



# ENVIRONMENTAL PRODUCT DECLARATION (EPD)

## EYRISE® S350 SOLAR SHADING GLASS TRIPLE GLAZING UNIT

In compliance with ISO14025:2010 and EN 15804:2012  
independent verified





## EYRISE® VISION ON SUSTAINABILITY

*“Workforce and consumer preferences are changing – the real estate industry now has a once-in-a-lifetime opportunity to regenerate the built environment in a sustainable and responsible manner.” <sup>(1)</sup>*

We use science and technology to positively impact the future of mankind and our planet at eyrise B.V. and our parent company, Merck KGaA Darmstadt, Germany.

From innovative product design, manufacturing with renewable energy until recycling and reuse, this is our guiding principle. Our product eyrise® contributes to a healthier and better work environment for the people in buildings during the use phase.

Hence, our customers benefit from higher ratings on green building certification, and a happy and healthy workforce.

Green building certifications are based on the Society, Economy and Ecology dimensions. We support on the Society/Human level by providing access to daylight and increase thermal comfort. On the Economic dimension, eyrise® increases tenant income and building stock value, reduces maintenance costs and creates local jobs by producing in Europe.

Ecological benefits are a reduction of CO<sub>2</sub> due to less cooling and heating, and short supply lines from factory to building site. eyrise® liquid crystal glazing increases the score on various certification categories of multiple green standards (Swiss based SNBS, DGNB, LEED, Well, HQE, and Estidama).

eyrise® is a substantial building block to achieve a range of global sustainability goals. With eyrise® our clients achieve a positive impact in a building's carbon footprint and decrease energy needs, creating sustainable and thriving communities, and driving up economic value.

eyrise® is a driver for human, economic and ecological value creation.

<sup>(1)</sup> Source: Jones Lang LaSalle IP, Inc, Regeneration, 2021



## PRODUCT DESCRIPTION

# EYRISE® S350 SOLAR SHADING GLASS TRIPLE GLAZING UNIT

eyrise® s350 instant solar glass is a laminated Insulating Glass Unit (IGU), which consists of Liquid Crystals (LC) molecules embedded between two glass sheets having a coating of transparent conductive oxide.

A typical triple-glazed unit consists of a laminated inner pane, a middle pane, and a laminated outer pane separated each of them by a cavity (2 cavities in total). The outer pane is a laminate of heat-strengthened cover glass and two identical eyrise® cells. The eyrise® cells constitute the core of the dynamic tinting in an eyrise® IGU, each eyrise® cell has a thickness of 8 mm.

The cavities are filled with an inert gas (Krypton or Argon). The cavities are kept air-tight and water-tight with spacers and a primary seal. A secondary sealant provides structural strength to the triple glazing unit. Optionally, U-profile fixing option in the secondary seal is available for frameless appearance.

## WORKING PRINCIPLE

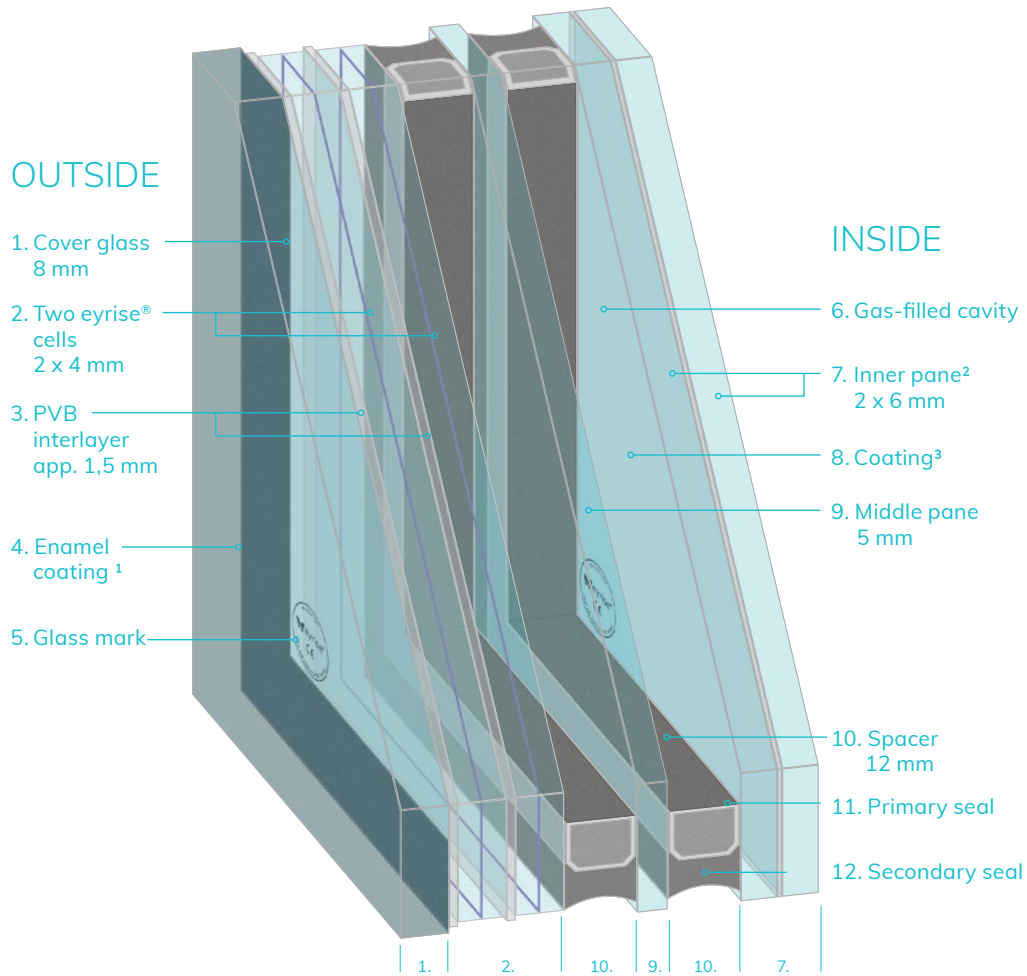
A low voltage changes the orientation of liquid crystal molecules which determines the tint of the solar shading glass. In this way, a variable light and heat transmittance is possible.



## BENEFITS

- Instant switch on demand
- Preserve the natural color of daylight
- Tangible energy savings by reducing the need for building cooling.
- Freedom to customise glass build-up and control system
- Frame compatibility with movable or fixed windows, roofs and other façade systems in any desired orientation ranging from horizontal to vertical
- Easy integration with existing automated Building Management Systems (BMS) or manual control schemes
- Fully functional shading with no additional mechanical parts and hence minimal maintenance
- Protect the occupants from solar heat and glare.
- Integrated shading system: no need for blinds
- Produced in Europe

## eyrise® s350 Solar Shading Glass – Triple Glazing Unit



<sup>1</sup> On surface#2. Please enquire for enamel coating possibilities on surface#1

<sup>2</sup> Monolithic or Laminated: multiple options available

<sup>3</sup> High performance Low-E coating on surface#7 for reduced solar heat gain

## DESCRIPTION OF THE MANUFACTURING PROCESS

The ITO glass comes in standardised measurements, these sheets of glass are first cut into the right sizes. On the ITO glass a thin layer of conductive material has already been applied. The glass is glued together at the edges after cleaning. Electronic wiring is applied to the edges, to ensure usage. The glass then goes into a vacuum vessel and in that vessel the liquid crystals are sprayed between the windows. Afterwards, the remaining openings are sealed. The product is then ready to be applied in the buildup of a Triple glass unit.

Mind that the window frame is not yet added in this step, nor in this LCA.

## DECLARED UNIT

- eyrise® s350 Solar Shading Glass TGU
- 1 m<sup>2</sup> of glass build-up for TGU windows
- The weight per square meter: approximately 111 kg/m<sup>2</sup>.
- A glass build-up of 1230x1480 mm, calculated back to 1m<sup>2</sup>, for a triple glass unit.
- Ug-value of 0.5 W/m<sup>2</sup>K and a lifetime of 25 years.
- The eyrise® IGU is driven by an eyrise® electronic driver through a cable with pigtail connection.
- The power consumption for the cells is  $\leq 1$  W/m<sup>2</sup>.
- Framing, fastening materials, adjusting frame, hinges and locks, silencing box, doorstep or water barrier are not included.



## SCOPE OF DECLARATION

This is a cradle to grave with options EPD. The life cycle stages included are as shown below: (X = included, MND = module not declared)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS & LOADS
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacturing	Transport	Installation process	Emissions during stage	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ Demolition	Transport	Waste Processing	Waste Disposal	Reuse, recycle, recovery
X	X	X	X	X	X	X	X	MND	MND	MND	MND	X	X	X	X	X

## VERIFICATION OF THE DECLARATION

The full report and certificate with registration number EPD-NIBE-20220601-27879 has been verified by Anne Kees Jeeninga, Advieslab and can be found at [www.mpri.nl](http://www.mpri.nl) or requested via [eyrisesupport@merckgroup.com](mailto:eyrisesupport@merckgroup.com)

CEN standard EN 15804:2012 serves as the core PCR.  
Independent verification of the declaration according to EN ISO 14025:2010.

ENVIRONMENTAL EFFECTS	UNIT	CONSTRUCTION PROCESS STAGE					USE STAGE			END OF LIFE STAGE				BENEFITS & LOADS	TOTAL
		A1 Raw material supply	A2 Transport	A3 Manufacturing	A4 Transport	A5 Installation process	B1 Emissions during stage	B2 Maintenance	B3 Repair	C1 Deconstruction / Demolition	C2 Transport	C3 Waste Processing	C4 Final Disposal		
Acidification (AP)	mol H+ eqv.	1,46E+00	2,66E-01	4,33E-01	8,60E-05	4,36E-04	0,00E+00	0,00E+00	2,05E-01	0,00E+00	5,90E-03	1,87E-02	1,34E-03	-1,58E-01	2,24E+00
Global warming potential (GWP-total)	kg CO <sub>2</sub> eqv.	1,42E+02	1,37E+01	7,68E+01	1,48E-02	8,87E-01	0,00E+00	0,00E+00	2,58E+01	0,00E+00	1,02E+00	1,31E+01	1,75E-01	-3,37E+01	2,40E+02
Global warming potential - Biogenic (GWP-b)	kg CO <sub>2</sub> eqv.	6,01E-01	9,69E-04	2,18E+00	6,85E-06	1,41E-04	0,00E+00	0,00E+00	-1,78E-01	0,00E+00	4,69E-04	5,89E-01	5,09E-04	-3,44E-01	2,85E+00
Global warming potential - Fossil (GWP-f)	kg CO <sub>2</sub> eqv.	1,42E+02	1,37E+01	7,45E+01	1,48E-02	8,87E-01	0,00E+00	0,00E+00	2,60E+01	0,00E+00	1,02E+00	1,25E+01	1,75E-01	-3,33E+01	2,37E+02
Global warming potential - Land use and land use change (GWP-luluc)	kg CO <sub>2</sub> eqv.	8,35E-02	7,28E-03	8,87E-02	5,44E-06	7,31E-05	0,00E+00	0,00E+00	4,19E-02	0,00E+00	3,72E-04	3,92E-03	2,90E-05	-1,80E-02	2,08E-01
Ecotoxicity, freshwater (ETP-fw)	CTUe	5,92E+03	1,47E+02	1,22E+03	1,99E-01	1,11E+01	0,00E+00	0,00E+00	2,38E+03	0,00E+00	1,37E+01	8,06E+02	1,36E+01	-1,17E+03	9,35E+03
Particulate Matter (PM)	disease incidence	1,30E-05	8,16E-07	2,94E-06	1,33E-09	3,84E-09	0,00E+00	0,00E+00	1,32E-06	0,00E+00	9,15E-08	1,75E-07	2,85E-08	-1,47E-06	1,70E-05
Eutrophication marine (EP-m)	kg N eqv.	2,20E-01	6,95E-02	7,58E-02	3,03E-05	1,24E-04	0,00E+00	0,00E+00	3,18E-02	0,00E+00	2,08E-03	4,47E-03	5,11E-04	-2,01E-02	3,84E-01
Eutrophication, freshwater (EP-fw)	kg P eqv.	7,07E-03	9,61E-05	5,16E-03	1,50E-07	2,69E-06	0,00E+00	0,00E+00	4,74E-03	0,00E+00	1,03E-05	1,49E-04	1,10E-06	-1,89E-04	1,70E-02
Eutrophication, terrestrial (EP-T)	mol N eqv.	2,71E+00	7,72E-01	9,12E-01	3,34E-04	1,37E-03	0,00E+00	0,00E+00	3,79E-01	0,00E+00	2,29E-02	4,76E-02	5,52E-03	-3,76E-01	4,47E+00
Human toxicity, cancer (HTP-c)	CTUh	8,29E-08	6,87E-09	4,64E-08	6,47E-12	1,69E-10	0,00E+00	0,00E+00	3,09E-08	0,00E+00	4,43E-10	8,48E-09	5,40E-11	-1,65E-08	1,60E-07
Human toxicity, non-cancer (HTP-nc)	CTUh	3,24E-06	1,44E-07	1,10E-06	2,18E-10	3,57E-09	0,00E+00	0,00E+00	1,39E-06	0,00E+00	1,50E-08	1,62E-07	1,67E-09	-8,64E-07	5,19E-06
Ionising radiation, human health (IR)	kBq U235 eqv.	4,96E+00	8,06E-01	2,27E+00	9,37E-04	3,25E-03	0,00E+00	0,00E+00	1,19E+00	0,00E+00	6,42E-02	1,77E-01	1,91E-02	-5,71E-01	8,91E+00
Land use (SQP)	Pt	6,60E+02	9,95E+01	2,62E+02	1,94E-01	3,57E-01	0,00E+00	0,00E+00	1,53E+02	0,00E+00	1,33E+01	1,83E+01	9,72E+00	-2,32E+02	9,83E+02
Ozone depletion (ODP)	kg CFC 11 eqv.	1,96E-05	2,88E-06	6,72E-06	3,27E-09	2,84E-08	0,00E+00	0,00E+00	2,19E-06	0,00E+00	2,24E-07	1,42E-06	6,61E-08	-1,72E-06	3,14E-05
Photochemical ozone formation - human health (POCP)	kg NMVOC eqv.	6,75E-01	2,04E-01	3,20E-01	9,54E-05	3,70E-04	0,00E+00	0,00E+00	1,05E-01	0,00E+00	6,54E-03	1,30E-02	1,59E-03	-6,13E-02	1,26E+00
Resource use, fossils (ADP-f)	MJ	1,77E+03	1,90E+02	1,03E+03	2,24E-01	7,87E-01	0,00E+00	0,00E+00	3,17E+02	0,00E+00	1,53E+01	3,94E+01	4,40E+00	-3,01E+02	3,07E+03
Resource use, minerals and metals (ADP-mm)	kg Sb-eqv.	2,44E-02	2,21E-04	1,03E-03	3,76E-07	1,29E-06	0,00E+00	0,00E+00	1,33E-02	0,00E+00	2,58E-05	8,28E-05	1,23E-06	8,06E-04	3,99E-02
Water use (WDP)	m <sup>3</sup> world eqv.	5,24E+01	4,91E-01	8,59E+00	8,00E-04	4,52E-02	0,00E+00	0,00E+00	6,40E+00	0,00E+00	5,49E-02	2,52E+00	1,81E-02	-1,23E+01	5,83E+01



# RESULTS 1/2 eyrise® s350 Solar Shading Glass – Triple Glazing Unit

July 2022

ENVIRONMENTAL EFFECTS	UNIT	CONSTRUCTION PROCESS STAGE					USE STAGE			END OF LIFE STAGE				BENEFITS & LOADS	TOTAL
		A1 Raw material supply	A2 Transport	A3 Manufacturing	A4 Transport	A5 Installation process	B1 Emissions during stage	B2 Maintenance	B3 Repair	C1 Deconstruction / Demolition	C2 Transport	C3 Waste Processing	C4 Final Disposal	D Reuse, recycle, recovery	
renewable primary energy ex. raw materials (PERE)	MJ	1,15E+02	1,86E+00	1,02E+03	2,80E-03	1,02E-02	0,00E+00	0,00E+00	3,52E+01	0,00E+00	1,92E-01	4,31E-01	1,03E+00	-1,00E+01	1,16E+03
renewable primary energy used as raw materials (PERM)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
renewable primary energy total (PERT)	MJ	1,15E+02	1,86E+00	1,01E+03	2,80E-03	6,99E-02	0,00E+00	0,00E+00	3,53E+01	0,00E+00	1,92E-01	3,94E+00	6,89E-02	-2,57E+01	1,14E+03
non-renewable primary energy ex. raw materials (PENRE)	MJ	1,89E+03	2,02E+02	1,13E+03	2,38E-01	2,46E-01	0,00E+00	0,00E+00	3,37E+02	0,00E+00	1,63E+01	9,37E+00	1,86E+01	-1,67E+02	3,43E+03
non-renewable primary energy used as raw materials (PENRM)	MJ	2,44E+01	0,00E+00	1,69E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-4,52E+00	3,68E+01
non-renewable primary energy total (PENRT)	MJ	1,91E+03	2,02E+02	1,11E+03	2,38E-01	8,36E-01	0,00E+00	0,00E+00	3,38E+02	0,00E+00	1,63E+01	4,18E+01	4,68E+00	-3,25E+02	3,30E+03
use of secondary material (SM)	KG	4,56E-01	0,00E+00	1,17E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,68E-01
use of renewable secondary fuels (RSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
use of non-renewable secondary fuels (NRSF)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
use of net fresh water (FW)	M3	1,30E+00	1,69E-02	3,89E-01	2,72E-05	1,33E-03	0,00E+00	0,00E+00	2,40E-01	0,00E+00	1,87E-03	6,97E-02	5,23E-03	-3,14E-01	1,71E+00
hazardous waste disposed (HWD)	KG	6,45E-03	3,37E-04	4,41E-03	5,67E-07	1,57E-06	0,00E+00	0,00E+00	1,83E-03	0,00E+00	3,89E-05	3,30E-03	4,95E-06	4,09E-03	2,05E-02
non hazardous waste disposed (NHWD)	KG	1,28E+01	6,60E+00	1,68E+01	1,42E-02	6,15E-02	0,00E+00	0,00E+00	3,62E+00	0,00E+00	9,73E-01	2,94E+00	3,14E+01	-3,80E+00	7,13E+01
radioactive waste disposed (RWD)	KG	5,68E-03	1,28E-03	2,95E-03	1,47E-06	3,17E-06	0,00E+00	0,00E+00	9,16E-04	0,00E+00	1,01E-04	1,66E-04	2,99E-05	-5,69E-04	1,06E-02
Components for re-use (CRU)	KG	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (MFR)	KG	0,00E+00	0,00E+00	1,35E+01	0,00E+00	1,92E-02	0,00E+00	0,00E+00	3,25E-02	0,00E+00	0,00E+00	7,33E+01	0,00E+00	0,00E+00	8,68E+01
Materials for energy recovery (MER)	KG	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported Energy Thermic (EET)	MJ	0,00E+00	0,00E+00	2,64E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,52E+01	3,55E+01
Exported Energy Electric (EEE)	MJ	0,00E+00	0,00E+00	1,53E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,05E+01	2,06E+01



## COMPANY INFORMATION / DECLARATION OWNER

Manufacturer: eyrise BV  
Production Location: De Run 5432  
5504 DE Veldhoven  
The Netherlands  
E-mail: eyrisesupport@merckgroup.com  
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## EPD INFORMATION

Calculation number: EPD-NIBE-20220601-27879  
Date of issue: 03-06-2022  
End of validity: 03-06-2027  
Version NIBE's EPD Application: v2.0  
Version database: v3.10 (2022-05-17)  
PCR: EN15804+A2:2019  
Material Database for LCA: ecoinvent, Switzerland (ecoinvent.org)

