Ingersoll-Rand compressors are not designed, intended or approved for breathing air applications. Ingersoll-Rand does not approve specialised equipment for breathing air applications and assumes no responsibility or liability for compressors used for breathing air service.

Nothing contained on these pages is intended to extend any warranty or representation, expressed or implied, regarding the product described herein. Any such warranties or other terms and conditions of sale of products shall be in accordance with Ingersoll-Rand’s standard terms and conditions of sale for such products, which are available upon request.

Product improvement is a continuing goal at Ingersoll-Rand. Designs and specifications are subject to change without notice or obligation.
What Influences Your Compressed Air Quality?

Dirt, moisture and oil are everywhere. But they shouldn’t be in your compressed air supply.

- Dust, dirt, pollen, microorganisms, smoke, exhaust emissions and other particulates
- Moisture in the form of water vapour
- Oil, unburned hydrocarbons from the ambient air and compressor coolant carryover
- Caustic gases such as sulfur oxides, nitrogen oxides and chlorine compounds

The act of compressing atmospheric air to 7 bar(g) creates an 800% increase in the concentration of contaminants.

The Importance of Air Quality

Atmospheric

Compressed to 7 bar(g)

Maintaining air quality is so important that the International Standards Organisation (ISO) developed six compressed air quality classes, as defined by ISO 8573.1. To determine which industry classification you require, ask yourself these simple questions:

- Does compressed air quality affect my production process and the quality of my end products?
- Will poor compressed air quality decrease my productivity, cost-savings and product quality standards?
- What internal and external ambient conditions affect the quality of my compressed air produced by my system?
Removing Particulate Contamination

Contaminants Can Destroy a Compressed Air System
Think of it as a mini dust storm at 7 bar(g). The particulates scattered almost invisibly throughout the ambient air become a concentrated force for damage and destruction of your air-operated tools, equipment and instruments.

- Systems are damaged and products are spoiled
- Scoring and uneven wear patterns ruin tools and instruments
- Volatile, hazardous compounds are produced
- Production shuts down, productivity and quality suffer

Dual Filters Eliminate Dirt and Problems
Eliminating the “sandblast” effect of particulates in your compressed air stream gets rid of:

- Premature wear
- Scored surfaces
- Clogged orifices
- Ruined finishes and instruments

Compressed Air Quality ISO 8573.1

<table>
<thead>
<tr>
<th>Class</th>
<th>Solid Particle Maximum number of particles per m³</th>
<th>Water Pressure Dewpoint (°C)</th>
<th>Oil (incl. vapour) mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1-0.5 micron 100 1 0 -70 0.01</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.5-1.0 micron 10,000 1,000 10 -40 0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Not specified 10,000 100 500 -20 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Not specified Not specified 1,000 3 5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Not specified Not specified 20,000 7 Not specified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Not specified Not specified Not specified 10 Not specified</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For sensitive or critical applications more than one set of filters may be required at the “point of use.”
Removing Moisture

Why Is Relative Humidity Important?

Moisture contamination has the following effects:

- Rust and corrosion in the air system piping
- Inadequate air tool lubrication
- Damage to labelling, packaging and the finished goods
- Productivity losses throughout your operation

Refrigerated air dryers are capable of maintaining less than 50% Relative Humidity in most industrial plant ambient environments. Processes that require ultra-dry air (ISO Class 1, 2 or 3) will need an advanced solution using nonrefrigerated dryer technology.

How To Compare Relative Humidity In ISO Standard?

- ISO classifies a constant Pressure Dewpoint at a specific ambient air temperature (25°C)
- As illustrated in the graph, when Pressure Dewpoint (PDP) is held constant (represented by the colour curves) and ambient air temperature changes, the Relative Humidity will increase or decrease
- When a constant Relative Humidity (RH) is maintained, your air system's performance will be consistent and reliable

Compressed Air Quality ISO 8573.1

<table>
<thead>
<tr>
<th>Class</th>
<th>Solid Particle</th>
<th>Water Pressure Dewpoint (°C)</th>
<th>Oil (incl. vapour) mg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum number of particles per m³</td>
<td>0-1.0 μm</td>
<td>1.0-5.0 μm</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>100,000</td>
<td>1,000</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Not specified</td>
<td>10,000</td>
<td>500</td>
</tr>
<tr>
<td>4</td>
<td>Not specified</td>
<td>Not specified</td>
<td>1,000</td>
</tr>
<tr>
<td>5</td>
<td>Not specified</td>
<td>Not specified</td>
<td>20,000</td>
</tr>
<tr>
<td>6</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
</tbody>
</table>
Removing Oil

Oil in Compressed Air Affects Products and the Work Environment

- Oil, unburned hydrocarbons and compressor coolant become highly concentrated during compression.
- These contaminants enter the air flow as entrained droplets and will pass through the compressed air system into the production process unless they are removed.
- The built-in air/oil separator on all rotary screw air compressors will remove a portion of the oil, but this is not sufficient for most applications.
- Oil contamination will cause batch spoilage, poor quality in finished goods, unwanted colouring in finished goods and a messy or hazardous work environment.

Proper Filtration Removes Unwanted Oil from the Air Stream

Removing oil from the compressed air stream provides some real benefits.

- Longer air tool life
- Ensures high quality of finished goods
- No unwanted odours
- Safer workplace

Inherent oil-free compressed air can only be achieved by installing an oil-free air compressor. However, particulate filtration and moisture removal are still necessary.

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Compressed Air Quality ISO 8573.1

<table>
<thead>
<tr>
<th>Class</th>
<th>Solid Particle Maximum number of particles per m³</th>
<th>Water Pressure Drop (°C)</th>
<th>Oil (incl. vapour) mg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100</td>
<td>0.5</td>
<td>0.01</td>
</tr>
<tr>
<td>2</td>
<td>100,000</td>
<td>1,000</td>
<td>0.1</td>
</tr>
<tr>
<td>3</td>
<td>Not specified</td>
<td>10,000</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Not specified</td>
<td>Not specified</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Not specified</td>
<td>Not specified</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
</tbody>
</table>

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The first filter removes large oil droplets.

The second filter removes fine oil droplets.

The third filter removes oil vapours, providing odour-free air.

Always precede fine filters with a coarser grade.
## IR Industry Classifications

<table>
<thead>
<tr>
<th>Class</th>
<th>Description</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IN1</strong></td>
<td>Instrument Grade Air: ISO Class 2.1.1 Efficient removal of solid particulates and oil. ISO Class 1 Pressure Dewpoint will be maintained.</td>
<td>Instrumentation, process, oil and gas, chemical, electronics.</td>
</tr>
<tr>
<td><strong>IN1 Odour Free</strong></td>
<td>Instrument Grade Air: ISO Class 2.1.1 odour free Efficient removal of solid particulates and oil, and oil vapour ISO Class 1 Pressure Dewpoint will be maintained.</td>
<td>Pharmaceutical, food and beverage, clean rooms.</td>
</tr>
<tr>
<td><strong>IN2</strong></td>
<td>Instrument Grade Air: ISO Class 2.2.1 Efficient removal of solid particulates and oil. ISO Class 2 Pressure Dewpoint will be maintained.</td>
<td>Instrumentation, process, oil and gas, chemical, electronics.</td>
</tr>
<tr>
<td><strong>IN2 Odour Free</strong></td>
<td>Instrument Grade Air: ISO Class 2.2.1 odour free Efficient removal of solid particulates and oil, and oil vapour ISO Class 2 Pressure Dewpoint will be maintained.</td>
<td>Pharmaceutical, food and beverage, clean rooms.</td>
</tr>
<tr>
<td><strong>IG4</strong></td>
<td>Industrial Grade Air: ISO Class 2.4.1 Efficient removal of solid particulates and oil, and oil vapour ISO Class 4 Pressure Dewpoint or a 30% (or less) Relative Humidity (RH) will be maintained.</td>
<td>General manufacturing, metal stamping, air tool use, forging, assembly, painting and finishing.</td>
</tr>
<tr>
<td><strong>IG4 Odour Free</strong></td>
<td>Industrial Grade Air: ISO 2.4.1 odour free Efficient removal of solid particulates and oil, and oil vapour ISO Class 4 Pressure Dewpoint or a 30% (or less) Relative Humidity (RH) will be maintained.</td>
<td>Food and beverage, raw material mixing.</td>
</tr>
<tr>
<td><strong>IG6</strong></td>
<td>Industrial Grade Air: ISO 2.6.1 Efficient removal of solid particulates and oil. ISO Class 6 Pressure Dewpoint or a 50% (or less) Relative Humidity (RH) will be maintained.</td>
<td>Sand blasting, home use, construction.</td>
</tr>
</tbody>
</table>

### Applications

**Instrumentation, process, oil and gas, chemical, electronics.**

**Pharmaceutical, food and beverage, clean rooms.**

## AirCare, Flexible Maintenance Programs and Constant Quality

With an understanding of your industry classification requirements, IR can provide the optimal air treatment equipment for your system. Also with IR's AirCare extended warranty and preventive maintenance program, you'll continue to enjoy reduced costs and increased productivity.

- You can extend the drivetrain or full-package warranty for a five year period.
- Certified professional technicians will perform routine inspections and diagnostic service.
- An all-inclusive fluid-analysis program monitors compressor lubricants for early detection of problems.
- Vibration analysis and trending can pinpoint an impending component replacement.
- Optional remote monitoring provides 24-hour, seven-day-a-week surveillance of your compressor installation for the utmost in peace of mind.

#### FEASIBILITY STUDY:
- Analysis by walking around
- Interview operations, finance, management
- Identify potential opportunities from a supply-side audit or full system audit

#### SUPPLY-SIDE AUDIT:
- Differentials, signals and set point management
- Pressure drop management yields significant energy savings
- Air quality management results in significant productivity improvements

#### FULL SYSTEM AUDIT:
- All audit components previously identified, plus...
- An exact match of optimal demand-side requirements to minimum compressed air consumption
- Air leakage and inappropriate use of compressed air assessment