

Pipe material selection

Piping for compressed air system comes in a range of materials. With the emphasis on energy efficiency, the correct choice of piping materials brings positive benefits to the cost of running a well designed and maintained compressed air system. The previous cost advantage that steel maintained is no longer a consideration which then focuses the choice on technical specifications.

Advantages and disadvantages of available compressed air pipe materials

Pipe material	Advantages	Disadvantages
Galvanised steel	Known technology, widely available	Heavy, prone to rusting, threaded joints require careful preparation, inner surfaces are not smooth and as a result promotes energy loss (pressure drop)
Aluminium	Lightweight, easy to install, does not rust.	Not suitable for applications where there is a fire risk, e.g. mines, offshore and hospitals.
High performance plastic e.g. ABS, polyethylene	Lightweight, non-corrodible, non-toxic	Use only piping specified as suitable for compressed air. Pressure rating reduces as temperatures increase check suppliers data for suitability Subject to ultra-violet degradation
Stainless steel	High rigidity, corrosion and rust resistant.	Applications tend to be limited to high specification, critical processes (e.g. food processing) due to the higher initial cost
Copper	High purity copper inhibits microbial growth useful for medical applications	Maximum diameter is 40mm

Relevant standards - examples

BS EN 10255 – steel pipe for general use (formerly BS1387)	BS 4825 - Stainless steel tubes and fittings for the food industry (in 5 parts)
BS EN 10296-2 – Stainless steel	BS EN 12449:1999 Copper and copper alloys. Seamless, round tubes for general purposes
BS 6362 – Stainless steel pipe for threading	BS 3974 – Supporting of piping
BS 5391-1:2006 ABS pressure pipe. Specification	BS1710 – Identification of pipelines

Pipe corrosion

Rusting (a specific form of corrosion) on steel or galvanised steel leads to the following:

- Contamination of product
- Reduces the effective cross-sectional area of the pipe thus restricting flow and increasing pressure drop
- Premature blocking of pneumatic components and filters

Corrosion of aluminium results in a layer of aluminium oxide which is very stable and has in addition a very good adhesion to the metal surface and thus protects aluminium from corrosion or further oxidation. Once the oxide layer is formed provided that it is not disturbed it will not react further in the manner of the rusting of steel. Therefore any restriction to flow will be limited unlike that for steel.

The importance of system design

Remember that whatever materials are selected, the efficiency of the system depends on the correct design and application of the joints and connections. More details appear in the Installation Guide (5th edition) and Pressure & Leak Testing Code of Practice.

If you have a specific issue related to distribution systems, send an email to: technical@bcas.org.uk