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ILLUMINATED HALO VIEW WINDOW SYSTEM (IHVW)

USER MANUAL

ISO-100, 160, 200 & 250 Viewing Windows

IHVW-09252023 - V 1.0.2

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If you have any questions concerning the installation or operation of this equipment, or if you need warranty or repair service, please contact us. Customer Service and Technical Support is available weekdays, from 8am-5pm, Mountain Time.

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SAFETY

IMPORTANT SAFETY INFORMATION

Thank you for purchasing this equipment from Ideal Vacuum Products. We want you to operate it safely.

- **Read this manual before installing or operating this equipment. Failure to follow the warnings and instructions may result in serious injury or equipment damage.**
- **Keep this manual in a safe location for future reference.**
- **This equipment should only be installed and operated by trained, qualified personnel, wearing appropriate protective equipment.**
- **Follow all codes that regulate the installation and operation of this equipment.**

WARNING SYMBOLS AND DEFINITIONS

This is the universal safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER	**Indicates an imminently hazardous situation that, if not avoided, will result in death or severe injury.**
WARNING	**Indicates an imminently hazardous situation that, if not avoided, could result in death or severe injury.**
CAUTION	**Indicates a potentially hazardous situation that, if not avoided, could result in moderate or minor injury. It may also be used to alert against unsafe practices.**
NOTICE	**Indicates a potentially hazardous situation that, if not avoided, could result in equipment or property damage.**
NOTE	**Indicates helpful tips and recommendations, as well as information for efficient, trouble-free operation.**

Internationally recognized safety symbols may be used with safety warnings to specify the type of hazard or a safety protocol to follow. For example:

Indicates an electric shock hazard

Indicates safety glasses are required

ADDITIONAL SAFETY FOR HALO VIEW WINDOWS (HVW)

DANGER

Implosion/explosion hazard. Failure to follow ALL instructions and safety precautions can result in serious injury or death.

CAUTION

Always wear protective equipment, including safety glasses and gloves. Exercise care when working with any vacuum component.

All viewing windows or ports are inherently fragile. Exercise great care when handling, mounting and when using a chamber with a viewing window. Below are specific warnings and special precautions needed for safely installing and using a viewing window.

VISUAL INSPECTION

Visually inspect the window upon receipt and check regularly for scratches or any irregularity. Even small scratches can cause a weak spot in the window causing failure Keep hard objects away from the window. Use only a soft cloth or lens tissue and isopropyl alcohol (IPA) for cleaning.

MOUNTING

Carefully follow all mounting instructions in this manual.

PRESSURE

NEVER subject a viewing window equipped chamber to positive internal pressure. The viewing window is designed and rated for VACUUM ONLY. Chamber pressures in excess of ambient atmosphere could cause the viewing window assembly to fail catastrophically.

TEMPERATURE CHANGES AND THERMAL SHOCK

The fragile nature of the window makes it susceptible to thermal shock. Rapid temperature changes under vacuum, hot or cold, can cause failure. Keep chamber temperature change rates to <10° C/min (<18° F/min). The maximum bakeout temperature of illuminated HALO View windows is 105°C which is the limit of the electronics inside.

If directing a laser beam through the window, make sure the laser's wavelength can be reasonably transmitted through the window's material. Directing a laser through the window of a wavelength the window material absorbs, or focusing a laser of any wavelength within the window medium, will cause a steep thermal gradient extending outward from the point of incidence. This could result in localized weakening or fracturing of the window.

1. GENERAL INFORMATION

1.1 INTRODUCTION

The Ideal Vacuum illuminated HALO View Window System (IHVW) is a popular accessory for chamber systems with ISO ports. The window takes the place of an ISO blank and can be added to a system at any time. The IHVW has a built in LED light ring which lights the chamber and allows a user to more readily inspect processes and perform experiments. LED brightness is manually controlled by onboard (+) and (-) pushbuttons. There are 6 manually adjusted brightness settings, from off to 100% in 20% increments. The last brightness setting is retained if the power supply is unplugged or turned off. A universal 24 VDC power supply (100-240 VAC input) is included, and comes with interchangeable plugs for most countries. To use, plug the output cable into the window's connector and plug the power supply into house power.

Illuminated HALO View windows are available in ISO-100, 160, 200 and 250 flange sizes. These ISO-K flanged windows use either single or double claw clamps along with a centering ring fitted with an O-ring for mounting. Use double claw clamps to mount to other ISO-K flanges. Use single claw clamps to mount to ISO-F flanges with bolt holes (smooth bored or threaded). See Table 3, Sec. 1.4, p. 8. for claw clamps and centering rings.

For information about how to properly mount ISO-K fittings, download:
idealvac.com/files/manuals/Common_Vacuum_Fittings-Selection_and_Assembly_Guide.pdf.

Two window materials are available: tempered glass and fused silica (Sec. 1.3, p. 7). See Sec. 1.6, p. 9, for for material characteristics and suggested uses.

IHVW's employ a zero metal-to-glass contact design that holds the 3/8" thick window pane to a stainless steel ISO-K type mounting flange. This cushioned window mounting system ensures operator safety and window longevity. Illuminated ISO HALO View windows employ Viton O-rings and PTFE spacers. The onboard electronics limit the maximum bakeout temperature to 105°C.

All parts that make up the HVW are carefully selected for vacuum system compatibility and long life. All production, assembly and testing is done in our own manufacturing facility in Albuquerque, NM, U.S.A. Before it ships, every illuminated HALO viewing window is fully assembled, tested, visually inspected for window imperfections, helium leak tested, cleaned, and sealed. This ensures that it operates correctly, safely, and is ready for immediate installation upon delivery.

Figure 1 - Illuminated HALO View ISO-200 window and included power supply.

1.2 SPECIFICATIONS

PARAMETER	MEASURE/TYPE
Ultimate Vacuum Pressure	3 x 10^{-8} Torr
Leak Rate	<1 x 10^{-8} std cc/sec atm Helium
Temperature Rating	-20° to 105° C (-4° to 200° F)
Max. Temperature Change Rate	10° C/min (18° F/min) max
Light Pattern	115° Flood
Light Temperature	5000° K
Voltage	24 VDC
Part	**Materials**
Viewing Window	3/8" thick; tempered glass or fused silica
Window Trim Ring	6061-T6 Anodized Aluminum
ISO-K Flange	304 Stainless Steel
O-Ring Seals	Viton®
Dowel Pin Spacers	PTFE, 3/16” x 3/8” L
Trim Ring Hold-Down Bolts	18-8 Stainless Steel

Window Size	Viewing Diameter	Viewable Area	Number of LEDs	Brightness (Lumens)	Power (Watts)
ISO-K 100	3.0 in.	7.1 in.^{2}	16	620	3.7
ISO-K 160	4.8 in.	18.1 in.^{2}	24	930	5.6
ISO-K 200	7.1 in.	39.6 in.^{2}	32	1240	7.4
ISO-K 250	9.0 in.	28.3 in.^{2}	40	1550	9.2

Table 1 - Technical specifications

1.3 WINDOW ASSEMBLIES

WINDOW SIZE	LOW IRON TEMPERED GLASS	FUSED SILICA (Corning HPFS® 7980)
ISO-100	P1013162	P1013300
ISO-160	P1013163	P1013301
ISO-200	P1013164	P1013302
ISO-250	P1013165	P1013303

Table 2 - Part number selector

1.4 CLAW CLAMPS AND CENTERING RINGS

HALO View ISO window flange bolts, including claw clamp bolts, should be torqued to 7-10 lb-ft. or until the centering ring makes contact with the flanges. There will be a small gap between the flange faces when torqued to the correct tightness.

FLANGE SIZE	MIN. # CLAMPS	OPTIMAL # CLAMPS	DOUBLE CLAW	SINGLE CLAW	CENTERING RING
ISO-100	4	8	P104066	P108058	P101763
ISO-160	4	8	P104067	P104065	P101764
ISO-200	6	12	P104067	P104065	P101765
ISO-250	8	12	P104067	P104065	P105424

Table 3 - Part number selector: claw clamps and centering rings

1.5 WINDOW MATERIAL CHARACTERISTICS

The selection of a suitable window material depends largely on its intended purpose. We offer two window materials for illuminated HALO View Windows: standard low-iron tempered float glass and high purity fused silica (comparable to Corning HPFS 7980). Both are polished plate material.

Our high clarity, tempered window glass is standard low-iron float glass. It has a surface quality and flatness of Q4 per ASTM 1036-06 and 1048-04. This glass exhibits a slight blueish tint. It is the more economical window material we offer and is most commonly used for general, direct observation of roughing or high-vacuum chamber processes and can be used to facilitate optical alignments of chamber components, observe degassing of fluids, or used to help teach in-vacuo processes by direct observation. This glass is not suitable for high power laser experiments.

Our high purity fused silica windows are ground and polished to optical grade on both sides with a total thickness variation (TTV) of <10μm, a surface finish of S/D 40/20, and a surface roughness of Ra < 1 nm. These windows have appreciably improved transmittance, and a wider useful wavelength range than standard glass. Characteristics include extraordinarily low refractive index variations, low birefringence values, and an ultra-low thermal expansion coefficient. Fused silica is used for transmissive optics where a high laser damage threshold is required. Fused silica is used for optics operating in the deep UV, visible, and the near infrared wavelength range.

Figure 2, below, shows a comparison of the percent transmission of light including both reflection and absorbtion effects over the range of wavelengths that the two available viewing window pane materials can pass without unreasonable energy absorption. The graph shows that both materials have excellent transmissivity throughout the visible range. Below approximately 350 nm, standard glass begins to absorb energy significantly. Fused silica does not become overly absorptive until well into the deep UV (<200 nm) and maintains excellent transmissivity into the Mid IR (≈ 2100 nm). It does exhibit a broad OH absorption band between 2600 and 2800 nm.

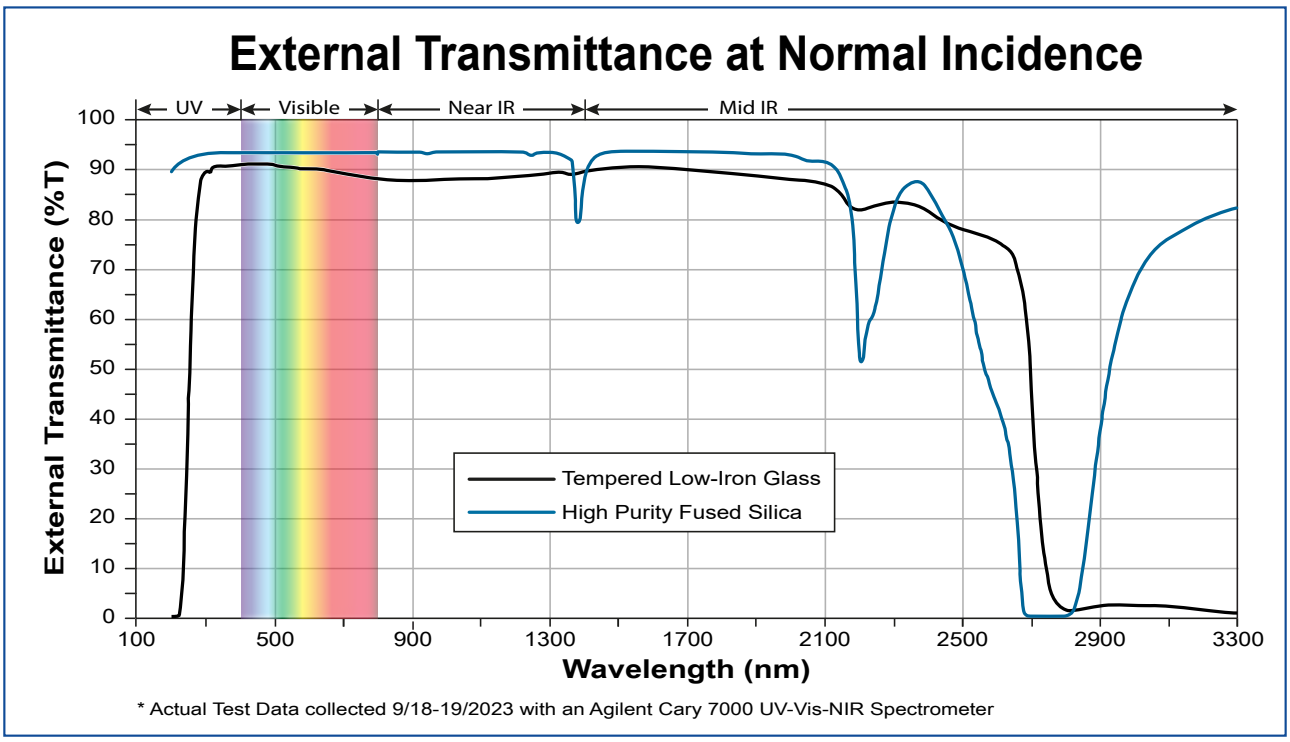

Figure 2 - External transmittance of tempered glass and fused silica at normal incidence

2. CLEANING AND SERVICE

WARNING

Before performing any maintenance or service on the HALO View Window, the vacuum chamber must be at ambient atmosphere.

NOTICE

Prepare and use a clean, soft surface to perform maintenance or service on a viewing window assembly. Viewing windows are more fragile than many vacuum components. Be careful, use gloves, clean tools, and only recommended cleaning agents.

Inspect the IHVW regularly as part of scheduled, system preventive maintenance.

Regular cleaning of the IHVW is beneficial to maintain good operation and a clear field of view. Particulates and other contaminants that begin to accumulate on the window pane cause reduced transparency and can damage the window media. Clean the window assembly and the window pane ONLY with a soft, clean, lint-free cloth and isopropyl alcohol (IPA). Be careful not to scratch the window media.

Unlike the non-illuminated HVW, the design of the illuminated HVW does not allow the IHVW pane to be replaced or upgraded in the field. The window assembly should be removed and returned to Ideal Vacuum for service if:

- The pane gets scratched, chipped, or otherwise damaged.
- The pane cannot be successfully cleaned with a cloth and IPA.
- The window develops a leak.
- The user wants to change the media material (i.e., from tempered glass to fused silica).

Depending on the ISO flange size of the window, a 1/2”, 13 mm or 17 mm wrench is required to remove the claw clamps.

Service includes cleaning or replacing the media as needed with the user’s selection of window material (glass or silica). Service includes complete leak and electronic testing. O-ring seals are always replaced, and any other deficient parts are replaced as needed. Re-assembly, testing and leak checking are performed before cleaning, packaging, and shipment back to the customer.

Please contact Ideal vacuum should you require the illuminated HALO View window to be serviced.

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