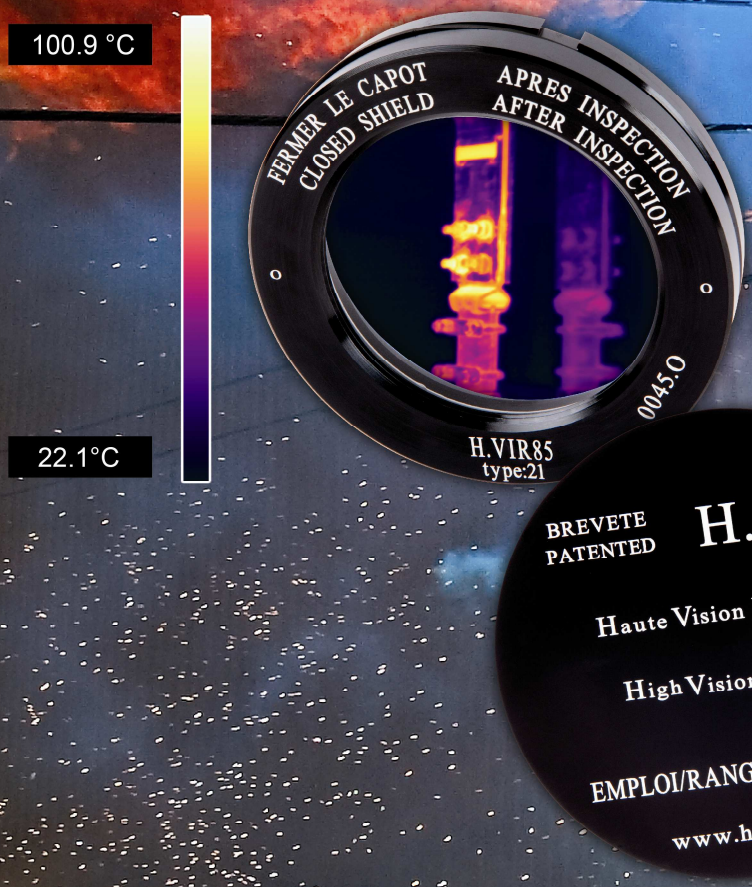
Inventor & World Leader of Infrared Window

For 15 years we make your electrical cells transparent !

BREVETE PATENTED

H.VIR®



Improves productivity, reliability of your equipment and safety of your staff.
IR thermography for low to high voltage.

General

Prevention of risks associated to high voltage electrical equipment

Electrical equipment may be submitted to more or less intensive internal electrical arcs which can lead to severe burning and even explosion with possible injured people. Besides it is now well established that about 40% of fires originate in electrical equipment.

These facts have promoted preventive maintenance actions. Among them the periodic IR thermographic inspection of the critical areas is an efficient method which is recommended by the Insurance Companies and encourages it through financial advantages.

But the conditions of its application present some difficulties:

- This operation needs that the IR beam emitted in the zone controlled enters into the camera without significant modification and that the equipment must be on representative electrical charge condition.
  The inspection must then carry out after dismantling the protective panels, allowing direct view of the zones. But this requirement is time consuming and makes the control very dangerous for the inspectors who must on these conditions be specially qualified and wear protective clothes. In case of accident the responsibility of the company inspected may be involved.
  The duration of the process must include long preparation and refit stages

- Moreover in many countries, the access to high voltage equipment is only permitted if the electrical current is cut off. This regulation imposes to stop the unit which is a serious handicap for operational unit and consequently movements of deactivation / reactivation which are always risky (difficulties for rearming).

An economic, efficient and precise alternative solution:

The **H.VIR®** window definitely placed on appropriate position on the external front faces of electrical equipment has been specially designed and patented in order to avoid all these constraints and which present numerous advantages:

- **ECONOMY**

  - The **H.VIR®** avoids any preparation and refit stages of the electrical equipment and all preinspection operations until now necessary: disassembly and assembly of panel and interruptions of operations during inspection (no electrical cut-off).

  - The **H.VIR®** has been defined (performances and sizes) for an optimum yield and a minimum investment.

  - The **H.VIR®** can be placed on new or in service equipment, once for quite (no limit of life).

- **EFFICIENCY AND PRECISION**

  - With the **H.VIR®** window, the inspection can be made on normal conditions of electrical charge.

  - The transmission characteristics of the window material, adapted to the different families of IR cameras, assure a high precision in the temperature measurement. This allows to detect all premonitory signs of damage and to take always the appropriate decision.

    The **H.VIR®** window has a unique compromise of performance, cost and ease of use.

- **SAFETY AND AGREEMENT**

The setting up of a thermal inspection window on electrical equipment must not affect or degrade the safety level of the electrical equipment on which it is placed. The window must also be in conformance with the different international standards and specifications of electrical equipment manufacturers.

The **H.VIR®** has been submitted since 1995 to numerous tests and has been approved by most of the major electrical equipment manufacturers:

Technical informations

• QUALIFICATIONS :

❖ International standards

The H.VIR® windows are conformed to:

- CEI 60529 standard
  Water and dust penetration:
  - IP67 code : **LCIE** (2008)
- To CEI 62262 standard
  Mechanical impact
  - IK 07 code : **LCIE** (2008)

IP 67 Qualification

- CEI 60255-21-1 and CEI 60255-21-3 standards
  - Vibration and seism categories (severity class: 1) : **CETIM** (2008)
- To NEMKO (Norway) and
  NEK- EN 60439-3 and NEK 511(186) (April 96) standards
- **UL certification** (2008) :
  USR and CNR recognized

❖ Manufacturers Tests :

- **Internal pressure behaviour**
  (with cover open)
  - SOREM internal test
  - Square D test
    The guaranteed behaviour of the windows (standard versions) is :
  - H.VIR 75 = **4 bars**
  - H.VIR 85 = **3 bars**
  - H.VIR 105 = **2 bars**

❖ Internal Arc fault Behaviour :

- NATA tests Australia (1997)
- KEMA tests (1998)
- ABB tests (1999)
- AREVA tests (2008)

❖ Oxydation/ corrosion Behaviour:

SOREM Internal Tests.

• THE WINDOW COMPRISES:

1) Tightened protection cap, equipped with sealing gasket and magnet.
2) Frame.
3) Optical window transparent to UV, visible and IR radiations covering the wavelengths of work.
4) Outer sealing gasket.
5) Inner self-adhesive flat gasket.
6) Fastener ring.

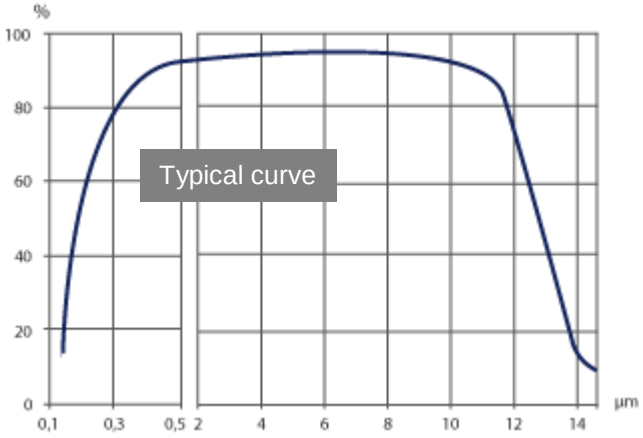
The H.VIR is the only window having the best transmission in bands II and III.

Technical informations

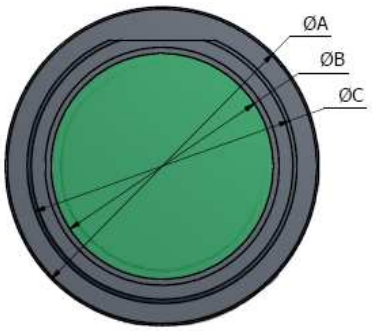
• CHARACTERISTICS :

- ➢ Use from 0.3 µm to 13 µm
- ➢ UV sensitivity : none
- ➢ Optical component quality :
  Parallelism : < 3 µm
  Flatness : 5(2)
  Surface condition : P4 (S/D : 20/40)
- ➢ Use in temperatures -40°C +70°C
- ➢ Electric insulation of the frame :
  Resistivity - 4 x 10^{15} ohms cm2/m (20 °C)
  - 8 x 10^{15} ohms cm2/m (100 °C)

TRANSMISSION CURVE : UV – VISIBLE - IR



• SIZES :



** Vision
E = Plate thickness
F = Threading lenght

	H.VIR® 75 type 20	H.VIR® 85 type 21	H.VIR® 105 type 22
Ø A	79 mm	99 mm	133 mm
Ø B**	52 mm	71 mm	95 mm
>Ø C	M68 x 1.5	M88 x 2	>M113 x 3
D	14 mm	14 mm	14 mm
Standard version : 0 < E ≤ 4 mm	F = 10 mm	F = 10 mm	F = 10 mm
L1 version : 4 mm < E ≤ 8 mm	F = 15 mm	F = 15 mm	F = 15 mm
L2 version : 8mm < E ≤ 12 mm	F = 20 mm	F = 20 mm	F = 20 mm

• STANDARD MODELS:

- All types provide a total transmission in the **visible range**. This enables rapid visual control of critical areas and make easy to interpret the results by comparing images from classical numerical camera and from IR inspection.

- All types proved sufficient transmission ratio in the **UV** range for inspection by UV cameras to detect current loss, isolation faults (CORUNA effect).

Technical informations

• APPLICATIONS

The H.VIR® window is particularly adapted to following applications:

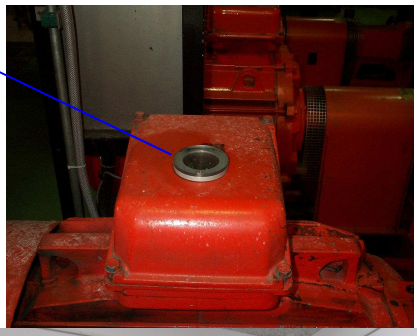
- High voltage protection cells (connecting cable head visualization, circuit breakers, fuses and fuse-boxes);
- High- low voltage transformers : low voltage connection boxes;
- Low voltage distribution (400V) : main circuit breakers (distribution bar connectors, bar connectors and crimping), low voltage output, plug in racks;
- Electric motors (medium and low voltage except ADF): connection boxes, DC motor commutators, synchronous or asynchronous motor rings;

The standard models meet the normal use conditions of electric cells and transformers which are :

- Temperatures from – 40°C to + 70°C included and differential pressures up to 1.2 bar.

They are exclusively designed for **inside and outside** use under standard environmental conditions. The cover must be screw on the frame between the inspection sequences.

• SOME EXAMPLES OF INSTALLATION



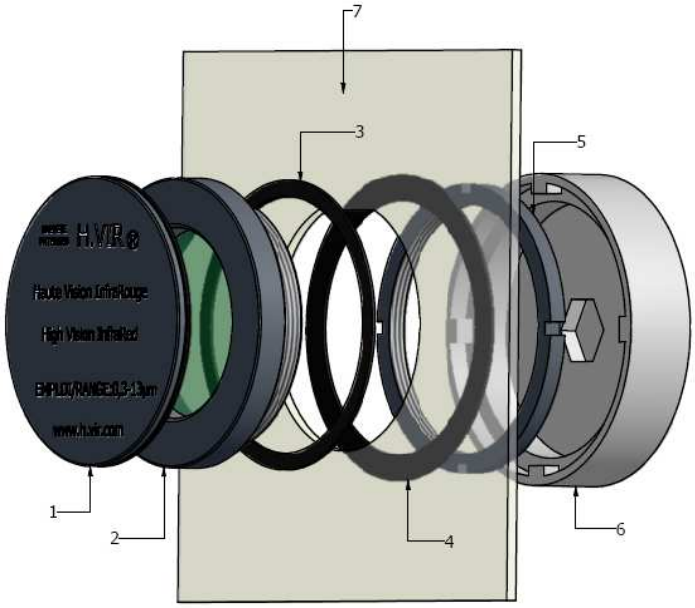
Practical Informations

• INSTALLATION

The installation process consists of the following steps:

➢ **Preliminary analysis** :

- Identifying the areas to be checked.
- Defining the location and number of H.VIR observation windows taking account the field of vision and the capacities of the camera being used.
- Recording the thickness of metal sheeting in which windows will be placed. In the event that they are higher than 4 mm, two versions of threading are an available option :
- Reference L1: 15 mm threading length
- Reference L2: 20 mm threading length



➢ **Preparation :**

Using the provided drilling plan :

- According to the defined diameter of each window, make an opening in the panel using a GREENLEE style cutter or by laser and water spray, following the directions provided.
- Affix self-adhesive flat gasket n°4 to inner side of panel n° 7.
- Ensure that the cap n°1 is tightly screwed onto the frame n°2.
- Place the frame n°2 to the front surface (take care that the flat sealing gasket n°3 is in place on the frame).
- Tighten the nut n°5, in reversed clockwise mode, using a specific key n° 6 adaptable to all dynamometric wrenches.
- Coupling must be :

H.VIR® - H.VIR Exr® :
- 10Nm ou 1Kg
H.VIS ElectricEye® :
- 20Nm ou 2 Kg

Note ***: This operation needs only ten minutes per window.***

• MAINTENANCE

➢ The **H.VIR®** windows do not need any particular maintenance procedure when they are used according to our recommendations.
➢ In case of superficial dirty marks, a cleaning procedure according to our indications should be applied.

• RECOMMANDATIONS

➢ The accuracy of the measured temperature depends on the emissivity of the target, the transmission characteristics of the window and the performance of the camera.
It is reminded that the use of non qualified window or equip with a short wave crystal with infrared cameras working in band III cause a risk of degradation of the results.

➢ In order to avoid any confusion during inspection, the range of use of each H.VIR ® is marked on each window.
➢ **The standard versions type 20-21-22 cannot be used in explosive atmosphere (ATEX Standard).**

Sectors of activities

- **ENERGY DISTRIBUTION**

EDF

COGEMA

AUGUSTA POWER

FLORIDA POWER

WISCONSIN ELECTRIC

VIRGINA POWER

- **PETRO- CHEMICAL INDUSTRY**

BP

CHEVRON

EXXON

TOTAL

ESSO

STATOIL

MOBIL OIL

SHELL OIL

TEXACO

AMPOL

- **OTHERS**

HOPITAUX DE PARIS / PAU

INTEL

MOTOROLA

US NAVY

NASA

MUSE D'ORSAY

MARS ALIMENTAIRE

KNORR

BEGHIN SAY

COCA- COLA

NESTLE

PENRICE SODA