	40	40	40	40	40	40	40	50	50	50	50	63	63	63	63
200	32	32	32	32	40	40	40	40	40	40	40	50	50	50	50	50	63	63	63	63	63	63
300	32	40	40	40	40	40	50	50	50	50	50	50	50	63	63	63	63	63	80	80	80	80
400	40	40	40	40	50	50	50	50	50	50	63	63	63	63	63	63	80	80	80	80	80	80
500	40	40	50	50	50	50	50	63	63	63	63	63	63	63	80	80	80	80	80	80	100	100
750	50	50	50	50	63	63	63	63	63	63	80	80	80	80	80	80	100	100	100	100	100	100
1000	50	63	63	63	63	63	63	80	80	80	80	80	80	80	100	100	100	100	100	160	160	160
1500	63	63	63	80	80	80	80	80	80	80	100	100	100	100	100	160	160	160	160	160	160	160
2000	63	80	80	80	80	80	100	100	100	100	100	100	100	160	160	160	160	160	160	160	160	160
2500	80	80	80	80	80	100	100	100	100	100	100	160	160	160	160	160	160	160	160	160	160	160
3000	80	80	80	100	100	100	100	100	160	160	160	160	160	160	160	160	160	160	160	160	160	
4000	80	100	100	100	100	100	160	160	160	160	160	160	160	160	160	160	160	160				
5000	100	100	100	100	160	160	160	160	160	160	160	160	160	160	160	160						
6000	100	100	160	160	160	160	160	160	160	160	160	160	160	160	160							
7000	100	160	160	160	160	160	160	160	160	160	160	160	160	160								
8000	100	160	160	160	160	160	160	160	160	160	160	160										
9000	160	160	160	160	160	160	160	160	160	160	160											
10000	160	160	160	160	160	160	160	160	160	160												



Minimum pipe diameter required for a linear system (dead-end)

TOTAL LENGTH OF THE NETWORK (FEET)

TOTAL FLOW REQUIRED SCFM / FEET	25	50	75	100	150	200	250	300	400	500	600	700	800	900	1000	1500	2000	2500	3000	4000
5	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	20	20	20	20	20
10	16	16	16	16	16	16	16	16	20	20	20	20	20	20	20	25	25	25	25	32
15	16	16	16	16	20	20	20	20	20	20	25	25	25	25	25	25	32	32	32	32
20	16	16	16	20	20	20	20	25	25	25	25	25	25	25	25	32	32	32	32	40
30	16	20	20	20	25	25	25	25	25	32	32	32	32	32	32	32	40	40	40	40
40	20	20	20	25	25	25	25	32	32	32	32	32	32	32	32	40	40	40	40	50
60	20	25	25	25	32	32	32	32	32	40	40	40	40	40	40	40	50	50	50	50
80	25	25	32	32	32	32	32	40	40	40	40	40	40	50	50	50	50	50	63	63
100	25	32	32	32	32	40	40	40	40	40	50	50	50	50	50	50	63	63	63	63
125	25	32	32	32	40	40	40	40	50	50	50	50	50	50	50	63	63	63	63	63
150	32	32	32	40	40	40	40	50	50	50	50	50	50	63	63	63	63	63	63	80
200	32	32	40	40	40	50	50	50	50	50	63	63	63	63	63	63	80	80	80	80
300	40	40	40	50	50	50	63	63	63	63	63	63	63	80	80	80	80	80	100	100
400	40	50	50	50	63	63	63	63	63	80	80	80	80	80	80	80	100	100	100	100
500	40	50	50	63	63	63	63	63	80	80	80	80	80	80	80	100	100	100	100	160
750	50	63	63	63	63	80	80	80	80	80	100	100	100	100	100	100	160	160	160	160
1000	50	63	63	80	80	80	80	80	100	100	100	100	100	100	160	160	160	160	160	160
1500	63	80	80	80	100	100	100	100	100	160	160	160	160	160	160	160	160	160	160	160
2000	63	80	80	100	100	100	100	160	160	160	160	160	160	160	160	160	160	160		
2500	80	80	100	100	100	160	160	160	160	160	160	160	160	160	160	160				
3000	80	100	100	100	160	160	160	160	160	160	160	160	160	160	160					
4000	100	100	160	160	160	160	160	160	160	160	160	160								
5000	100	160	160	160	160	160	160	160	160	160										
6000	100	160	160	160	160	160	160	160												
7000	100	160	160	160	160	160	160													
8000	160	160	160	160	160	160														
9000	160	160	160	160	160															
10000	160	160	160	160																



Note:
Diameters are based on the CAGI Handbook's recommendations for pressure drop less than 3 psi, with the following conditions: pressure 100 psig at 20 degrees C, main loop including 2 valves and 4 elbows.

3. SYSTEM PLANNING

3.7 Thermal variations

Aluminum compressed air pipes are subjected to temperature variations and expansion movements which may be compensated by absorption devices on the system network. Several solutions are explained in the following pages to counter this phenomenon.

Explanation of thermal expansion and contraction

Comparison of the linear expansion coefficients for materials frequently used in compressed air systems

Steel	1.3×10^{-5} m/m-°C
Copper	1.7×10^{-5} m/m-°C
TOPRING S08 100% aluminum	**2.3×10^{-5} m/m-°C**
TOPRING S08 PA (polyamide)	1.2×10^{-4} m/m-°C
ABS	1.5×10^{-4} m/m-°C
PVDF	1.5×10^{-4} m/m-°C
PP	1.7×10^{-4} m/m-°C
PE	1.1×10^{-4} m/m-°C

The linear expansion coefficient (d) is 0.23 mm / m °C, or 0.23 millimeter per meter, per degree Celsius.

System design must factor in the phenomenon of expansion, which is calculated with the formula: DL = d x L x DT

Example with an aluminum pipe:

Installation temperature: +10 °C
Pipe length: 20 m
Service temperature: 35 °C
Linear expansion coefficient: 0.023 mm/m

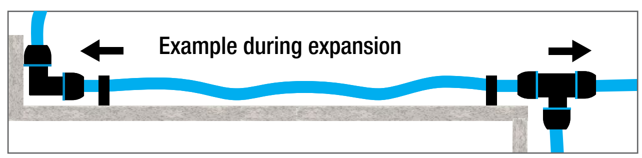
Calculation:

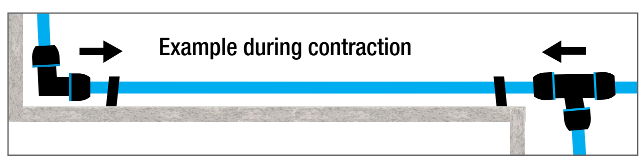
DT = 35 – 1 0 = 25 °C
DL = 0.023 x 20 x 25 = 12 mm

LEGENDE	DESCRIPTION
d	Linear expansion coefficient
L	Length of the pipe
DT	Temperature difference in degrees Celsius
DL	Difference in length (expansion or contraction)

Effects of expansion or contraction if the expansion coefficient is not considered:

- Strain of pipes between two fixed points
- Compression of clamps or equipment with risk of strain, sagging or rupture





Solutions to counter the effects of thermal variations

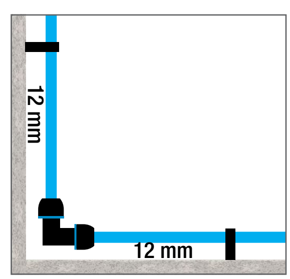
Leave space between pipe and wall

To prevent the effects of expansion/contraction and make sure there is enough room, space should be left between the pipes and walls at the time of installation.

Example using the calculation above:

DL = 0.023 mm/m coefficient for an aluminum pipe x 20 m x 25 °C = **12 mm**

Since the difference in length (DL) is 12 mm, the space between pipe and wall must be at least 12 mm.



3. SYSTEM PLANNING

3.7 Thermal variations / cont.

Adding expansion loops or expansion connectors

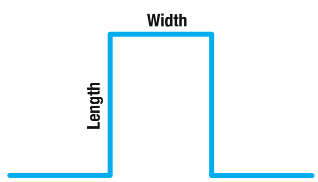
Aluminum compressed air piping is subject to temperature variations and expansion movements.
Each 50 meter straight section must contain an elastic element to absorb the expansion, without causing excessive stress to the piping.

For systems with a pipe diameter of 20 to 160 mm (3/4 to 6 in)

Expansion loops are a good way to absorb expansion. The diagram and table beside indicate the recommended dimensions for the loops.

Dimensions of the expansion loops

Pipe diameter		Length		Width	
mm	in	m	ft	m	ft
20 to 25	3/4 to 1	1.2	4	1.2	4
32 to 40	1-1/4 to 1-1/2	1.5	5	1.2	4
50	2	1.8	6	1.2	4
63 to 80	2-1/2 to 3	2.1	7	1.2	4
100	4	2.4	8	1.2	4
160	6	3	10	1.5	5



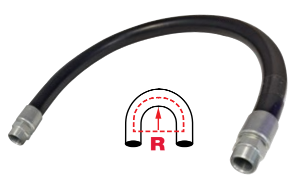
CAUTION
Dimensions for reference only.
TOPRING assumes no responsibility for the design of any particular piping system. It is the responsibility of the project designer to ensure compliance with the applicable standards. These dimensions are only valid for an expansion loop intended to absorb the expansion of a straight section of up to 50 meters in length, in aluminum piping subject to a temperature variation relative to the building of up to 60 degrees Celsius.

For systems with a pipe diameter of 16 to 50 mm (1/2 to 3 in)

Anti-vibration hoses can also absorb expansion movements. The anti-vibration hose must not be overly bent (too squared or not rounded enough).

16 to 50 mm rubber anti-vibration hoses are available with a Canadian Registration Number (CRN).

Rubber anti-vibration hose can also be installed at the compressor to neutralize sources of vibration (see 3.8.).

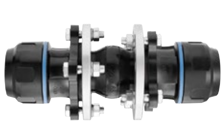


RUBBER ANTI-VIVBRATION HOSES

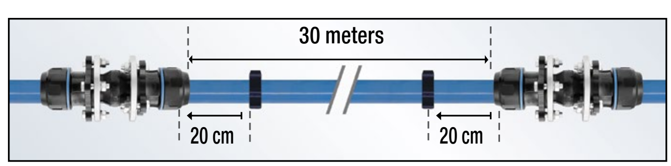
Inside diameter pipe / connector		Minimum bending radius	
mm	po	mm	po
16	1/2	89	3-1/2
20	3/4	121	4-3/4
25	1	152	6
32	1-1/4	210	8-1/4
40	1-1/2	254	10
50	2	318	12-1/2
63	2-1/2	381	15
80	3	451	17-3/4

For system with pipe diameter of 63 to 160 mm (2-1/2 to 6 in)

Expansion loops may be replaced by expansion connectors for quick and easy installation.


63 -80 mm

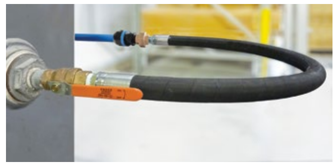

100-160 mm



3. SYSTEM PLANNING

3.8 Installing anti-vibration hoses

An anti-vibration rubber hose can also be installed at the compressor to neutralize sources of vibration (see table on previous page with radii of curvature).



CAUTION

An anti-vibration hose must always be installed between the compressor and the beginning of the piping system to protect the system from vibrations and expansion forces.

Ideally a high temperature stainless steel anti-vibratoion hose at the start of the network helps reduce the vibration and heat produced by the compressor.

16 to 50 mm /1/2 to 2 in

63 to 100 mm 2-1/2 to 4 in

HIGH TEMPERATURE STAINLESS STEEL WITH THREADED FITTINGS 12 / 14 / 24 IN

Fittings (M) NPT	Hose I.D. in	Length in	Maximum Misalignment in		Max Pressure PSI at 21˚C
1/2	1/2	12	1.240	5/8	1225
3/4	3/4		1.104	1/2	1034
1	1		0.920	7/16	796
1-1/4	1-1/4		0.490	1/4	600
1-1/2	1-1/2		0.427	1/4	557
2	2		0.399	3/16	570
2-1/2	2-1/2	14	0.135		398
3	3		0.125		327
1/2	1/2	24	1.65	3-5/8	1225
3/4	3/4		1.650	3	1034
1	1		1.880	2-5/8	796
1-1/4	1-1/4		2.55	2	600
1-1/2	1-1/2		2.94	1-3/4	557
2	2		3.14	1-7/16	570

HIGH TEMPERATURE STAINLESS STEEL WITH FLANGE FOR COMPACT CONNECTION 12 / 24 IN

Flange	Hose I.D. in	Length in	Maximum Misalignment in		Max Pressure PSI at 21˚C
2-1/2	2-1/2	12	0.500	285	1225
3	3		0.440	285	1034
4	4		0.335	284	796
2-1/2	2-1/2	24	3.125	285	600
3	3		2.850	285	557
4	4		2.259	284	570

3.9 The importance of take-off drop couplings and drain units

- A compressed air system must be designed by taking into account that the air taken from the main pipe may contains unwanted condensate that can be transfered throughout all the piping system.
- A simple and efficient way to prevent water from the main line to infiltrate the drop is to install a take-off drop coupling.
- You also have to think about installing drains at the bottom of a drop leg that is not created with a take-off drop coupling.
- The use of automatic drains will facilitate maintenance.

3.10 Installing bypass

Each piece of equipment (water separator, refrigerated dryer, filters) in a compressed air piping system that may require maintenance or repair should be able to be isolated by a bypass.

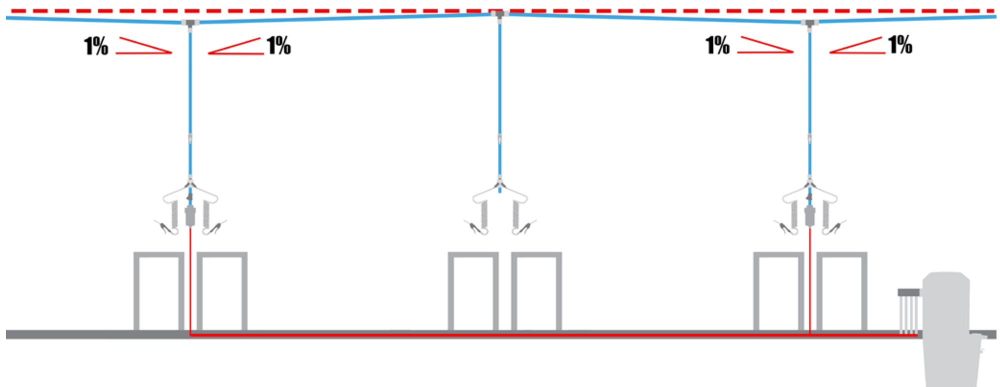
3. SYSTEM PLANNING

3.11 Determining the slopes

All horizontal pipes must have a slope of 1% to allow drainage of condensate.

Descending slopes must lead to drain downspouts fitted with condensate drains, placed at the low points of the network.

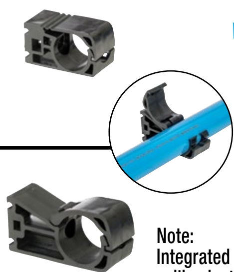
Example: with a distance of 6 meter, a 60 mm slope is needed.



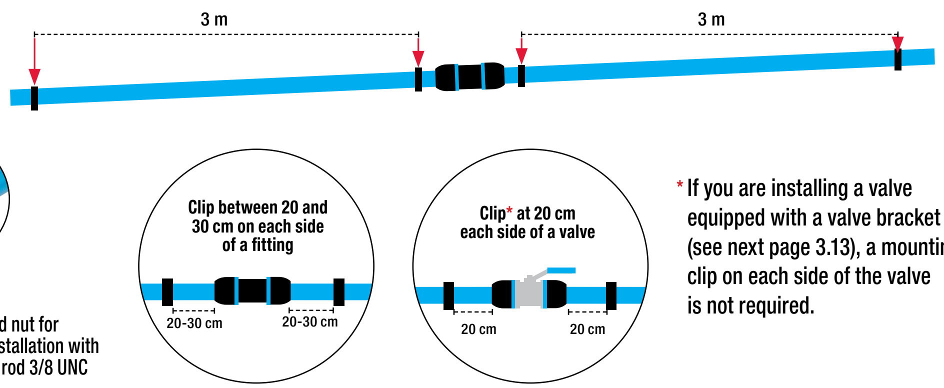
3.12 Fixing the pipes

The pipe fixing methods are defined according to the configuration of the building and must be carried out in such a way as to obtain perfect alignment and good solidity of the whole. The maximum distance between each mounting clip must be 3 meters, regardless of the pipe diameter. It is strongly recommended to install a mounting clip between 20 and 30 cm from each side of the fitting or 20 cm from each side of a valve. This will eliminate the possibility of pipe bending and distortion.

MOUNTING CLIP FOR PIPE		
	Pipe	
No	mm	in
08.700	16	1/2
08.701	20	3/4
08.702	25	1
08.703	32	1-1/4
08.704	40	1-1/2
08.705	50	2
08.706	63	2-1/2
08.707	80	3
08.788	100	4



Note:
Integrated nut for ceiling installation with threaded rod 3/8 UNC



* If you are installing a valve equipped with a valve bracket (see next page 3.13), a mounting clip on each side of the valve is not required.

Clip spacer for mounting clip

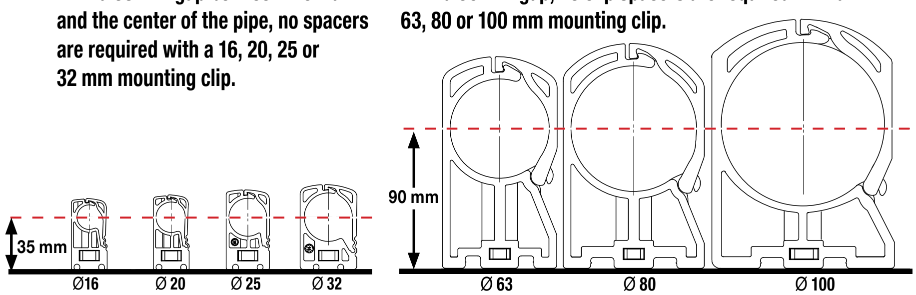
To securely fix the pipe to the wall, a combination of mounting clip and clip spacers may be necessary depending on the diameters of the pipe and the space to be filled between the wall and the piupe (see drawings below). A spacer compensates for the height difference created when connecting pipes with different diameters. The spacer allows perfect alignment.

SPACER FOR PIPE MOUNTING CLIP			
No	Thickness mm	For mounting clip mm	in
08.518	35	16 to 32	1/2 to 1-1/4

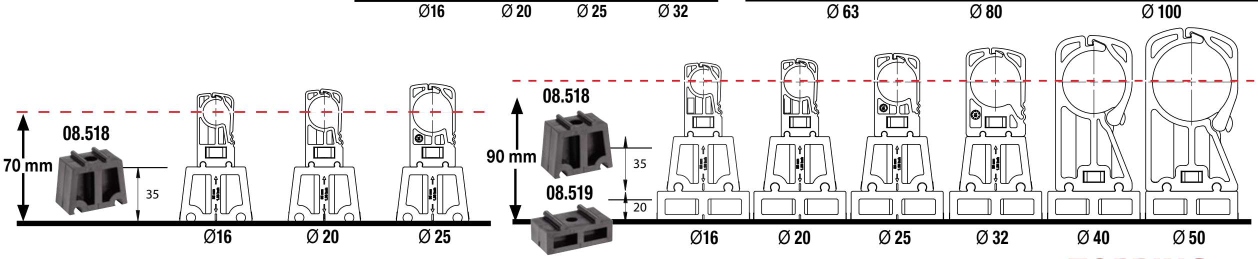
No	Thickness mm	For mounting clip mm	in
08.519	20	40 to 50	1-1/2 to 2

With a 35 mm gap between the wall and the center of the pipe, no spacers are required with a 16, 20, 25 or 32 mm mounting clip.

With a 90 mm gap, no clip spacers are required with a 63, 80 or 100 mm mounting clip.



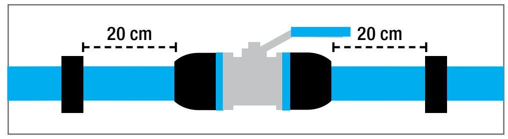
Examples of installations requiring a combination of clip spacers and mounting clip with a 70 or 90 mm gap between the wall and the center of the tube.



3. SYSTEM PLANNING

3.13 Fixing ball valves

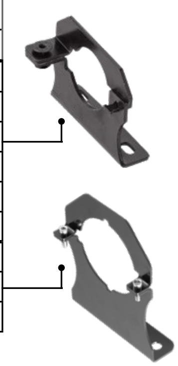
It is important to install a mounting clip 20 cm on each side of a ball valve to avoid pipe distortion or vibrations during application, particularly in a drop.



There are also several models of brackets for ball valve depending on the diameter.
If you are installing a ball valve equipped with a valve bracket, a mounting clip on each side of the valve is no longer required.

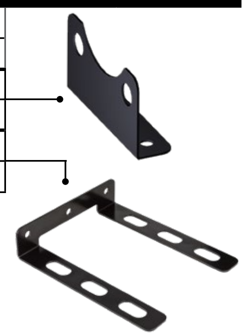
BRACKET FOR BALL VALVE

No	Pipe mm	Pipe in
08.984.01	16	1/2
08.984.02	20	3/4
08.984.03	25	1
08.984.04	32	1-1/4
08.984.05	40	1-1/2
08.984.06	50	2
08.985.07	63	2-1/2
08.985.08	80	3
08.985.09	100	4



BRACKET FOR BALL VALVE WITH FLANGE

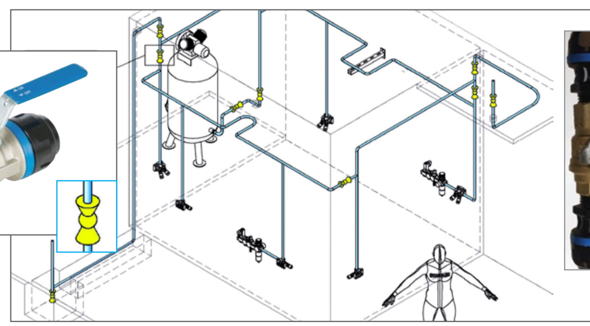
No	Pipe mm	Pipe in
08.984.07	63	2-1/2
08.984.08	80	3
08.984.09	100	4
08.984.10	160	6



Typicial installations of valve bracket on a 16 to 50 mm ball valve

3.14 Planification de la maintenance

Ball valves should be installed every 30 meters in order to facilitate maintenance and isolate the system into sections.



SAFETY SOLUTIONS

Since maintenance operations must be carried out on a depressurized system, **TOPRING** offers ball valves with a safety exhaust that can be locked out.

Installing a safety remote controlled pneumatic valve is a great option to isolate hard-to-reach areas of a piping system. Whether it's for a part of the system that is too high, or to get around an architectural constraint, they are an ideal solution to prevent access issues, maximize worker safety and facilitate maintenance.

CHOICE FOR PILOTED VALVES

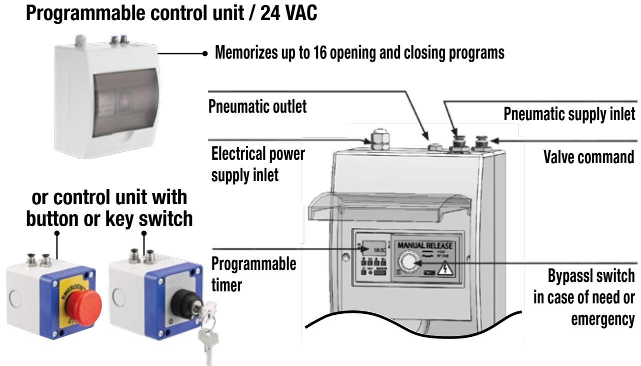
Threaded valve
Ø 16 to 25 mm

Valve Ø 40 to 80 mm

Valve Ø 100 mm

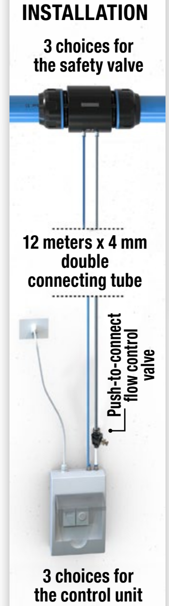
CHOICES FOR CONTROL UNIT FOR PILOTED VALVE

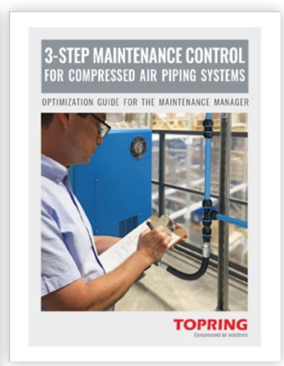
Programmable control unit / 24 VAC



Several kits including the necessary components (piloted valve/tube /mini flow control valve/control unit) are offered with choice of valve and control unit / see Series 08

TYPICAL INSTALLATION





Consult the " 3-steps maintenance control for compressed air systems " document on TOPRING.com

Includes procedures, useful tips and a practical checklist to help you with your compressed air system maintenance.

3. SYSTEM PLANNING

3.15 Pressurizing the system

1. Check the tightness of the couplings and inspect for scratches, dents, gashes or abrasions on the pipe; the marks made during assembly must still be visible. If you see any issues, replace faulty parts immediately.
2. Check all clamps and wall mounting brackets.
3. Pressurize the system in 3 stages:
   - Pressurize to a maximum of 45 PSI to identify leaks and/or faulty unions. Maintain the pressure at 45 PSI for at least 5 minutes before increasing it.
   - Gradually increase the pressure (14 PSI every 5 seconds) until the compressor's maximum pressure is reached. Caution: do not exceed 232 PSI*.
   - Maintain constant test pressure for at least 10 minutes (without any significant drop in pressure).
4. Set the system's pressure to the desired service pressure.
5. After 72 hours power the system and check the fittings to confirm the nuts remained fully tightened (observe the marks made when you originally tightened the nuts).

3.16 Liability of all buyers and/or users

Anyone who purchases and/or uses a TOPRING product and/or system (hereinafter “TOPRING Product(s)”) must carefully read the user instructions for that TOPRING Product and, where the product relates to compressed air, must be familiar with the associated health and safety risks prior to use.

By purchasing and using a TOPRING Product, the buyer and/or user acknowledges that he or she understands and accepts his or her sole liability for installation, identification, maintenance, and use of the TOPRING Product as well as for configuration of any system that uses a TOPRING Product. Subject to the limits of public policy as expressed in the law, the buyer and/or user assumes the risk and liability that may arise from loss, damage, or injury caused by improper installation, identification, maintenance, and/or use of a TOPRING Product, or by misconfiguration of any system using a TOPRING Product, to the extent to completely and entirely exonerate TOPRING and its subsidiaries and affiliated corporations (hereinafter “TOPRING”). The buyer and/or user must consider, among other factors, current regulations, the user instructions for the TOPRING Product, safety measures, the specifics of the premises or location, and the activities or operations conducted there.

By purchasing a TOPRING Product, and subject to the limits of public policy expressed in the law, the buyer and/or user hereby acknowledges and agrees that TOPRING cannot be held liable for any damages whatsoever (including damages caused by loss of profits, business interruption, loss of information, or any other loss) arising from improper installation, identification, maintenance, and/or user of a TOPRING Product, misconfiguration of a system that uses a TOPRING Product, or the impossibility of such a configuration, installation, identification, maintenance, and/or use.

The buyer and/or user of a TOPRING Product is responsible for informing any persons concerned of the risks, warnings and safety measures for TOPRING Products, including but not limited to employees using one or more TOPRING Products.

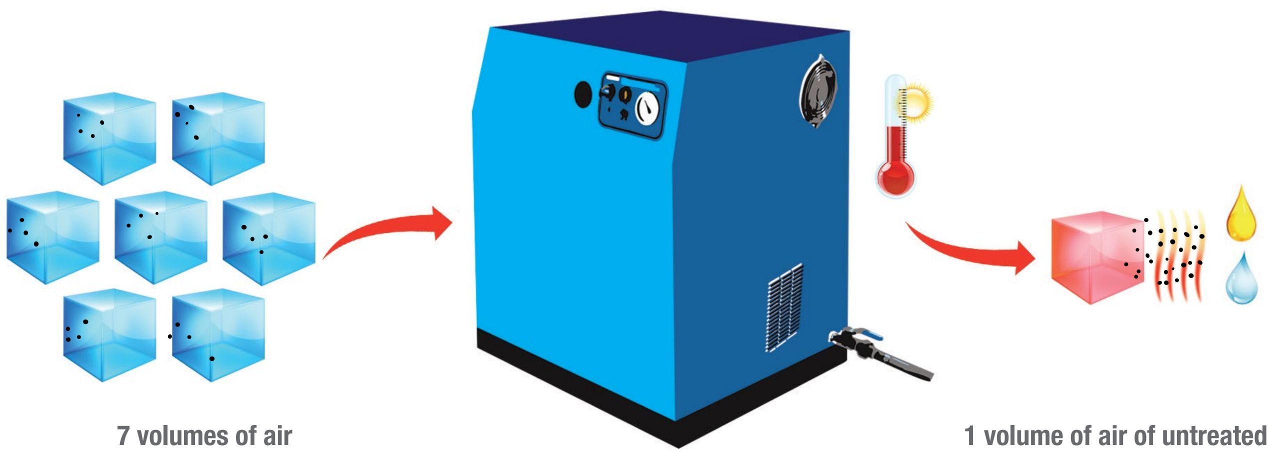
* 100 and 160 mm diameter fittings operate at a maximum pressure of 191 PSI (13 BAR)

4. COMPRESSED AIR QUALITY

Compressed air is an efficient energy source used for many applications and processes. Its optimal use—and better air quality—depends on the removal of all condensates. Group 1 products provide solutions for removing and treating condensates and contaminants.

Compressed air and water

Ambient air contains moisture in the form of water vapor. A compressor converts 7 volumes of ambient air into 1 volume of compressed air. This compression process concentrates water vapor and increases air temperature. As a result, exhaust air is warm and moisture-laden. As it flows through the system pipes, the compressed air cools and the water vapor condenses into liquid. The dewpoint is the temperature to which the air must be exposed for it to continue condensing water droplets. The dryer the air, the lower its dewpoint.



For information purposes, this table shows that a 25 HP compressor can generate close to 200 L of water over an 8-hour operating period, depending on the temperature.

LITERS OF WATER PRODUCED BY A 25 HP COMPRESSOR AFTER 8 HOURS									
Ambient air temperature °C	% Humidity								
	20%	30%	40%	50%	60%	70%	80%	90%	100%
38	47.7	70.9	94.1	118.7	141.8	166.4	189.6	212.8	237.3
32	35.6	51.8	69.6	87.3	105.0	121.4	139.1	156.8	174.6
27	25.9	38.2	50.5	62.7	76.4	88.6	101.0	113.2	126.8
21	17.7	27.3	35.5	45.0	54.5	61.4	72.3	81.8	90.0
16	12.3	19.1	25.9	32.4	38.2	45.0	50.5	57.3	64.1
10	9.5	13.6	17.7	21.8	27.3	31.4	35.5	39.6	45.0
4	5.5	9.5	12.3	15.6	17.7	21.8	24.5	27.3	30.0
-1	4.1	5.5	8.2	9.5	12.3	13.6	16.4	17.7	20.5
-7	2.7	4.1	5.5	6.8	7.7	8.6	9.5	10.9	12.3
-12	1.4	2.3	3.2	3.6	4.5	5.5	6.4	6.8	8.2

4. COMPRESSED AIR QUALITY

Water leads to corrosion

The water that builds up in the compressor tank and in the piping is a source of oxidation that can cause significant damage:

- Corrosion or rust in the compressed air system
- Malfunction or premature wear of tools and equipment
- Premature wear and frequent maintenance of FRLs (Air treatment at point of use)
- Blocked valves and openings
- Contaminated finished goods (contaminated paint, proliferation of bacteria and microorganisms)
- Higher maintenance and downtime costs
- More compressed air leaks (less efficient and higher electricity costs)
- Diminished productivity from pressure drops

It's important to treat air at the compressor outlet to prevent these issues. Using an aluminum piping system is also an optimal solution as it will not corrode.

Other contaminants in the system

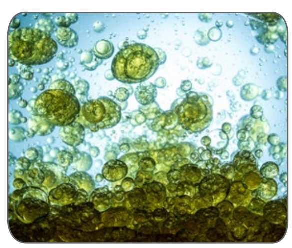
Ambient air is a mixture of gases and millions of solid particles. These particles can be harmful to a compressed air system and to the quality of finished goods, especially at high concentrations and high speeds.

Lubricated compressors also contribute to air contamination. Oil that makes its way into the system combines with water and other contaminants to form a thick, viscous substance that leads to even more damage at the point of use.

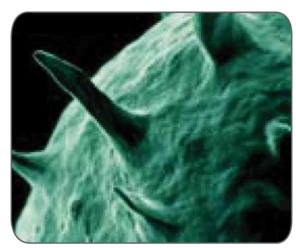
Top 10 contaminants in a compressed air system

Atmospheric dirt
Rust or corrosion
Deposits from pipe walls

Water vapor
Condensed water
Water aerosol



Liquid oil
Oil aerosol
Oil vapor



Microorganisms

4. COMPRESSED AIR QUALITY

Air quality standards

Certain applications and processes require very high air quality standards. This is true in food processing industries where compressed air may come into contact with food (during processing, curing, packaging, and other steps). Water or contaminants in the air can lead to pneumatic equipment failing and bacteria proliferating in compressed air lines.

The International Organization for Standardization (ISO) established the ISO 8573 Series of standards to make it easier to select, design and measure air treatment components. ISO 8573.1 identifies three main types of contaminants in a compressed air system: solid particles, water, and oil (in the form of aerosol and vapor). Each is categorized and assigned a purity class ranging from Class 0 (the most stringent) to Class 9 (the least stringent). Air use determines the required purity level based on industry standards and applications.

Class ISO 8573.1 (2010)	Solid particles				Water		Oil
	Maximum no. of particles per m³			Concentration	Vapor	Liquid	Total Oil(1)
	0.1 – 0.5 micron	0.5 – 1 micron	1 – 5 microns	mg/m³	Pressure dew point	g/m³	mg/m³
0	As specified by the equipment user or supplier						
1	≤ 20 000	≤ 400	≤ 10	---	≤ -94°F	---	≤ 0.01
2	≤ 400 000	≤ 6 000	≤ 100	---	≤ -40°F	---	≤ 0.1
3	---	≤ 90 000	≤ 1 000	---	≤ -4°F	---	≤ 1
4	---	---	≤ 10 000	---	≤ 37°F	---	≤ 5
5	---	---	≤ 100 000	---	≤ 45°F	---	---
6	---	---	---	≤ 5	≤ 50°F	---	---
7	---	---	---	5 – 10	---	≤ 0.5	---
8	---	---	---	---	---	0.5 – 10	---
9	---	---	---	---	---	5 – 10	---

(1) All forms of oil including liquids, aerosols and vapor

For example, the illustration below shows that Class 1.4.1 applies to the food industry (Level 4). This corresponds to Class 1 filtration for solid particles, Class 4 for water, and Class 1 for oil.

Level 1
Compressed air without specification

ISO 8573.1
Class 5.6.5

Level 2
General shop air: air tools (sand blasting, grinding)

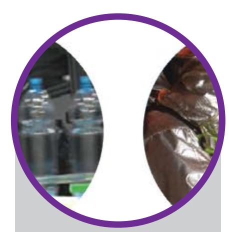
ISO 8573.1
Class 3.6.4

Level 3
Air instrument, spray painting, powder coating, packing machines

ISO 8573.1
Class 1.5.3.

Level 4
Food industry pharmaceutical and chemical industries, laboratories

ISO 8573.1
Class 1.4.1



Level 5
Food industry (breweries, dairies), pharmaceutical and chemical industries, laboratories

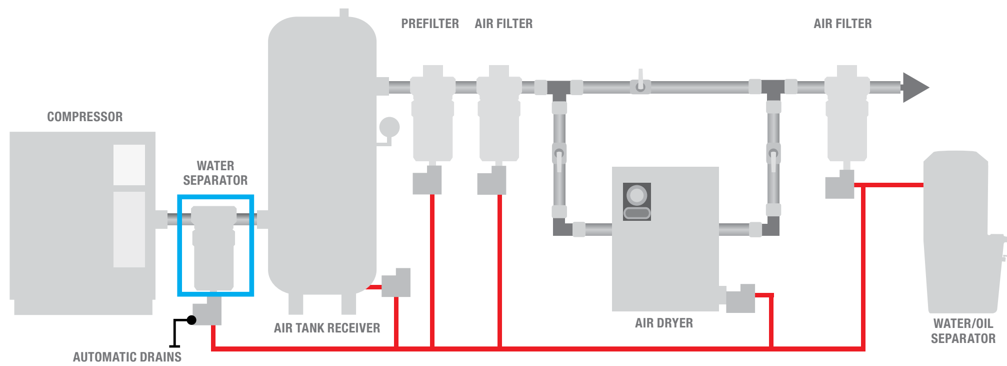
ISO 8573.1
Class 1.1.1

5. SOLUTIONS TO REMOVE AND TREAT CONDENSATES

The products presented in this section can be apply to safely and efficiently remove and treat condensates while maintaining clean, dry air.

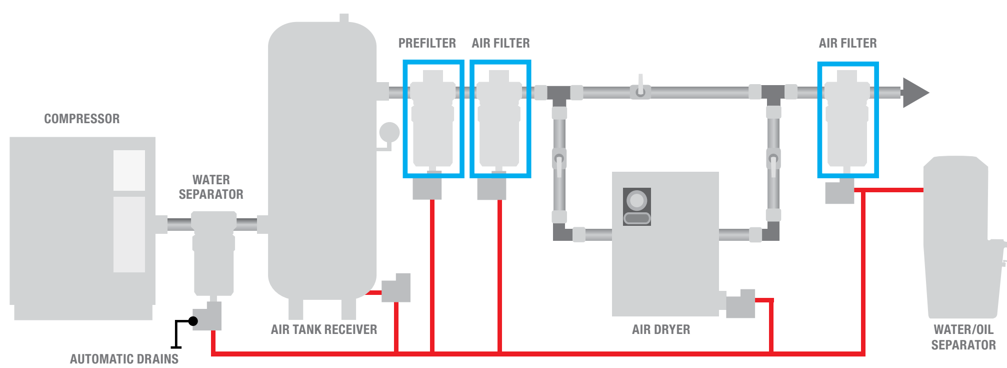
Water separators –Series 56

This is the first step to remove condensates at the compressor outlet. Water separators use centrifugal force (the vortex effect) to remove up to 99% of the water and solid contaminants from compressed air. Since the hot air injected into the system will continue to cool down and condense water droplets, a water separator should be paired with other compressed air solutions.



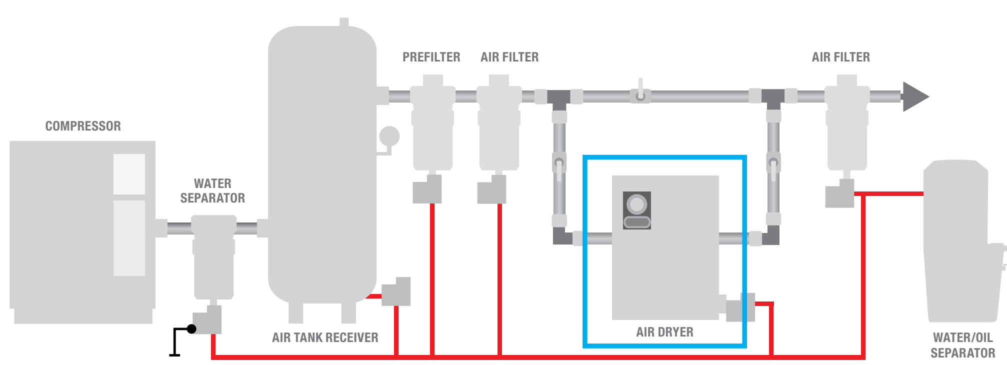
Compressed air filters • Series 53

Compressed air filters deliver the required level of air quality according to the needs of each application. Their role is extremely important as some applications require a very high quality of air.



Refrigerant air dryers • Series 49

Refrigerant air dryers are an efficient means of drying compressed air. They can reduce the dew point to as low as 3°C, cooling the water vapor in compressed air and condensing it into water. If your application requires exceptionally dry air, it's best to install a regenerative air dryer: this type of dryer can reduce the dew point to as low as -70°C (for more details on regenerative air dryers, visit Topring.com).



5. SOLUTIONS TO REMOVE AND TREAT CONDENSATES

Condensate drains • Series 59

Condensate drains collect and remove the water that accumulates in a compressor's tank, water separator, filters, and air dryer, as well as in a piping system's service outlets (the drop). The choice of drain depends on the environment, the pressure and the temperature.

CHOOSE FROM 3 TYPES OF DRAINS

Zero air loss drain

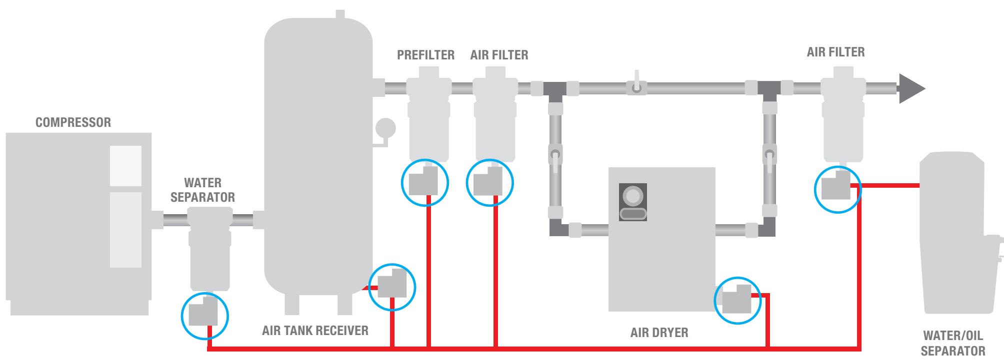
A sensor in the condensate collector triggers the tank's drain when a set value is reached. A drain with zero air loss is the most energy-efficient solution.

Programmable drain

A switch-operated valve opens at fixed intervals to drain condensates for a specific period of time.

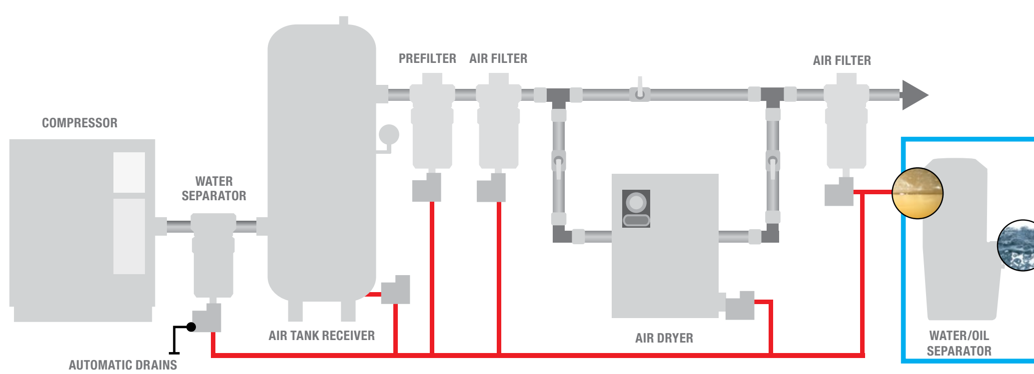
Mechanical drain

Condensate collects in a storage tank. A float opens a valve when a certain amount of condensate builds up.



Water/oil separators • Series 57

Water/oil separators are an economical, environmentally friendly way to separate, collect, and dispose of the oil in condensates. Condensate drains connect to water/oil separators. The water collected is then treated by a filter that attracts and retains oil droplets but repels water. The treated water holds a very low concentration of oil (5 mg/L) that meets current environmental standards (municipal or provincial) and can be legally discharged to sewers. This eliminates the need to store thousands of liters of condensate every year for costly outsourced treatment.



10 mg/L = 10 ppm/volume — CONDENSATE DRAIN LINE

Less than 5 mg/L of oil residue values at the output stage

6. COMPLEMENTARY PRODUCTS: Filters, regulators and lubricators

Treating compressed air at the point of application delivers a better-quality compressed air, regulates pressure to the right level, and lubricates pneumatic tools and equipment.

Air preparation at the point of use involves three elements, known as FRL.:

- Filtration (F) removes impurities and much of the water still found in the air system.
- Regulation (R) adjusts the air pressure based on application requirements.
- Lubrication (L) injects a controlled amount of lubricant (oil mist or fog) into the compressed air system to reduce premature wear of tools and equipment.

FILTRATION

Even when air is treated at the compressor outlet using water separators, refrigerated air dryers, filters, water/oil separators or drains, a compressed air system can still contain traces of water vapor and impurities. These vapors cool down and condense into water. This water requires filtration and must be eliminated at the point of application to prevent premature wear of air tools and equipment, lubricants from losing their efficiency, and pipes from freezing as temperatures drop.

Although new filters will provide proper airflow, saturated filters will cause pressure drops. Adopting a preventive maintenance program that involves periodically changing filter components will increase the air piping system efficiency.

Where should a filter be installed?

- Install the filter at the furthest point from the compressor to allow the compressed air to be cooled and vapors to condense. It's easier to remove water in its liquid form than as vapor
- Install the filter as close to the tool as possible and before the lubricator and regulator
- Always install the filter with the arrows pointing toward the tool or application (the arrows show the airflow direction)

REGULATOR

An air regulator is a control valve designed to regulate upstream pressure (at the valve inlet) to a downstream pressure level (at the valve outlet). This ensures a constant and accurate pressure, even if there are variations in upstream pressure or flow rate through the valve.

As the required working pressure of pneumatic tools and equipment may be higher or lower than the system's pressure, it is critical that the pressure is regulated at the point of use. When compressed air tools and equipment are used at a pressure beyond the recommended level, energy is wasted, safety is jeopardized, and equipment is subject to premature wear. When a system operates at pressures below the recommended levels, it will not deliver the performance it is designed for. Controlling air pressure levels will optimize the efficiency of each pneumatic tool and equipment of a compressed air system.

Where should a regulator be installed?

- Regulators should be installed on the pipe leading to each outlet where service applications and tools require a working pressure different than the main system
- Always install the regulator downstream from a filter and upstream from a lubricator
- Always install the regulator with the arrows pointing toward the tool or application (the arrows show the airflow direction)
- Regulators can be installed vertically or horizontally

6. COMPLEMENTARY PRODUCTS: Filters, regulators and lubricators

LUBRICATION

Many components of a compressed air system and most air tools require lubrication to work properly and last longer.

Every air tool has its own specifications for lubrication. Too little oil can cause excessive wear and premature breakage, while too much is wasteful, can pollute, and lead to clogged pipes and equipment.

A lubricator properly adjusted prevents excessive wear and premature breakage, as well as limit waste, and prevent clogged pipes and equipment. A small amount of oil is released with each use.

Where should a lubricator be installed?

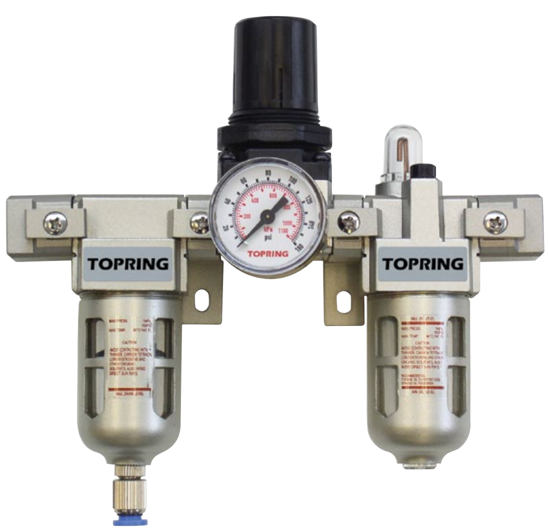
- Oil-mist lubricators should be installed within 5 meters of the application
- Micro-fog type lubricators should be installed within 30 meters of the application
- Always install downstream from a filter and a regulator
- Always install the lubricator with the arrows pointing toward the tool or application (the arrows show the airflow direction)
- Make sure the lubricator is accessible for replenishment. (check out TOPRING's series 69 air tool oils)

FRL COMBINED UNITS

Filters, regulators and lubricators are usually installed in combination, near the application. Filter and regulator can be combined into one unit and precede either a lubricator (for air tools) or a coalescing filter (for paint applications).

These combinations are designed to provide the exact level of air treatment required, in a compact format. Their choice must be made according to the flow capacity of the most restrictive unit and according to the needs of the application.

Filter + Regulator + Lubricator



Filter/Regulator + Lubricator

7. COMPLEMENTARY PRODUCTS: Hose reels

Hose reels offer a more convenient solution and safer method of handling and storing hoses

Reduction of hose wear

- Hoses are kept out of the way when not in use
- Only the needed length is pulled out of the reel when working
- Hoses stay cleaner
- Hoses, couplers and tools last longer reducing maintenance costs

Improved accessibility for users

Hose reels can be attached to the ceiling, wall, floor or under the work table. The tools are easily accessible thanks to the adjustable length of the hose. Users lose less time in untangling the hose.

Safer for users

In addition to being an ergonomic solution, having fewer hoses dragging on the ground reduces the risk of stumbling to users. Hose reels also reduce the risk of tools falling on the ground and increase their service life.

POINTS TO CONSIDER WHEN CHOOSING A HOSE REEL

Frequency of use

- Intensive use – Choose a heavy-duty model
- Regular use – Choose an industrial model
- Occasional use – Choose a professional model

Retraction mode

- Automatic retractable hose reel
  - Spring driven requires no effort

  The user guides the hose as it retracts itself around the hose reel drum. Automatic retractable hose reel easily wraps and stores the hose.

- Manual hose reel

  The user must manually crank the reel and guide the hose evenly as it wraps around the hose reel drum.

Open or closed model

An open reel model provides better visibility and ease of access for cleaning, while a closed reel protects the hose and internal components better. The choice of a closed or open model is purely a matter of the user's preference.

Hose and hose reel material

The type of industry in which the hose reel will be used will influence the choice of the reel material. For example, in the food industry, a stainless steel reel should be chosen. Installation height of the hose reel To avoid unnecessary maintenance costs, it is preferable to choose a quality hose reel, especially if it is installed in a location that is more difficult to access (e.g. in height). The hose must be of quality, suitable for the application, and be the least elastic possible.

7. COMPLEMENTARY PRODUCTS: Hose reels

POINTS TO CONSIDER TO CHOOSE AN HOSE REEL / CONT.

Length of the hose

The distance between the hose and the compressor must always be as short as possible to avoid pressure losses. When considering the overall length of the hose, the distance between the mounting location of the hose reel and the working station and the length of use required to perform the movements must be taken into account.

Inside diameter of the hose

The required air flow (cubic foot or SCFM) at the outlet of the reel must be sufficient enough to operate the tools and equipment. The amount of air is determined by the length of the hose and its inside diameter. It is preferable to choose the largest diameter possible.

Maximum working pressure

The maximum working pressure of the hose must be greater than the working pressure of the tool or equipment.

Material of the hose

The fluids transported or in contact with the hose must be compatible with its material (air, water, acids, oils, steam, etc.). In some environments this may be a critical element (e.g., food manufacturing, petroleum products, etc.). The hose selection guide in the Series 70 to 78 illustrates the differences between the hoses and their degree of resistance to the elements that can contribute to their deterioration.

8. COMPLEMENTARY PRODUCTS: Manifold and quick coupler kits

TOPRING offers several types of manifolds with manual drain and 1, 2 or 3 outlets. These manifolds are offered with or without quick couplers. Convenient and efficient, these kits reduce installation time.

Manifod kit
with manual drain
and 1, 2 or 3 outlets

Manifod kit
with manual drain,
ball valve and
1, 2 or 3
quick couplers

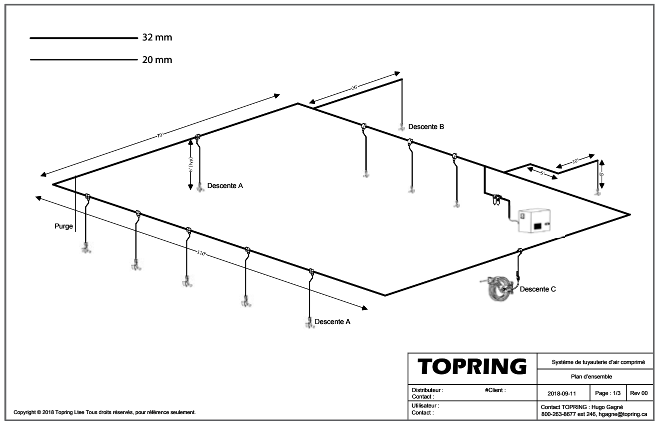
9. TOPRING CAN HELP YOU

TOPRING can help you plan, design, and select the right compressed air piping system.

GENERAL LAYOUT

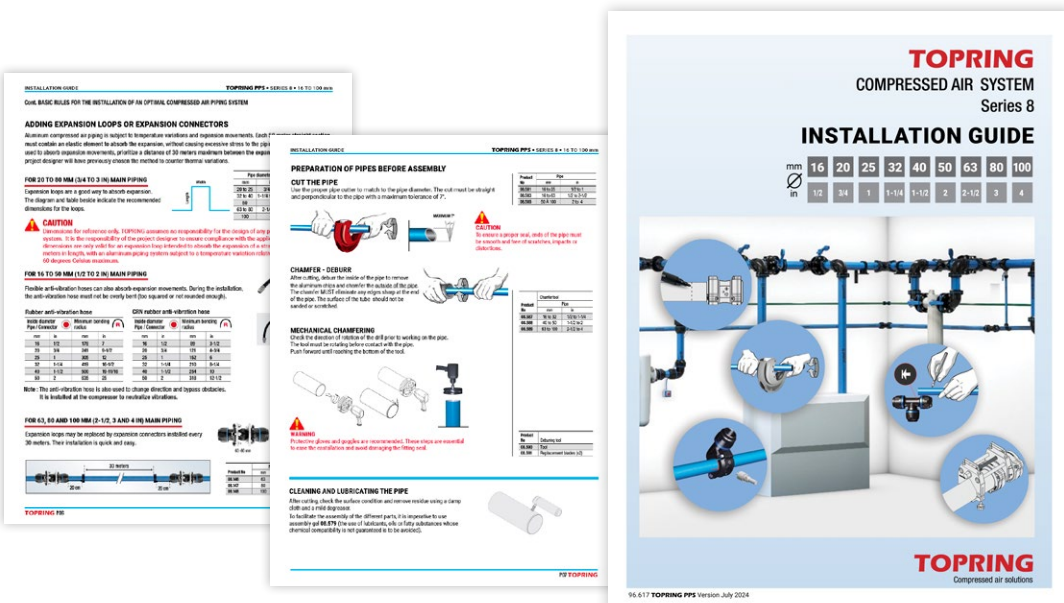
Visualize your compressed air installation with a Visio drawing provided upon request.

For technical support with a specific project, contact us at 1 800 263-8677 or visit **TOPRING**.com



INSTALLATION SUPPORT

The installation guide for the **TOPRING** S08 piping system contains technical information explaining each of the installation steps, facilitating the understanding of the assembly of the various components of the system.



Download the **TOPRING** S08 INSTALLATION GUIDE on **TOPRING**.com. Guide also availbale in French.

NOTES

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