CompAir

Downstream

High Quality Compressed Air

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Agenda:

- Oil Free Compressors
- Contamination and the myths
- Purification Technologies for Contaminant Removal
- Specifying Air Purity In Accordance With ISO 8573.1 : 2001
- ISO 8573.1 : 2001 Class 0

Oil Free Compressors

DH-Oilfree_1500K.wmv

Contamination & Types of Compressor

- It is often believed that the level of compressed air purification equipment required in a system is dependent upon the type of compressor used
- This is incorrect as contamination in a compressed air system originates from many sources and is not related solely to the compressor or it's lubricants

Contamination & Types of Compressor

- One common practice when installing an ‘oil free’ compressor is to omit one or both coalescing filters as no oil is present

- Although lubricating oil is not added to the air during compression, even an oil free compressor does not supply contaminant free air

Sources of Contamination in a Compressed Air System

Contaminants in a compressed air system can generally be attributed to the following :

- Quality of the atmospheric air being drawn into the compressor
- The type & operation of the Air Compressor
- Compressed air storage devices
- Pipes / Distribution system

Compressed Air Contaminants

The 10 main contaminants found in a compressed air system

- Water Vapour
- Condensed Water
- Water Aerosols
- Atmospheric Dirt & Solid Particles
- Micro-organisms
- Oil Vapour
- Liquid Oil
- Oil Aerosols
- Rust
- Pipe scale

Contamination & Types of Compressor

- **<u>Regardless</u> of which compressor type is selected, adequate filtration is required to remove the large volume of water aerosols, particulate, rust, pipescale and microbiological contamination entering the system**

Purification Technologies for Contaminant Removal

Coalescing Filters

- Coalescing filters are probably the most important items of purification equipment in any compressed air system
- They are designed to remove aerosols (very fine droplets) of oil & water using mechanical filtration techniques
- Coalescing filters also have the additional benefit of removing solid particulate and micro-organisms to very low levels
- Installed in pairs, the first filter, a general purpose filter is used to protect the high efficiency filter from bulk contamination

Adsorption Dryers

- Water vapour is water in a gaseous form which is removed from compressed air using a dryer

- Typically a pressure dewpoint of
  - 40°C is used in most critical applications as compressed air with a dewpoint below - 26°C will also inhibit the growth of micro-organisms within the compressed air system

Refrigeration Dryers

- Refrigeration dryers provide water vapour removal with pressure dewpoints of $^{+}3°C$, $^{+}7°C$ or $^{+}10°C$
- Ideal for general purpose compressed air
- Refrigeration dryers are not suitable for installations where piping is installed in ambient temperatures below the dryer dewpoint

Dust Removal Filters

- Used for the removal of particulate when no liquid is present
- Identical particulate removal performance to a coalescing filter
- Uses mechanical filtration techniques to provide up to 99.9999% particle removal efficiency
- For absolute particulate retention (100% at a given size), a sieve retention membrane filter must be used

Specifying Air Purity In Accordance With ISO 8573.1 : 2001

ISO 8573 The compressed air quality standard

- ISO 8573.1 : 2001 is the primary document used as it allows the user to specify the air quality or purity required at key points in a compressed air system

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Specifying Air Purity in Accordance with ISO 8573.1 :2001 Contamination Levels

- **Using the standard, air quality is written as follows**

ISO 8573.1 : 2001 Class Dirt.Water.OIL e.g. ISO 8573.1 : 2001 Class 1.2.1

Along side each purity class, a maximum permissible amount of contamination per cubic metre is shown

ISO8573.1 : 2001 Compressed air purity classses

Class	Solid Particulate					Water		Oil
	Maximum number of particles per m^3			Particle Size	Concentration	Vapour	Liquid	Total oil (aerosol, liquid and vapour)
	0.1 - 0.5 micron	0.5 - 1 micron	1 - 5 micron	micron	mg/m^3	Pressure Dewpoint	g/m^3	mg/m^3
0	As specified by the equipment user or supplier			-	-	As specified by the equipment user or supplier		As specified by the equipment user or supplier
1	100	1	0	-	-	-70°C	-	0.01
2	100,000	1,000	10	-	-	-40°C	-	0.1
3	-	10,000	500	-	-	-20°C	-	1
4	-	-	1,000	-	-	+3°C	-	5
5	-	-	20,000	-	-	+7°C	-	-
6	-	-	-	5	5	+10°C	-	-
7	-	-	-	40	10	-	0.5	-
8	-	-	-	-	-	-	5	-
9	-	-	-	-	-	-	10	-

Class 1 Particulate

100 Particles 0.1-0.5 micron/m^3

1 Particle 0.5 - 1 micron/m^3

0 Particles 1 - 5 micron/m^3

Class 2 Water

-40°C Pressure Dewpoint

Class 1 Oil

0.01 mg/m^3 (aerosol & vapour)

ISO 8573.1 : 2001
Class 0

ISO 8573.1 :2001 Class 0

- **The ISO8573.1 : 2001 table also includes a Class 0 for each type of contaminant.**

ISO8573.1 : 2001 Compressed air purity classses

Class	Solid Particulate					Water		Oil
	Maximum number of particles per m^3			Particle Size	Concentration	Vapour	Liquid	Total oil (aerosol, liquid and vapour)
	0.1 - 0.5 micron	0.5 - 1 micron	1 - 5 micron	micron	mg/m^3	Pressure Dewpoint	g/m^3	mg/m^3
0	As specified by the equipment user or supplier			-	-	As specified by the equipment user or supplier		As specified by the equipment user or supplier
1	100	1	0	-	-	-70°C	-	0.01
2	100,000	1,000	10	-	-	-40°C	-	0.1
3	-	10,000	500	-	-	-20°C	-	1
4	-	-	1,000	-	-	+3°C	-	5
5	-	-	20,000	-	-	+7°C	-	-
6	-	-	-	5	5	+10°C	-	-
7	-	-	-	40	10	-	0.5	-
8	-	-	-	-	-	-	5	-
9	-	-	-	-	-	-	10	-

ISO 8573.1 :2001 Class 0

- Should an application require compressed air purity which is higher than the levels shown for class 1, then class 0 allows the user and an equipment manufacturer or supplier to agree their own levels within the following guidelines :

- THE PURITY LEVELS SELECTED MUST BE MORE STRINGENT THAN THOSE OF CLASS 1
- THE PURITY LEVELS SELECTED ARE MEASURABLE WITH THE TEST EQUIPMENT AND METHODS OF ISO8573 PARTS 2 TO 9
- THE AGREED LEVELS ARE WRITTEN AS PART OF THE AIR QUALITY SPECIFICATION

BUT:

- CLASS 0 DOES NOT MEAN ZERO CONTAMINATION ALLOWED IN THE COMPRESSED AIR

- MANUFACTURERS SHOULD NOT STATE PRODUCTS COMPLY WITH CLASS 0 UNLESS PURITY LEVELS HAVE CLEARLY BEEN DEFINED AND AGREED WITH THE USER

- TO OPERATE A COST EFFECTIVE COMPRESSED AIR SYSTEM, CLASS 0 SHOULD ONLY BE SPECIFIED AT THE POINT OF USE AND FOR THE MOST CRITICAL OF APPLICATIONS

Simple guidelines for the selection of purification equipment

- Purification equipment is installed to provide air quality and you must first of all identify the quality of compressed air required for your system

- Each usage point in the system may require a different air quality dependent upon the application

- Using the quality classification's shown in ISO8573.1 : 2001 will allow your supplier to quickly and easily select the correct purification equipment necessary for each part of the system

Thank You.