Filtration

More widespread and demanding applications of compressed air have governed the requirements concerning compressed air quality to become more critical. Compressed air is applied in many sectors of technology, for example in the pharmaceutical industry, when manufacturing vaccines or antibiotics, in the food and beverage industry, in hospitals and also manufacturing in the electronic industry. All these compressed air users depend on purified compressed air.

The quality requirements are relative but differ considerably. Depending on the location of the installation, pollution can occur in many forms, namely as solid or liquid suspended particles or in a gaseous state. Depending on the purpose or application of the compressed air, one selects the filters in such a way that most closely matches the air quality required to prevent breakdown or low productivity.

In addition, the resistance of individual filter materials, plays an important part. The selection of the correct type of filter and filter material assumes greater importance if impurities in the air are dangerous such as, dust from insecticides, or bacteria and viruses. The same can apply to certain metallic compounds such as beryllium or lithium derivatives or radioactive substances.

The selection of the necessary air treatment measures are correspondingly specific. It is difficult to specify quality grades in this instance, because differing parameters have to be taken into consideration in each case such as:

- Dust/Dirt
- Moisture
- Oil
- Viruses and bacteria
- Gaseous constituents

When dry and dust free compressed air is used, it becomes more effective, efficient and ultimately more economical, because malfunctions are avoided.Water, oil, polluting gases and dusts lead to primary and secondary damage, as they cause corrosion in pipelines and fittings, bring about abrasive effects in conjunction with emulsions, as well as blocking and icing up. In order to eliminate these malfunction factors, treatment systems, i.e. dryers and filters are used.

Depending on the design of the compressor and the location where it is installed, compressed air may, as limiting values, contain up to :

- 250 mg/m^3 dust
- 85 g/m^3 water vapour
- 15 mg/m^3 oil

This being unsuitable for a compressed air system. The oil content in the compressed air consists of condensed, liquid oil, generally in aerosol form, and evaporated oil vapour.

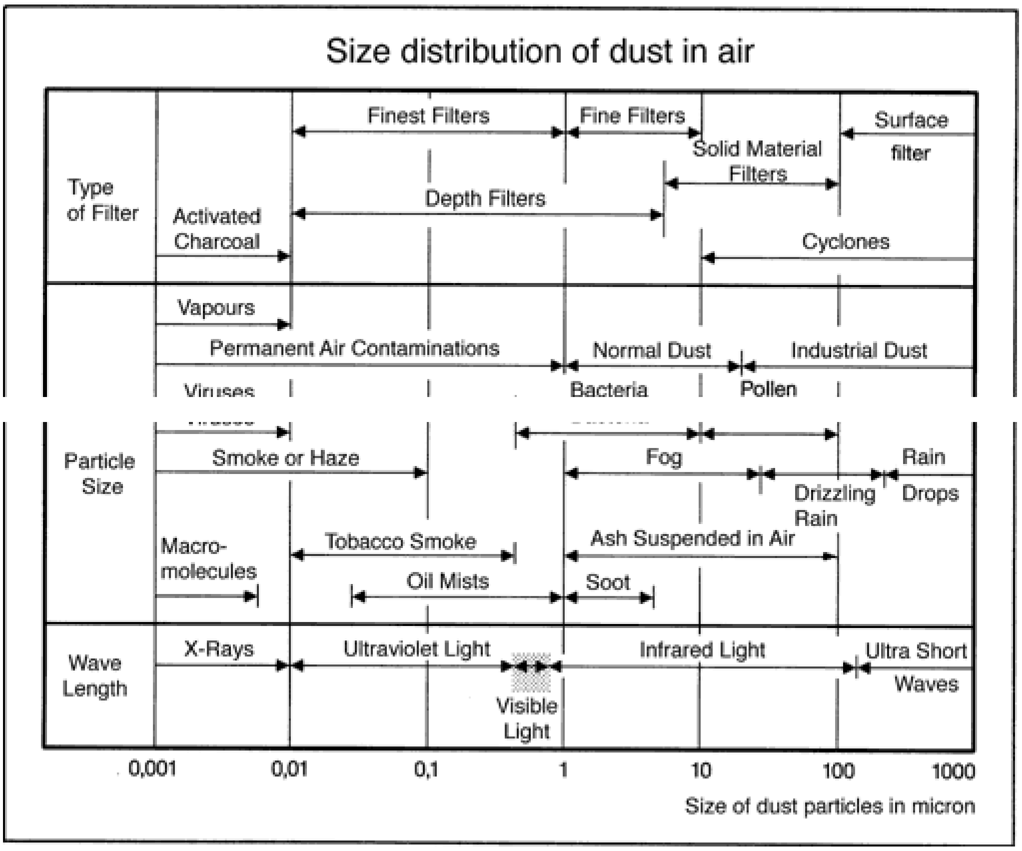

Diagram 4.0.1

Liquid droplets in gas or air can be of a widely different diameter size. For this reason, aerosols are divided into two groups:

Spray : Liquid particles with a diameter of 10 microns or more are referred to as spray. Spray can be relatively easily removed from compressed air by means of various mechanical separators.

Mist : Liquid particles with a diameter of 10 microns or less are described as mist. The term mist or aerosol is applied to droplets the mass of which is so small they can remain in suspension in the gas stream. Mist can only be removed from compressed air steam with great difficulty and calls for finer filter systems.

Mist or fog arises in the following manner :

Most often through cooling followed by condensation of the liquid particles from the medium.

Separation effect of mist

	Brownian Movement	**Inertia Effect**	**Blocking Effect**
Surface Speed m/min	5 - 12	120 - 150	120 - 150

Performance Particle> 3µm	practically 100%	practically 100%	practically 100%
Performance Particle> 3µm	55 - 99%	90 - 98%	15 - 30%
Pressure drop mm Water Column	125 - 400	150 - 200	25 - 50

Table 4.0.1

If a sufficiently large number of such mist droplets is present, mass attraction forces become effective and the mist droplets coalesce. In this manner, large droplets will, in the course of time, be formed, the mass of which is so large that the suspension forces in air are overcome by the weight of the droplet, causing the droplet to fall.