Clean and dry compressed air for the railway industry
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Filtration, purification and separation is our business

Parker domnick hunter is a world leader in the filtration, purification and separation of compressed air and gases, having many significant brand labeled products and major customers.

Parker domnick hunter specializes predominantly in the fine end of the market where compressed air and gas purity, product quality, technological excellence and global support are paramount. We design and manufacture compressed air treatment products, gas generators and ancillary equipment for many key industries where ease of integration, low cost of ownership and energy savings can make a real difference.

While some applications may involve standard off-the-shelf products, the trend is moving more towards providing best practice solutions for the ever-changing demands of specific railway applications.

Parker domnick hunter offers maximum protection from a dedicated range of railway and transportation air purification and separation systems. Utilizing the smallest space envelope available for horizontal or vertical installation, the patented design technologies enable the air treatment to be installed either internally or externally. Other noteworthy benefits such as suitability for all climatic conditions, preventing systems freezing and having the lowest weight and operating noise levels, makes Parker domnick hunter the natural choice for new builds and companies involved in rolling stock refurbishment.

At Parker domnick hunter, customers can select the level of integration that best fits their needs.
Compressed air contamination is a real problem for rail operators

Reliability and punctuality of operation are key demands with passenger and freight rolling stock today, in an industry where safety and performance are paramount.

Compressed air provides power to some of the most sophisticated applications that keep the rolling stock operational but is generally contaminated with some of the most natural contaminants known – dirt, water and oil. Further contamination in the form of compressor oil and wear particles then mix with the atmospheric dirt and water to produce an abrasive paste which has no lubricating properties at all.

If this contamination is not removed from the compressed air system, it will result in:

- **Detrimental effect on performance**
- **System breakdown**
- **Unscheduled maintenance**
- **Set out for service costs**
- **Costly repairs**
- **Dissatisfied customers**

As the majority of applications are external, they are therefore susceptible to climatic conditions. Any moisture remaining in the compressed air system has a major effect on performance, and is a contributing factor to fracturing air lines and damaged pneumatic cylinders caused by freezing and blocked pipes. Unplanned and unbudgeted maintenance will be required, affecting the single most important value each operator is striving to attain – a reliable service!

Awareness of the value of compressed air used in railway applications is growing, and so is the need for better quality in terms of the elimination of contamination and the improved lifetime of all applications which depend upon it.

The introduction of new and sensitive pneumatic control systems, linked with economic and environmental considerations makes the effective treatment of compressed air necessary.

Different applications place varying demands on the compressed air system. Not only is reliability a major concern but the entire safety of the train and therefore the entire rail transport network is heavily dependent on a reliable compressed air supply.

Whether new build or refurbishment of locomotives and rolling stock, total compressed air protection can be provided by the installation of a dedicated Parker domnick hunter railway dryer package complete with pre- and after filtration.

Wet compressed air will cause ice to form.

Oily wet condensate will enter the compressed air system if not removed efficiently.
Applications depend on clean, dry compressed air for reliable operation.
Sources and types of contamination in a compressed air system

Understanding the sources of compressed air contamination and the types of contaminants which must be eliminated is fundamental to understanding the principles of effective purification methods.

- **The atmospheric air**
  Air compressors draw in vast volumes of air from the surrounding atmosphere which contain large numbers of airborne contaminants.

- **The type and operation of the air compressor**
  The air compressor can also add contamination, from wear particles to coolants and degraded lubricants.

- **Air receivers and system piping**
  The air receiver and system piping distributes the compressed air but will also retain the large amounts of contamination drawn into the system. Additionally, they cool the moist compressed air to cause condensation on a large scale. This will promote corrosion, poor performance and ultimately costly damage.

Atmospheric dirt
Atmospheric air in industrial and urban environments typically contain 140 million dirt particles for every cubic metre of air. 80% of these particles are less than 2 microns in size and are therefore too small to be captured by the compressor air intake filter and pass directly into the compressed air system.

Water vapor
Large volumes of atmospheric air enter the compressed air system through the compressor intake. As the air is compressed, the temperature increases significantly, causing it to become fully saturated with water vapor. The ability of air to retain water vapor is dependent upon its temperature and pressure.

- The higher the temperature, the more water vapor that can be retained.
- The higher the pressure, the greater the amount of condensed water that will be released.

Condensed liquid water and water aerosols
After the compression stage, the saturated air is normally cooled to a usable temperature by an aftercooler, causing the retained water vapor to be condensed into liquid water which can now be removed by a condensate drain. The air leaving the after-cooler is now 100% saturated with water vapor and any further cooling of the air will result in more water vapor condensing into liquid water.

Condensation occurs at various stages throughout the system as the air is cooled further by the air receiver, piping and the expansion of air in valves and cylinders. The condensed water and water aerosols cause corrosion to the storage and distribution system, reduce performance efficiency and increase maintenance costs of the application. Water in any form must be removed to enable the system to function correctly and perform efficiently.
**Rust and pipescale**

Water contamination will cause rust and pipescale to form in air receivers and the system piping which will eventually break away to cause blockage or damage to the application.

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**Oil**

Most air compressors use oil in the compression stage for sealing, lubrication and cooling. During operation and especially at elevated operating temperatures, as much as 50% of the degraded compressor oil, in liquid, aerosol and vapor form can be carried over into the compressed air system.

Additionally, unburned hydrocarbons drawn into the compressor intake will carry over into the compressed air system where it will cool and condense.

All this acidic oil mixes with water vapor in the compressed air causing damage to air receivers, the air distribution system and valve/cylinder seals.

It should also be noted that oil-free compressors do not supply contaminant free air. Regardless of which compressor type is selected, whether oil-free or oil lubricated, adequate filtration and separation equipment will be required to remove the large volume of dirty contaminated water in addition to unburned hydrocarbons, dirt, rust and pipescale contamination from entering the system.

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**Compressed air contamination**

The accumulative effect of oil, water and dirt contamination collected by a compressed air filter.
Compressed air purification

Having identified the different types of contamination found within a compressed air system, the purification technologies available for its removal can now be explained.

**Water separators**
Water separators are used to protect coalescing filters in systems where excessive cooling takes place in air receivers and distribution piping.

Using mechanical separation techniques, water separators will remove in excess of 92% bulk liquid contamination.

**Coalescing filters**
Coalescing filters are probably the single most important purification equipment in a compressed air system. They are designed not only to remove aerosols (droplets) of oil and water using mechanical filtration techniques, but also to remove solid particulate to very low levels (as small as 0.01micron in size). Installed in pairs, the first filter is a ‘general purpose filter’ which protects the second ‘high efficiency filter’ from bulk contamination. The dual filter installation from Parker domnick hunter ensures a continuous supply of high quality compressed air with the additional benefits of low operational costs and minimal maintenance.

**Adsorption dryers**
Water vapor is removed from compressed air using an adsorption dryer. Adsorption dryers remove moisture by passing air over a regenerative desiccant material which strips the moisture from the air. This type of dryer is extremely efficient and a typical pressure dewpoint for adsorption dryers is -40°F (-40°C). However, in rolling stock applications the dryness of the compressed air is stated as a dewpoint suppression of 72°F (40°C) below the ambient temperature.

As adsorption dryers are designed to remove only water vapor and not water in a liquid form, they require the use of coalescing filters to work efficiently.

**Dust removal filters**
Dust removal filters are used for the removal of dry particulate which may be carried over from the desiccant material in the dryer. They provide identical particulate removal performance to the equivalent coalescing filter and use the same mechanical filtration techniques to provide up to 99.9999% particle removal efficiency.

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**High efficiency filtration**
Coalescing filters preceded by a water separator will remove in excess of 92% bulk liquid contamination, particulate to 0.01 micron and oil removal down to 0.01 mg/m³.

**High efficiency drying**
A modular adsorption dryer comprised of twin chambers filled with desiccant material which dry the compressed air as it passes through. One chamber is operational (drying), while the opposite chamber is regenerating using the pressure swing adsorption (PSA) method of regeneration.

**KEY:**
1. TFSE Water Separator
2. TFGE General Purpose Filter
3. TFHE High Efficiency Filter
4. TDS Adsorption Air Dryer
5. TFDE Dust Filter
A dedicated solution for every application

Parker domnick hunter offers maximum protection, with a dedicated range of railway and transportation air purification and separation systems, designed specifically to combat the problems experienced with today’s rolling stock.

A filter package combining high-efficiency water separation (better than 92% efficiency) with high-efficiency coalescing technology (oil removal down to 0.01 mg/m³ and particle retention down to 0.01 micron), ensures that compressed air can be filtered to meet the requirements of both the NF F11-100 standards for rolling stock and the international ISO 8573-1 compressed air quality standards.

The Parker domnick hunter range of railway dryers uses extruded aluminum in its design which is engineered for each application and enables the air treatment to be installed either internally or externally, both horizontally or vertically. Utilizing the smallest space envelope available for installation makes upgrading of existing rolling stock easy.

This patented design technology has the ability to withstand the rigors of shock and vibration in the most arduous and extremes of operating conditions and climates.

Awareness of the value of compressed air purification in rolling stock and the systems dependent on it is growing. More and more users recognize the problems associated with poor filtration and the need for better quality compressed air in terms of contamination removal and the improved lifetime of all applications and systems which rely upon it.

Addressing the cause rather than the symptom has enabled many operators to provide a long-term solution to contamination problems, rather than applying short-term fixes in the hope that the symptoms will disappear. This has resulted in longevity of operation, with significantly lower maintenance and operating costs with the added benefits of minimal downtime and a reliable service.
Railway filter and dryer packages

Features
- **Fully corrosion protected**
  Alocrom treatment and epoxy paint finish
- **Flexible installation**
  Can be installed vertically or horizontally, internally or externally
- **Independently validated**
  Independently tested for shock, vibration, EMC and flammability
- **Quiet operation**
  Low operating noise level
- **Electrical supply**
  Designed to customer specifications

Benefits
- **Highest quality compressed air**
  Meets international standards
- **Optimal performance guaranteed**
  Continued protection in any climate
- **Compact and lightweight**
  Can be installed almost anywhere
- **Modular design**
  Simple to install
- **Low maintenance**
  Simple and easy to maintain
- **Compatible with all compressor oils**
  Suitable for all types of compressor
- **Cost effective**
  Low operational costs

Options
- **100°F (70°C) dewpoint suppression**
- **OEM design and build**
- **Electronic condensate drains**
- **Pneumatic condensate drains**
- **Trace heating**

A modern approach to high efficiency compressed air drying can remove water vapor to 72°F (40°C) dewpoint suppression. Vertical and horizontal solutions shown.
Types of rail vehicles which benefit from clean, dry compressed air for reliable operation.

1. High speed train
2. Maintenance vehicle
3. Light rail vehicle
4. Locomotive
5. Class 1 locomotive
6. People carrier
The Parker domnick hunter design philosophy

Air quality
Improved air quality is the main reason for installing filtration and drying equipment in the first instance. All Parker domnick hunter purification equipment has been designed to provide compressed air quality in accordance with the recommendations described in ISO 8573-1:2001, the latest edition of the international air quality standard. Additionally, Parker domnick hunter product performance has been independently verified by Lloyds Register and is backed up by a 12 month performance guarantee, which can be extended simply by conducting annual maintenance in accordance with the Parker domnick hunter recommendations.

Energy efficiency
During the development of Parker domnick hunter filtration and drying products, our engineers strive to provide the lowest operating costs while achieving the required air quality. Pressure loss is the major contributor to operational costs of filtration products. Parker domnick hunter Railway & Transportation filters have been designed using aerospace technology to ensure both pressure loss and energy consumption are kept to an absolute minimum.

Low lifetime costs
Equipment with a low purchase price may turn out to be a more costly investment in the longer term. The operational and maintenance costs of the purification equipment also needs to be considered. The user should also consider the cost of poor quality compressed air impacting on his railway operation.

Aftermarket support
Many railway applications require much more than simply supplying high quality compressed air products in order to maintain operational effectiveness.

Equipment manufacturers must not only comply with ever increasing industry standards, they must also provide maximum utilization and optimum efficiency from their products to ensure a minimum lifetime cost of ownership.

Our commitment goes much further than simply supplying high quality products. Our aim is to maximize benefits of your compressed air purification system by providing you with an unparalleled service.

From product design and selection through to installation, validation and maintenance, Parker domnick hunter can support you every step of the way.

For further information please email: dhrail@parker.com or visit: www.domnickhunter.com/railways

INTERNATIONAL APPROVALS

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At Parker, we’re guided by a relentless drive to help our customers become more productive and achieve higher levels of profitability by engineering the best systems for their requirements. It means looking at customer applications from many angles to find new ways to create value.

Whatever the motion or control technology need, Parker has the experience, breadth of product and global reach to consistently deliver. No company knows more about motion and control technology than Parker.

For further information call 800 345 8462.