

EXISCAN™

Size Matters



ELECTRICAL INSPECTION WINDOWS



When is it OK to open energized enclosures?



It's not.

Recent evolutions of the standards have made it clear that PPE (personal protective equipment) is not the answer to every hazard.

Opening covers or removing panels to perform routine inspections exposes workers to recognized hazards and fails to properly mitigate risk at the highest order possible. Use of PPE does not absolve the owner from responsibility since PPE is the mitigating method of last resort.

Infrared (IR), visual and ultrasonic inspections require line-of-site access to the energized conductors. However, opening the enclosure is a hazard-exposing task. Inspection windows or view-ports keep equipment in normal operating condition, with energized conductors guarded and unexposed, thereby eliminating the hazardous task.

Hierarchy of Risk Controls

- 1 Elimination
- 2 Substitution
- 3 Engineering
- 4 Warnings
- 5 Administrative
- 6 PPE

Equipment Owners & Employers are Required to:

- ▶ Provide a workplace free of known hazards and comply with related standards per OSHA General Duties Clause¹
- ▶ Prioritize hazard elimination in their electrical safety program (Hierarchy of Risk Controls) per NFPA 70E²
- ▶ Properly maintain equipment per NFPA 70E³
- ▶ Perform infrared inspections of electrical equipment at-least-annually per NFPA 70B⁴

Condition monitoring via inspection windows reduces inspection time by up to 95% enabling facilities to:

- ▶ Comply with requirements for annual monitoring
- ▶ Monitor equipment typically skipped due to time or manpower constraints
- ▶ Free up personnel for mission-critical tasks
- ▶ Monitor more frequently where appropriate

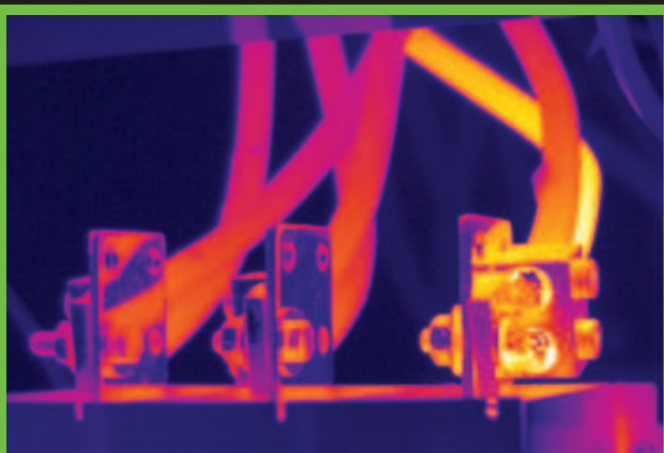
Exiscan™ inspection windows will assist facility managers in their efforts to comply with standards mandates, improve employee safety, de-risk the tasks during ongoing periodic condition monitoring inspections, save time and money by expediting the inspection process.

¹ OSH Act 1970; Sec 5 "General Duties Clause"

² NFPA 70E, "Standard for Electrical Safety in the Workplace," 2024 Edition; Section 110.3(H)(1)&(3)

³ NFPA 70E, "Standard for Electrical Safety in the Workplace," 2024 Edition; Section 205.4

⁴ NFPA 70B, "Standard for Electrical Equipment Maintenance," 2023 Edition; Table 9.2.2 Maintenance Intervals



Thermogram Credit: SNELL Group



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WHO USES INSPECTION WINDOWS?

- Preventive Maintenance Culture
- Leadership Prioritizes Electrical Safety
- Strategic Use of Risk Mitigation
- Continuous Power is Critical

WHAT TO INSPECT?

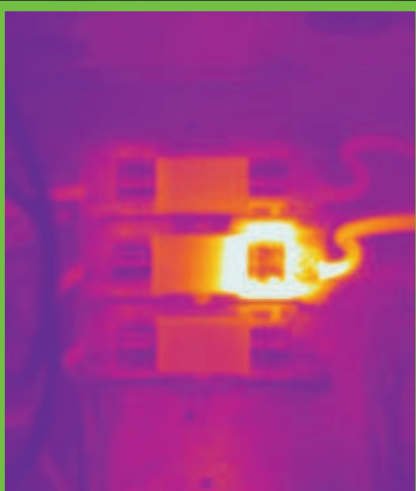
- Switchgear
- Transformers
- MCCs
- Bus Plugs
- Capacitor Banks
- Distribution Panels
- Termination Boxes
- Etc.

INDUSTRIES USING WINDOWS


- Cement
- Commercial
- Data Centers
- Food Processing
- Industrial
- Mining
- Petrochemical
- Power Generation
- Pulp & Paper
- Resorts
- Steel / Metals
- Water Treatment

WHY USE INSPECTION WINDOWS?

- De-Risk Work Processes
 - Personnel, Plant Assets & Processes
- Better Data Leads to Better "Calls"
 - Inspect Under Higher Loads
 - Inspect More Frequently
 - Eliminate Background "Noise"
- 95% More Efficient for Immediate ROI
- Inspect the "Un-Inspectable"



Thermogram Credit: Infrasppection Institute.

| | | | | | | |
|------------------------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| Model Series | XLF | XIR | XRW | XPM | XUP | XVW |
| Inspection Type | Infrared, Visual, Ultrasound | Infrared | Infrared, Ultrasound | Infrared | Ultrasound | Visual |

DIMENSIONS

| | | | | | | |
|------------------|---|---|----------------------------|---|---------|-------------------------|
| Optic | 20" x 3.75" (IR); 5" x 2.5" (visual) 15" x 3.75" (IR); 5" x 2.5" (visual) 10" x 3.75" (IR); 5" x 2.5" (visual) 5" x 3.75" (IR); 5" x 2.5" (visual) | 4" x 4" 3" x 3" * 2.25" x 2.25" * | 4"ø 3"ø (special order) | 10" x 2.5" 5" x 2.5" 5" x 5.0" 2" x 2.5" | 0.25"ø | 10" x 2.5" 5" x 2.5" |
| Footprint | 22.25" x 9.25" 17.25" x 9.25" 12.25" x 9.25" 6.25" x 9.25" | 6" x 6" 5" x 5" * 4.25" x 4.25" * | 6" x 6" 5" x 5" | 11" x 3.5" 6" x 3.5" 6" x 6.0" 3" x 3.5" | 1" x 1" | 11" x 3.5" 6" x 3.5" |





MATERIALS

| | | | | | | |
|---|---|---|--|---------------------------|--|--|
| Frame / Base | Aluminum: Anodized & Powder Coated (anti-corrosion warrantied)* | | | Aluminum: Powder Coated | Aluminum: Anodized and Powder Coated (anti-corrosion warrantied)* | |
| Cover | Stainless Steel: Powder Coated | Aluminum: Anodized & Powder Coated (anti-corrosion warrantied)* | | Mild Steel: Powder Coated | Aluminum: Anodized & Powder Coated (anti-corrosion warrantied)* ^x | n/a |
| Reinforcement Plate, Hinges, Cover Screws† | Stainless Steel | | | | | |
| Mounting Hardware | Stainless Steel Screws w/ Thread-Locking Patch | Stainless Steel Studs & Nickel-Plated NyLock Nuts | Stainless Steel Screws w/ Thread-Locking Patch | | Nickle-Plated ½" Conduit Nut | Stainless Steel Screws w/ Thread-Locking Patch |
| IR Optic | Propreitary HDPE Derivative | | | | n/a | |
| Viewing Optic | Polycarbonate w/ 4-Layer Sacrificial Tear-Aways | n/a | | | Polycarbonate w/ 4-Layer Sacrificial Tear-Aways | |

TRANSMISSION

| | | |
|-------------------------------|--|-----|
| IR Transmission Rate | 57%, +/-2% | n/a |
| Transmission Stability | Lifetime Stability Warrantied: Transmission does NOT degrade over time | n/a |
| Spectral Transmission | LWIR (7 to 14µm) & MWIR (3-5µm) | n/a |

MISCELLANEOUS

| | | | | | |
|----------------------|--|---------------------------------------|----------------------------------|---|-----------------------------|
| UL / cUL | UL / cUL Listed & Recognized   | | | UL / cUL Listed  | n/a |
| Environmental | Type 4/4X; IP 65 | | Type 1 | Type 4/4x; IP 65 | n/a |
| Installation | Punch ^y / Nibble / Saw-Cut | Punch ^z / Nibble / Saw-Cut | 4" Conduit Punch / 4.5" Hole Saw | Punch ^y / Nibble / Saw-Cut | ½" Conduit punch / Step-Bit |
| Warranty | Unconditional Lifetime Warranty: over-engineered for your safety and piece of mind | | | | |
| Origin | Proudly Made in the USA  | | | | |

* Available as a special order; minimums may apply
 x Available in all stainless steel; minimums may apply

† On models that include hardware noted
 y Requires use of XPLR Balancing system for dual-RAM hydraulic pulling

z XKO-4040, or Greenlee® 60177 with standard hydraulic puller (recommend 10 ton minimum)

OUR DIFFERENTIATORS



STRUCTURAL INTEGRITY

- ▶ Only manufacturer with full line of UL Listed Inspection Windows
- ▶ Used in Arc Resistant Switchgear by Multiple manufacturers
- ▶ Engineered to be STRONGER than the enclosure it is installed on
- ▶ Unconditional Lifetime Warranty



BEST-IN-CLASS ACCURACY

- ▶ Polymer Optic is a Superior Transmitter in Long Wave
- ▶ Polymer Optic Will Not Degrade (unlike laboratory crystals or clear polymers)
- ▶ Better Accuracy Day-1...and on Day-5,000
- ▶ Never Needs Replacement



NO COMPROMISES, NO APOLOGIES

- ▶ Made in America for Consistent, Superior Quality
- ▶ Highest Grade Materials
- ▶ Built to Out-Live Your Equipment



SUPERIOR FIELD OF VIEW

- ▶ Larger Optics Than Traditional Laboratory-Style Windows
- ▶ 4" x 4" Window is more than 60% Larger Than Other 4" Round Windows
- ▶ Field of View = 4.5 X Distance to Target
- ▶ See More With Fewer Windows

FAQS



Do I need PPE when using an inspection window?



No. As long as the equipment is in “Normal Operating Condition”¹ (properly installed, properly maintained, doors and cover closed and secured, etc.) then the process should comply with NFPA 70E, Table 130.5, which indicates no need for PPE when performing infrared thermography outside the restricted approach boundary when doors and covers are closed.

In short, the work process for using inspection windows (a) does not increase the risk (likelihood or severity) of triggering the arc flash hazard, and (b) represents the highest order of risk mitigation (elimination of the hazardous task). Therefore, further mitigation (use of PPE) is not required.



What Transmission rate should I use for my camera offset?



The Exiscan™ polymer optic transmits at 57% (+/- 2%). Simply turn your camera’s IR Window feature on, and set the Transmission rate for 57%, and enter the window’s approximate temperature (to account for reflected energy). The camera will then automatically adjust temperature and ΔT calculations.



How does the accuracy of Exiscan™ windows compare to other optics?



The Exiscan™ polymer has a relatively consistent transmission rate throughout the entire mid-wave and long-wave spectra. Therefore, the single-point (57%) calibration (adjustment) will allow your camera to accurately calculate the temperature and ΔT values. Just as importantly, the transmission rate of the Exiscan™ optic is stable for decades and will not degrade, resulting in accurate, trend-able data for the life of the window.

By comparison, traditional calcium fluoride (CaF_2) crystals, transmit very well at shorter wave-lengths (hotter targets), but allow considerably less radiation through for longer wave-lengths (warm targets), until they are non-transmissive for most energy released from targets that are room temperature and cooler. Because of the “variable transmission,” it is not possible to use a single-point calibration to properly calculate temperatures, resulting in magnified errors in ΔT calculations. This effect is well documented in technical papers^{3,4} written by the camera manufacturers as well as the inventor of crystal windows.

The accuracy issue is then compounded when the crystal or clear polymer degrade over time. Because the crystals and clear polymers react to environmental factors (airborne contaminants, moisture, humidity, vibration) the optics degrade at an unpredictable rate, allowing less and less radiation though as they age. Consequently, temperature and ΔT calculations become less and less reliable, data is not trend-able, any analysis of data taken from different windows is inherently flawed, and the owner will need to plan on replacing the window or optic on a regular basis⁵. For this reason, one of the best known training companies (owned by one of the camera manufacturers) recommended in their Level 1 training manual, that crystal windows be recalibrated to the camera every 6 months⁶. To do so, the enclosure would need to be opened, negating the primary benefit of using windows.

¹NFPA 70E, 110.2(B)

²NFPA 70E, Table 130.5(C)


³Madding; IR Window Transmittance Temperature Dependence; Inframation, 2004

⁴Holliday; Understanding Infrared Windows & their Effects on IR Readings; UpTime Magazine; Oct/Nov 2012; pg 24-26


⁵DeMonte, Is What You See, What You Get?; UpTime Magazine, Apr 2009; pg 24

⁶ITC Level 1 Training Manual, Technical Publication: EZ IR Window Transmission Measurement, 2016

EXISCANTM

 +1(585)366-0333

 www.exiscan.com

 info@exiscan.com