

WHITE PAPER

Effective Air Preparation



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Breakthrough Engineering for a Better World

Norgren is part of global engineering organisation IMI plc. IMI is at the forefront of delivering the solutions we need in a changing world and is focused on **creating tremendous value by solving key industry problems** in attractive markets and employing the best.

Norgren has a proud history of creating innovative engineering solutions in precise motion control and fluid technology, and we collaborate with our customers across more than 50 countries in critical areas such as Factory Automation, Material Handling, Rail, Energy, Process Control, Life Science and Commercial Vehicles.

From improving speed, productivity, reliability and efficiency of equipment, to generating significant energy and cost savings, or lowering total cost of ownership across many industries, Norgren's high-quality solutions are designed to help customers pursue progress, achieve new goals and overcome problems.

With market-leading industry expertise, we offer the capability, resources, engineering intelligence and global support infrastructure to tackle the largest project demands.

Our world-class portfolio of fluid and motion control products include Norgren, Bimba, Buschjost, FAS, Herion, Kloehn and Maxseal. Supplied either individually or combined into powerful customised solutions to meet customer needs.

Breakthrough engineering you can count on.



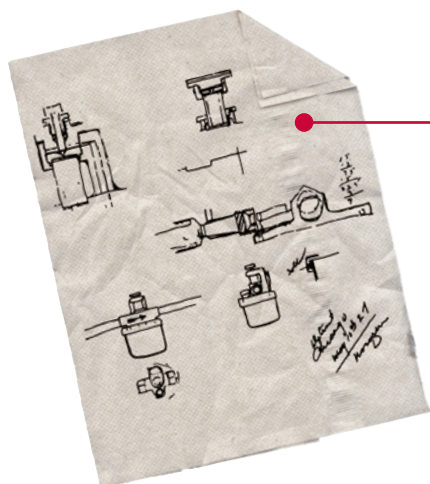
It's All in the Air

The efficient and long-term performance of pneumatic equipment and systems, as well as compliance with manufacturers' warranties, relies upon the availability of clean and dry compressed air.

In 1925, when Carl Norgren invented the automatic airline lubricator, he effectively created an industry and began the practice of air preparation - delivering air of the right quality to a pneumatic device enables that device to run at it's optimum efficiency for the longest possible time, keeping life costs to a minimum.

We have continued developing world class air preparation products ever since. Today, Norgren air preparation products are used globally, and are founded on a best-in-class reputation based on quality, reliability & robustness.

Here, we have compiled our top tips for effective air preparation, including using the correct filters, choosing the correct pressure regulators and incorporating soft start valves into your pneumatic system.



Automatic
airline lubricator
invented in 1925



1 Maintain filters regularly

Clogged filters lower the efficiency of the compressor, limit the flow of air through lines, and generally increase energy costs. Having filter elements replaced regularly is a first line function of maintaining your compressed air system.



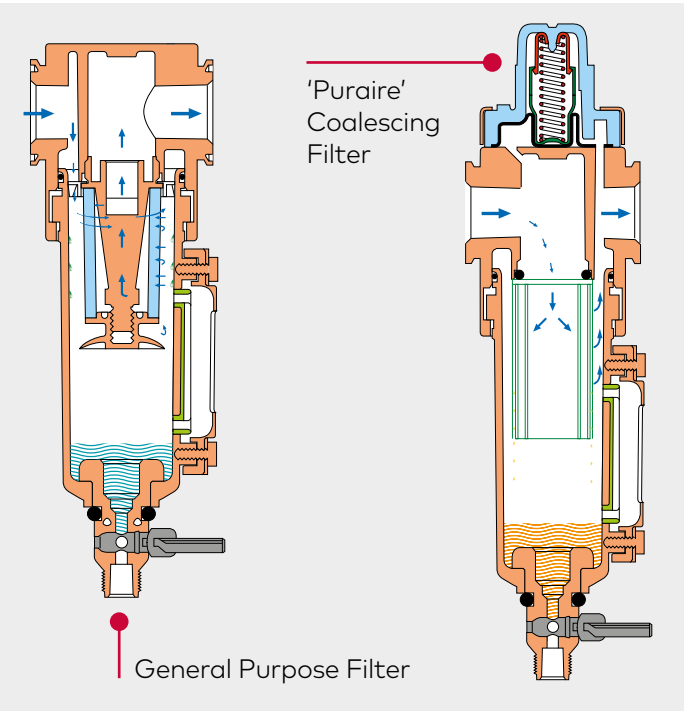
Norgren's Excelon® Plus is designed with a unique maintenance system. The filter element is removed together with the bowl which means minimal bowl removal clearance is needed and servicing is quick and simple.

2 Use the right filter

There are several types of contaminants in a compressed air line. The most common are particulate, water, and oil. Selecting the most appropriate filter(s) depends on the process requirements. General-purpose filters remove particles and liquid bulk water, and should be included in all pneumatic systems. Coalescing/oil removal filters remove liquid oil as well as extremely small particles (down to 0.01 microns). Vapour removal filters remove oil vapour, eliminating odour.

International Standards

Many compressed air filter manufactures test their products against ISO 8573 air purity classes which quantify the contaminants listed above that are allowed in each cubic metre of compressed air. The table below outlines the purity classes and additional detail can be found on www.iso.org. Norgren's Excelon Plus range is tested in accordance with ISO 12500, used to qualify a filter's air purity class according to ISO 8573.



ISO8573-1:2010 Class	ISO 8573-1:2010 Purity classes						
	Solid Particulate				Water		Oil
	By Particle Size (Max. # number of particles per m³)			Mass Concentration mg/m³	Vapor pressure Dewpoint	Liquid g/m³	Total Oil (Aerosol liquid & vapor) mg/m³
	0.1 - 0.5 micron	0.5 - 1 micron	1- 5 micron				
0	As specified by the equipment user or supplier, and more stringent than Class1						
1	≤ 20,000	≤ 400	≤ 10	-	≤ -70°C	-	≤0.01
2	≤ 400,000	≤ 6,000	≤ 100	-	≤ -40°C	-	≤0.1
3	-	≤ 90,000	≤ 1,000	-	≤ -20°C	-	≤1
4	-	-	≤ 10,000	-	≤ +3°C	-	≤5
5	-	-	≤ 100,000	-	≤ +7°C	-	-
6	-	-	-	≤ 5	≤ +10°C	-	-
7	-	-	-	5 - 10	-	≤0. 5	-
8	-	-	-	-	-	0.5 - 5	-
9	-	-	-	-	-	5 - 10	-
X	-	-	-	>10	-	>10	>10

3 Install automatic condensate drains

Contaminants can enter a compressed air system in multiple areas. Drains must operate properly to enable filters and separators to work correctly and prevent any liquid being drawn into the air line. When used correctly they reduce operating costs, and limit the need for filter maintenance.

Installing an auto-drain is preferable, as it drains once liquid reaches a certain level, offering a fit and forget solution.



4 Select metal filter bowls for high pressure applications

Standard with larger units, metal filter bowls are often offered as an option for compressed air filters. These add an additional layer of protection to the system, particularly when pressures are high or when there is a risk of chemicals or solvents being in the compressed air, or environment. Consider the application, as well as the environment when selecting compressed air filters. In the event of any concerns, it is recommended to opt for safety, and select a metal filter bowl.



5 Ensure correct operation of pressure regulators

Variation in an application's processes can cause a variety of problems.

Pressure regulators enable a constant outlet pressure, even while inlet pressure fluctuates, reducing variations in the process. Excelon® Plus comes with either a market standard plastic knob, or the more durable T handle with metal bonnet for arduous environments and applications. With a choice of three spring range options, it can cater for primary pressures up to 20 bar.

Finally, when setting the pressure regulator, always set it with the pressure increasing, which means in the event of inadvertently overshooting the set pressure, it should be reduced to at least 15psi below the set pressure and then taken back up to the set pressure.



6 Be sure to add pressure switches

Continuous monitoring and control of the pressure in the compressed air system is key when trying to manage energy use and efficiency in processes. Monitoring devices such as pressure gauges can offer a visual indication to users, while pressure switches signal back to the machine, which then communicates to another device, such as a proportional valve, to provide accurate pressure adjustment.

A device such as Norgren's IEPS can measure and monitor the secondary pressure. Such a device can be used in a traditional way where meeting or exceeding that pressure setting gives a digital output of a switch. This device is also future proofed for IIoT applications. Using the IO-Link protocol, the output signal from a transducer offers additional process data that can be used for predictive maintenance and other machine optimising routines.



7 Add shut-off valves to provide safety during maintenance

One of the most underutilised products in the industry is the shut-off valve that can lock out, tag out (LOTO) while personnel are performing maintenance and repair on a compressed air system. It is best practice to use multiple pad locks to require both the supervisor of the area, as well as the maintenance person, to unlock the shut-off valve once they agree when the system is safe to be turned back on.

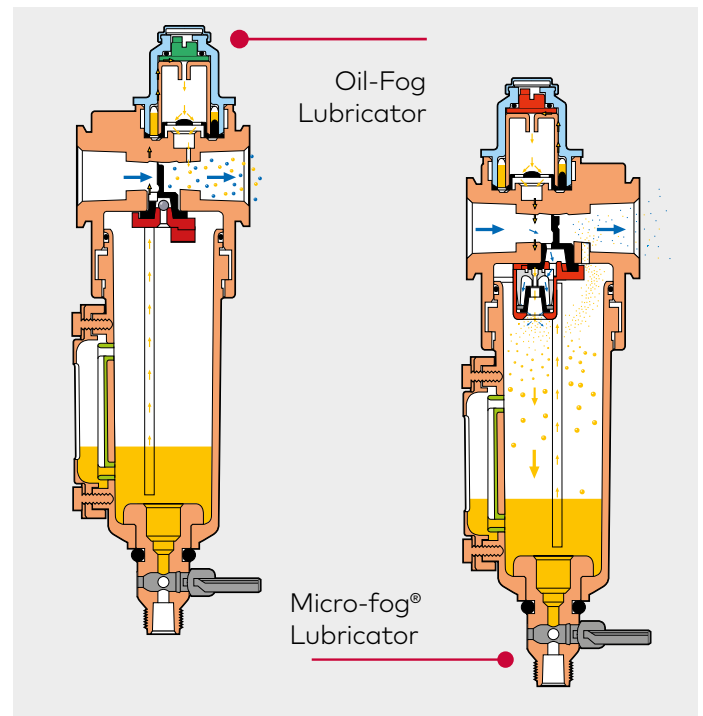
The valve is designed to be locked in the closed position. In the closed position the primary air is isolated and the secondary air is exhausted to atmosphere via the valves threaded exhaust port.



8 Use lubrication as part of your maintenance

When it comes to compressed air valves and cylinders, proper and regular lubrication can greatly extend the life of equipment. Even on pre-lubricated valves and cylinders, using a lubricator will extend the life of units by three or four times.

Most manufacturers only offer one type of technology 'Oil-fog' sometimes referred to as high delivery units. These units are best suited for lubricating over short distances where wet-out is required early. Norgren offer a second unique technology which is now widely used in the industry, the Micro-fog®. Designed for lubricating over long distances where particles must reach the furthest parts of intricate systems. Suited to; control circuitry, multiple valve / actuator systems. The oil drips are atomised in the bowl and stay in suspension longer.



9 Incorporate soft start valves

Wear and tear is a major concern for compressed air system components. Hard starts put more strain on the system than is generally recognised. By incorporating smooth start valves, users can greatly reduce start up wear. Furthermore, soft start valves increase the safety of the system. Injuries can occur if people are near equipment that moves or snaps into place when compressed air is introduced to a system.

As well as factories being responsible for having safe working areas machine builders are responsible for ensuring their machines are designed and built with safety in mind and have an obligation to comply with the Machinery Directive 2006/42/EC. In addition to supporting compliance with this directive the application of the Soft Start/Dump valve helps designers comply with ISO12100 and ISO13849-2 (basic safety principles).



Norgren operates four global centres of technical excellence and a sales and service network in 50 countries, as well as manufacturing capability in Brazil, China, Czech Republic, Germany, India, Mexico UK and the USA.

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