HVAC Solutions for Cleaner Air, Health Benefits and Energy Efficiency

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Sustainability enhancements in commercial construction are the wave of the future. With a growing worldwide population and greater environmental changes, the need for heating ventilation and air conditioning (HVAC) within construction is also on the rise. Serving as the respiratory system for buildings, it is essential to consider opportunities related to improving or revolutionizing HVAC in the fight for carbon neutrality.

HVAC systems comprise 40–60% of energy usage within buildings, translating to approximately 15% of total energy consumption worldwide. For this reason, HVAC systems are important targets for efficiency improvements. Companies are investing in more sustainable technologies and equipment to utilize less energy to heat, cool and run appliances, working together towards the achievement of net-zero carbon emissions.

A significant opportunity for improved efficiency of HVAC systems exists at the design stage. A proper design helps lower energy consumption, while providing a safe and comfortable indoor environment. To ensure optimal performance and achieve energy-saving goals, design engineers take into consideration all components that go into HVAC systems. Quality gasketing and sealing materials in HVAC applications allow for lower energy bills and an improved indoor environment that has significantly less dust or other pollutants, providing cleaner air and greater health benefits.

Gasketing and Tape Solutions for Modern Day HVAC Needs

The most common HVAC gasketing needs include:

- **Sealing:** A soft material with good compressibility and an appropriate thickness is ideal for both dimensional variation and uneven edges often found in HVAC ductwork. As metal ductwork often experiences dimensional changes and shifts between warmed and cooled air, gaskets that provide leak-tight sealing and have good compression recovery are ideal for responding to these frequent changes.
- **Reducing vibration transmission:** The cellular structure of the gasket can aid in absorbing the vibration caused by HVAC fans and motors. These gasketing applications help to avoid the low humming sounds and prevent noise complaints from building occupants.
- **Environmental resistance:** Many HVAC systems, especially commercial ones, are installed outdoors, on roofs of buildings. These outdoor applications require gasketing solutions that can serve as a buffer from environmental factors such as water seepage, dust or sunlight. Potential solutions include PVC, EPDM, neoprene rubber or premium silicones. The best solutions can stand up to the challenge of UV lighting, extreme temperatures, moisture penetration and ozone resistance.

Saint-Gobain® has a wide variety of thermally conductive products, polyurethane and PVC foam materials that are optimal for HVAC needs. Our sealing and gasketing materials enable thermal comfort and consistent air quality in indoor environments by preventing leakage in or out of the system boundaries.

Figure 1: Square air-conditioning unit on a roof with a fan.

Source: **Shutterstock**.

Modern Day Commercial HVAC

Figure 2: Modern day commercial building design.

Source: **Shutterstock**.

Most commercial buildings such as office spaces, hospitals, labs or factories utilize centralized HVAC systems, where air is heated or cooled in a central location and later distributed to numerous rooms via fans and ductwork. One major component of a centralized system is referred to as the Air Handling Unit (AHU), often thought of as the heart of central air conditioning. AHUs create comfortable, quality indoor air by collecting air from the outside, filtering, heating, cooling, humidifying or dehumidifying air as it passes through the unit to achieve optimal room conditions.

AHUs are generally comprised of a large metal enclosure, containing a blower (fan), heat exchanger, filter chambers, a humidifier, dampers and sound attenuators. The way the conditioned air gets distributed to various zones within a commercial building is dependent on whether the AHUs utilize CAV (Constant Air Volume) or VAV (Variable Air Volume) control. While

Figure 3: Air Handling Unit in metal box enclosure on rooftop of commercial building.

Source: **Shutterstock**.

VAVs maintain constant temperatures to supply variable air flow, CAVs have varying temperatures while supplying constant airflow. VAV is the more modern and efficient demand control system, with an ability to adjust to changing demand within a building and reduce the supply of treated air in spaces where it is not needed. VAV-based air distribution systems are made up of AHU and VAV boxes, with one VAV box allocated per building zone and connected to a dedicated thermostat.

Additionally, the system consists of dampers that modulate based on airflow and zone temperature sensors. These dampers help to conserve energy by stopping air from flowing into spaces that do not require heating or cooling and can also protect against smoke or fire.

Figure 4: HVAC damper with gasketing.

Source: **Shutterstock**.

In VAV systems, Smart Air Valves with intelligent air control manage the volume of air flow to maintain optimum air change rates, minimize energy use and maximize comfort.

Although demand control ventilation systems like VAVs generally have a higher up-front price tag, they are the premier choice for modern energy efficient buildings.

Enhancing HVAC Energy, Safety and Performance

Sealing and gasketing materials are vital components for efficient, high performance HVAC systems. They seal access panels, louvers and doors and help to reduce unwanted noises caused by motor or fan vibrations. They prevent unwanted air leaks and energy waste and can also allow for thermal expansion and contraction. The **Saint-Gobain**

product portfolio, consisting of high-performance silicone, polyurethane, and PVC foams, provides optimal solutions that meet demanding HVAC application needs.

Silicone Foam Rubber

While premium silicone materials are a costlier option, they have outstanding performance in applications requiring excellent flame retardancy with low toxicity and smoke generation.

Norseal® Silicone Foams are ideal for applications that include fireblocks, thermal barriers, noise and vibration dampeners and insulation. Additionally, their weather, moisture, ozone, UV and fungus resistance make them perfect gasketing materials that withstand harsh environmental stressors found in outdoor applications.

Norseal F-12 has a unique cellular structure, high temperature stability, general inertness and low compression set. This premium, soft and easy to compress silicone foam is ideal for applications that require high temperature resistance and fire retardance. Such applications may include ventilation control dampers and enclosure seals near the heating section of the AHU. Carrying a UL94 V-0 rating, this product is highly effective for maintaining the overall safety and performance of a commercial HVAC system. It is also an ideal product for utilization in smart valves due to its ease to compress, the low compression set at elevated temperatures, ability to be die-cut for fitting within the valve, resistance to microbial growth and ability to serve as a gasket to both the inner and outer damper.

Norseal F-20 is a silicone foam with medium density for a more durable seal. It has outstanding compression set resistance as well as excellent flame resistance (UL94 V-0) with low toxicity and smoke generation. Often applied in outdoor sealing applications, F-20 is exceptionally resistant to environmental conditions, providing excellent water sealing capabilities.

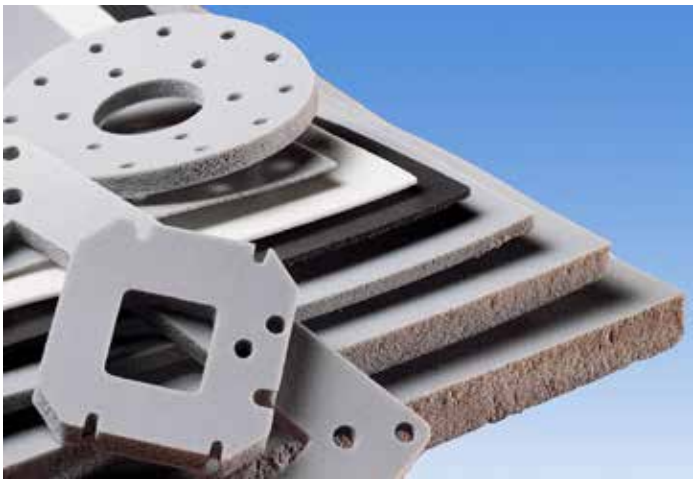

Figure 5: Die-cut **Norseal** Silicone Foam Rubber.

Source: **Saint-Gobain**.

SNS Silicone Tapes

Norseal Silicone can be supplied with optional Silicone or Acrylic pressure sensitive adhesive. SNS Tapes are compressible, flexible and can conform to irregular surfaces and shapes for sealing and gasketing applications. These tapes are also perfect for vibration dampening and thermal insulation.

- **Norseal SNS100S and 200A:** These products are specially designed to form gaskets that can withstand high temperature, without utilization of complex tools. They are optimal for applications on and within access panels or inspection doors that are adjacent to burners or other heating elements.

Polyurethane Gasketing Foams

Norseal Polyurethane Gasketing Foams (PUR) are easy to apply, have excellent gap filling, cushioning and environmental resistance properties making them a solid choice for HVAC gasketing or sealing needs with modest temperature range (up to 212°F/100°C). They are optimal for providing protection from mechanical or environmental stressors. They help to protect longevity and performance by dissipating stress and motion and dampening shock and vibration.

The micro-cellular structure of PUR gaskets allows for excellent resiliency. Consequently, these products allow for the frequent opening and re-closing of the service doors within HVAC systems, allowing for pain free maintenance and a consistent seal of the foam gasket in panel applications.

PVC Gasketing Foams

Norseal Foam Gaskets are perhaps the most economical. While they have good compression properties, are highly conformable and adapt easily to irregular surfaces, they are often utilized in applications that require less severe temperature requirements (160°F) and most suitable for fixed joint applications.

Norbond® Bonding Tapes to Enhance HVAC Aesthetics

Saint-Gobain Tape Solutions offers other material solutions for HVAC application needs including the **Norbond®** Bonding Tapes. These tapes are used for HVAC emblem and frame bonding applications. They can be die-cut to various shapes and sizes and have good resistance to external environmental stressors such as harsh weather, fungi or oxidation. Bonding tapes are optimal for creating more lightweight HVAC systems by removing the need for mechanical fasteners, rivets and screws.

Making the Right HVAC Material Choice

HVAC systems and the AHUs connected to them for circulating air are often difficult and expensive to install. Incorporating necessary gasketing solutions are vital for optimal performance of the AHU. Proper gasketing materials can protect the AHU from environmental stressors and ensure that all internal components of the AHU work efficiently.

Common factors that result in HVAC unit breakdown include overheating and vibration damage or seal and gasket failure. By considering premium silicone foam and sponges, HVAC design engineers help to increase HVAC process efficiency and longevity, minimizing repairs, and ensuring safety and security of building occupants.

There is no single gasket solution for every HVAC application and choosing the right one can help solve common HVAC pain points. The ideal solution depends on needs as well as a variety of criteria such as temperature resistance, compression requirements, environmental factors and costs.

To meet specific functional or aesthetic needs, we offer custom solutions that are designed to factor in anticipated environmental conditions and expected wear over the life expectancy of your HVAC system. Get in touch today to learn more about products that are optimal for protecting today's investment and provide long lasting resiliency that meets the requirements of tomorrow.

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