Through revolutionary fiber glass research and detailed third-party testing and review, Johns Manville has repeatedly confirmed the safety and validity of fiber glass as one of the top insulation choices in North America.
Johns Manville’s resilient fiber glass insulations have been engineered to be safely used in both commercial and residential applications. Our insulations have been thoroughly tested in our labs and by independent research labs to confirm that they are safe for both building occupants and installers.

Long-term research performed for the North American Insulation Manufacturers Association (NAIMA) and reviewed by the World Health Organization’s International Agency for Research on Cancer (IARC) exposed animal test subjects to massive amounts of bio-soluble glass wool fibers for extended periods of time. The subjects experienced fiber glass concentrations that were orders of magnitude greater than any human would ever be exposed to, and the tests conclusively confirmed that bio-soluble glass fiber insulation presents no cancer hazard when inhaled. Additionally, analysis of nearly one million person-years of human exposure has shown that fiber glass workers are as healthy as the general population. Based on the human and animal research, IARC removed insulation fiber glass from its list of possible carcinogens in 2001. As such, none of JM’s HVAC and mechanical fiber glass products are classified as a possible carcinogen, and they are safe for insulating purposes.

IARC’s decision has been further substantiated by a 2011 report released by the National Toxicology Program (NTP), a component of the U.S. Department of Health and Human Services. They concluded that glass fibers that have been successfully tested in animals, such as those used in JM’s products, are not considered to present a cancer hazard.

EXTENSIVE SCIENTIFIC STUDIES AND REGULATORY REVIEW HAVE CONFIRMED THAT BIO-SOLUBLE FIBER GLASS INSULATION IS NON-CARCINOGENIC AND SAFE TO USE DURING PRODUCTION, INSTALLATION AND APPLICATION.

In addition to NAIMA research, studies investigated indoor fiber glass particle concentrations in commercial and residential settings to determine whether respirable fiber glass was entering the airstream. The results confirmed that indoor fiber concentrations of both organic and inorganic materials were extremely low. As a whole, fiber particle concentrations are below 0.01 fibers per cubic centimeter. Of those existing fibers, 97% are from organic sources like carpet, drapes or clothing. The absence of indoor fiber glass concentrations, coupled with entirely bio-soluble fiber glass, speaks strongly to the overall safety of fiber glass insulation for HVAC and mechanical applications.
As a manufacturer, Johns Manville tests our fiber glass products to extremes to ensure they can withstand rigorous applications without showing signs of damage or erosion. For example, Johns Manville’s primary commercial and residential duct products that are directly exposed to the airstream are tested in conditions with air velocities up to 12,000 fpm (hurricane force winds) or more in order to meet stringent UL-181 requirements. This is 3x faster than the highest air velocities typically found in a duct system, and even in such extreme environments, our fiber glass insulation does not show any signs of cracking, breaking, peeling, flaking, or any evidence of delamination or erosion.

Johns Manville takes performance and accountability very seriously. We ensure that each of our insulation products not only performs, but contributes to the health, safety, and sustainability of the environments where they are used.

We encourage you to do your research and choose the insulation that is appropriate for your application. Below, we have listed several studies and articles produced by independent, third-party organizations that discuss the safety of fiber glass in detail and provide empirical evidence for their conclusions.

SELECTED REFERENCES:

PROVEN PERFORMANCE

At Johns Manville, we firmly believe in providing top-of-the-line products that perform to the highest standards. Each of our fiber glass insulations meets all applicable ASTM specifications and building code requirements to enable greater thermal and acoustical control. Fiber glass has inherent characteristics that make it ideal for a number of different applications.

- **CONTRIBUTES TO ENERGY EFFICIENCY AND REDUCED CARBON EMISSIONS:**
  Fiber glass is one of the best insulators on the market. It enhances temperature control and energy efficiency, which reduces carbon emissions and saves money.

- **SUSTAINABILITY:**
  Fiber glass is made mostly from sand and recycled cullet. Sand is one of the most widely available resources on earth. Every year, the earth naturally produces 13-18 billion tons of sand. This enables Johns Manville to source raw materials close to our manufacturing plants, ultimately minimizing fuel consumption and environmental impact.

- **DOES NOT SUPPORT MOLD GROWTH:**
  Unlike organic insulations, fiber glass does not offer an ideal environment for mold growth. The smooth, inorganic surface of the glass fibers is not conducive to promoting life. Additionally, many of Johns Manville’s fiber glass products are coated with an EPA-approved mold-inhibitor to help prevent mold-related damage.

- **LONGETIVITY:**
  Fiber glass is designed for longevity and permanence, and, with the exception of unusual circumstances (like floods, leaks, fires or poor maintenance), it maintains its insulating properties and rarely needs to be replaced. When our fiber glass products are installed and properly maintained, they do not compress, settle, or erode over time, retaining their thermal performance.

- **FIRE RESISTANCE:**
  Since fiber glass is an inorganic insulation, it is not susceptible to fire hazards. This feature means that fiber glass can be fire-resistant without adding large quantities of fire-retardant chemicals.

- **VERSATILE:**
  Fiber glass can contribute to improved energy efficiency, reduction in unwanted noise, and greater temperature control in a myriad of settings. It can be utilized in mechanical, HVAC, and industrial applications.
Johns Manville’s fiber glass insulation is widely accepted by contractors and has proven performance characteristics that offer safe, reliable versatility.

<table>
<thead>
<tr>
<th>INSULATION TYPE</th>
<th>RESISTANCE TO THERMAL CONDUCTIVITY</th>
<th>NOISE REDUCTION COEFFICIENT (NRC)</th>
<th>LIMITED COMBUSTIBILITY</th>
</tr>
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<tbody>
<tr>
<td>Fiber Glass</td>
<td>+++</td>
<td>+++</td>
<td>Yes</td>
</tr>
<tr>
<td>Textile Glass</td>
<td>++</td>
<td>+++</td>
<td>Yes</td>
</tr>
<tr>
<td>Mineral Wool</td>
<td>+++</td>
<td>+++</td>
<td>Yes</td>
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</table>

**SYNTHETICS**

<table>
<thead>
<tr>
<th>Type</th>
<th>Resistance</th>
<th>Noise Reduction</th>
<th>Combustibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyester</td>
<td>++</td>
<td>++</td>
<td>No</td>
</tr>
<tr>
<td>Melt Blown Polypropylene</td>
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<td>+++</td>
<td>No</td>
</tr>
<tr>
<td>Recycled Cotton</td>
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<td>++</td>
<td>No</td>
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</table>

**FOAM**

<table>
<thead>
<tr>
<th>Type</th>
<th>Resistance</th>
<th>Noise Reduction</th>
<th>Combustibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elastomeric</td>
<td>+</td>
<td>++</td>
<td>No</td>
</tr>
<tr>
<td>Polyolefin</td>
<td>++</td>
<td>+</td>
<td>No</td>
</tr>
</tbody>
</table>

*Ratings are qualitative only and based on general knowledge of the various types of insulation*

**SUSTAINABLE BUILDING & DESIGN**

**LEADERSHIP IN ENERGY AND ENVIRONMENTAL DESIGN (LEED) CERTIFICATION/REGISTRATION**

V4 offers builders an opportunity to receive points to have a LEED certified building using JM HVAC and Mechanical products.*

- **ENERGY & ATMOSPHERE**
  - Minimum upgraded to ASHRAE 90.1-2010 (vs 2007)
  - Optimize energy (1-18 Points): 6%-50% improvement over base
    (Impact for JM Mechanical and HVAC products the greatest)

- **MATERIALS & RESOURCES (3 points available)**
  - Requires >20 products for >25% by cost

- **INDOOR ENVIRONMENTAL AIR QUALITY**
  - Low Emitting Materials (1-3 points available) (Greenguard Gold Certification)
  - Acoustic Performance (1 point available)
    - 2011 ASHRAE Handbook: HVAC Applications – Chapter 48 (Table 1)
    - AHRI Standard 885-2008 (Table 15)

*LEED V4 Published November 2013 (new construction)