

CANTY FuseView™

Sight Glass Technology

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CANTY PROCESS TECHNOLOGY

Industrial applications are typically viewed through sight glasses mounted on the side of a vessel. However, traditional sight glass designs are often limited by leakage, pressure, and temperature fluctuations. The CANTY FuseView™ sight glass addresses these challenges through a hermetically fused glass-to-metal seal. The design is made to significantly improve strength, impact resistance, and long-term durability while preventing leaks. As the core

technology behind CANTY's visualization systems, FuseView™ allows for these products to be reliable in demanding environments while providing a clear and unobstructed view of the process. FuseView™ improves safety, reduces maintenance requirements, and enhances overall process efficiency, making it a proven and reliable solution for modern process monitoring applications.

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Introduction and Overview

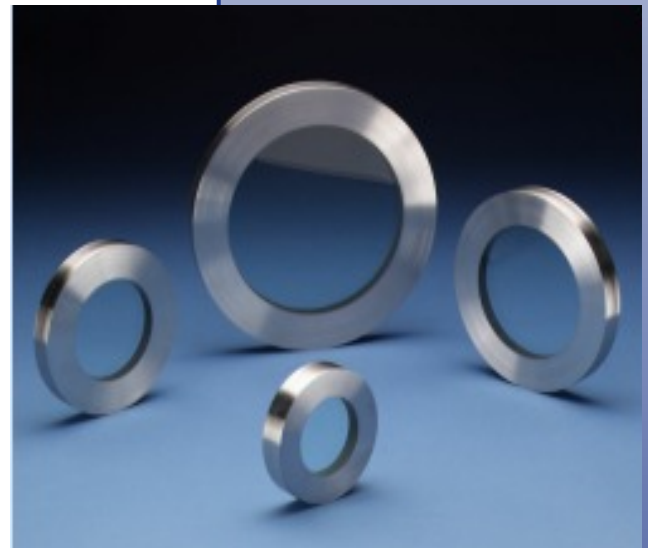
Sight glasses are critical components used to provide visual access into high-pressure vessels and pipelines, allowing operators to monitor internal process conditions such as fluid levels, chemical reactions, and product quality. In many industrial applications, including chemical processing and cleaning operations, a reliable view port is necessary to safely observe conditions under elevated pressure and temperature.

FuseView™ is a fused glass-to-metal sight glass technology designed to provide a robust, hermetically sealed barrier for process observation in demanding industrial environments. FuseView™ utilizes a one-piece construction in which the glass is directly fused to a metal ring. This design significantly reduces or eliminates the need for conventional sealing components and removes common failure points associated with gasketed or mechanically sealed sight glasses.

To manufacture a FuseView™ we heat the glass to its molten point and pour it into the metal where it flows to the wall of the metal. At that point the glass fuses or bonds to the metal creating an air tight seal between the two. Then we slowly cool the FuseView™ until the glass solidifies. During the cooling process



the glass contracts slower than the metal and eventually stops shrinking before the metal ring. The metal has a higher coefficient of expansion than the glass and the metal compresses on the glass. This squeezing pre-stresses the glass and puts it under uniform radial compression. Glass is strong in compression but not under tension or shear. When the FuseView™ is pressurized the glass bends and relieves the compression and avoids tension.



The CANTY Advantage

The CANTY Fuseview™ sight glass is engineered to overcome the limitations of conventional sight glasses, delivering superior performance in safety, reliability, and long-term operation. Its unique fused metal-glass design eliminates common failure points while improving visibility and ease of use across a wide range of process conditions. Key advantages include:

Largest Viewing Area: Provides the maximum possible viewing area of any metal-glass sight glass, allowing operators better visibility into the process without compromising strength or safety.

No Torque: The glass is never subjected to bolt load. Installation force is applied only to the outer metal ring, eliminating stress on the glass and preventing torque-related cracking or failure.

No Residual Stress: Unlike conventional sight glasses that develop stress patterns during installation, Fuseview™ remains stress-free. It can be unbolted, inspected, cleaned, and reinstalled repeatedly without risk of failure.

Removable and Reusable Design: Fuseview™ does not need to be discarded after removal. It supports routine maintenance and cleaning, reducing replacement frequency and overall operating costs.

Maintains Strength at Elevated Temperatures: Fully annealed by design, Fuseview™ does not lose strength over time when exposed to heat. This ensures reliable performance under high-temperature and high-pressure conditions.

High Pressure and Temperature Capability: Designed to operate in extreme environments, with pressure ratings up to 10,000 PSI and temperature ratings up to 2000° F, depending on configuration.

Hermetic Seal for Leak Prevention: The fused construction creates a true hermetic seal, eliminating potential leak paths and making it ideal for hazardous, high-pressure, or sterile processes.

Mechanical Safety and Durability: Resistant to scratching, impact, and thermal stress. The design prevents catastrophic failure modes commonly seen in conventional sight glasses.

Compatible with In-Place Cleaning Systems: Works seamlessly with CANTY Jet Spray Rings, allowing effective cleaning during operation without removal, reducing downtime and maintenance effort.



Comparison to Traditional Sight Glasses:

Installation and Torque:

- Tempered: Extremely sensitive to torque. Applying too much torque or uneven bolt loads can create residual stress, leading to immediate or early failure.
- CANTY: Designed to be torqued metal-to-metal via its outer ring. This means bolts can even be stripped without damaging the sight glass.

Strength and Safety:

- Tempered: Brittle, vulnerable to scratches, and can lose its enhanced strength at relatively low temperatures (as low as 200° F). Highly sensitive to impact, shock, and thermal stress, often shattering catastrophically into small fragments.
- CANTY: Fully annealed and maintains its strength under extreme temperatures (up to 2000° F) and pressures (up to 10,000 PSI), and resists scratching, shock, or rapid pressure changes.

Maintenance and Cleaning:

- Tempered: Cannot be removed safely for cleaning due to residual stress and risk of cracking; any attempt typically requires replacement.
- CANTY: Can be unbolted, inspected, or cleaned daily over many years without any stress-related failures. Compatible with CANTY Jet Spray Rings for in-place cleaning of liquids and gases,

Sealing and Reliability:

- Tempered: Requires extremely low torque, precise flatness, and a very fine surface finish to avoid point overloads and leakage. If these conditions are not met, it can result in unsafe vapor emissions, high labor costs, and early failure.
- CANTY: Eliminates these concerns. You can use whatever torque is needed for your gasket and process, handling tolerances and surface finish is not an issue, and the hermetic seal ensures no leakage.

Cost:

- Tempered: May appear less expensive up front, but total cost is significantly higher. Frequent replacements due to stress, cracking, or accidental breakage drive up material costs.
- CANTY: Designed for long-term durability. It can be unbolted, inspected, and cleaned daily without risk of failure, eliminating the need for yearly replacements or keeping large inventories of spare glass.

Energy Savings

In vacuum-based processes such as sugar crystallization, maintaining a full vacuum is essential to reduce boiling temperatures and minimize energy consumption. Lower boiling points allow processes to operate more efficiently, directly reducing overall heating requirements and operating costs.

Traditional tempered glass sight glasses can compromise this efficiency. Due to the risk of cracking during installation or thermal cycling, they are often not fully tightened, which can create leak paths. Even small leaks reduce vacuum levels, increase boiling temperatures, and require additional energy input.

FuseView™ technology addresses this limitation through its fused glass-to-metal construction, where the glass is bonded directly to a metallic outer ring. This design allows operators to tighten on metal rather than glass, eliminating the risk of damage from over-torquing. As a result, a true hermetic seal is achieved, ensuring that a full vacuum can be consistently maintained throughout operation

The impact is significant: as vacuum improves, the boiling point decreases, reducing the energy required for heating. In practical terms, this can result in substantial energy savings, particularly in large-scale operations where even small efficiency gains translate into meaningful cost reductions over time.

By ensuring a leak-free system, FuseView™ enables lower operating temperatures, reduced energy consumption, and improved process efficiency, providing both technical and economic advantages in vacuum-driven applications.

<i>Crystal Pan Capacity (Litres)</i>	<i>Savings per Batch per Degree Celsius °C*</i>	<i>Crystal Pan Capacity (US Gallons)</i>	<i>Savings per Batch per Degree Fahrenheit °F*</i>
25000	\$3.00	7500	\$1.50
50000	\$6.00	15000	\$3.00
100000	\$12.00	30000	\$6.00

*Savings calculated using $Q=mCp(T2-T1)$, and based on initial process fluid heat up costs only - additional savings would be gained on energy savings to maintain lower required process boiling temperature.

Safety

What are the key needs every process and every industry must meet to maintain a high level of safety? If your plant is using standard tempered sight glass and you have any level of exposure, that area should be addressed. While there is a clear financial advantage to using fused glass over standard tempered glass, the safety benefit is where the financial advantage cannot be measured.

Most operators who have been in a plant for more than a few years can speak to the issues they have experienced with tempered glass. In fact, many companies proactively replace sight glass after every campaign, often annually, simply to reduce risk. There have also been documented incidents of glass blowouts, some with severe consequences.

- A facility in Louisiana was transferring sugar syrup from one tank to another. During pressurization, a sight glass failed and blew out, resulting in a fatality.

- In England, a leaking sight glass led a maintenance worker to tighten the stainless-steel bolts. This caused the glass to fail, releasing over 30,000 gallons of product across three floors and shutting down operations. Fortunately, no injuries occurred.

Even standard sight glass manufacturers acknowledge these risks. Many specify "do not unbolt, clean, and re-bolt," yet this practice is often performed in the field.

Consider the routine practices in your facility:

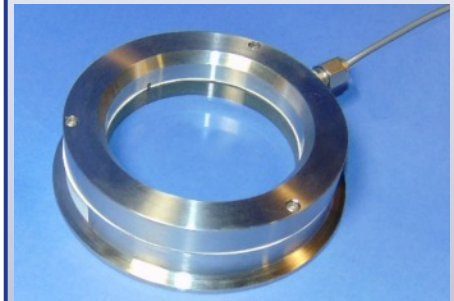
- Why are spare glass disks kept on hand?
- How many are purchased and replaced each year?
- What level of safety exposure does this represent?
- What is the risk of broken glass entering your product stream?

The CANTY FuseView™ eliminates many of these concerns. Its design removes the common failure points associated with tempered glass, reducing the risk of blowouts, leakage, and operator exposure. By eliminating residual stress, preventing torque-related cracking, and maintaining a hermetic seal, FuseView™ significantly improves both process safety and operator confidence.

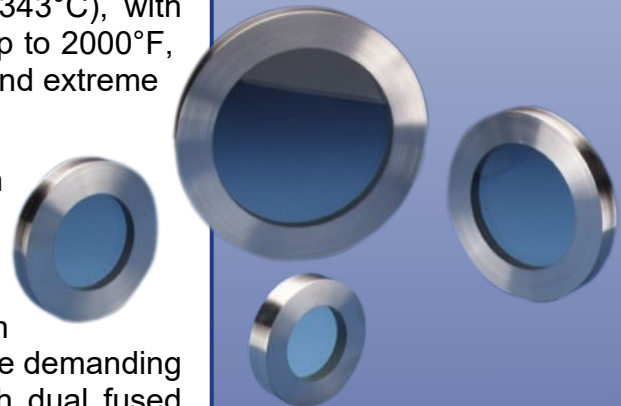


Design and options:

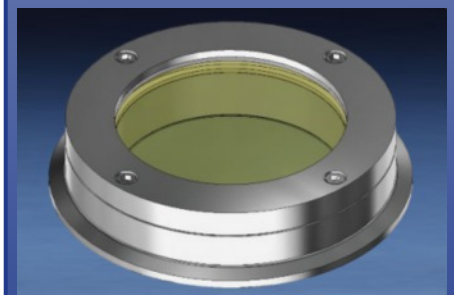
- **Connections:** FuseView™ units are available in standard ANSI and DIN flange configurations, allowing direct integration into existing vessel and pipeline connections. In addition to flanged designs, options such as threaded connections and sanitary Tri-Clamp® configurations are available to meet specific process and regulatory requirements. This flexibility enables compatibility with a wide range of systems without requiring significant modification to existing equipment.
- **Material:** A variety of material options are available to suit different process environments, including carbon steel, 316L stainless steel, and high-performance alloys such as Hastelloy® C-276 and C-22®. These materials provide corrosion resistance and mechanical strength for applications ranging from general industrial service to highly aggressive chemical environments.
- **Pressure and Temperature:** FuseView™ sight glasses are offered in a broad range of sizes and pressure ratings, with standard models available from Class 150 through Class 2500, and special designs capable of handling pressures up to 10,000 psi. Standard temperature ratings reach 650°F (343°C), with custom configurations available for temperatures up to 2000°F, making the technology suitable for both moderate and extreme operating conditions.
- **Industries:** The technology is applicable to both industrial and sanitary processes, with sanitary configurations offering a heating element to remove condensation and smooth surface finishes and compatibility with hygienic connections for use in pharmaceutical and food-grade applications. In more demanding environments, FuseView™ can be configured with dual fused glass designs to accommodate higher temperature applications while maintaining structural integrity.
- **Add-ons:** Additional options further enhance performance and usability. Jet spray rings can be integrated to allow in-place cleaning of the viewing surface, eliminating the need for system shutdown or manual removal. For harsh or caustic environments, protective quartz or sapphire shields can be added to extend service life and maintain optical clarity.
- **Retro-fitting:** FuseView™ sight glasses are also designed with retrofit capability in mind. Standard models can be installed directly into existing ANSI or DIN flanges, while custom retrofit solutions can be developed by matching the dimensions of existing sight glasses. This allows users to upgrade from conventional sight glass designs to FuseView™ technology without requiring major system modifications.



**FUSEVIEW-CF™
CONDENSATION-FREE
TRI-CLAMP® SIGHT
GLASS**



**FUSEVIEW™ TRI-CLAMP®
SIGHT GLASS WITH FILTER**

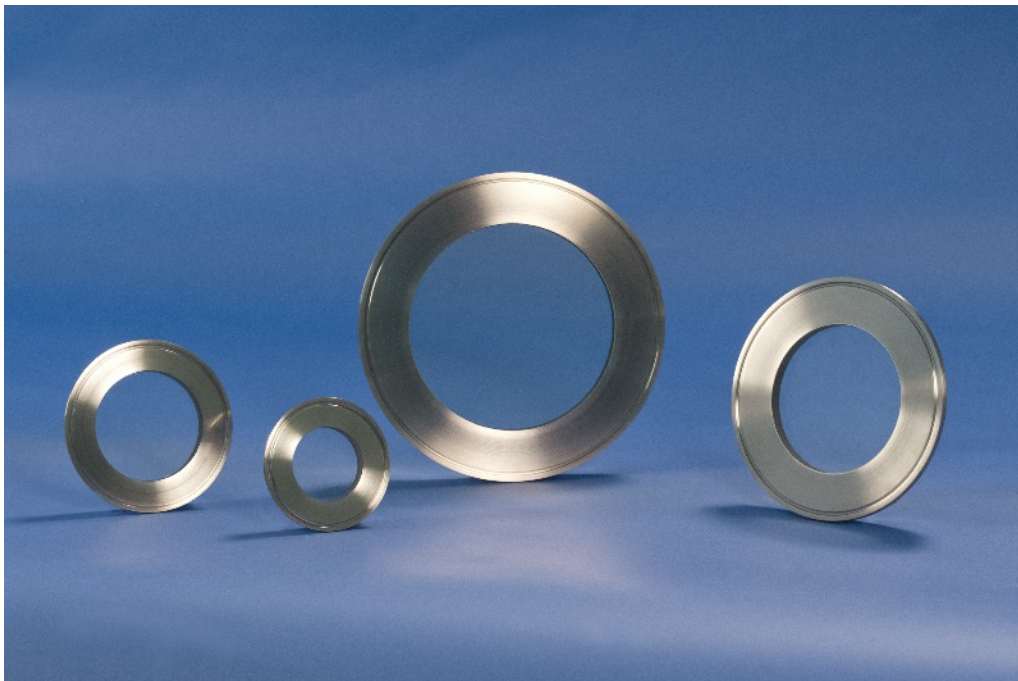


Conclusion

The CANTY Fuseview™ sight glass represents a significant advancement over conventional tempered sight glasses, combining unmatched safety, reliability, and operational flexibility. Its fused-glass design eliminates residual stress, prevents torque-related failures, and maintains strength under extreme temperatures and pressures. With the largest viewing area available and hermetic sealing, FuseView™ reduces maintenance, downtime, and safety risks.

The wide range of options ensures that FuseView™ can meet the needs of nearly any process environment. Additionally, its retrofit capability allows plants to upgrade existing sight glass installations easily and safely, without major modifications.

Overall, CANTY Fuseview™ offers a durable, long-term solution that improves visibility, enhances safety, lowers operational costs, and provides unmatched reliability, making it the ideal choice for critical process monitoring across industries.



Get more information!
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