

THE ULTIMATE LEVEL OF CUSTOM-MADE SOLAR PANELS

Master Energy

EXCLUSIVE AGENT FOR GREECE & CYPRUS

The Building Facade of the Future: Energy-Generating and Aesthetic

A VINCI GROUP COMPANY



ERTEX SOLAR

AUSTRIA

THE PIONEER & WORLD LEADER IN BUILDING INTEGRATED PHOTOVOLTAICS (BIPV) SINCE 2004



VINCI GROUP

FRANCE

294,000 EMPLOYEES WORLDWIDE

373,100 WORKSITES

7,000 LOCATIONS

€7 BILLION IN FREE CASH FLOW

€74.6 BILLION IN REVENUE

+120 COUNTRIES

€15.5 BILLION IN MANAGED NET CASH AS OF DECEMBER 31, 2025

€22.0 BILLION VINCI REPORTED A TOTAL LIQUIDITY POSITION DECEMBER 31, 2025

€6.5 BILLION UNUSED CREDIT FACILITY: EXTENDED TO A NEW MATURITY DATE OF JANUARY 2031

A WORLD LEADER IN CONCESSIONS, ENERGY AND CONSTRUCTION SINCE 1899

Roofing

Balconies

Sky Lights

Spandrels

Brises Soleil

Ventilated Facades

Sound Walls

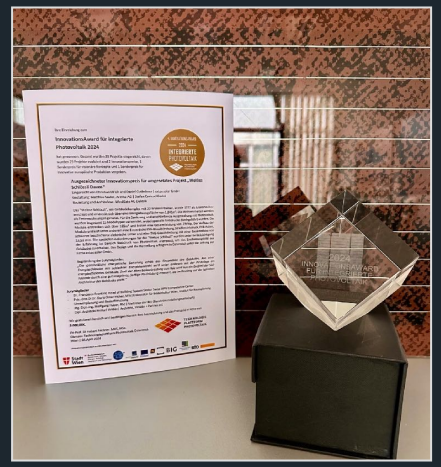
Curtain Walls

Active Building Skins

Walkable Floor

Canopies & Shade House

ERTEX SOLAR



MADE IN AUSTRIA

Global Energy Innovation & Quality Awards



Recognizing International Standards of Excellence

the world's only handcrafted solar panels

More than **22** years of creating Unique BIPV Solar Panels

More than **3.000** Unique Projects Worldwide

More than **70** years in the Glass Industry

More than **12 m²** panels

5,100 x 2,440 mm

is a World Record in the Solar Module Sector



Automotive–Grade PV Systems for Resilient Architecture



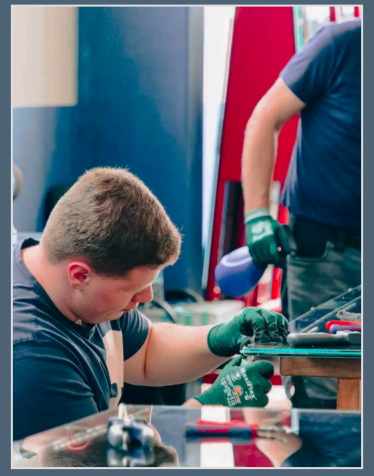
Secure – Sustainable – Bespoke

a unique, custom–engineered lamination line,
dedicated to manufacturing the world's only
handcrafted, automotive–grade PV modules

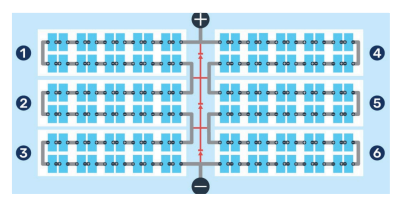


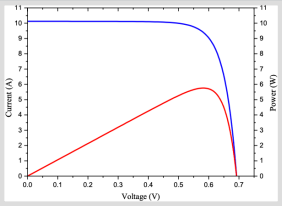
MADE IN AUSTRIA

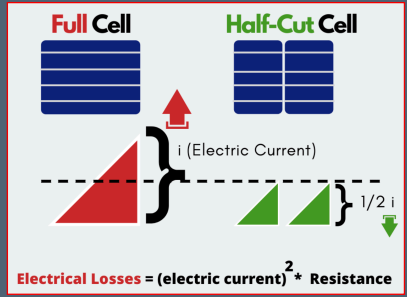


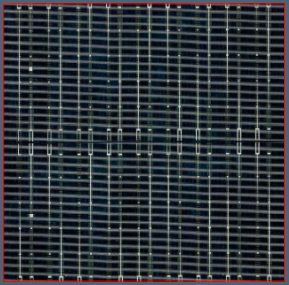


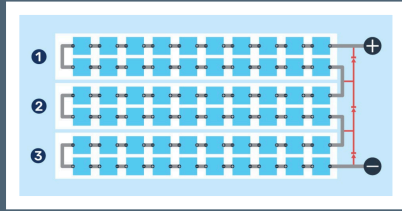


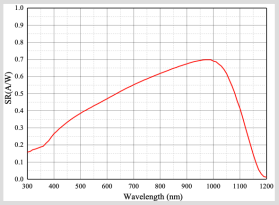












Efficiency(%)	Pmpp(Wp)	Umpp(V)	Impp(A)	Uoc(V)	Isc(A)	FF(%)
24.90-25.00	6.87	0.606	11.331	0.709	11.832	81.85

Voc.Temp.Coef.	-0.268%/K
Isc.Temp.Coef.	+0.042%/K
Pm.Temp.Coef.	-0.3%/K

half-cut new tech monocrystalline cells with ultimate performance, up to 20 busbars

- Reduced Resistance: By halving the current flowing through each cell, resistive power losses are significantly reduced, as the power loss is proportional to the square of the current ($P = I^2R$).
- Increased Efficiency: Less resistance leads to less energy wasted as heat, allowing more electricity to be captured and utilized, thus boosting the panel's overall efficiency.
- Improved Shading Tolerance: The panel's wiring is divided into two separate halves, connected in parallel. This design allows the other half to continue generating power even if one half is shaded, preventing a complete drop in output.
- Enhanced Durability: The reduced mechanical stress on smaller, half-cut cells can decrease the likelihood of micro-cracks developing, which can damage the panel over time.

excellent power generation performance ultimate conversion efficiency and reliability

Ventilated Facades Systems address the challenge of heat loss by integrating external insulation and a ventilated air gap

Energy efficiency meets the design

Experience the perfect symbiosis of functionality and aesthetics. By integrating photovoltaics into an insulating façade, you make a building more energy–independent and also transform it into an outstanding design object.

Facade with future

Solar cells in the building envelope allow the building to generate its electricity and at the same time save heating costs through insulation. In addition by protecting the environment, façades of this type are an important step towards a sustainable energy supply and an investment in the future. With our wide–ranging expertise in the fields of insulating glass and photovoltaics, we are constantly realising exceptional solar projects with insulating façades.

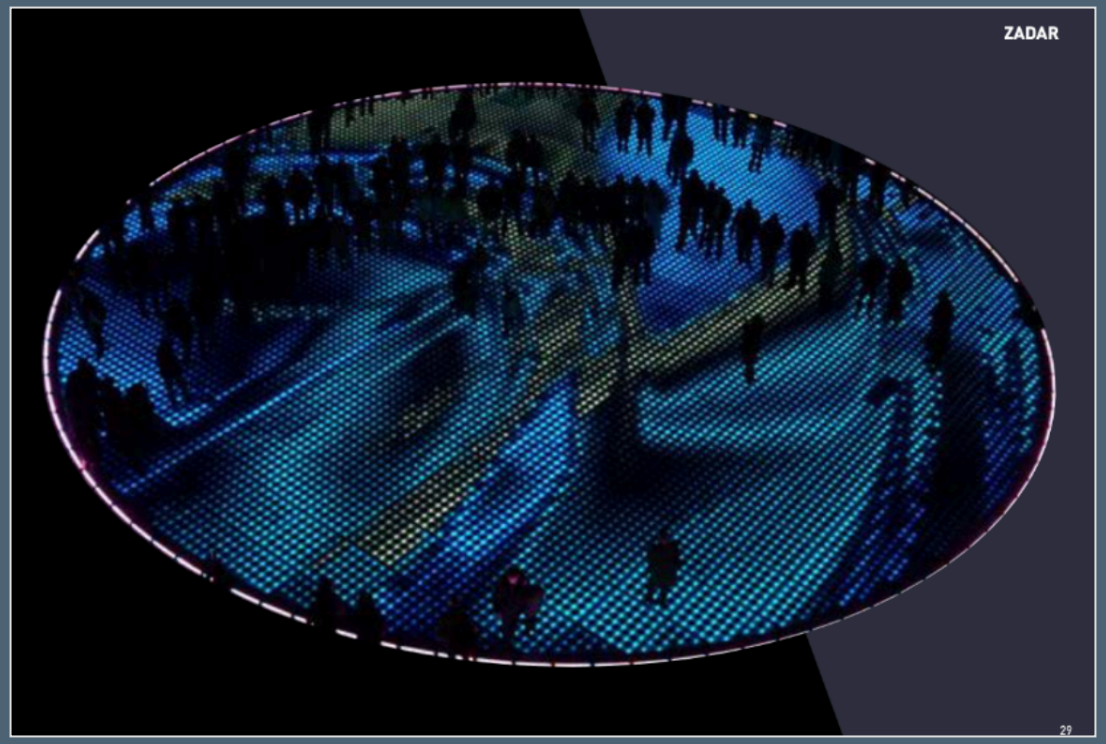
The global building integrated photovoltaics (BIPV) facade market is anticipated to grow significantly from 2024 to 2028, driven by a heightened focus on sustainability, renewable energy, energy efficiency, and cost savings.

BIPV facades, which incorporate solar panels directly into building exteriors, represent an innovative technology that has the potential to change how energy is generated and used in urban settings.

Colour design options

Our solutions consist of laminated safety glass into which photovoltaic elements are integrated. They fulfil the same standards as laminated safety glass in the construction industry and can, therefore, be integrated into any surface of the building envelope. The realisation of coloured variants is achieved by using coloured cells, coloured films, coloured or printed glass.

By integrating Solar Modules, the Façade is used not only for Protection, but also for Energy Generation



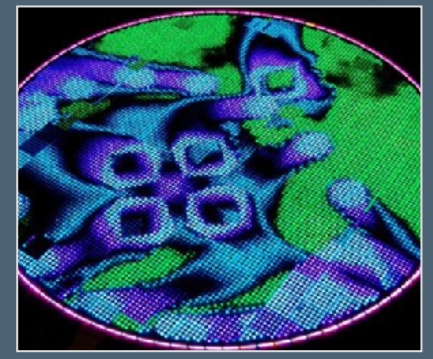
art & technology

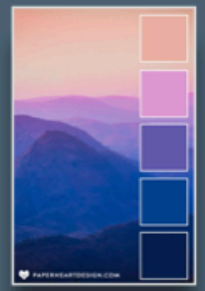
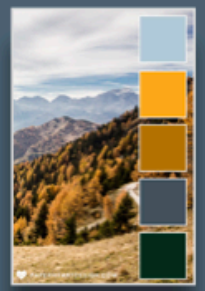


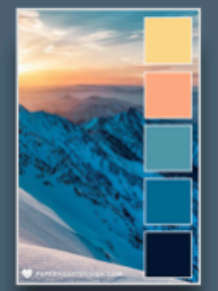


art & technology





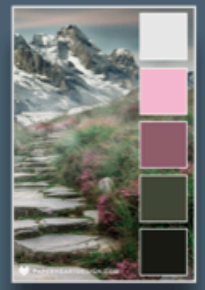
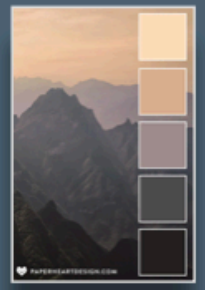
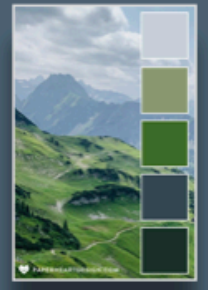



unique range of sizes, surface finishes and different colours





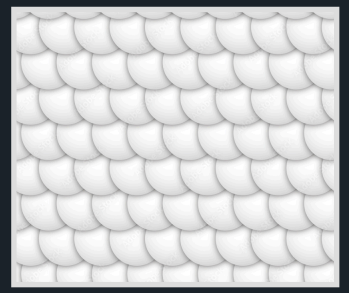
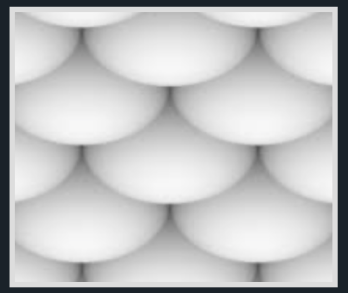
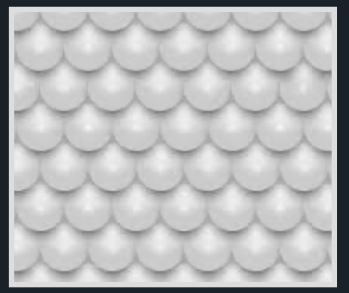
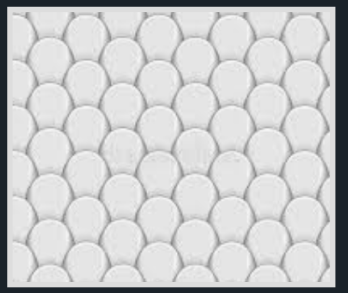

unique colour palettes to meet your architectural challenges

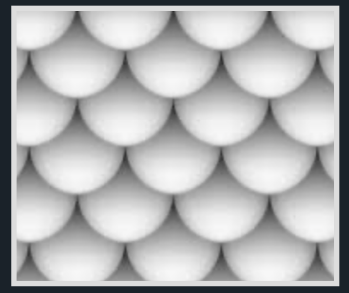
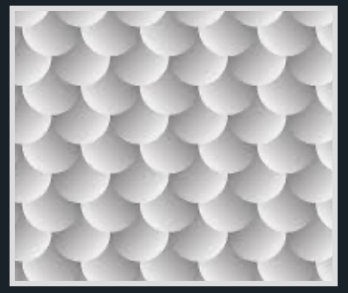
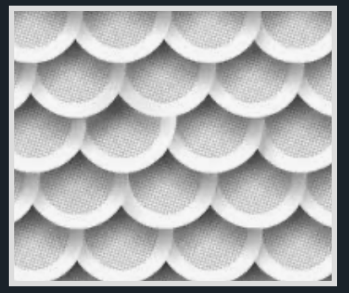
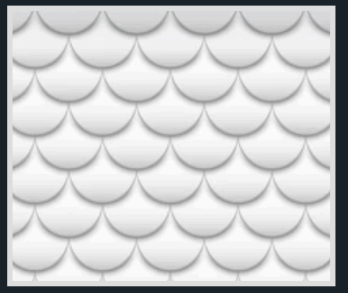


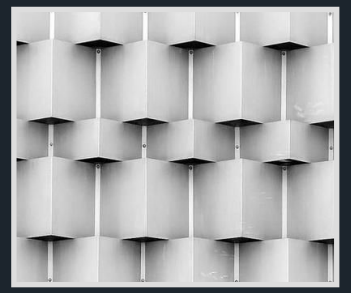
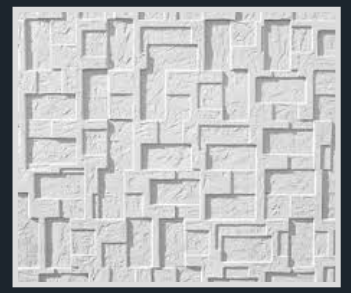
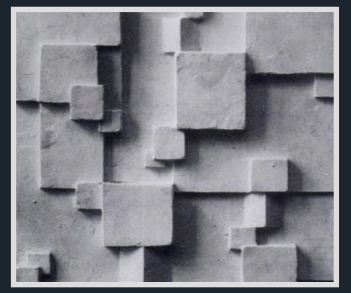

you name it.....
flowers
woods
special designs
gold
metallic
any size
exclusive images
steel
ertex solar
patterns
stones
trees
nature
leathers
any colour
industrial
any shape
rocks
.....we create it

here are just a few from our huge range of products and projects worldwide

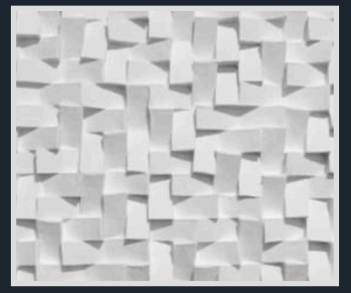
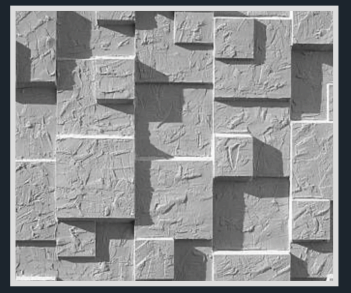
Modern Art Look

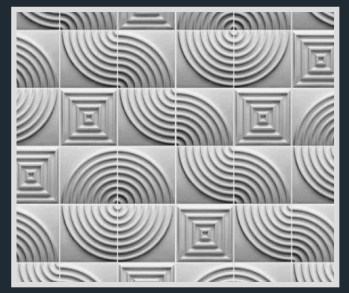
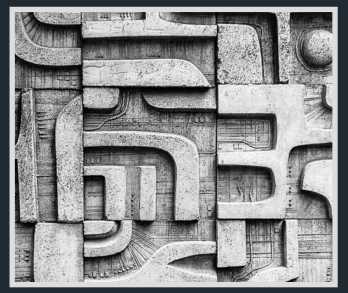
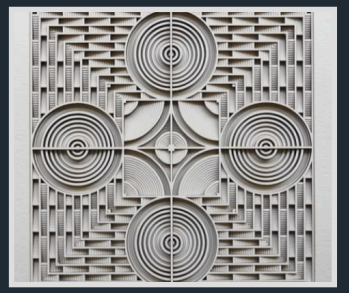
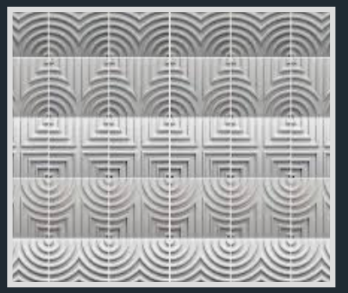





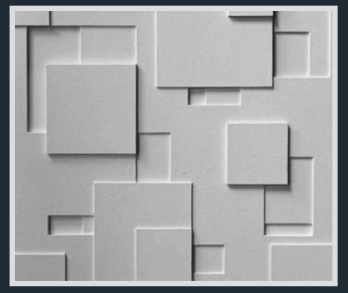

Classic Art Look



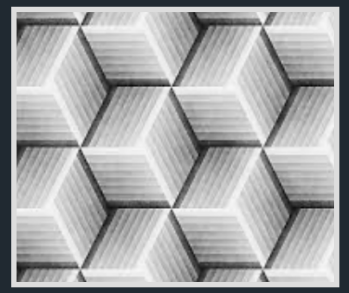
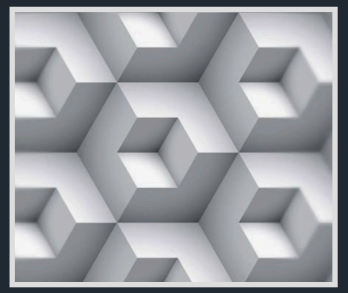
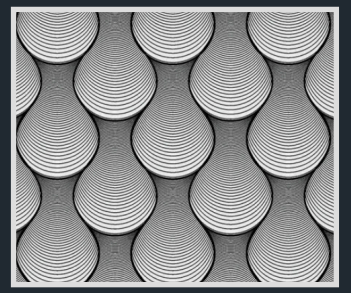
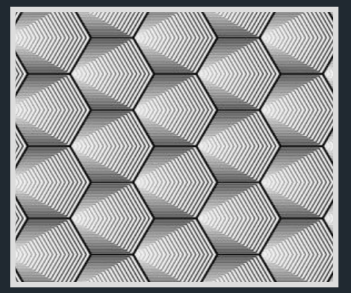



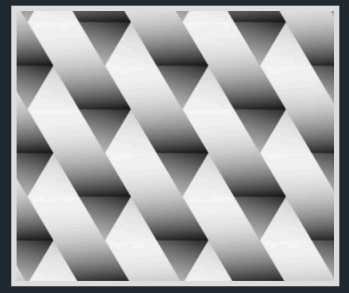
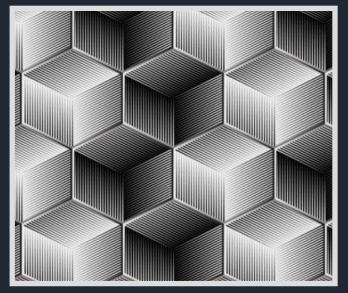
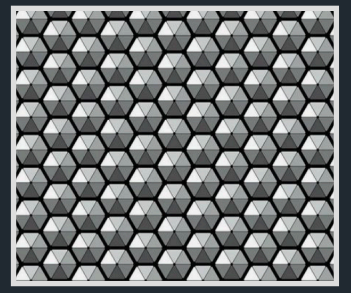
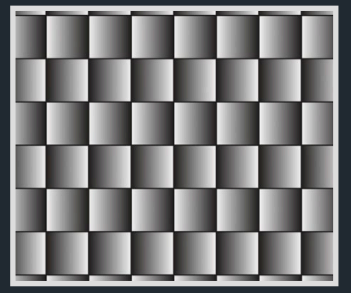
Unique Art Look

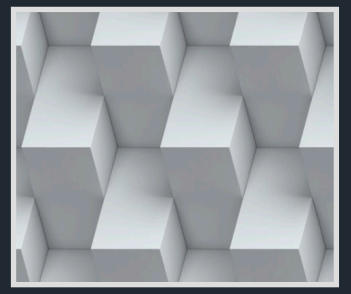


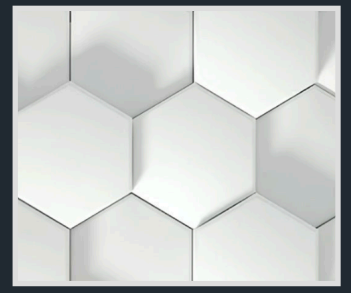
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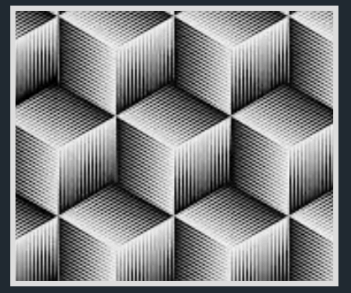





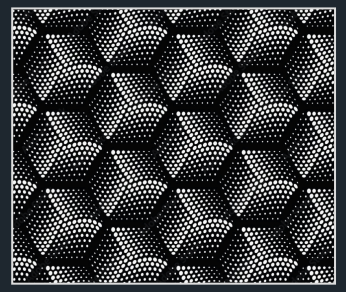
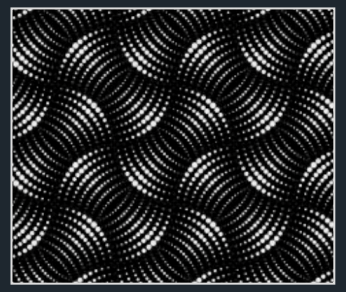
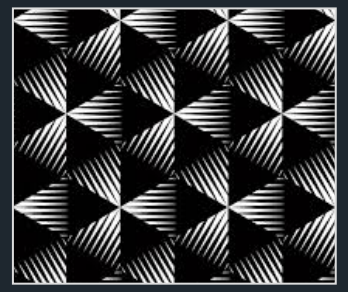
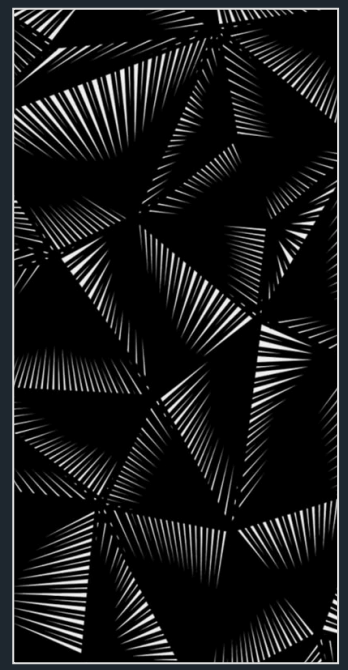




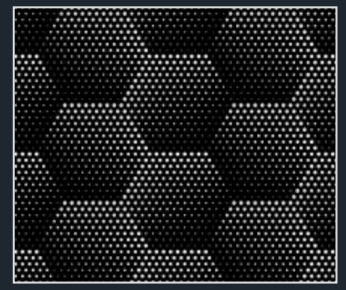
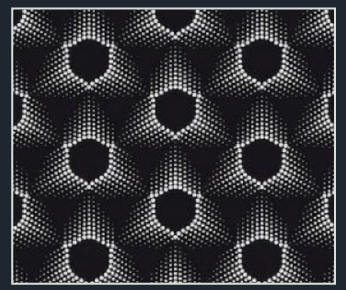
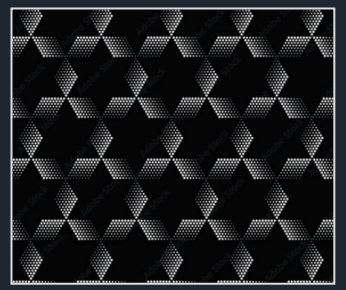

Modern Art Look

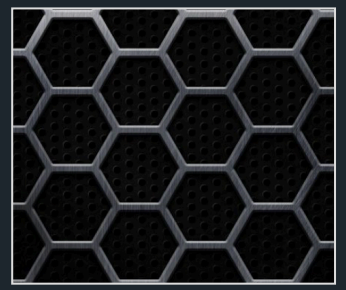
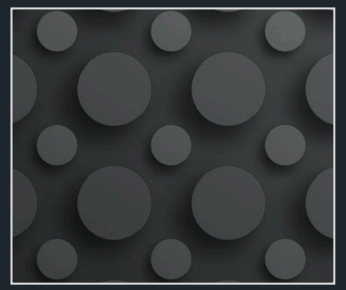
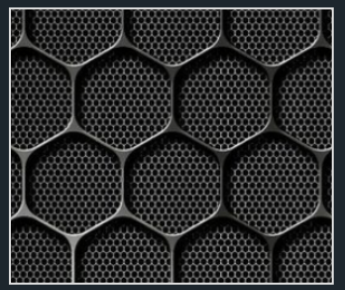
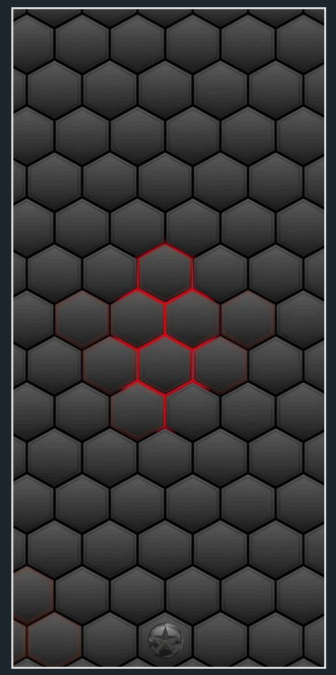


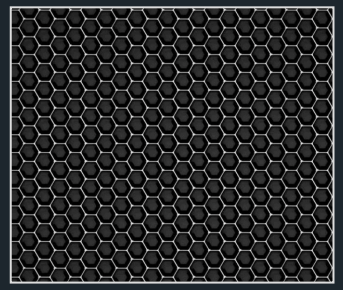
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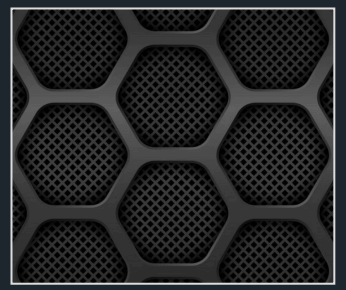
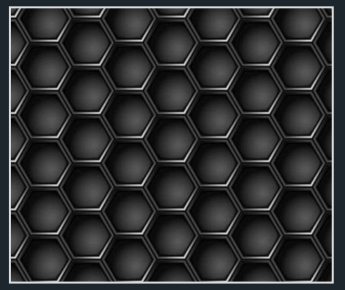




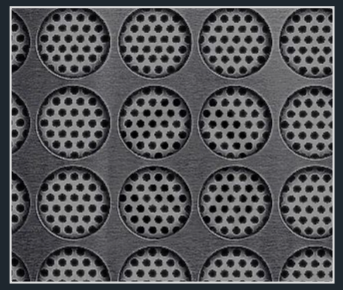
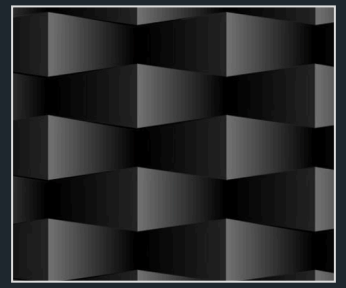
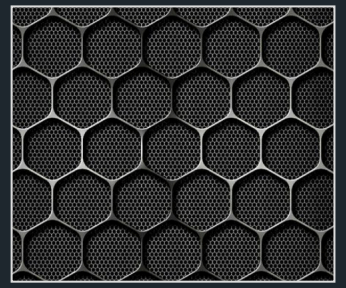
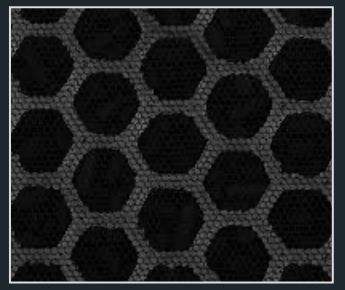
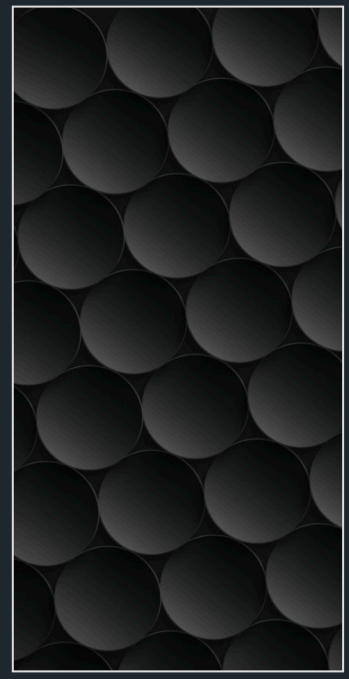


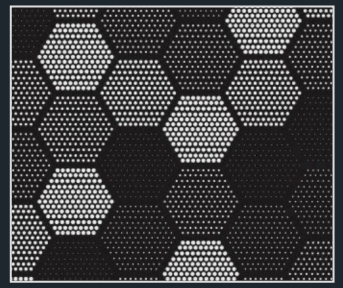
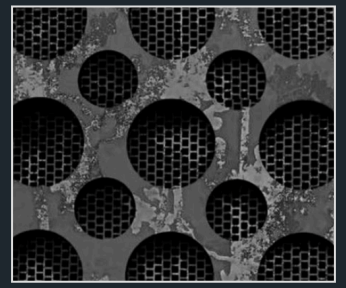
Unique Industrial Look



Unique Industrial Look



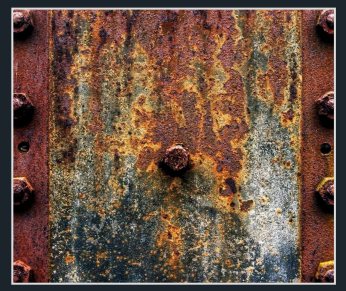


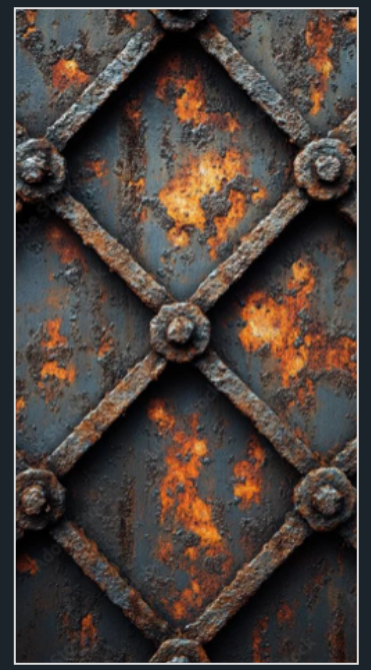



Unique Art Look

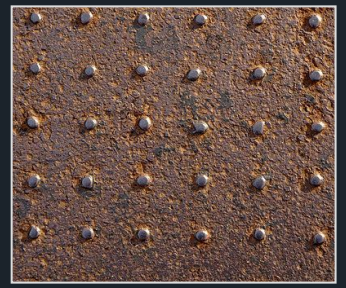




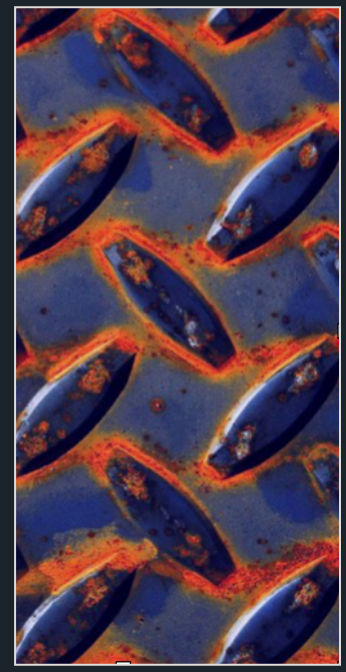
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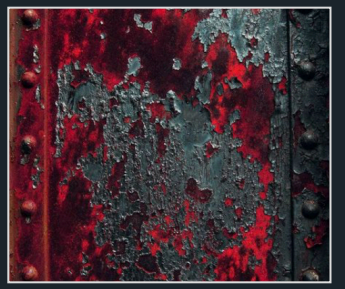


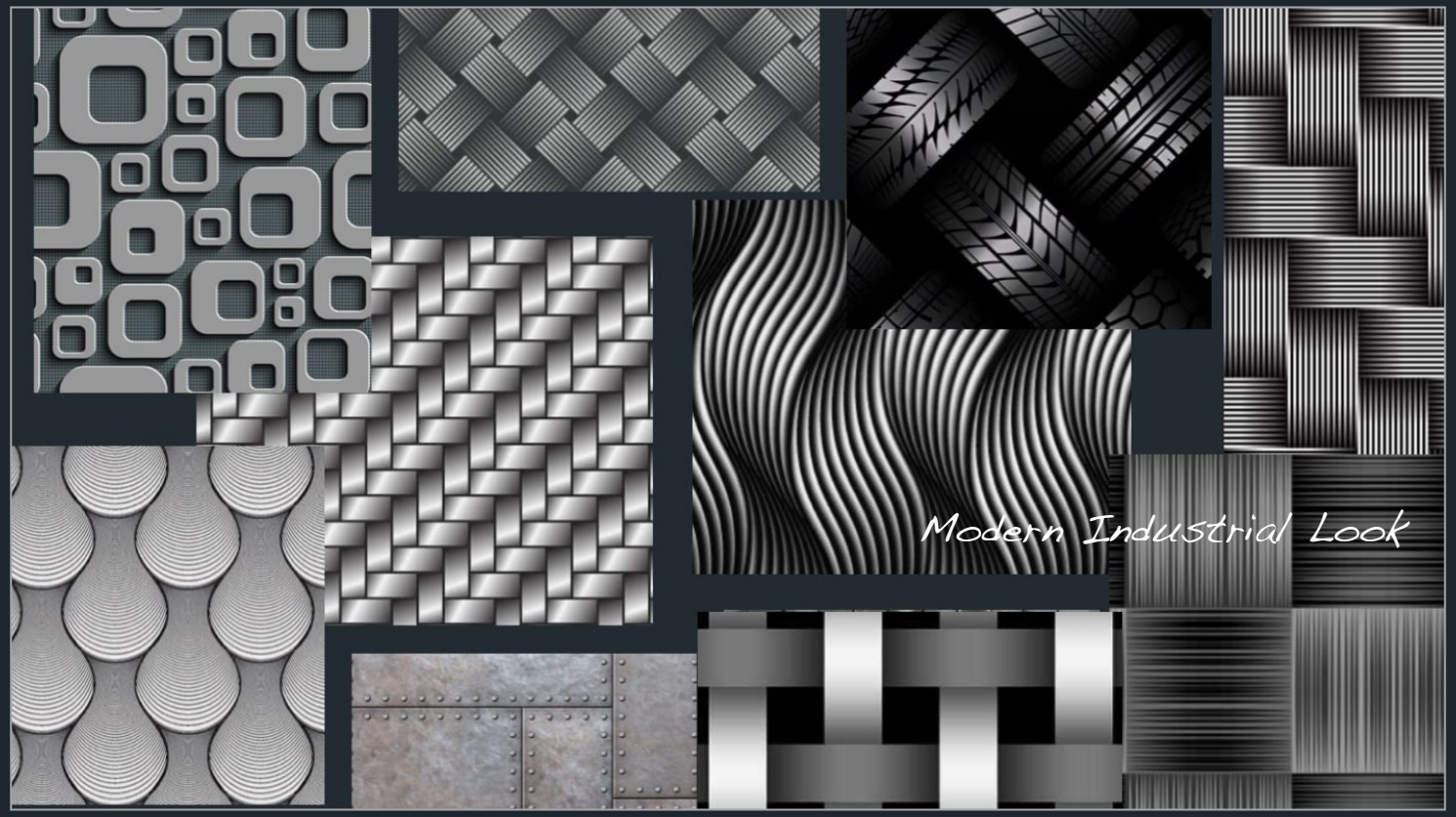


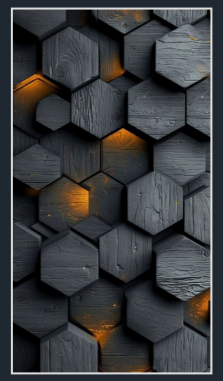


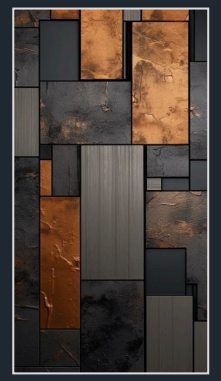
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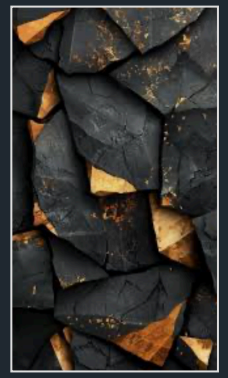



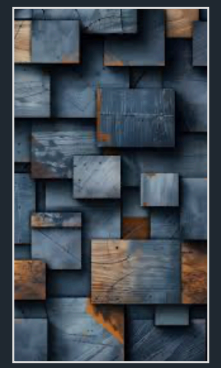

Modern Industrial Look

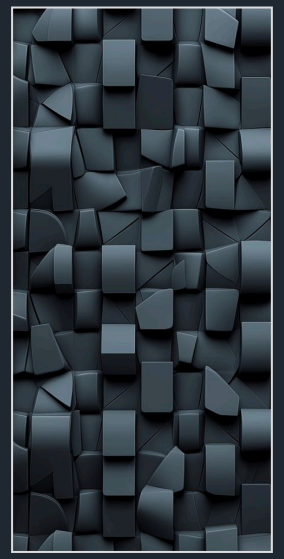


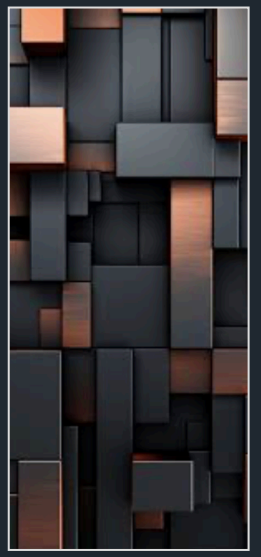


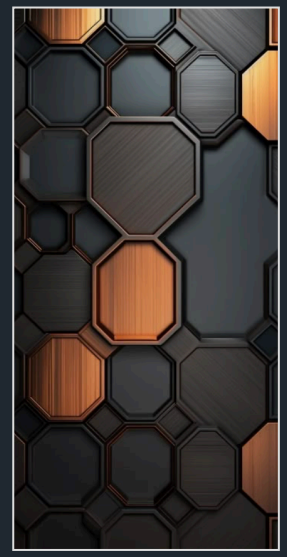
Modern Pattern Look

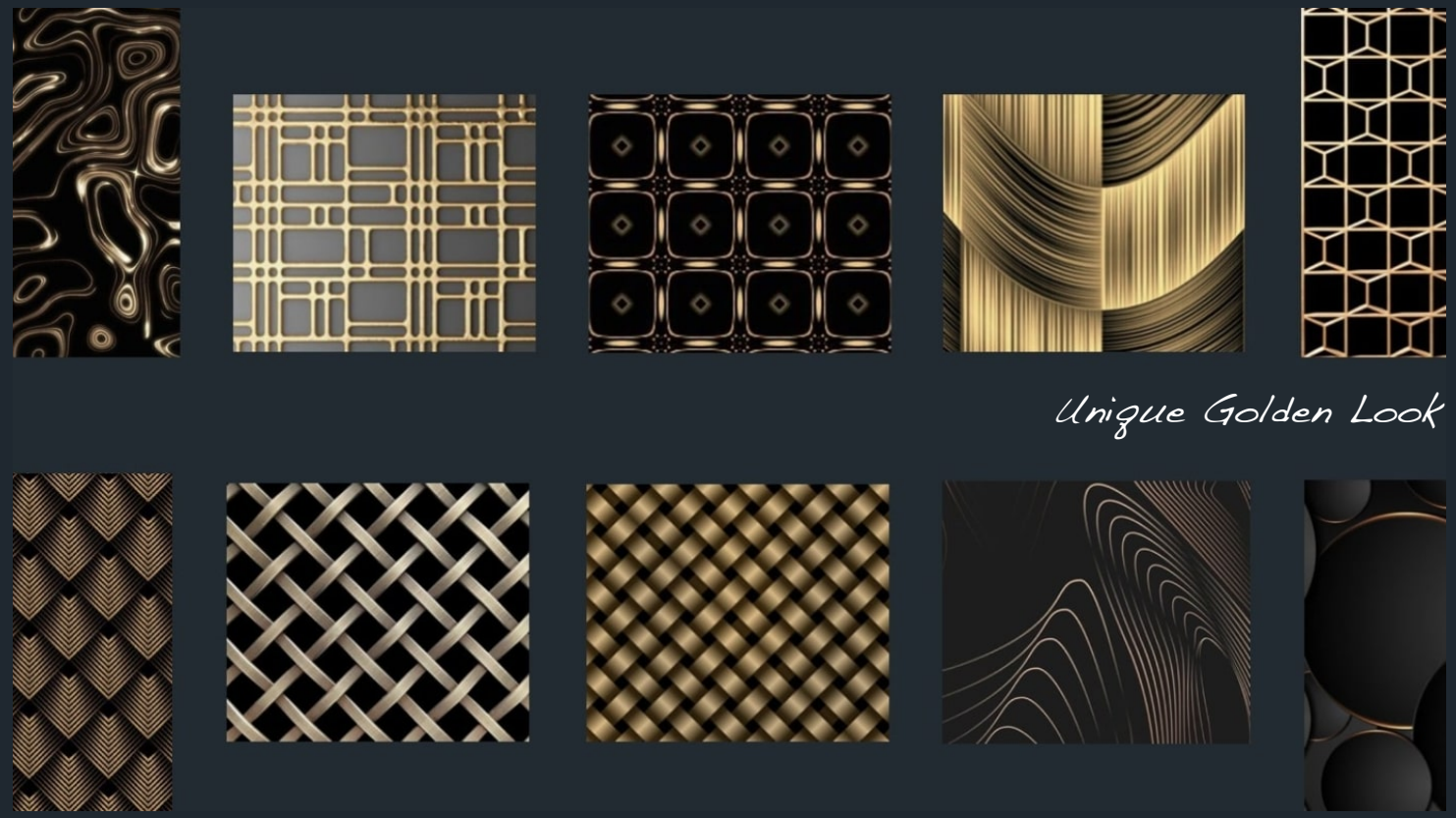




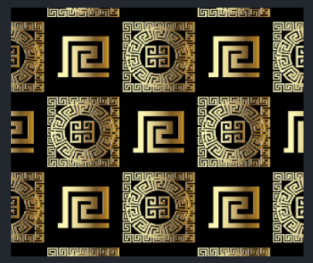






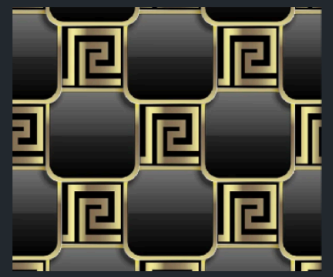

Unique Golden Look

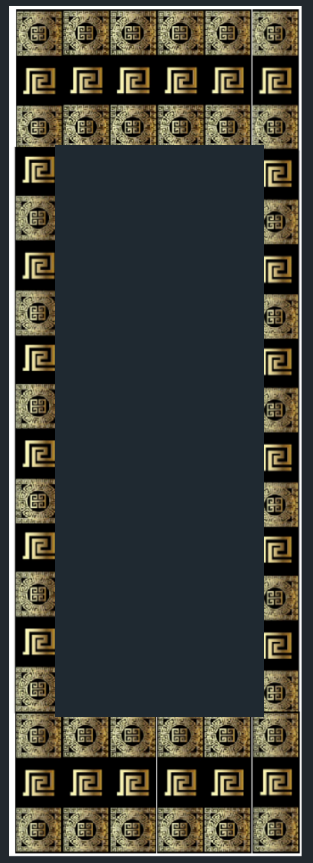




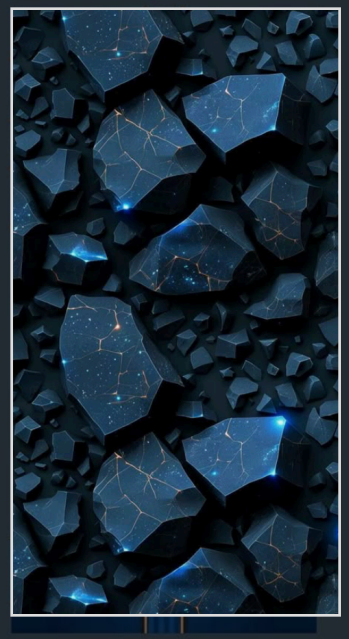
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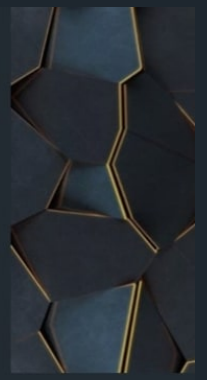




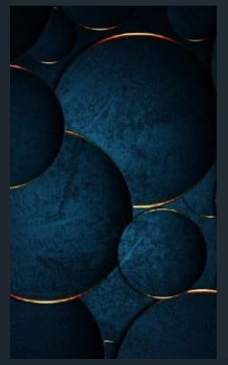
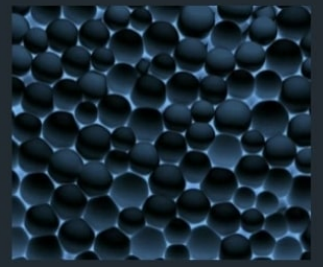




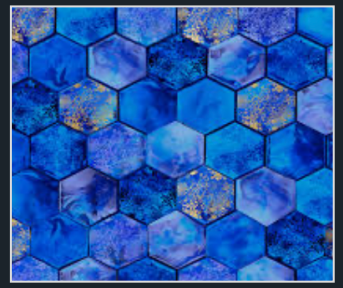
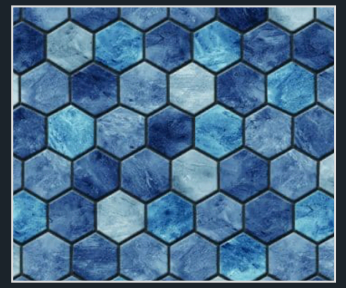




Modern Pattern Look

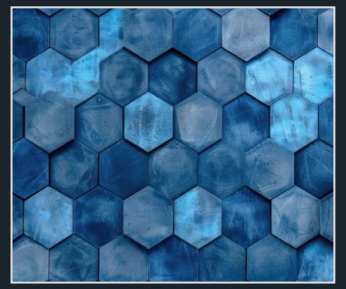




Modern Art Look



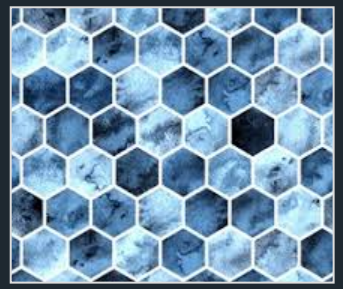


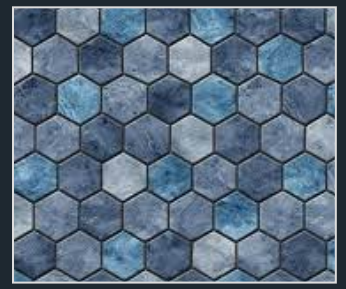


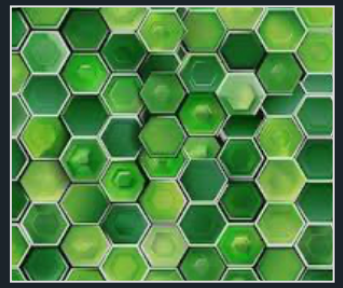
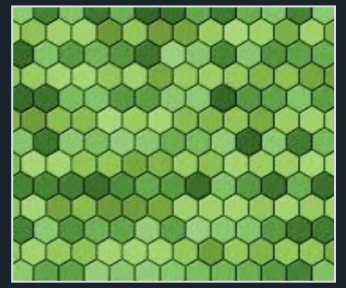
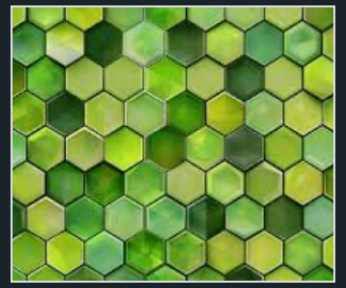
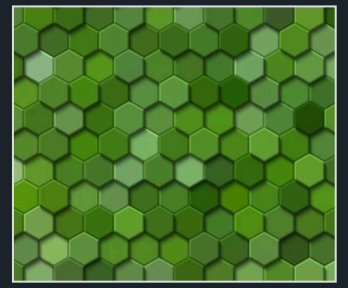




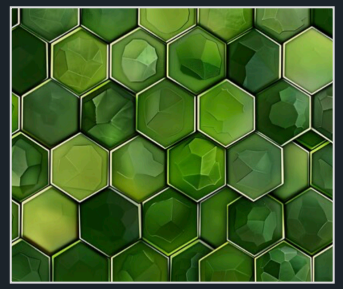
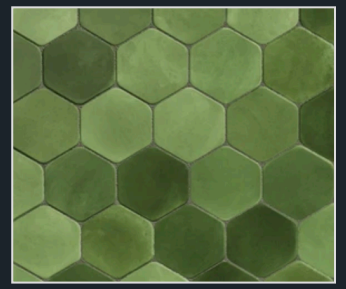
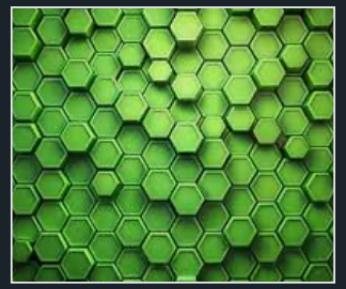
Modern Art Look



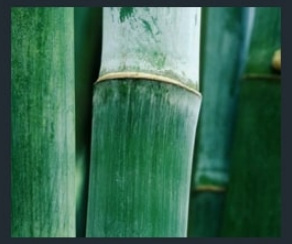





Modern Art Look







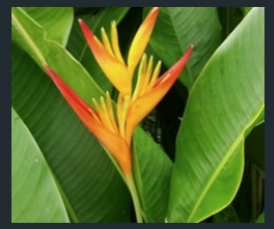
Unique Bamboo Look





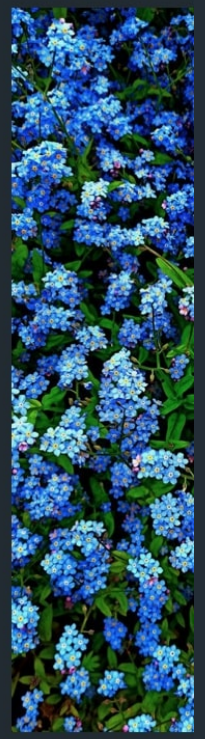




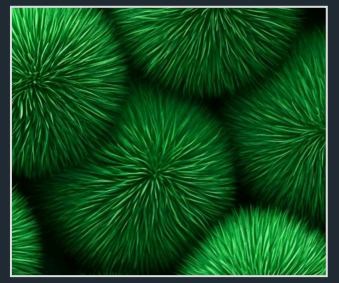



Unique Flower Look

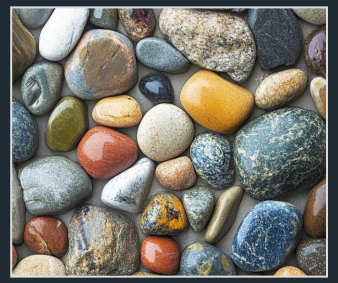









Unique Nature Look

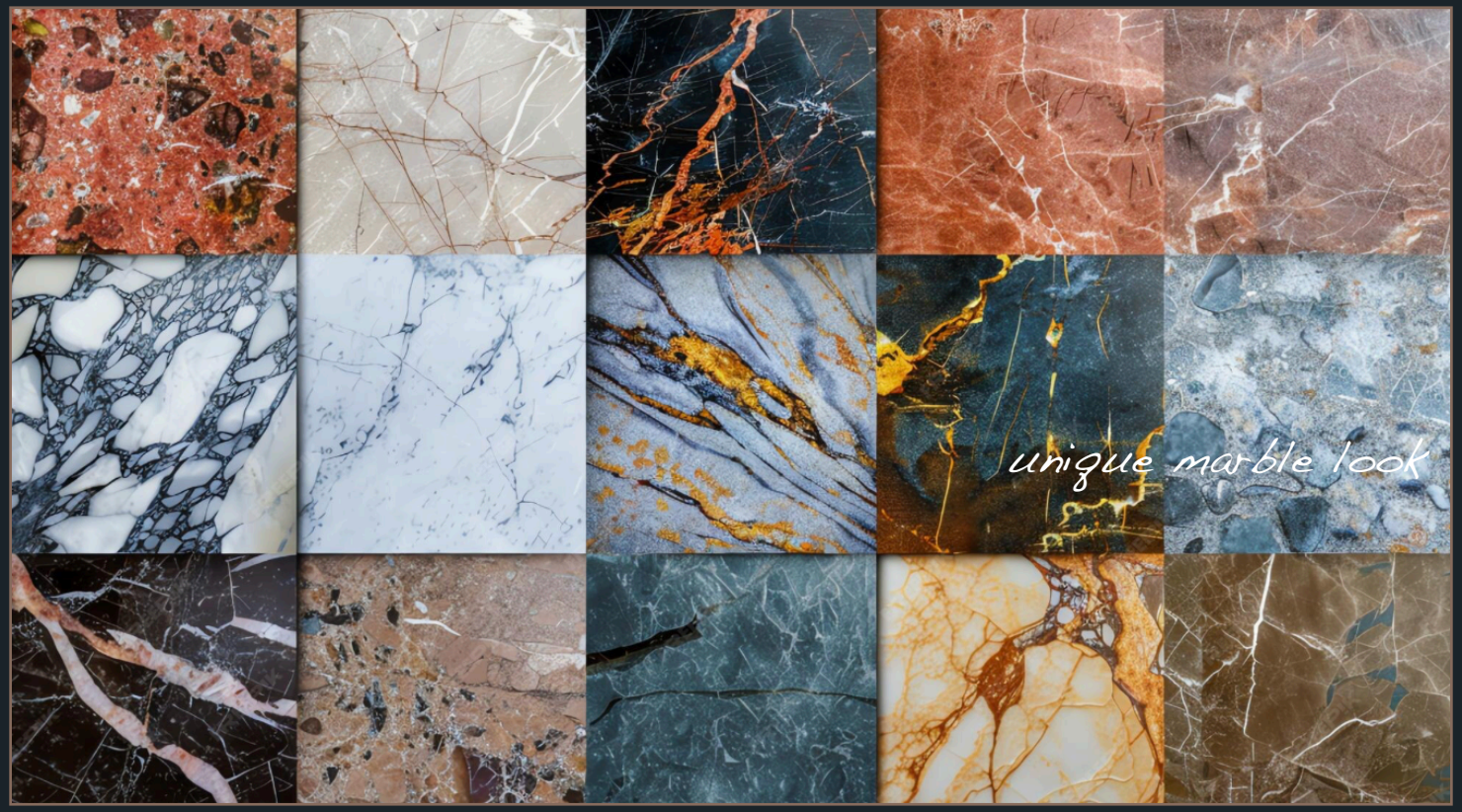





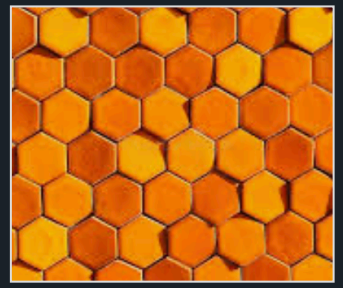
Unique Solar Panels
with Natural Wood Look

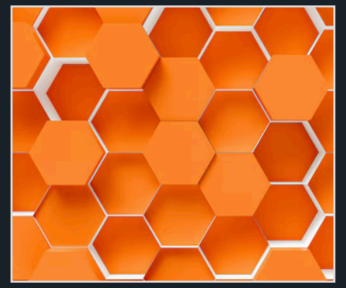

Natural Wood Look


Unique Solar Panels
with Natural Rock and Stone Look

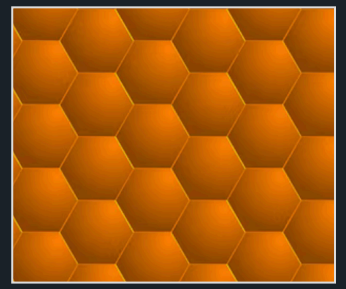
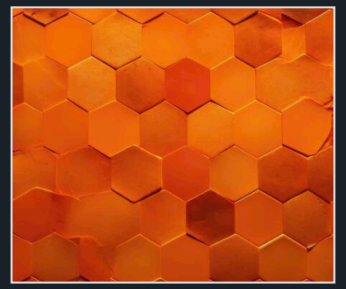

unique marble look


Unique Solar Panels
with Genuine Leather Look






Modern Art Look

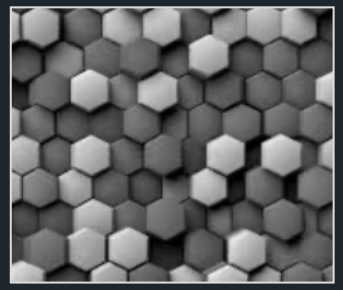










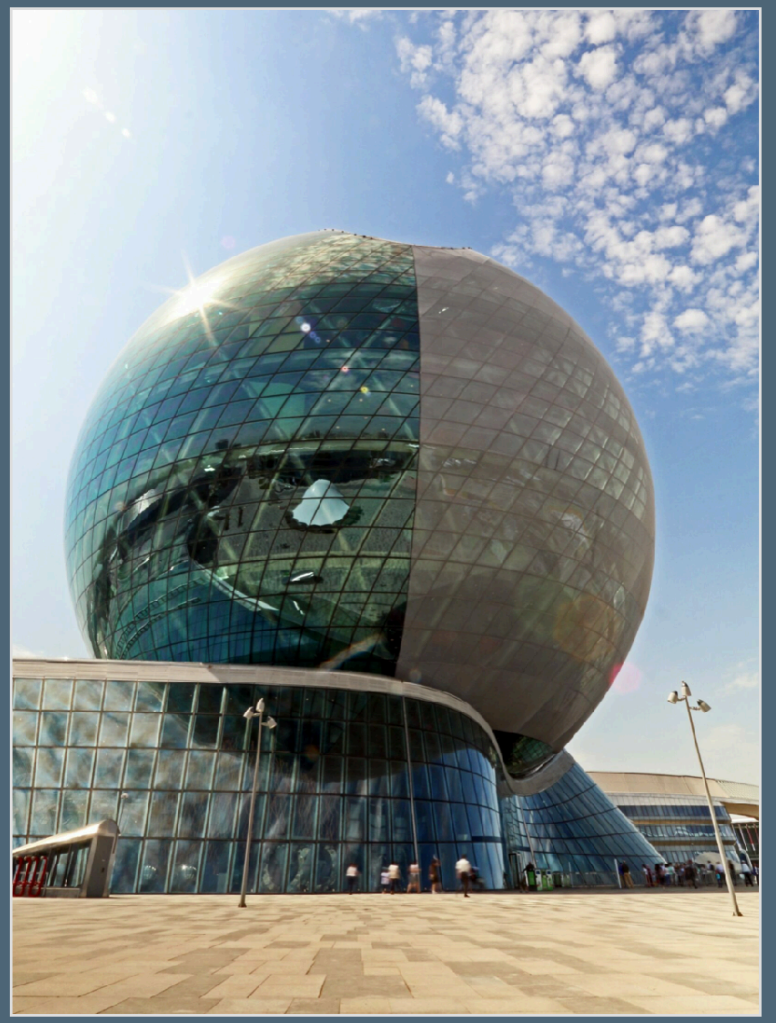
Modern Art Look





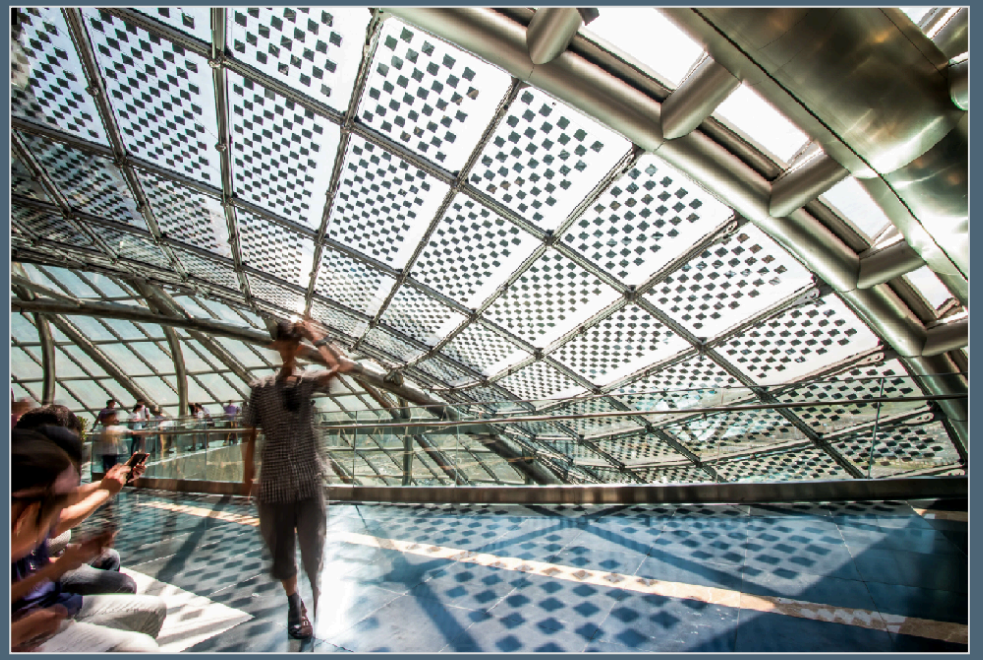

“ the sphere”

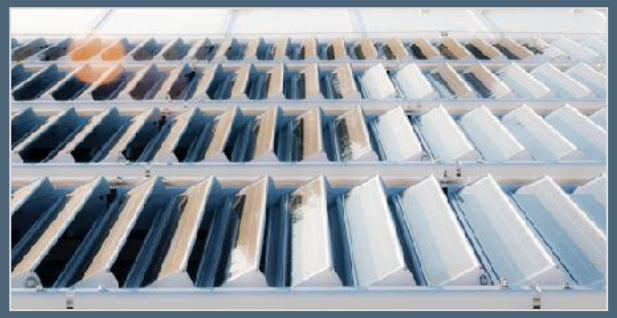
Astana Exhibition Center



“ the sphere”

Astana Exhibition Center





2.403 Transparent Panels

by Renzo Piano Building Workshop





Kimbell Art Museum



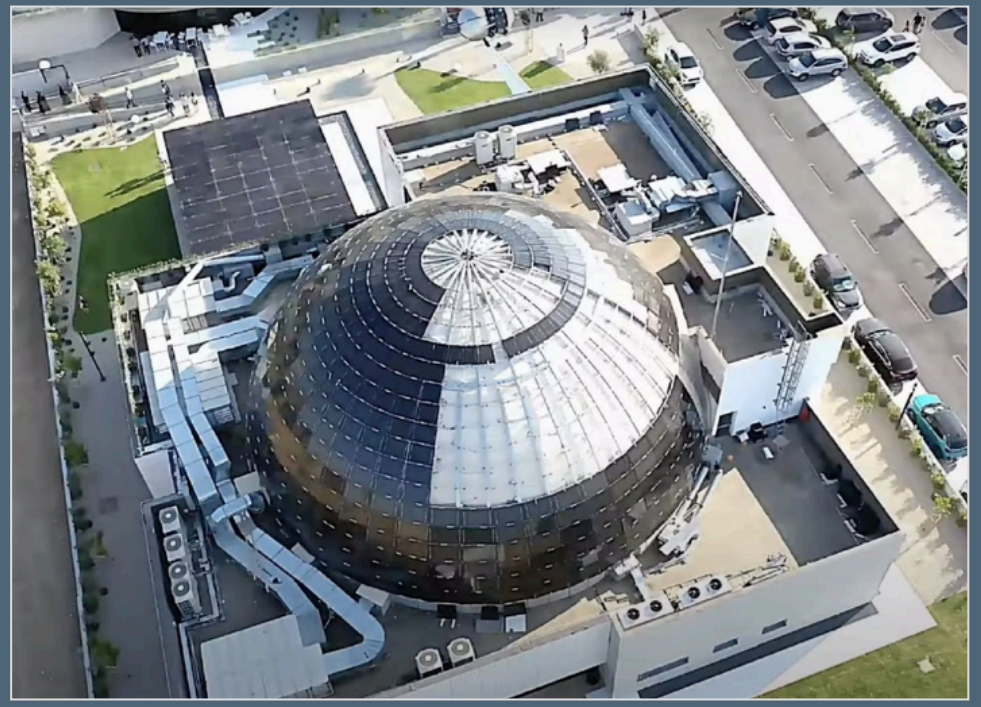
Dome Amphitheater

720 Custom–made P/V panels

17 different sizes

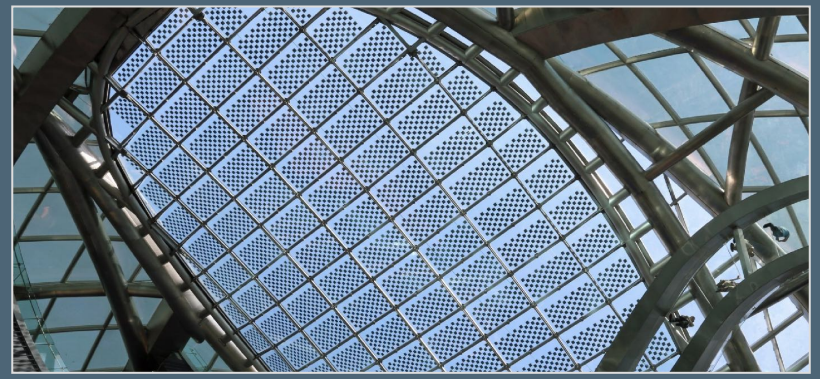
All trapezoidal in shape





amphitheatre

stadiums
sport centers





science center



unique facade

Audi experience center






AUDI
Brand Experience
Center - Munich

Audi Munich


AUDI
Brand Experience
Center - Munich


AUDI
Brand Experience
Center - Munich

Aesch – Switzerland

unique facade & roof installation

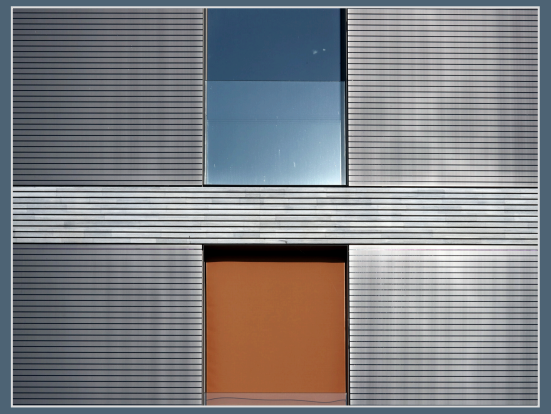


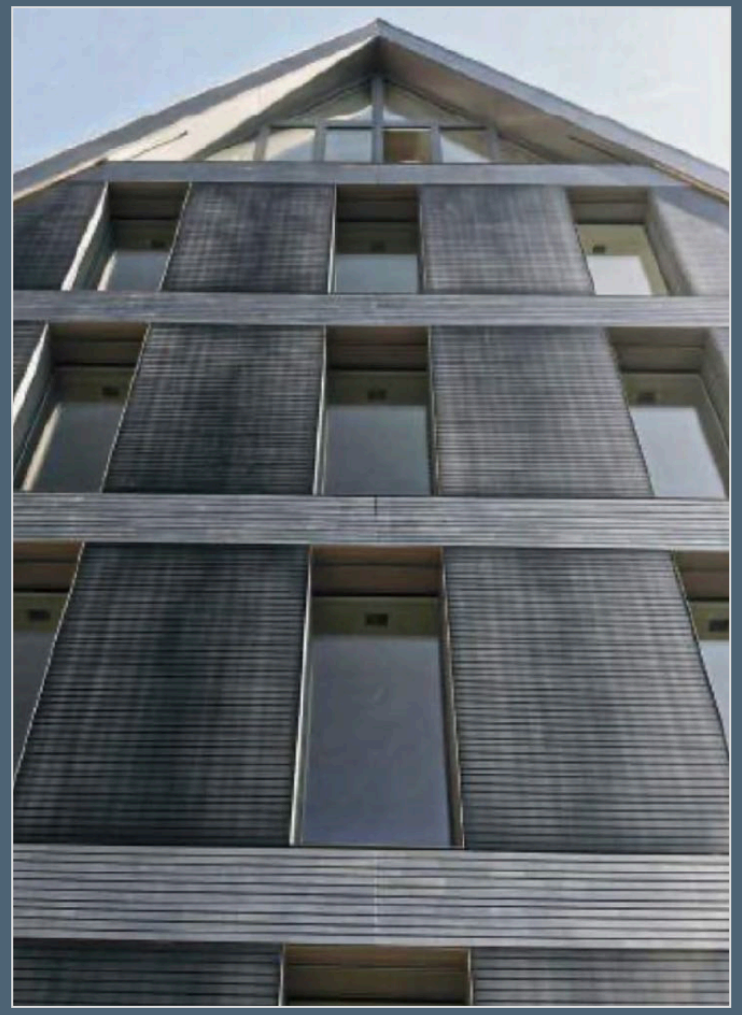




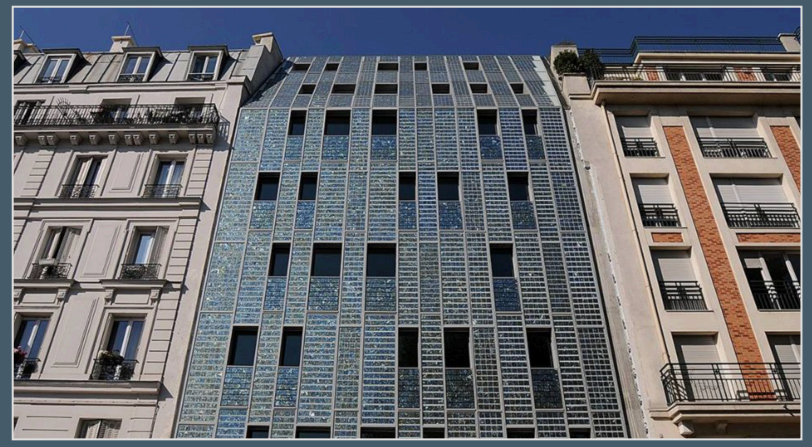


Roosli project



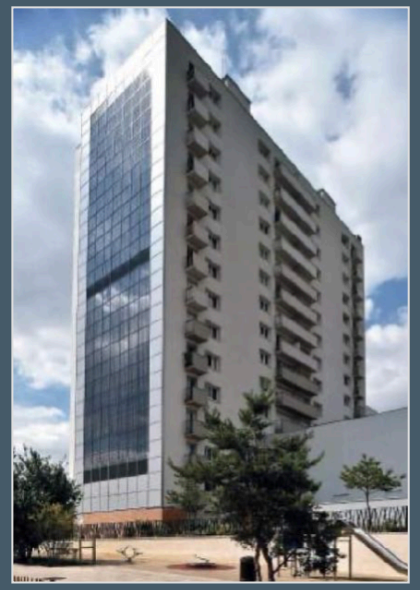


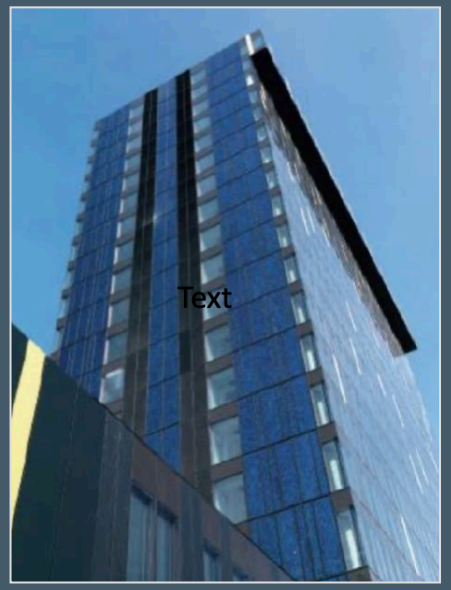
Emmaus Solidaritet
unique facade installation
Paris – France

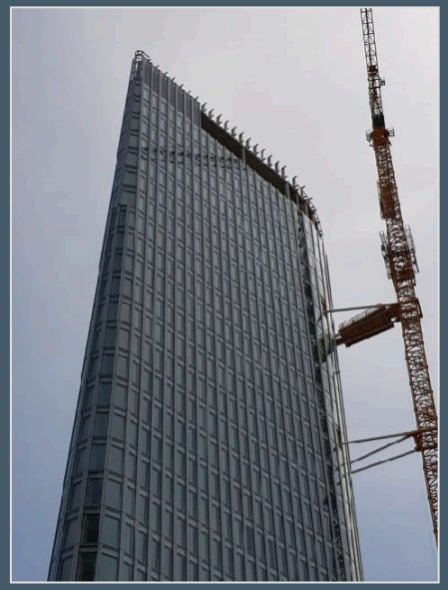




Towers













unique projects













unique projects













unique projects







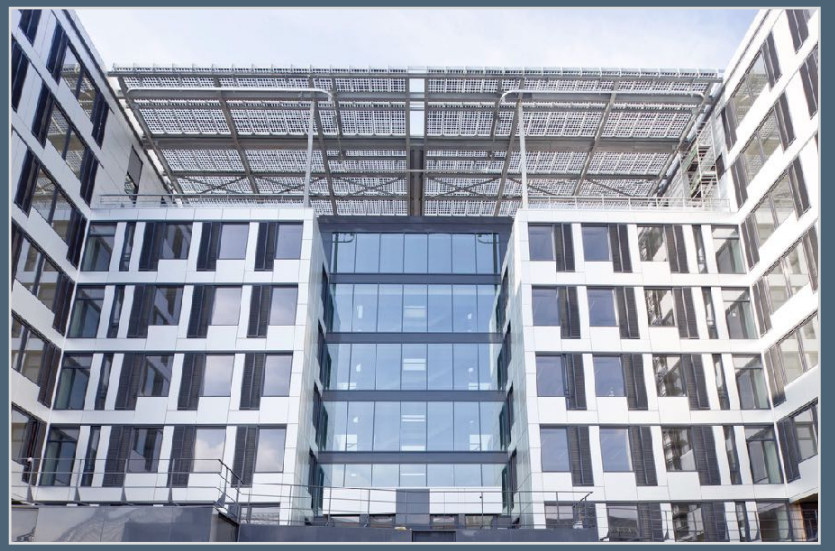
General Hospital Vienna







Headquarters
France



off–grid building

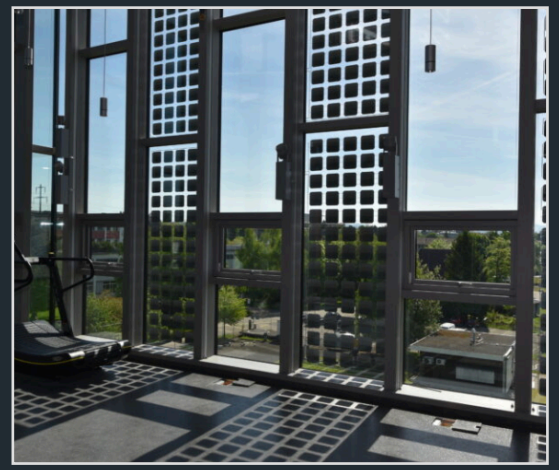


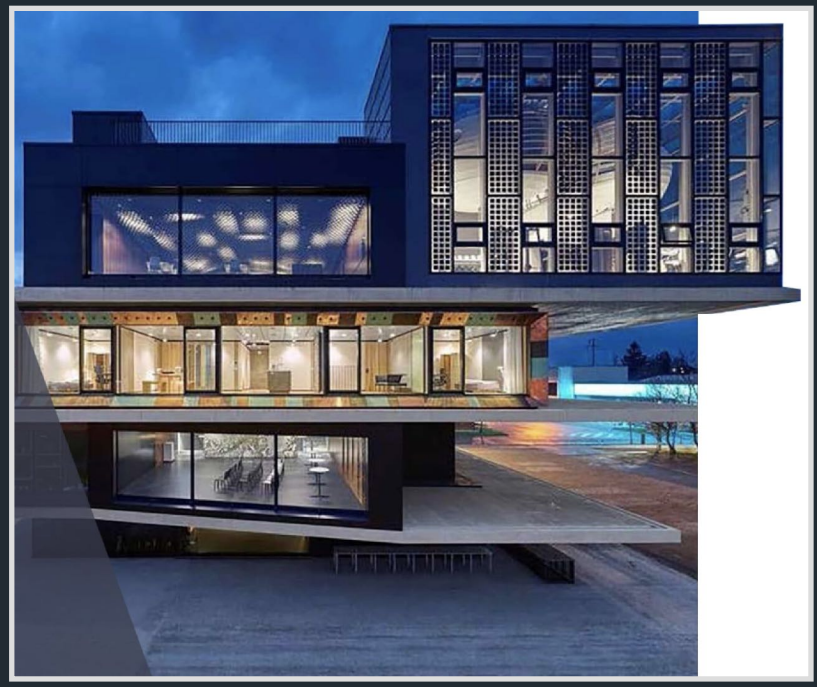
Biessenhofen
Germany





roof & facade installation





Dubendorf

Switzerland



Energiewurfel
Constance – Germany

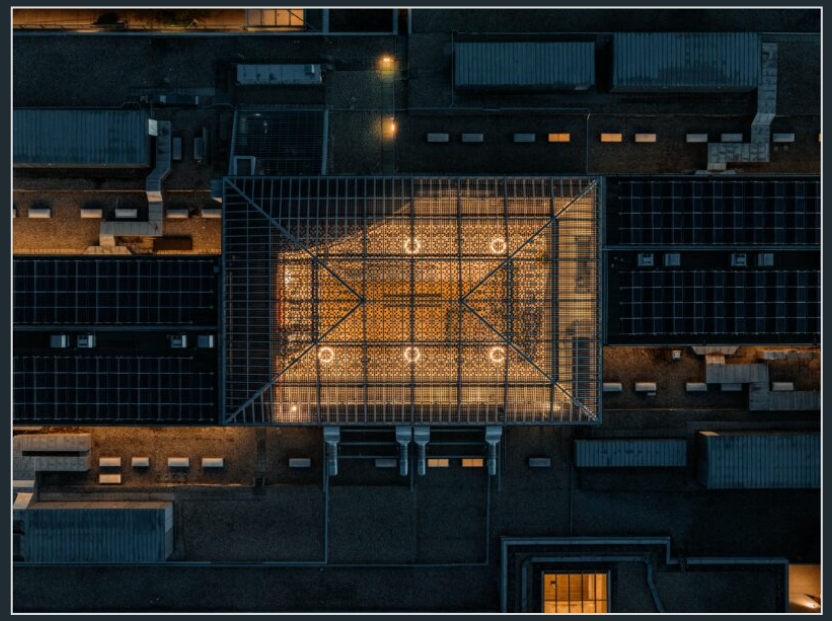


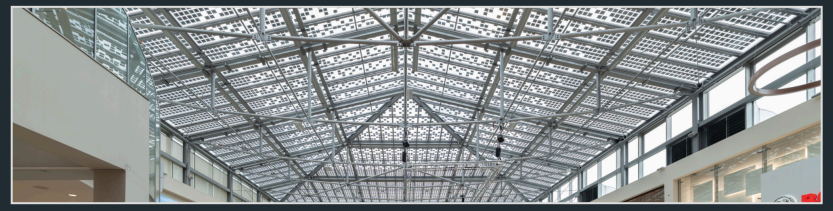
Pierre Arnaud Foundation



Pierre Arnaud France







shopping malls
transparent roofs



Marburg
Germany

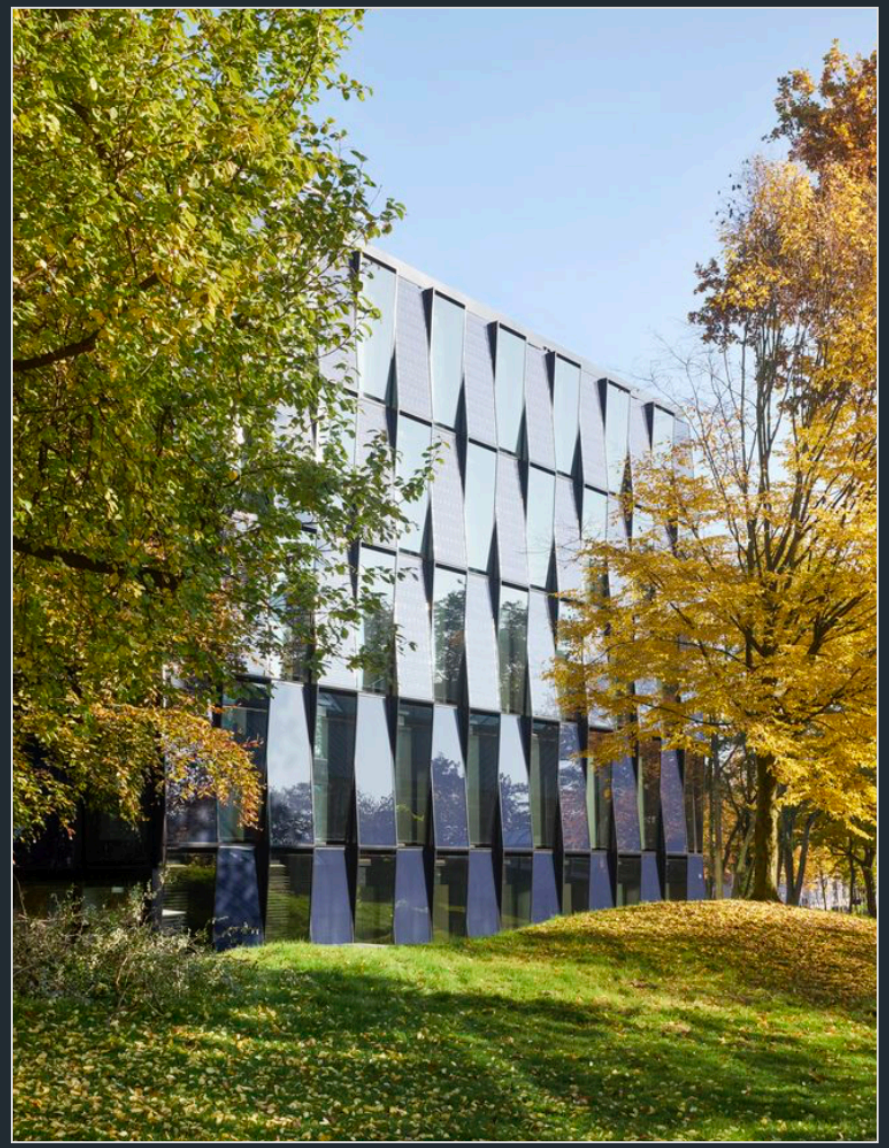


unique energy project



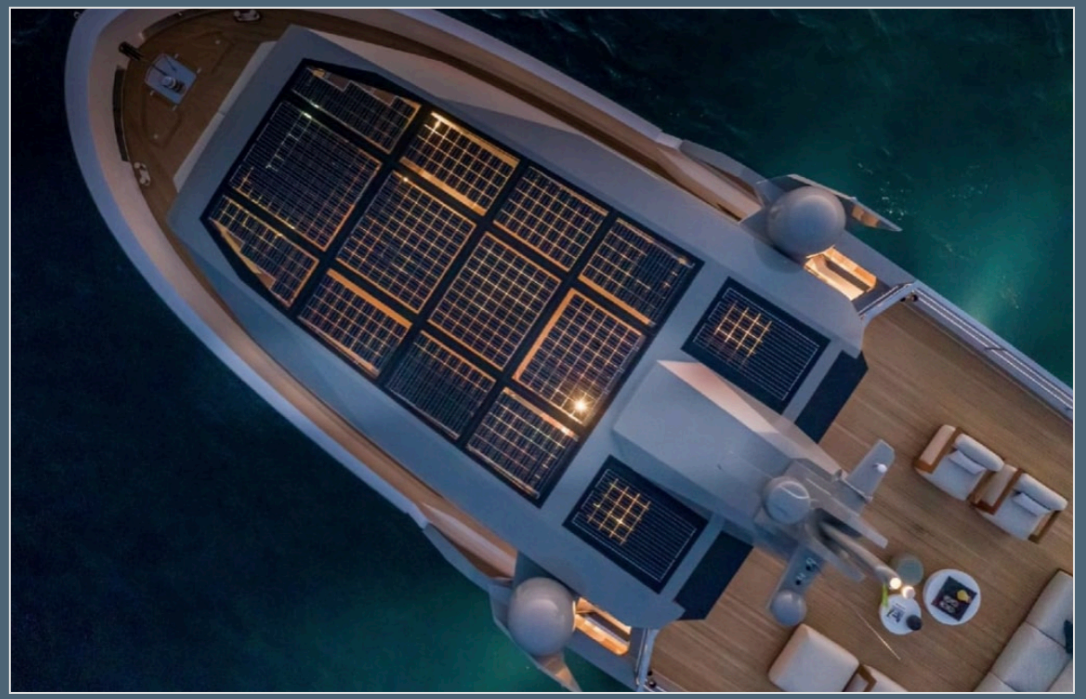


Headquarters
Mönchengladbach
Germany



yachts





yachts











unique cruise ships







cars











Fronius HQ









facade Empl

Canada









ventilated facades

roof & facade installation

Schweiz

Switzerland

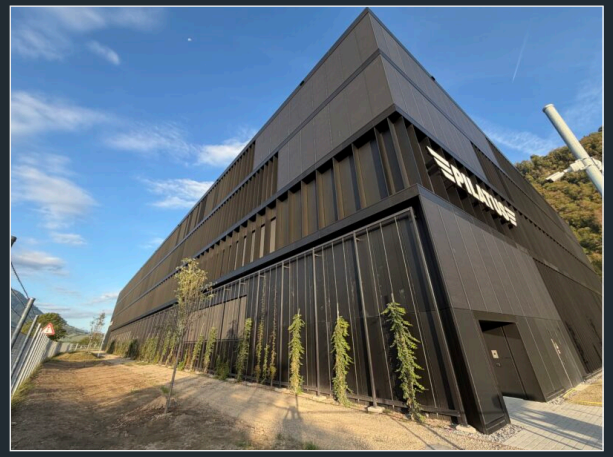


ventilated facades

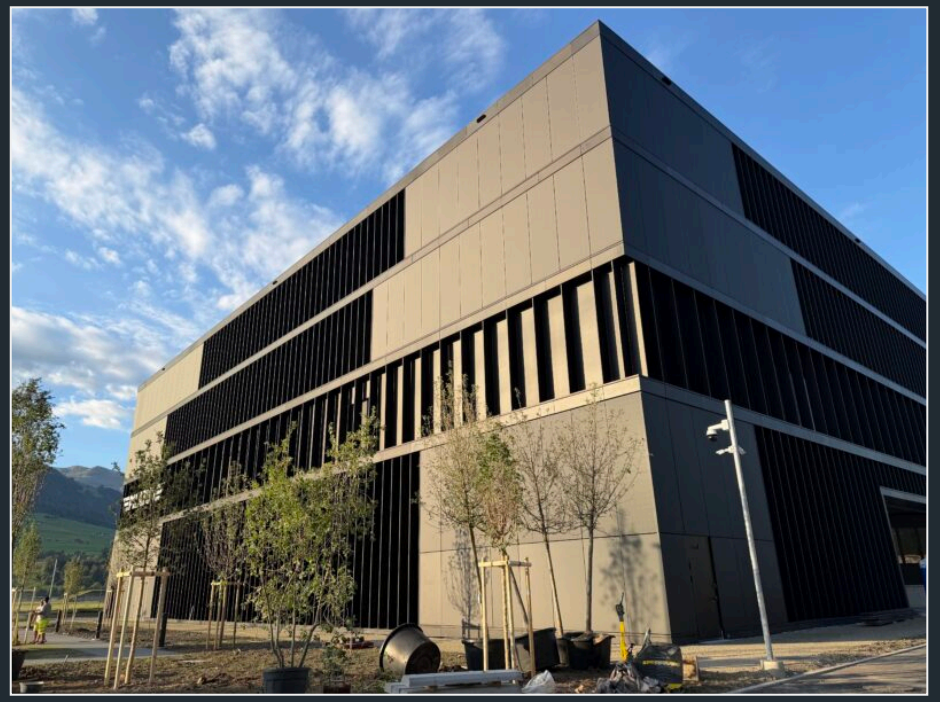




ventilated facades

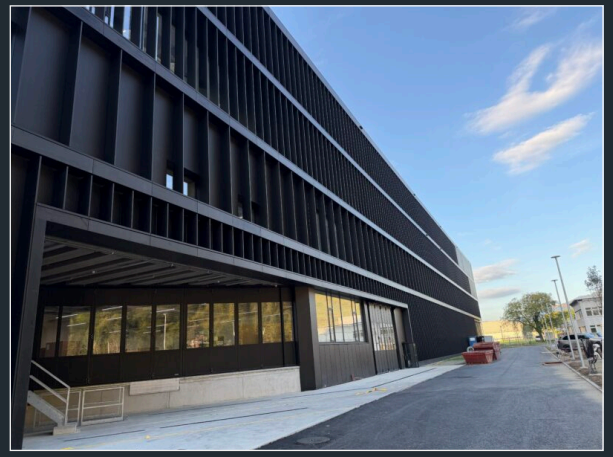


manufacturing plant



Pilatus Aircraft

Switzerland



ventilated facades



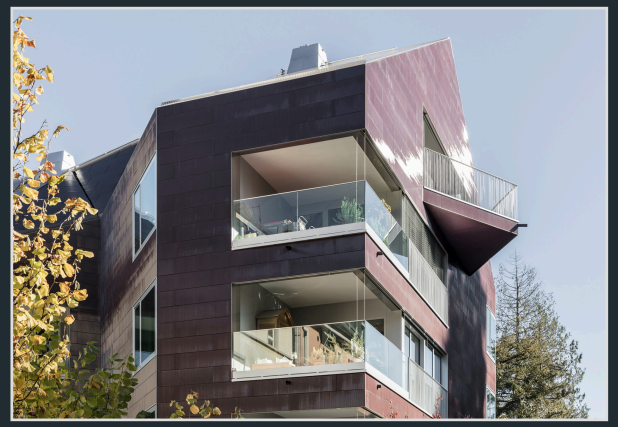
Coop Headquarters



facade & roof



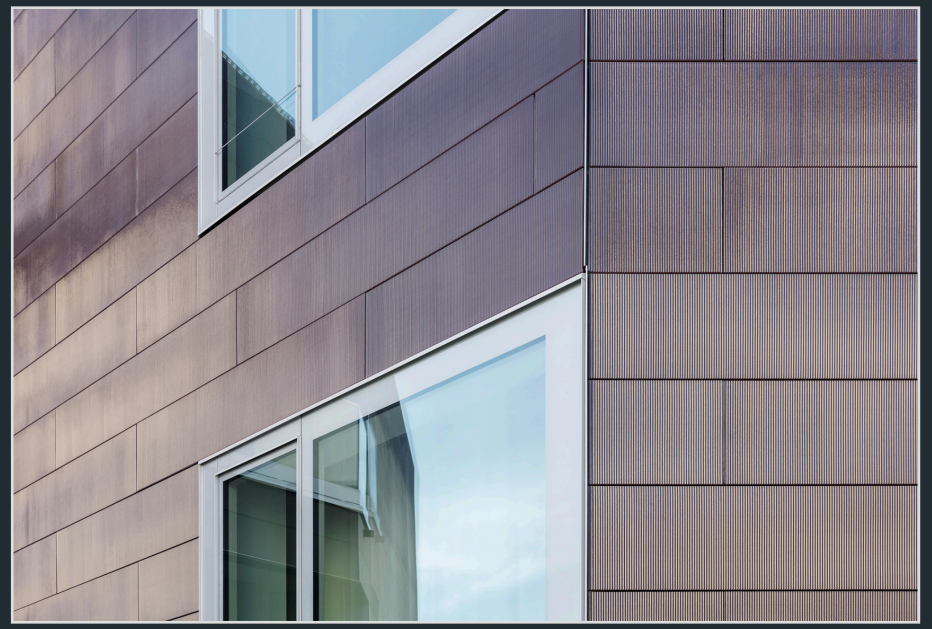
ventilated facades



Solaris

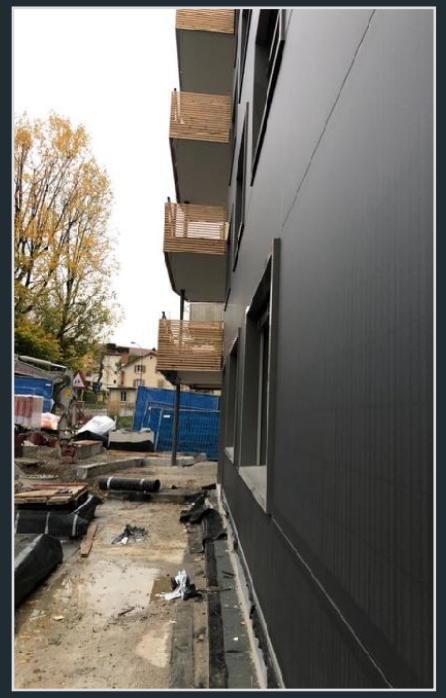
Zurich

Switzerland



zero energy building

ventilated facades



unique facades

Talstrasse
Zurich

Switzerland



ventilated facades

facade – roof

self–sufficient residence

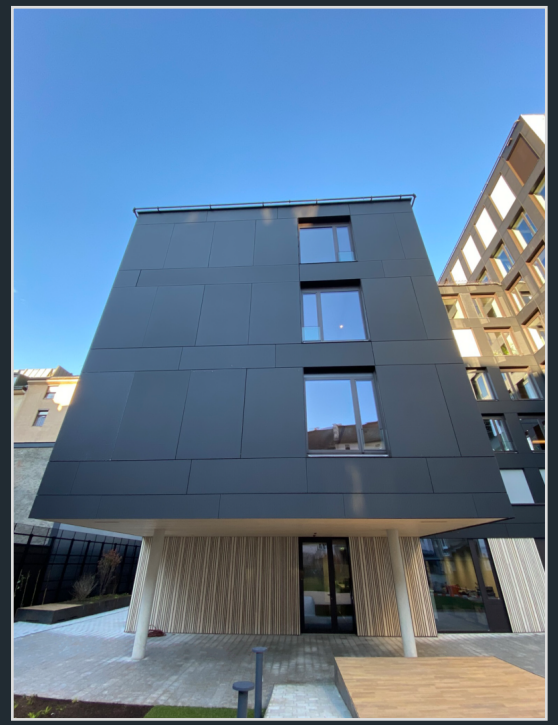


ventilated facades

self–sufficient office building

Tyrol







facades – roof

ventilated facades



self–sufficient
residences



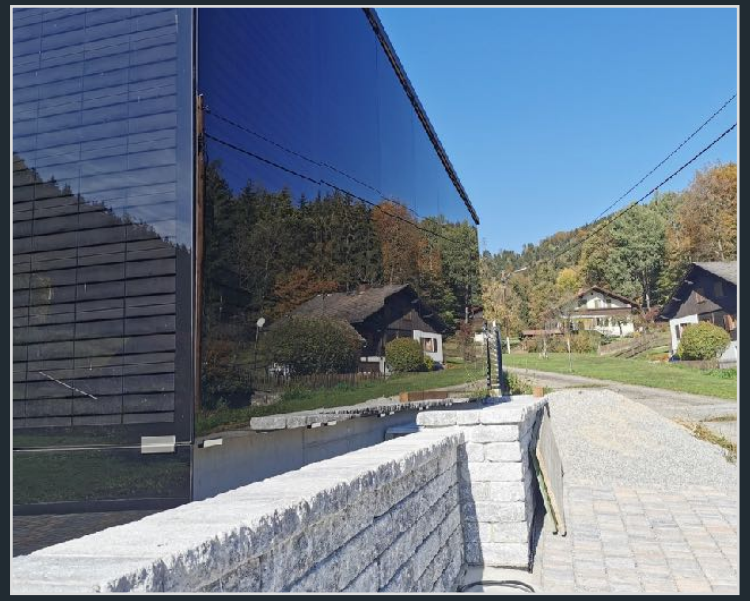
Sonnenpark project

ventilated facades



facades
roofs
balconies
storage





roof & facade



Unique Indoor Parking





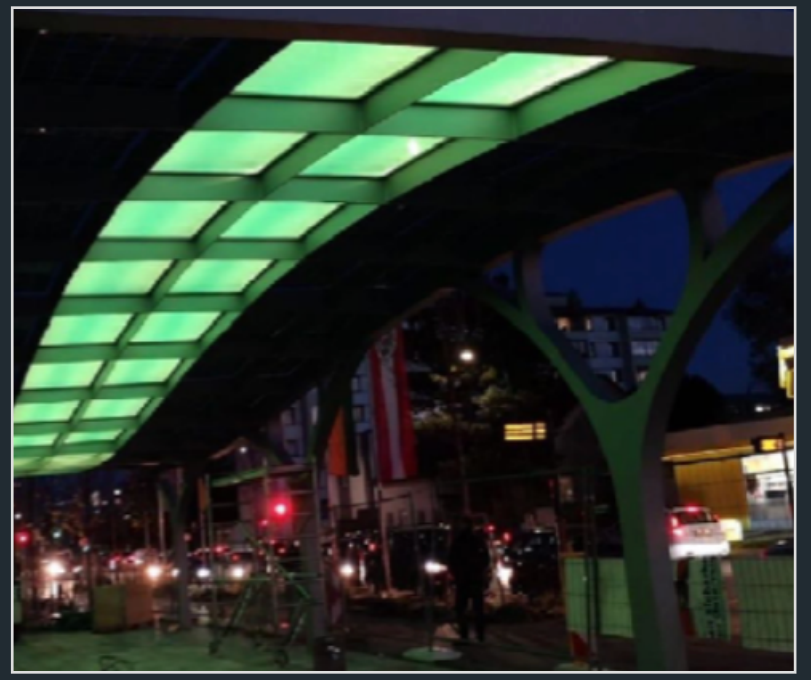


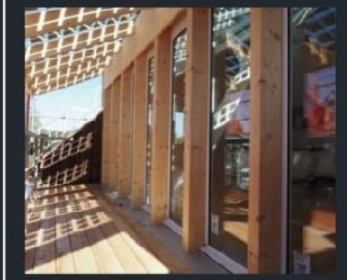
Fehlmann Areal Winterthur



unique projects “the waves”

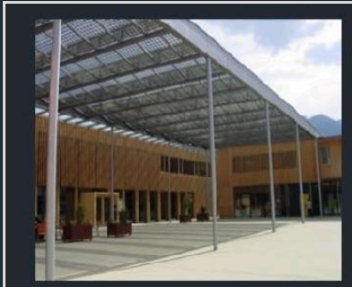
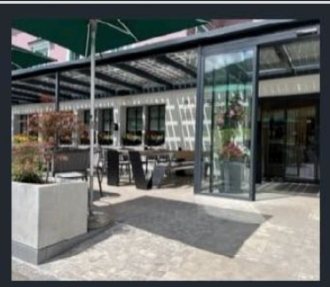
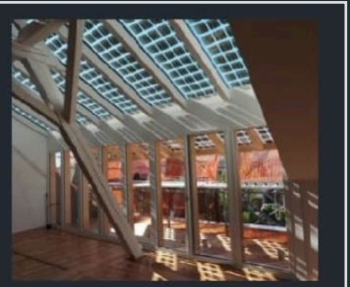








terraces

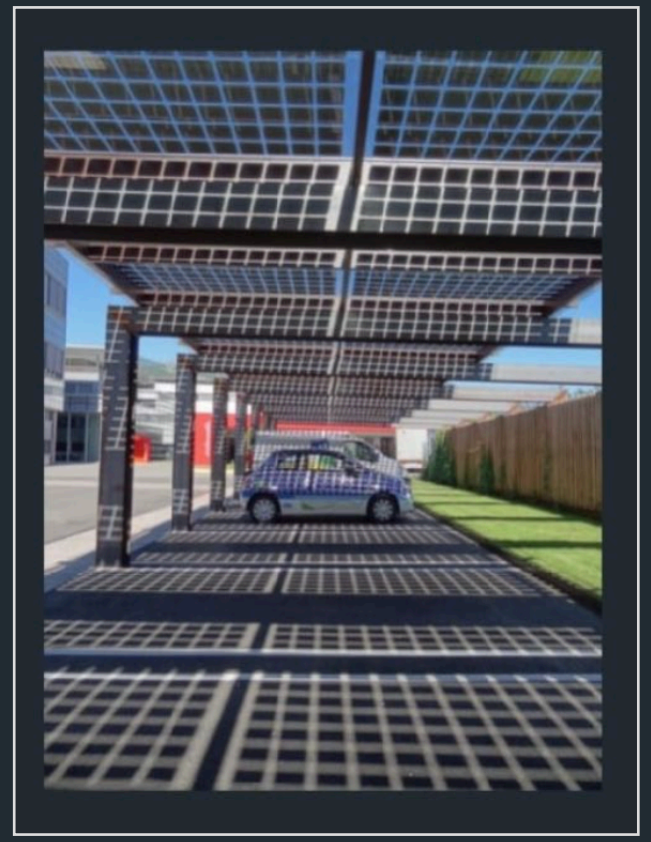




carports









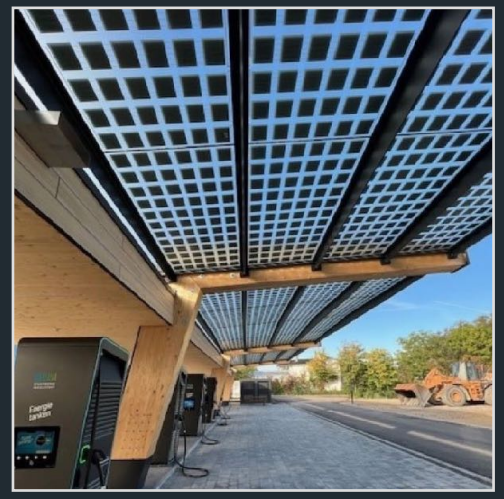




Audi



unique charging hubs



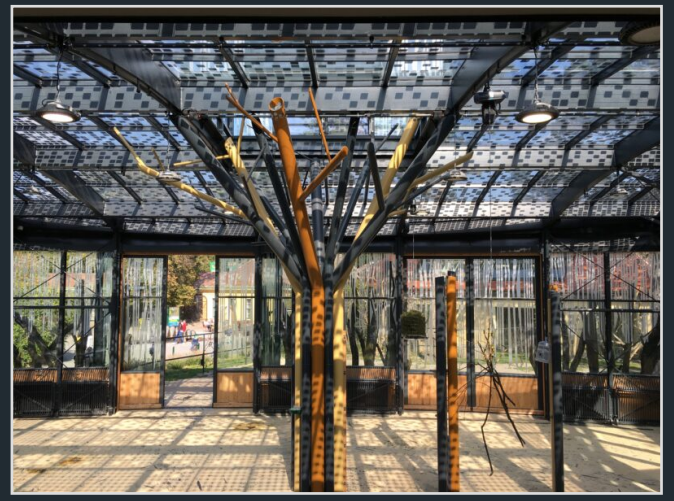






Schönbrunn Zoo

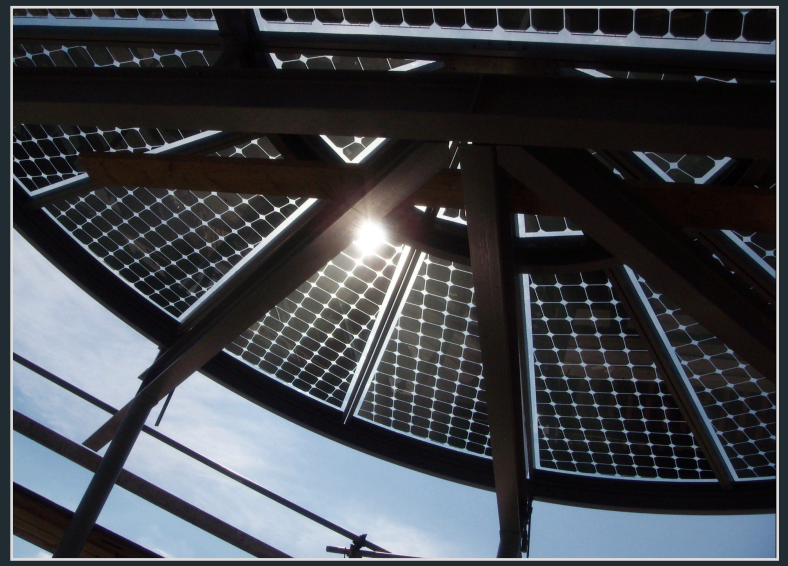






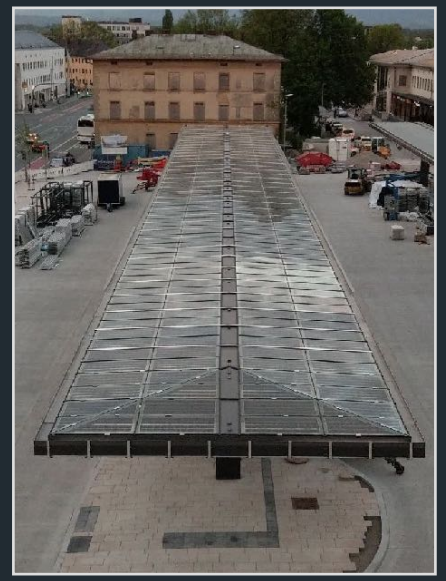
Båstad Tennis Stadium

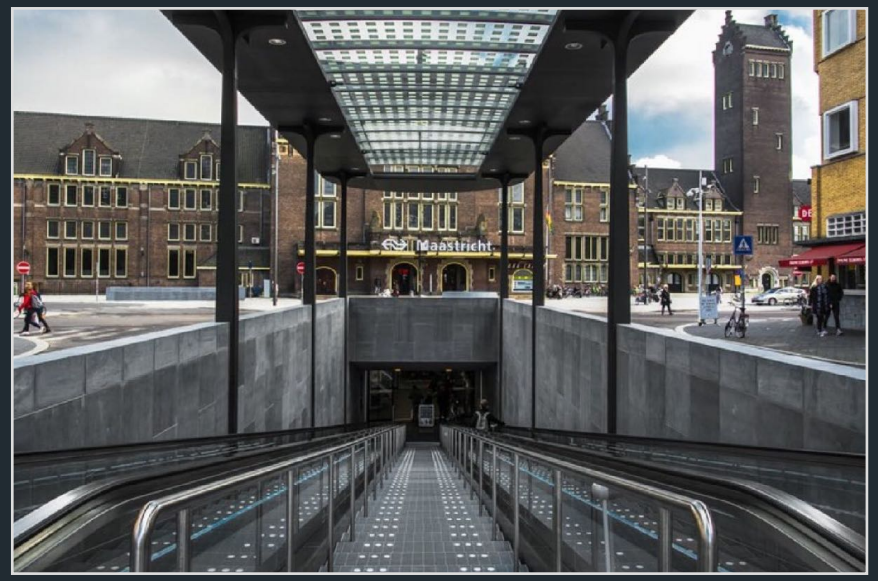




Swedish International Championship





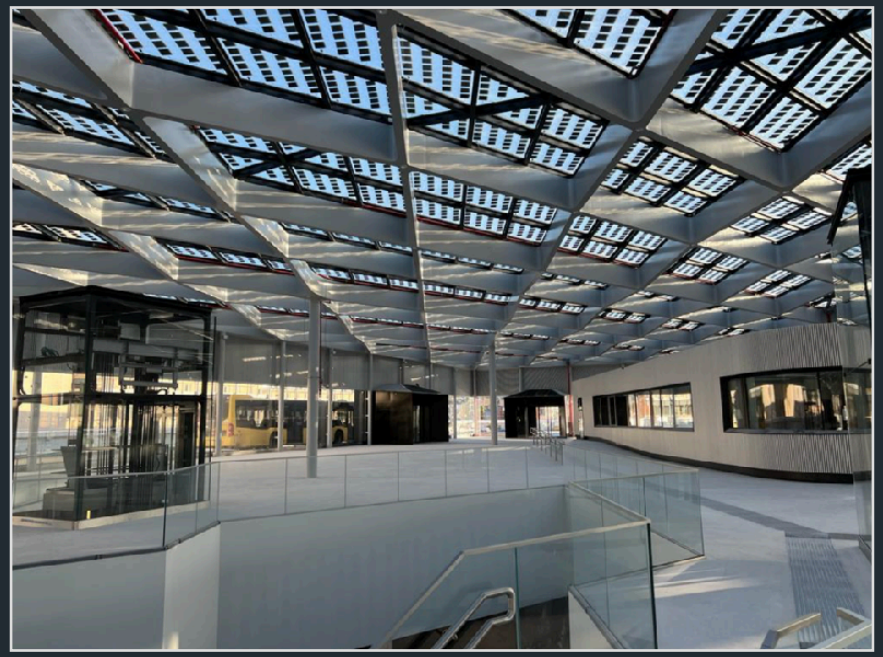


Maastricht



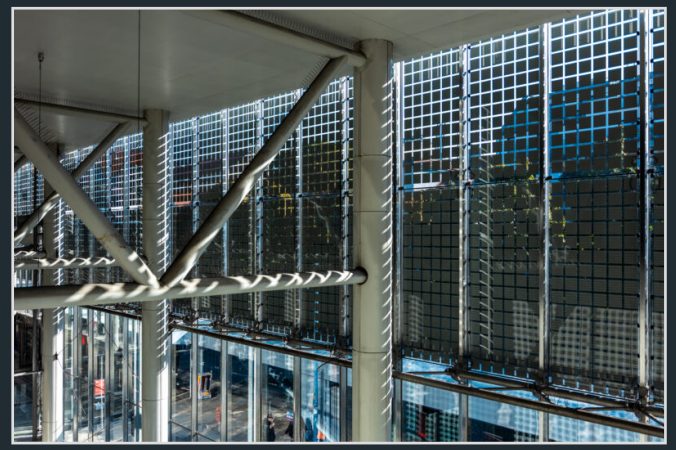
central bus station
8.000 m2
3.560 panels

Belgium

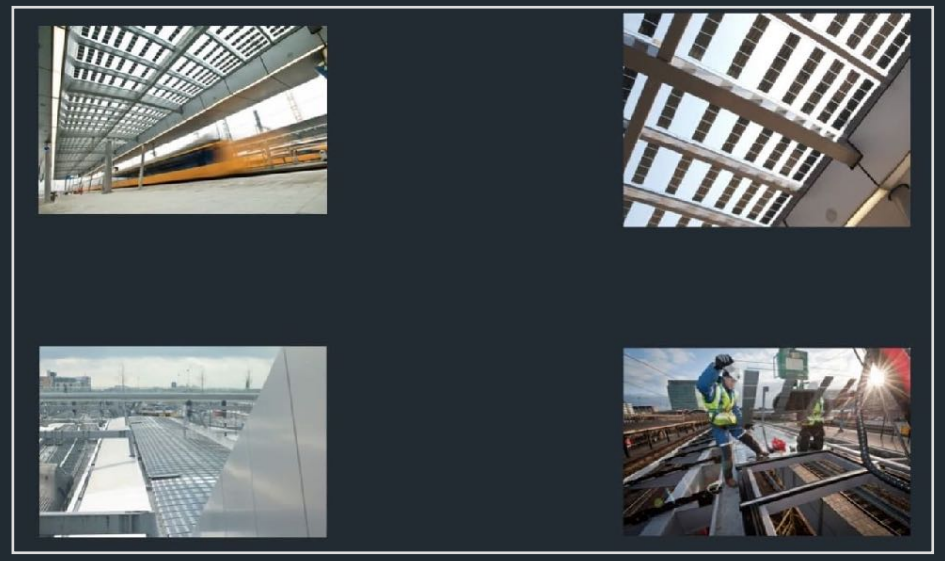




Vienna central train station









Utrecht central train station

panels of any size & shape





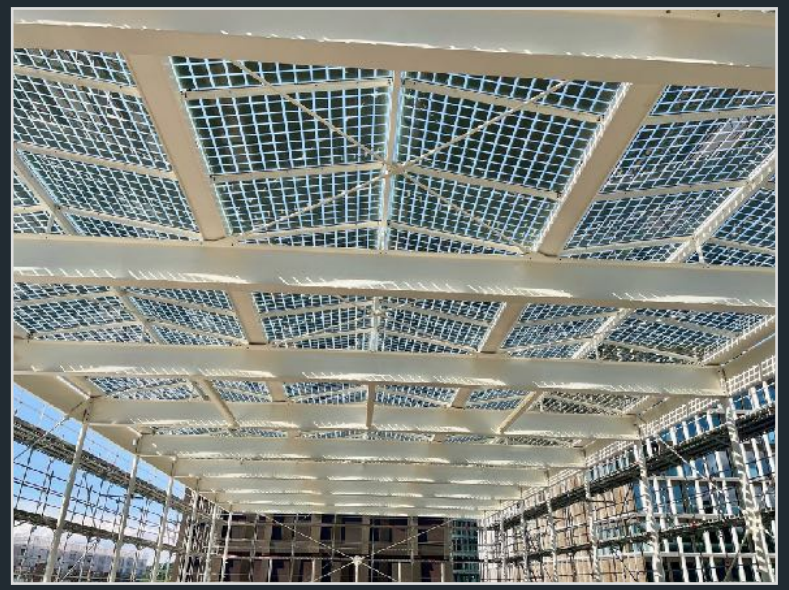
triple–side roof installation



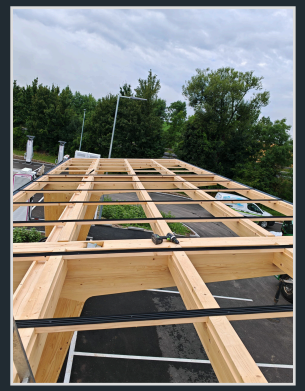
Switzerland

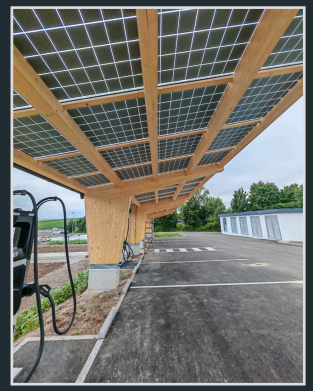


Zurich



Allmend School









public charging stations



wooden constructions



roofs and balconies



roofs
&
canopies




REWE
REWE
REWE
REWE





Unique Projects





perforated transparency







timber frame

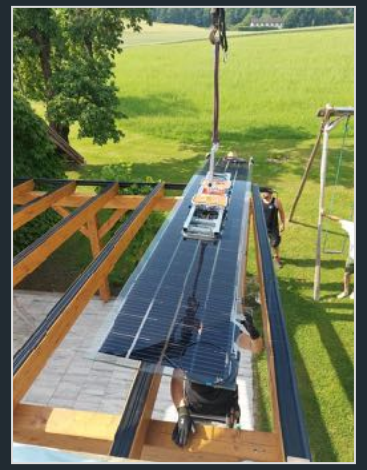


unique wooden construction



Switzerland

unique panels – length 5m









balconies







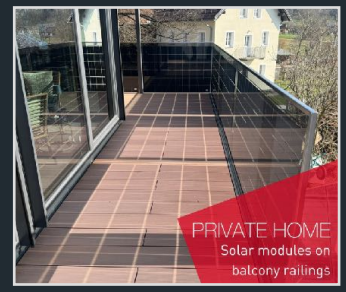












fences & balconies







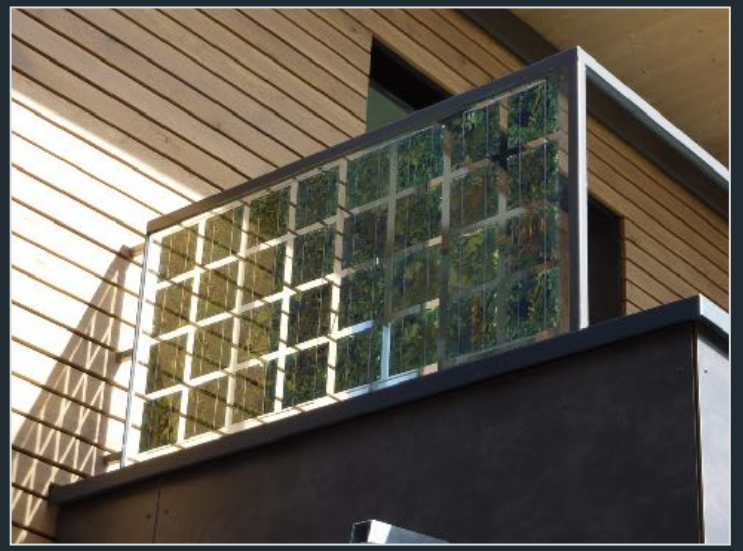




unique flower fence







country house



transparent flower balcony



Tamins
Switzerland

facade & roof installations

facade panels:
designed by Bruno Krucher







Leather Look



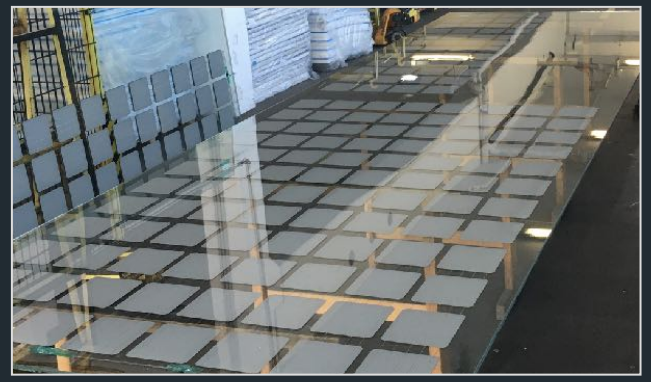


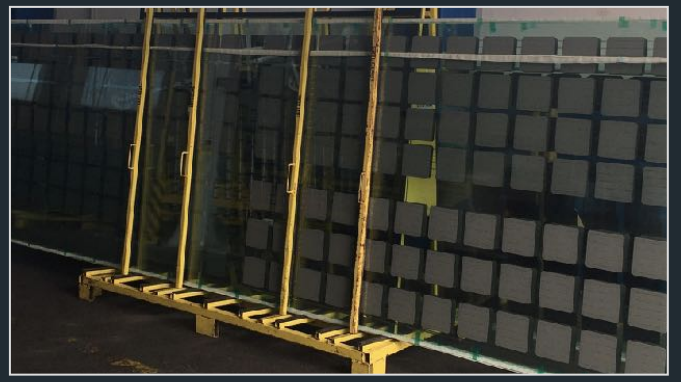
Weisses Schlössli
Davos





public places

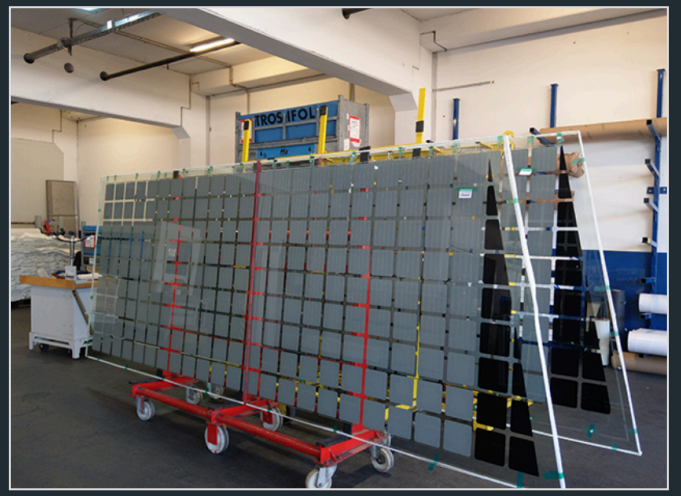




unique huge
custom–made panels
for special projects



5,100 x 2,440 mm
World Record



Austria's most
innovative Companies
at iLab of Austria's Pavilion

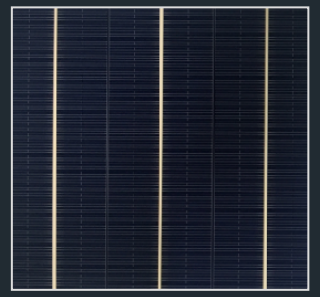


award – perforated cells

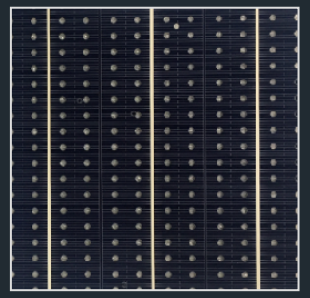


Dubai

handmade process
unique perforated transparency



before



after

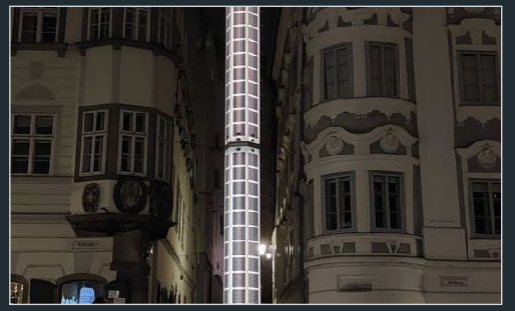


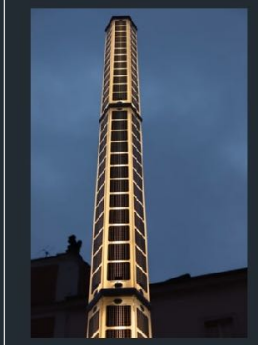
patented technology



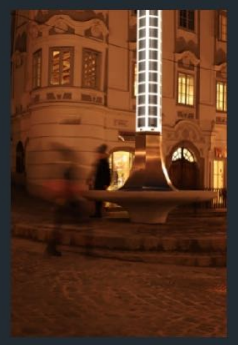
Lichtbrunnen

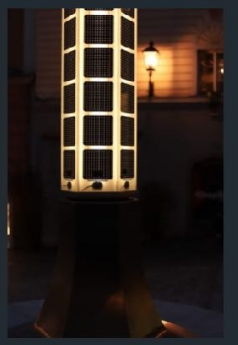
Linz – Austria

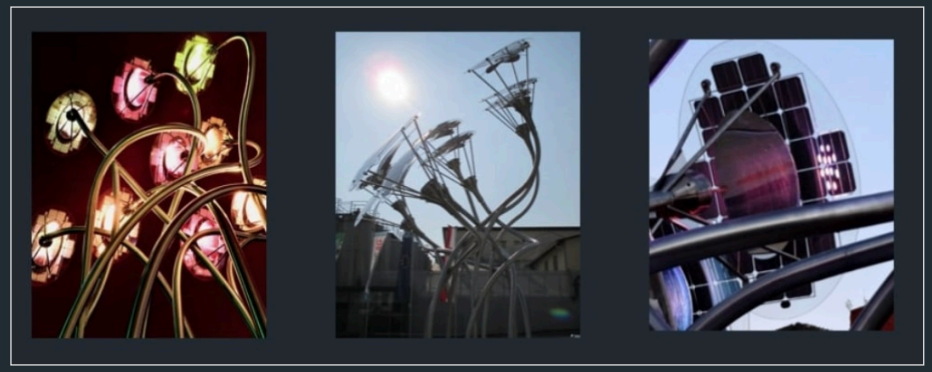












Sonnenblumen

Linz – Austria





ultra–modern museum
Germany





art & technology





Roofing

Balconies

Sky Lights

Spandrels

Brises Soleil

Ventilated Facades

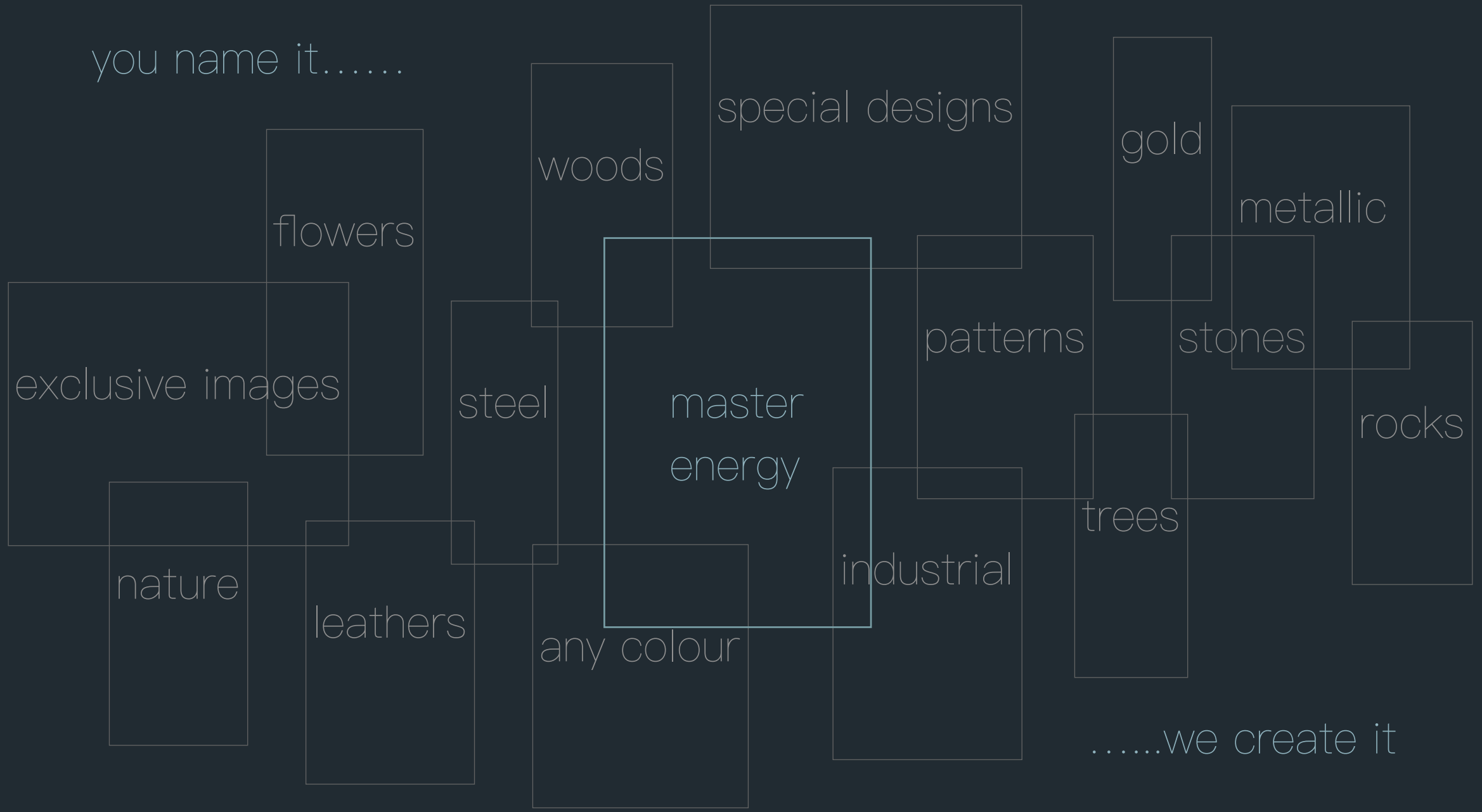
Sound Walls

Curtain Walls

Active Building Skins

Walkable Floor

Canopies & Shade House


you name it.....
special designs
woods
gold
metallic
flowers
exclusive images
steel
master
energy
patterns
stones
rocks
trees
nature
leathers
any colour
industrial
.....we create it

Regulatory Framework & EU Law Compliance

This framework is designed to support informed technical decision-making, strengthen the protection of long-term asset value, and provide owners, designers, consultants and project stakeholders with a clear basis for verification, accountability and risk management.

Master Energy

Solar Must Be Considered From The Building–Design Stage

EU law now requires new buildings to be designed to optimise their solar energy generation potential. Solar is therefore no longer an optional consideration to be addressed after the architecture has been completed — it must be considered from the building-design stage.

European rules progressively require suitable solar installations across defined categories of buildings. The obligation is European. The architectural response remains yours.

This Is Not Our Requirement – It Is EU Building Law

Directive (EU) 2024/1275 — Article 10
Solar Energy in Buildings

Ertex Solar Certifications

ISO 9001 STANDARD – QUALITY
ISO 9001–NORM – QUALITÄT
NORME ISO 9001 – QUALITÉ

ISO 14001 STANDARD – ENVIRONMENT
ISO 14001–NORM – UMGEBUNG
NORME ISO 14001 – ENVIRONNEMENT

IEC 61215 STANDARD – DESIGN QUALIFICATION AND TYPE APPROVAL
NORM IEC 61215 – BAUARTEIGNUNG UND BAUARTZULASSUNG
NORME IEC 61215 – QUALIFICATION DE LA CONCEPTION ET HOMOLOGATION

IEC 61730 STANDARD – SAFETY QUALIFICATION
NORM IEC 61730 – SICHERHEITSQUALIFIKATION
NORME IEC 61730 – SURETÉ DE FONCTIONNEMENT

EN 13501 STANDARD – CLASSIFICATION AND REACTION TO FIRE
NORM EN 13501 – KLASSIFIZIERUNG UND BRANDVERHALTEN
EN 13501– CLASSIFICATION ET REACTION AU FEU

EN 12600 STANDARD – IMPACT AND CLASSIFICATION OF FLAT GLASS
NORM EN 12600 – STOßPRÜFUNG UND KLASSIFIZIERUNG VON FLACHGLAS
NORME EN 12600 – IMPACT ET CLASSIFICATION DU VERRE PLA

ISO 9001	Quality Management
ISO 14001	Environmental management
IEC 61215	Crystalline silicon PV modules
IEC 61730	Operational reliability of PV modules
EN 12543	Laminated safety glass
EN 14449	Conformity assessment safety glass
EN 12600	Glass in construction — pendulum test

. Rigorous testing to meet building construction standards

. Impact tests: 1B1 according to 12600 standard

. Fire test: B s1 d0 according to EN 13501

. Thermal cycles (from –40°C to +85°C), humid environment

(1000h at 85°C and 85% RH), salt fog resistance

We are one of only to hold certifications in construction, electronics and photovoltaic technology

eu standards

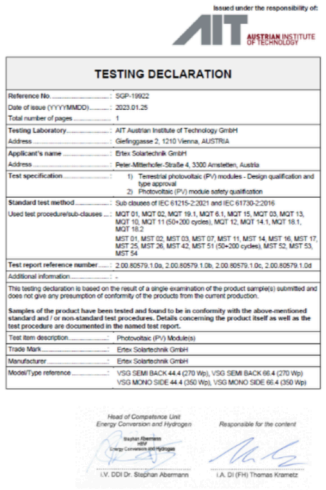
			EN 12758	Glass in building - Sound insulation
			EN 13501 - 1	Fire - Classification from reaction to fire tests
X8	C-Si framing for large area glass	TBD	EN 61730	PV module safety qualification
			EN ISO 12631	Curtain walling - Calculation of thermal transmittance
			EN 13022-1	Glass in building - Structural sealant glazing (SSG)
			**EN 13116	Curtain walling - Resistance to wind load - Requirements
			**EN 12179	Curtain walling - Resistance to wind load - Test
X9 to X11	C-Si semi-transparent low concentration and solar control BIPV system	Skylight	EN 1279-5	Glass in building - Insulating glass units - Conformity
			**EN 13830	Curtain walling - Product standard
			IEC 62108	CPV - Design qualification and type approval
			EN 410	Glass - Light & Solar
			**EN 13363-1	Solar protection devices - Light & Solar
			EN 673/674/675	Glass in building - U Value
		Façade	EN 12758	Glass in building - Sound insulation
			EN 13501 - 1	Fire - Classification from reaction to fire tests
			**EN 13116	Curtain walling - Resistance to wind load - Requirements
			**EN 12179	Curtain walling - Resistance to wind load - Test
X12	Glazed modules treated for improved passive properties	TBD	***EN ISO 12543 1-6	Glass in building - Laminated glass and laminated safety glass
			***EN 14449	Laminated glass
			EN 410	Glass - Light & Solar
			EN 673/674/675	Glass in building - U Value
			IEC 61215 c-Si	Design qualification and type approval
			EN 61730	PV module safety qualification

European Commission

Product		System for demonstration	Relevant standards according with EN 50583:2016	
X1/ X3	CIGS roofing shingle on metal substrate	Roofing shingles	IEC 61646 a-Si	TF modules - Design qualification and type approval
			EN 61730	PV module safety qualification
			50583-2 Annex A	PV in buildings. Rain penetration test
			EN 13501 - 1	Fire - Classification from reaction to fire tests
X2	CIGS large area flexible roofing membrane and bendable elements	Roofing membrane	IEC 61646 a-Si	TF modules - Design qualification and type approval
			EN 61730	PV module safety qualification
			**EN 13363-1	Solar protection devices - Light & Solar
			50583-2 Annex A	PV in buildings. Rain penetration test
			EN 13956	Flexible sheet for waterproofing
			EN 13501 - 1	Fire - Classification from reaction to fire tests
			EN 16002	Flexible sheets for waterproofing - Resistance to wind load
X4	CIGS large area elements on metal substrate	Large area tiles façade	IEC 61646 a-Si	TF modules - Design qualification and type approval
			EN 61730	PV module safety qualification
		Roof tiles on metal	EN ISO 6946	Construction - Thermal transmittance
			EN 14782-3	Self-supporting metal sheet (roofing, cladding, lining)
			EN 14783	Supported metal sheet and strip for roofing, cladding, lining
		Large area roofing shingles	EN 13501 - 1,2,5	Fire - Classification from reaction to fire tests
			**EN 13116	Curtain walling - Resistance to wind load - Requirements
			**EN 12179	Curtain walling - Resistance to wind load - Test
X5	C-Si glazed products with hidden bus bars and L interconnections	Ventilated façade	EN ISO 12543 1-6	Glass in building - Laminated glass and laminated safety glass
			EN 14449	Laminated glass
			IEC 61215 c-Si	c-Si modules - Design qualification and type approval
			EN 61730	PV module safety qualification
			EN 13501 - 1,2	Fire - Classification from reaction to fire tests
			**EN 13116	Curtain walling - Resistance to wind load - Requirements
			**EN 12179	Curtain walling - Resistance to wind load - Test
X6	Glass-glass products with back contact c-Si cells	Ventilated façade	IEC 61215 c-Si	c-Si modules - Design qualification and type approval
			EN 61730	PV module safety qualification
			*EN 410	Glass - Light & Solar
			*EN ISO 12543 1-6	Glass in building - Laminated glass and laminated safety glass
			*EN 12758	Glass in building - Sound insulation
			*EN 12600	Glass in building - Pendulum test
			*EN 13501 - 1,1	Fire - Classification from reaction to fire tests
			**EN 13116	Curtain walling - Resistance to wind load - Requirements
			**EN 12179	Curtain walling - Resistance to wind load - Test
X7	Curved glass-glass, CIGS technology	TBD	EN ISO 12543 1-6	Glass in building - Laminated glass and laminated safety glass
			EN 14449	Laminated glass
			EN 61730	PV module safety qualification
			EN 673/674/675	Glass in building - U Value

Zertifikate

EN61215-2/EN61730



Issued under the responsibility of:

AIT AUSTRIAN INSTITUTE OF TECHNOLOGY

TESTING DECLARATION

Reference No.	SGP-19922
Date of issue (YYYY/MM/DD)	2023.01.25
Total number of pages	1
Testing Laboratory	AIT Austrian Institute of Technology GmbH
Address	Giefinggasse 2, 1210 Vienna, AUSTRIA
Applicant's name	Ertex Solartechnik GmbH
Address	Peter-Mitterhofer-Straße 4, 3300 Amstetten, Austria
Test specification	1) Terrestrial photovoltaic (PV) modules - Design qualification and type approval 2) Photovoltaic (PV) module safety qualification
Standard test method	Sub-clauses of IEC 61215-2:2021 and IEC 61730-2:2016
Used test procedure/sub-clauses	MQT 01, MQT 02, MQT 19.1, MQT 6.1, MQT 15, MQT 03, MQT 13, MQT 10, MQT 11 (50×300 cycles), MQT 12, MQT 14.1, MQT 18.1, MQT 18.2 MST 01, MST 02, MST 03, MST 07, MST 11, MST 14, MST 16, MST 17, MST 25, MST 26, MST 42, MST 51 (50×200 cycles), MST 52, MST 53, MST 54
Test report reference number	2.00.80579.1.0a, 2.00.80579.1.0b, 2.00.80579.1.0c, 2.00.80579.1.0d
Additional information	

This testing declaration is based on the result of a single examination of the product sample(s) submitted and does not give any presumption of conformity of the products from the current production.

Samples of the product have been tested and found to be in conformity with the above-mentioned standard and / or non-standard test procedures. Details concerning the product itself as well as the test procedure are documented in the named test report.

Test item description	Photovoltaic (PV) Module(s)
Trade Mark	Ertex Solartechnik GmbH
Manufacturer	Ertex Solartechnik GmbH
Model/Type reference	VSG SEMI BACK 44.4 (270 Wp), VSG SEMI BACK 66.4 (270 Wp) VSG MONO SIDE 44.4 (350 Wp), VSG MONO SIDE 66.4 (350 Wp)

Head of Competence Unit Energy Conversion and Hydrogen — *Responsible for the content*

i.V. DDI Dr. Stephan Abermann — i.A. DI (FH) Thomas Krametz

Kugelfall / Pendelschlag



Stadt Wien | Prüf-, Inspektions- und Zertifizierungsstelle

ertex solartechnik GmbH
z.H. Herrn Ing. Christian ULRICH
Peter-Mitterhofer-Straße 4
3300 Amstetten

per E-Mail an: christian.ulrich@ertex-solar.at

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Fax +43 1 4000 99 8039
post@ma39.wien.gv.at
ma39.wien.at

MA 39 - 21-03445

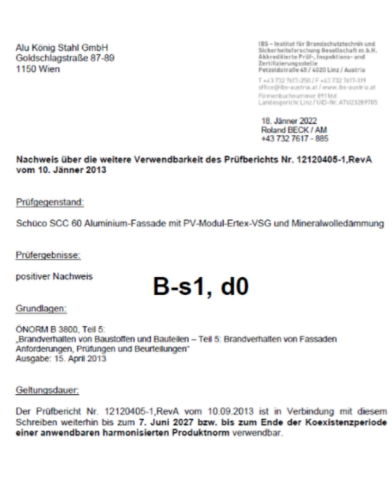
Wien, 31. August 2021
Gesamtseiten: 8

Prüfbericht

über Kugelfall- und Pendelschlagprüfungen an Verbundglas mit Photovoltaik-Einlagen

Auftraggeber/ Werk	ertex solartechnik GmbH, Peter-Mitterhofer-Straße 4, 3300 Amstetten
Auftragsdatum	13. April 2021
Prüfgut	Verbundglas mit Photovoltaik-Zellnetz aus 2 x 6 mm Einscheiben-Sicherheitsglas beziehungsweise 2 x 6 mm teilvorgespanntem Glas
Prüfguteingang	10. Juni 2021
Auftrag	Kugelfallprüfung gemäß ÖNORM EN 14449 sowie Pendelschlagprüfung gemäß ÖNORM EN 12600

FEUER PRÜFUNG



Alu König Stahl GmbH
Goldschlagstraße 87-89
1150 Wien

IBS – Institut für Brandschutztechnik und Sicherheitsforschung Gesellschaft m.b.H.
Akkreditierte Prüf-, Inspektions- und Zertifizierungsstelle
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office@ibs-austria.at / www.ibs-austria.at
Firmenbuchnummer 89156t
Landesgericht Linz / UID-Nr. ATU33287705

18. Jänner 2022
Roland BECK / AM
+43 732 7617 - 885

Nachweis über die weitere Verwendbarkeit des Prüfberichts Nr. 12120405-1,RevA vom 10. Jänner 2013

Prüfgegenstand:

Schüco SCC 60 Aluminium-Fassade mit PV-Modul-Ertex-VSG und Mineralwolledämmung

Prüfergebnisse:

positiver Nachweis

B-s1, d0

Grundlagen:

ÖNORM B 3800, Teil 5:
„Brandverhalten von Baustoffen und Bauteilen – Teil 5: Brandverhalten von Fassaden Anforderungen, Prüfungen und Beurteilungen"
Ausgabe: 15. April 2013

Geltungsdauer:

Der Prüfbericht Nr. 12120405-1,RevA vom 10.09.2013 ist in Verbindung mit diesem Schreiben weiterhin bis zum **7. Juni 2027 bzw. bis zum Ende der Koexistenzperiode einer anwendbaren harmonisierten Produktnorm** verwendbar.

abZ Approval (DIBt Germany)

One of the world's most demanding engineering approvals for structural construction technologies

Deutsches Institut für Bautechnik

DIBt

Independent validation of **Ertex Solar's** proprietary core technology, setting a global benchmark for structural integrity, durability and long-term performance

Stadt Wien | Prüf-, Inspektions- und Zertifizierungsstelle

ertex solartechnik GmbH
z.H. Herrn Ing. Christian ULRICH
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per E-Mail an: christian.ulrich@ertex-solar.at

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ma39.wien.at

MA 39 – 23-08415

Wien, 7. September 2023
Gesamtseiten: 8

Prüfbericht

über Kugelfall- und Pendelschlagprüfungen an Verbund-Sicherheitsglas mit Photovoltaik-Einlagen

Auftraggeber/ Werk	ertex solartechnik GmbH, Peter-Mitterhofer-Straße 4, 3300 Amstetten
Auftragsdatum	13. April 2021
Prüfgut	Verbund-Sicherheitsglas mit Photovoltaik-Zellnetz aus 2 x 6 mm Einscheiben-Sicherheitsglas beziehungsweise 2 x 6 mm teilvorgespanntem Glas
Prüfguteingang	10. Juni 2021
Auftrag	Kugelfallprüfung gemäß ÖNORM EN 14449 sowie Pendelschlagprüfung gemäß ÖNORM EN 12600

Dieser Bericht ersetzt den Bericht MA 39 – 21-03445. Der ersetzte Bericht verliert damit seine Gültigkeit und darf nicht weiter verwendet werden. Der Austausch des Originals und aller Kopien fällt in den Verantwortungsbereich des Auftraggebers. Gegenüber dem Bericht MA 39 – 21-03445 wurde der Begriff Verbundglas durch Verbund-Sicherheitsglas (mit Stoffbezeichnung) ersetzt.

Zertifizierungsstelle für Produkte gemäß der ÖNORM EN ISO 9001:2015 und der ÖNORM B 2110: 2021-01-01 durch die Quality Austria. Akkreditiert als Prüf- und Inspektionsstelle gemäß ÖNAK gemäß Bescheid des Bundesministeriums für Digitalisierung und Wirtschaftsstandort vom Datum ÖNORM EN ISO/IEC 17020 und ÖNORM EN ISO/IEC 17025. Akkreditiert als Zertifizierungsstelle gemäß ÖNAK gemäß Bescheid des Bundesministeriums für Digitalisierung und Wirtschaftsstandort vom Datum ÖNORM EN ISO/IEC 17065. Notifizierte Stelle (Notified Body) gemäß Bauproduktenverordnung (EU) Nr. 305/2011 unter der Kennnummer 1020. Die Liste der Prüfgebiete finden Sie unter http://www.austrian-accreditation.at. Prüfergebnisse beziehen sich ausschließlich auf die Prüfgegenstände. Veröffentlichungen, Auszüge, Kopien bedürfen der schriftlichen Genehmigung der MA 39.
Bitte beachten Sie die durch gültigen Allgemeinen Geschäftsbedingungen der MA 39 im Internet unter ma39.wien.at.
Information gemäß Artikel 13 DSGVO: Ihre dabei über Ihre Person der Tätigkeiten der MA 39 erhobene Daten automatisiert verarbeitet und elektronisch archiviert.
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1 Allgemeines

1.1 Auftrag

Die ertex solartechnik GmbH beauftragte die Magistratsabteilung 39 mit der Kugelfallprüfung gemäß ÖNORM EN 14449 sowie der Pendelschlagprüfung gemäß ÖNORM EN 12600 an unten beschriebenen Prüfgut.

1.2 Prüftermin

Die Kugelfallprüfung erfolgte am 26. Juli 2021. Die Pendelschlagprüfung erfolgte am 18. Juni 2021.

1.3 Verwendete Unterlagen

Die im Folgenden angeführten Unterlagen wurden für die Erstellung des Berichtes herangezogen und sind, soweit dies im Text erforderlich ist, nur mehr unter der Angabe der laufenden Nummer "[ ]" zitiert:

[1] ÖNORM EN 14449, Glas im Bauwesen – Verbundglas und Verbund-Sicherheitsglas – Konformitätsbewertung/Produktnorm, Ausgabe 1. Juli 2005
[2] ÖNORM EN 12600 Glas im Bauwesen – Pendelschlagversuch – Verfahren für die Stoßprüfung und die Klassifizierung von Flachglas, Ausgabe 1. Mai 2003

1.4 Prüfmittel

Kugelfall-Prüfrahmen:	Inventarnummer 6367
Stahlkugel:	Inventarnummer 9494
Pendelschlagprüfstand:	Inventarnummer 5681
Bügelmessschraube:	Inventarnummer 5756
Maßband:	Inventarnummer 5456

1.5 Prüfgut

Am 10. Juni 2021 wurden vom Auftraggeber folgende Gläser angeliefert.

- je 3 Stück Verbund-Sicherheitsglas, mit Photovoltaik-Einlage
  L x B = 500 mm x 500 mm
  aus 2 x 6 mm Einscheiben-Sicherheitsglas
- je 3 Stück Verbund-Sicherheitsglas, mit Photovoltaik-Einlage
  L x B = 500 mm x 500 mm
  aus 2 x 6 mm teilvorgespanntem Glas
- je 4 Stück Verbund-Sicherheitsglas, mit Photovoltaik-Einlage
  L x B = 876 mm x 1938 mm
  aus 2 x 6 mm Einscheiben-Sicherheitsglas

- je 4 Stück Verbund-Sicherheitsglas, mit Photovoltaik-Einlage
  L x B = 876 mm x 1938 mm
  aus 2 x 6 mm teilvorgespanntem Glas

Die Gläser waren eben und wiesen keinerlei augenscheinlich erkennbare Beschädigungen auf. Die Kanten der Prüfkörper waren symmetrisch ausgeführt, abgefast und die Seitenkanten geschliffen.

Die Verbund-Sicherheitsgläser aus Einscheiben-Sicherheitsglas wiesen im Eckbereich einen Email-Stempel auf:

„ERTEX A CE EN 12150 ESG"

Die Verbund-Sicherheitsgläser aus teilvorgespanntem Glas wiesen im Eckbereich einen Email-Stempel auf:

„ERTEX A CE EN 1863 TVG Z-70.4-93"

2 Versuchsdurchführung

2.1 Kugelfallprüfung

Die Durchführung der Kugelfallprüfung erfolgte gemäß [1], Punkt C.2, mit einer Probenanzahl von je 3 Stück pro Glastype.

Es wurde der Prüfrahmen für Kugelfallprüfungen gemäß [1], Pkt. C.2.2 herangezogen. Der Aufprallpunkt wurde im diagonalen Schnittpunkt der Gläser (innerhalb eines Kreises von 100 mm Durchmesser) sowie 4,00 m über der Glasoberfläche eingemessen. Die Bruchbilder gehen aus Bild 1 bis 5 hervor.

Die Temperatur im Prüfraum betrug 28°C, die relative Luftfeuchtigkeit betrug 47 %.

Die Dicke wurde an jeder Probe ermittelt. Die detaillierten Messergebnisse werden seitens der Magistratsabteilung 39 in Evidenz gehalten.

Die Ergebnisse der Kugelfallprüfung für VSG aus 2 x ESG sind in Tabelle 1 angeführt.

Glasart	Ergebnis
2 x 6 mm ESG	Versuch 1: kein Bruch, beide Gläser blieben intakt
	Versuch 2: Bruch beider Gläser
	Versuch 3: Bruch des oberen, aufprallseitigen Glases

Tabelle 1: Prüfergebnisse der Kugelfallprüfung für VSG aus 2 x 6 mm ESG

Die Ergebnisse der Pendelschlagprüfung für VSG aus 2 x 6 mm ESG gehen aus Tabelle 3 hervor:

Probe Nr.	Fallhöhe			Anmerkung
	190 mm	450 mm	1200 mm	
1	i.O.	i.O.	i.O.	kein Bruch
2	i.O.	i.O.	i.O.	
3	i.O.	i.O.	i.O.	
4	i.O.	i.O.	i.O.	

Tabelle 3, Ergebnisse der Pendelschlagprüfung für VSG aus 2 x 6 mm ESG

Die Ergebnisse der Pendelschlagprüfung für VSG aus 2 x 6 mm TVG gehen aus Tabelle 4 hervor:

Probe Nr.	Fallhöhe			Anmerkung
	190 mm	450 mm	1200 mm	
1	i.O.	i.O.	i.O.	kein Bruch
2	i.O.	i.O.	i.O.	
3	i.O.	i.O.	i.O.	
4	i.O.	i.O.	i.O.	

Tabelle 4, Ergebnisse der Pendelschlagprüfung für VSG aus 2 x 6 mm TVG

Michael Chval — Der Sachbearbeiter Ing. Michael Chval

Dieter Werner — Der Laborleiter Dipl.-Ing. Dieter Werner, MSc Oberstadtbaurat

Georg Pommer — Der Leiter der Prüf-, Inspektions- und Zertifizierungsstelle Dipl.-Ing. Georg Pommer Senatsrat

Das Dokument wurde elektronisch signiert (Aussteller: Stadt Wien Benutzer C9 A 2). Die händische Unterschrift wurde aus Sicherheitsgründen entfernt. Sollten Sie ein Dokument in Papierform mit händischen Unterschriften benötigen, kann dieses bei der MA 39 per Mail (post@ma39.wien.gv.at) angefordert werden.

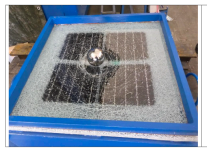


Bild Nr. 1
(P1040018.JPG)

VSG aus ESG
Glas 2,
Bruch beider Gläser

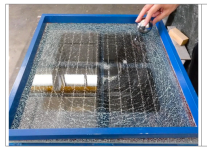


Bild Nr. 2
(P1040025.JPG)

VSG aus ESG
Glas 3,
Bruch des oberen Glases



Bild Nr. 4
(P1040056.JPG)

VSG aus TVG,
Glas 2,
Bruch beider Gläser

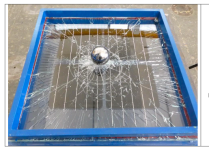


Bild Nr. 5
(P1040059.jpg)

VSG aus TVG,
Glas 3,
Bruch beider Gläser

Die Ergebnisse der Kugelfallprüfung für VSG aus 2 x TVG sind in Tabelle 2 angeführt.

Glasart	Ergebnis
2 x 6 mm TVG	Versuch 1: Bruch des unteren, aufprall-abgewandten Glases
	Versuch 2: Bruch beider Gläser
	Versuch 3: Bruch beider Gläser

Tabelle 2: Prüfergebnisse der Kugelfallprüfung für VSG aus 2 x 6 mm TVG

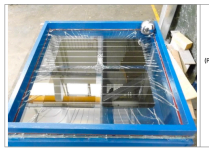


Bild Nr. 3
(P1040043.JPG.jpg)

VSG aus TVG,
Glas 1,
Bruch des unteren Glases

2.2 Pendelschlag

Die Durchführung der Pendelschlagprüfung erfolgte gemäß [2], Punkt 5.

Die Dicke wurde an jeder Probe ermittelt. Die detaillierten Messergebnisse werden seitens der Magistratsabteilung 39 in Evidenz gehalten.

Die Temperatur im Prüfraum betrug 26°C, die relative Luftfeuchtigkeit 45 %.

Der Einbau eines Verbund-Sicherheitsglases im Pendelschlag-Prüfstand ist in Bild 6 dargestellt.



Bild Nr. 6 (P1030533.JPG)

Verbund-Sicherheitsglas im Pendelschlag-Prüfstand

Institut für Brandschutztechnik und Sicherheitsforschung

Prüfbericht

Prüfgegenstand: Rückseite PV-Paneel „Ertex VSG"

Auftraggeber	**ertex-solartechnik GmbH** Peter-Mitterhofer-Straße 4 3300 Amstetten Österreich
Prüfgrundlagen	EN 13823:2020
Prüfdatum	09.02.2026
Geprüfte Stärke	13,5 mm
Probeneingang	27.01.2026
Prüfergebnisse	$FIGRA_{0,2}$ 59 $FIGRA_{0,4}$ 59 THR_{600s} 3,4 LFS < Rand des Probekörpers: ja FDP_{1200s} und FDP_{1-12} in den ersten 600 Sekunden nein SMOGRA: 1 TSP_{600s}: 4
Bearbeiter	Roland Beck

Bericht Nr.: **326011502-1**
Berichtsdatum: 18.04.2026
BecR / MarR

Dieser Prüfbericht enthält:
8 Textseiten und 3 Anlagen (siehe Seite 2)

Die Ergebnisse des Prüfberichtes beziehen sich nur auf die geprüften Gegenstand wie erhalten.

IBS – Institut für Brandschutztechnik und Sicherheitsforschung Gesellschaft m.b.H.
Prüf-, Inspektions- und Zertifizierungsstelle
Petzoldstraße 45 | 4020 Linz | Austria
T +43 732 7617-250 | F +43 732 7617-119 | office@ibs-austria.at | www.ibs-austria.at
Firmenbuchnummer 97116d | Landesgericht Linz | UID-Nr. ATU72389705

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1. Einleitung

Dieser Klassifizierungsbericht definiert die Klassifizierung, die dem Bauprodukt PV-Paneel „Ertex VSG" in Übereinstimmung mit dem Verfahren nach EN 13501-1:2018 zugeordnet wird.

2. Details zum klassifizierten Bauprodukt

2.1. Allgemeines

Das Bauprodukt PV-Paneel „Ertex VSG" gehört dem Produkttyp „vorgehängte hinterlüftete Fassade" an.

2.2. Produktbeschreibung

Beim Bauprodukt PV-Paneel „Ertex VSG" handelt es sich um die Rückseite einer PV-Fassadenplatte.

Eine genauere Beschreibung ist in den Berichten, auf die in 3.1 Bezug genommen wird, zu finden.

3. Prüfberichte und Ergebnisse als Grundlage dieser Klassifizierung

3.1. Berichte

Name der Prüfstelle[1]	Name des Auftraggebers	Nr. des Berichts	Prüfverfahren und Datum
IBS	ertex-solartechnik GmbH	326011502-1	EN 13823:2020
IBS	ertex-solartechnik GmbH	326011502-2	EN ISO 11925-2:2020

[1] **Name/Adresse sowie Notifizierungsnummer / Status der Prüfstelle:**
IBS - IBS - Institut für Brandschutztechnik und Sicherheitsforschung Gesellschaft m.b.H., Petzoldstraße 45, 4020 Linz / Österreich, Notifizierungsnummer: 1322

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4. Klassifizierung und Anwendungsbereich

4.1. Referenz zur Klassifizierung

Diese Klassifizierung wurde nach EN 13501-1:2018 durchgeführt.

4.2. Klassifizierung

Das Bauprodukt PV-Paneel „Ertex VSG" wird in Bezug auf sein Brandverhalten wie folgt klassifiziert:

B

Die Zusätzliche Klassifizierung in Bezug zur Rauchentwicklung ist:

s1

Die Zusätzliche Klassifizierung in Bezug auf das brennende Abtropfen/Abfallen ist:

d0

Das Format der Klassifizierung des Brandverhaltens für Bauprodukte mit Ausnahme von Bodenbelägen und Rohrisolierungen ist:

Brandverhalten		Rauchentwicklung			brennendes Abtropfen	
B	-	s	1	,	d	0

d.h.: **B-s1,d0**

Klassifizierung des Brandverhaltens: B-s1,d0

4.3. Anwendungsbereich

Diese Klassifizierung ist für die folgenden Produktparameter gültig:

- Produktaufbau wie geprüft (siehe Prüfberichte nach 3.1)

Diese Klassifizierung ist für die folgenden Endanwendungen gültig:

- Das Bauprodukt darf nur auf Untergründen entsprechend den Euroklassen A1 oder A2-s1,d0 (ausgenommen Gipsplatten) eingesetzt werden, mit einer Mindestdicke von 9 mm und einer Mindestrohdichte von 870 kg/m³.
- Das Bauprodukt darf nur mit Hinterlüftung verwendet werden.
- Als Wand- und Deckenbekleidung anwendbar.
- Horizontale und vertikale Fugen sind nicht zulässig.
- Nicht horizontal als Bodenbelag anwendbar.
- Diese Klassifizierung ist nur für die Rückseite des PV-Paneels anwendbar.

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5. Einschränkungen

Das Klassifizierungsdokument stellt keine Typgenehmigung oder Zertifizierung des Produktes dar.

Generell erlischt die Gültigkeit, wenn der Auftraggeber unzulässige technische Veränderungen vornimmt und die dem gegenständlichen Klassifizierungsbericht zu Grunde liegenden Zusammensetzungen über- bzw. unterschreitet (siehe Prüfberichte).

Weiters erlischt die Gültigkeit durch Änderungen in den verwendetet Prüf- und Klassifizierungsnormen und allenfalls beschränkende Bestimmungen in zukünftig erscheinenden Produktnormen.

IBS-Institut für Brandschutztechnik und Sicherheitsforschung Gesellschaft m.b.H.
Akkreditierte Prüf-, Inspektions- und Zertifizierungsstelle

Unterzeichner	Roland Beck
Datum/Zeit-UTC	2026-04-20T08:49:50+02:00
Prüfung	Siehe http://www.signaturpruefung.gv.at
Hinweis	Diese Unterschrift ist gemäß EU-Verordnung Nr. 910/2014 (eIDAS) der handschriftlichen Unterschrift gleichgestellt.

Ing. Roland BECK
Techniker

Unterzeichner	Josef Stockinger
Datum/Zeit-UTC	2026-04-20T13:41:29+02:00
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Hinweis	Diese Unterschrift ist gemäß EU-Verordnung Nr. 910/2014 (eIDAS) der handschriftlichen Unterschrift gleichgestellt.

Ing. Josef STOCKINGER
Zeichnungsberechtigter

3.2. Ergebnisse

Rückseite

Prüfverfahren und Prüfbericht Nr.	Parameter	Anzahl der Prüfungen	Prüfergebnisse: stetige Parameter Mittelwert (m)	Prüfergebnisse: Übereinstimmung mit den Parametern / Grenzwerte aus EN 13501-1
EN 13823 326011502-1	$FIGRA_{0,2}$ [W/s]	3	59	übereinstimmend B: ≤ 120 W/s
	THR_{600s} [MJ]		3,4	übereinstimmend B: ≤ 7,5 MJ
	SMOGRA [m²/s²]		1	s1: ≤ 30 m²/s²
	TSP_{600s} [m²]		4	s1: ≤ 50 m²
	brennendes Abfallen / Abtropfen		nein	d0: kein Brennen d1: ≤ 10s Brenndauer d2: > 10s Brenndauer
	LFS < Rand des Probekörpers		ja erfüllt	< Rand des Probekörpers
EN ISO 11925-2 326011502-2 Beflammungszeit 30s	Kantenbeflammung	6	max. Wert: 0 mm	übereinstimmend Fs ≤ 150mm
	brennendes Abfallen / Abtropfen		nein	übereinstimmend d0: keine Entzündung des Filterpapiers
	Kantenbeflammung 90° gedreht	6	max. Wert: 0 mm	übereinstimmend Fs ≤ 150mm
	brennendes Abfallen / Abtropfen		nein	übereinstimmend d0: keine Entzündung des Filterpapiers
	Flächenbeflammung	6	max. Wert: 0 mm	übereinstimmend Fs ≤ 150mm
	brennendes Abfallen / Abtropfen		nein	übereinstimmend d0: keine Entzündung des Filterpapiers

---

Anlage A – Fotodokumentation

Fotodokumentation zur Normprüfserie der Rückseite / Prüfung SBI 26-034


Bild 1:
Probekörper 1 vor der Prüfung


Bild 2:
Probekörper 1 während der Prüfung


Bild 3:
Probekörper 1 nach der Prüfung


Bild 4:
Beflammter Bereich von Probekörper 1

Fotodokumentation zur Normprüfserie der Rückseite / Prüfung SBI 26-035


Bild 5:
Probekörper 2 vor der Prüfung


Bild 6:
Probekörper 2 während der Prüfung


Bild 7:
Probekörper 2 nach der Prüfung

Fotodokumentation zur Normprüfserie der Rückseite / Prüfung SBI 26-036


Bild 8:
Probekörper 3 vor der Prüfung


Bild 9:
Probekörper 3 während der Prüfung


Bild 10:
Probekörper 3 nach der Prüfung


Bild 11:
Beflammter Bereich von Probekörper 3

---

5. Einschränkungen

Das Klassifizierungsdokument stellt keine Typgenehmigung oder Zertifizierung des Produktes dar.

Generell erlischt die Gültigkeit, wenn der Auftraggeber unzulässige technische Veränderungen vornimmt und die dem gegenständlichen Klassifizierungsbericht zu Grunde liegenden Zusammensetzungen über- bzw. unterschreitet (siehe Prüfberichte).

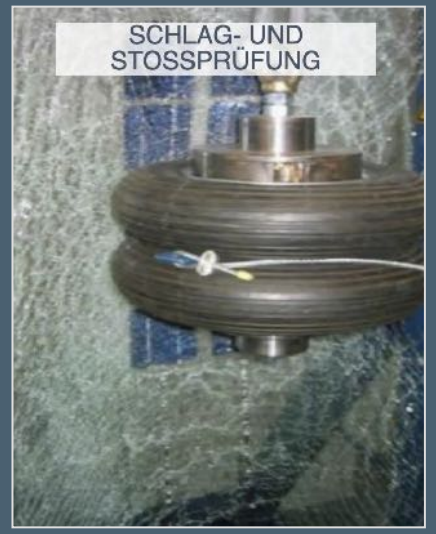
Weiters erlischt die Gültigkeit durch Änderungen in den verwendetet Prüf- und Klassifizierungsnormen und allenfalls beschränkende Bestimmungen in zukünftig erscheinenden Produktnormen.

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Ing. Roland BECK
Techniker

Ing. Josef STOCKINGER
Zeichnungsberechtigter

extreme impact test

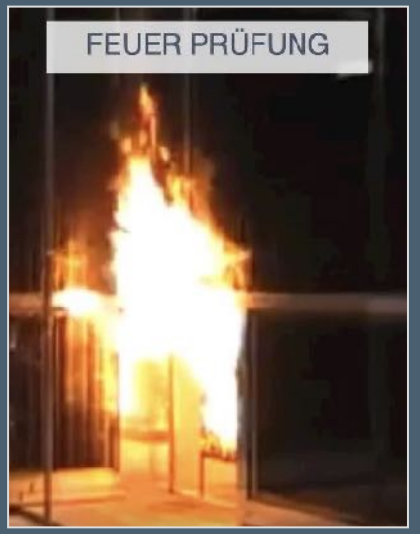


extreme hail test

Ice ball
diameter 70mm – speed 110km/h



extreme fire test



Overhead Photovoltaic Glass Systems (BIPV)

Structural Safety In Occupied Applications

🟩 SAFETY REQUIREMENTS

Photovoltaic glass systems installed above occupied areas are structural safety–relevant components.
Applications include pedestrian zones, buildings, parking structures, and public spaces.
Design shall consider permanent, variable, and accidental actions including impact.
Overhead systems require system–level structural verification.
Compliance with Eurocodes defines minimum structural safety baseline.
EN 12600 defines minimum impact resistance classification for glazing systems.

🟨 BEHAVIOR AND MATERIAL PERFORMANCE

System behavior under failure conditions is a primary design parameter.
Post–fracture performance shall be verified in addition to intact–state conditions.
Fragment detachment, collapse mechanisms, and debris release are critical safety risks.
Residual load–bearing capacity shall be demonstrated under defined failure scenarios.
Controlled failure behavior and fragment retention are required in overhead applications.

Laminated glass systems shall ensure post–impact cohesion and stability.
Interlayer performance must be validated under post–fracture conditions.
System safety cannot be assumed from component compliance alone.

🟨 ENGINEERING RESPONSIBILITY

Responsibility for structural safety remains with the design authority.
Compliance with standards does not transfer liability for system performance under failure conditions.
Safety must be demonstrated at system level for the intended application.

Technical Position Note

🟥 TECHNICAL SAFETY QUESTION :

WHEN PHOTOVOLTAIC GLASS SYSTEMS ARE INSTALLED ABOVE OCCUPIED AREAS

IS COMPLIANCE WITH EUROCODES AND HARMONISED STANDARDS SUFFICIENT TO DEMONSTRATE STRUCTURAL SAFETY

OR

IS VERIFIED POST–FRACTURE SYSTEM BEHAVIOR REQUIRED?

🟩 TECHNICAL SOLUTION :

Verified safety in overhead BIPV applications is achieved through automotive–grade laminated glass systems with validated post–fracture performance and controlled fragment retention.

Regulation (EU) 2024/3110 — Annex I §§1 & 4

Ertex Solar

Structural Integrity · Safety In Use · Impact · Falling Or Breaking Parts

Structural Energy Glass For Next–Generation Landmarks

Stadiums · Airports · Transport Hubs · Shopping Malls · Luxury Resorts · Iconic Landmarks · Critical Infrastructure

Handcrafted Lamination · Bespoke Energy Glass

Modern large–scale architecture has fundamentally changed the role of the building envelope.

It is no longer a passive layer of protection.

It is a structural system.

An energy–generating surface.

And a critical safety component.

The Ertex Solar approach defines a distinct class of architectural BIPV systems, based on the integration of:

- **full–surface structural lamination**
- **energy–active glass design**
- **specialist hand assembly & bespoke lamination engineering**

into a single, unified architectural element.

Unlike standard photovoltaic modules, ERTEX Solar's architectural glass is engineered around the requirements of each application — integrating photovoltaic functionality within purpose–designed laminated glass constructions.

Glass configuration, interlayer selection and structural design are coordinated with the intended loads, supporting conditions and applicable safety requirements.

ERTEX Solar combines specialist hand assembly with its dedicated, custom–engineered lamination capability to produce bespoke photovoltaic safety glass.

This manufacturing expertise enables project–specific glass configurations, photovoltaic integration and architectural geometries to be developed alongside the applicable structural, electrical and safety requirements.

Craftsmanship enables exceptional architectural freedom. Engineering, testing and approvals establish the conditions for its safe application.

This combination establishes a clear technological position within architectural BIPV: not as a component supplier, but as a provider of structural energy glass systems for landmark–scale applications.

For architecture where structure, energy, and safety converge into one system

Structural Energy Glass — Applications & Manufacturing Standard

All structural BIPV glass systems are produced under an automotive–grade quality framework aligned with:

This ensures controlled production, repeatability, and long–term stability for safety–critical architectural applications.

Where Structural Energy Glass Is Applied

Structural BIPV glazing systems are designed for deployment exclusively in architectural environments where glass operates above occupied public space and forms part of the building's structural and environmental system:

1. Stadiums & Sports Arenas

Roof structures and large–span canopies above spectators, where structural glazing must combine load resistance, safety performance, and energy generation.

2. Airports & Aviation Terminals

Large overhead glazing systems in passenger circulation zones, check–in halls, and boarding areas with continuous public occupancy and high operational load.

3. Railway & Metro Infrastructure

Covered platforms, concourses, and transit hubs where structural glazing is exposed to dynamic loads and constant pedestrian flow.

4. Mobility & Charging Infrastructure

EV charging hubs, transport interchanges, and integrated mobility shelters where energy generation and weather protection are combined within the same structural envelope.

5. Architectural Canopies & Urban Coverage Systems

Public walkways, civic spaces, and commercial environments requiring lightweight structural glazing systems with environmental protection functions.

6. Civic & Cultural Landmarks

Large–span architectural spaces such as museums, exhibition halls, and public atriums where transparency, structural performance, and energy integration converge

System Principle

In all applications, the building envelope functions simultaneously as:

- a structural system
- an energy–generating surface
- an environmental protection layer
- and a public safety interface

Regulation (EU) 2024/3110 — Article 22(4) · Annex IX

For architecture that is built to perform above people, not beside them

Manufacturing Origin & Commercial Identity

ORIGIN IS A FACT. NOT A MARKETING ASSET

- COMPANY NATIONALITY ≠ PRODUCT ORIGIN
- BRAND ORIGIN ≠ MANUFACTURING ORIGIN
- HEAD OFFICE ≠ FACTORY
- FACTORY ≠ PRODUCTION
- PRODUCTION CAPACITY ≠ ACTUAL OUTPUT
- FINAL ASSEMBLY ≠ AUTOMATIC ORIGIN
- FACTORY EXISTENCE ≠ DELIVERED-BATCH ORIGIN

INPUT → PROCESS → OUTPUT → BATCH → ORIGIN

- Identify the origin of critical inputs and components.
- Establish the manufacturing operations actually performed.
- Reconcile declared capacity with actual production.
- Trace the delivered product to identifiable production records.
- Link the delivered batch to manufacturing, quality-control and shipping evidence.
- Establish origin from the actual production chain — not corporate identity.

A PRODUCTION LINE PROVES CAPABILITY

Certification does not prove batch origin.

Factory ownership does not prove production.

Capacity does not prove output.

Assembly does not automatically establish origin.

SHOW THE INPUT.

SHOW THE PROCESS.

SHOW THE OUTPUT.

SHOW THE BATCH.

THEN DECLARE THE ORIGIN.

Regulation (EU) No 952/2013 — Articles 59–61
Directive 2006/114/EC — Article 3

It Does Not Prove That The Delivered Product Ran Through It

Technical Specification Fingerprinting

A TENDER DOES NOT NEED TO NAME A MANUFACTURER TO IDENTIFY ONE

A technical fingerprint can be created through the cumulative effect of:

- Dimensions
- Performance thresholds
- Materials
- Manufacturing methods
- Fixing architecture
- Certification requirements
- Reference requirements
- Production capability
- Warranty conditions
- Financial thresholds

DELETE THE BRAND. THE FINGERPRINT REMAINS

A specification can change.

Its provenance cannot.

A requirement can be rewritten.

Its history cannot.

FOLLOW THE REQUIREMENT BACK TO ITS SOURCE

Directive 2014/24/EU — Articles 40, 41, 42 & 84 — where applicable

REQUIREMENT → SOURCE → PRIOR INPUT →

APPROVAL → COMPETITIVE EFFECT → REVISION

Establish:

- WHO introduced the requirement.
- WHEN it first appeared.
- WHERE it came from.
- WHAT technical basis justified it.
- WHO had prior access or input.
- WHO approved it.
- WHO could comply.
- WHO could not.
- WHAT changed after issue or award.

EVERY MATERIAL CHANGE LEAVES A RECORD

- Original requirement
- Revision
- Proposer
- Technical justification
- Approval
- Timing
- Cost consequence
- Performance consequence
- Lifecycle consequence

Responsibility Continuity & Corporate Change

PRODUCT TRACEABILITY IS NOT ENOUGH – RESPONSIBILITY MUST ALSO REMAIN TRACEABLE

RESPONSIBILITY CHAIN

WHO SPECIFIED
the system

WHO ENGINEERED
the solution

WHO APPROVED
the design and integration

WHO MANUFACTURED
the product

WHO SUPPLIED
the delivered system

WHO INSTALLED
the system

WHO WARRANTED
the product and performance

RESPONSIBILITY MUST HAVE

AN OWNER.

CONTINUITY THROUGH CHANGE

Corporate or contractual change must not leave the responsibility chain unidentified.

ESTABLISH:

- Which entity assumed the contracts
- Which entity assumed the design obligations
- Which entity assumed manufacturing obligations
- Which entity assumed supply obligations
- Which entity assumed warranties and guarantees
- Which obligations were transferred
- Which obligations were not transferred
- Who remains responsible after the change

Regulation (EU) 2024/3110 — Economic Operator Obligations
Directive 2014/24/EU — Articles 71–72, where applicable

THE PROJECT MAY CONTINUE.

THE QUESTION IS:

WHOSE OBLIGATIONS CONTINUE WITH IT?

ENTITY → CONTRACT → DESIGN → MANUFACTURING → SUPPLY → INSTALLATION → WARRANTY → CONTINUING RESPONSIBILITY

Continuity Must Be Identifiable. · Obligations Must Be Traceable

Lifecycle Cost & Maintenance Exposure

Lowest Capex is not Lowest Cost

A TECHNICAL SPECIFICATION CREATES LIFECYCLE COST OBLIGATIONS

ACQUISITION → INSPECTION → MAINTENANCE → ACCESS → REPAIR → REPLACEMENT → END OF LIFE

EU CONSTRUCTION PRODUCT LAW

REGULATION (EU) 2024/3110
ANNEX IV

ESTIMATED SERVICE LIFE
PREVENTIVE MAINTENANCE
INSPECTION TYPE & FREQUENCY

MAINTENANCE TYPE & FREQUENCY
PARTS SUBJECT TO WEAR
REPLACEMENT CRITERIA

PRODUCT PERFORMANCE EXTENDS
BEYOND INSTALLATION.

EU LIFECYCLE COST LAW

DIRECTIVE 2014/24/EU
ARTICLES 67–68

ACQUISITION
USE
MAINTENANCE
END OF LIFE

DIRECTIVE (EU) 2024/1275
ARTICLE 2(32)

COST–OPTIMAL = LOWEST COST
OVER THE ECONOMIC LIFE CYCLE

INVESTMENT + MAINTENANCE + OPERATING COST

SPECIFICATION → LIFECYCLE OBLIGATION → TOTAL COST

INITIAL PRICE ALONE DOES NOT ESTABLISH TECHNICAL EQUIVALENCE

Capex without lifecycle cost is not total cost – Follow the cost beyond the contract

Procurement / Competition Integrity
Decision—Transaction Forensics

Delegation Must Identify Responsibility — Not Create A Gap In It

DECISION CHAIN

- WHO SPECIFIED
- WHO INTRODUCED THE REQUIREMENT
- WHO CHANGED IT
- WHO APPROVED THE FINAL DESIGN
- WHO QUALIFIED THE SUPPLIER
- WHO FINANCED IT
- WHO GUARANTEED IT
- WHO MANUFACTURED IT
- WHO INTERMEDIATED
- WHO BENEFITED
- WHAT CHANGED AFTER AWARD

TRANSACTION CHAIN

COUNTERPARTY → BENEFICIAL OWNER → ECONOMIC PURPOSE →
VALUE → TIMING → SOURCE OF FUNDS → BENEFICIARY → DECISION LINK

Reconcile:

- Counterparty identity
- Beneficial ownership
- Economic substance
- Consideration
- Timing
- Intermediaries
- Financing
- Guarantees
- Beneficiaries
- Decision chronology

A GUARANTEE IS ONLY WHAT THE INSTRUMENT ACTUALLY GUARANTEES

- PRODUCT WARRANTY ≠ PERFORMANCE BOND
- PERFORMANCE BOND ≠ BANK GUARANTEE
- BANK GUARANTEE ≠ EXPORT-CREDIT GUARANTEE
- EXPORT-CREDIT GUARANTEE ≠ PAYMENT GUARANTEE

LEGAL GUARANTOR → OBLIGATION → INSTRUMENT → BENEFICIARY →
AMOUNT → DURATION → CONDITIONS → INSOLVENCY SURVIVAL

RECONCILE THE PRODUCT WITH THE SPECIFICATION.

RECONCILE THE SPECIFICATION WITH THE DECISION.

RECONCILE THE DECISION WITH THE MONEY.

YOU CAN CHANGE THE STORY.

YOU CANNOT CHANGE THE RECORD.

FOLLOW THE MONEY.

FOLLOW THE SPECIFICATION.

FOLLOW THE PRODUCT.

Directive 2014/24/EU — Articles 24, 41, 57, 69 & 84 — where applicable.

Regulatory Compliance & Risk Management

Institutional Framework for High–Value Energy Infrastructure & Building Envelope Systems

1. Fiduciary Duty & Director's Liability (Duty of Care):
Directors and executive officers are required to exercise due care and informed business judgment in material procurement decisions. Knowingly selecting a supplier exhibiting systemic financial instability or a demonstrable downward trajectory in solvency, without adequate due diligence or risk mitigation, may expose decision–makers to claims of Breach of Fiduciary Duty or Gross Negligence where foreseeable warranty, continuity or asset–value losses subsequently arise.

2. Anti–Money Laundering (AML) & Source of Funds Compliance:
EU anti–money–laundering rules impose risk–based due–diligence obligations on regulated entities and require enhanced scrutiny where elevated financial or transactional risks are identified. Suppliers sustained through opaque or inadequately documented funding structures may trigger enhanced Source of Funds, beneficial–ownership and Know Your Business (KYB) scrutiny. Proceeding despite identified red flags can expose companies and responsible decision–makers to serious regulatory, financial and, where applicable, criminal consequences.

3. EU Corporate Sustainability Due Diligence (CSDDD 2024/1760):
EU sustainability due–diligence rules place increasing responsibility on large enterprises to identify, assess and address material adverse impacts and risks across relevant parts of their chains of activities. Selecting "lower–cost alternatives" despite documented sustainability, continuity or compliance concerns can create significant governance and due–diligence exposure. Failure to address identified risks may expose the company to regulatory sanctions and, where applicable, claims under national law.

4. Foreign Subsidies Regulation (FSR — EU 2022/2560):
European law empowers the European Commission to investigate foreign subsidies capable of distorting competition within the Internal Market, including advantages enabling subsidised bidders to submit unduly advantageous tenders. In covered transactions and public–procurement procedures, distortive foreign subsidies may trigger investigation, commitments or redressive measures, prohibition of an award and substantial fines. Artificially low pricing supported by undisclosed foreign financial contributions is therefore a material procurement and compliance risk.

5. Professional Liability of Design & Lead Consultants:
Lead Architects, Engineers and Project Managers carry professional responsibility for specifications, technical recommendations and the exercise of appropriate professional care. Failure to investigate material and reasonably identifiable financial, technical or continuity risks associated with manufacturers of long–life building components may constitute professional negligence under applicable law and contractual duties. Where foreseeable system failure follows an inadequately assessed specification, the responsible consultant may face substantial professional and civil liability. Delegation of specialist design does not, by itself, remove the professional responsibilities attached to the Lead Designer's appointed role. Where specialist design is incorporated into the building, responsibility should remain identifiable for the definition of performance requirements, coordination of design interfaces, review of the specialist design and approval of its integration into the overall project.

6. Compliance & Innovation Integrity:
Under Article 107 TFEU and applicable State–aid frameworks, including GBER 651/2014, public support for R&D and innovation is subject to defined eligibility, incentive–effect and eligible–cost requirements. Aid granted for genuine research, development or innovation cannot simply be diverted into unauthorised operating support or used to distort the commercial pricing of existing products outside the applicable aid conditions. Non–compliance can expose beneficiaries and affected projects to investigation, audit, recovery of incompatible aid and associated financial consequences.

Financial Continuity & Economic Credibility

An Unsustainable Price Is a Risk Indicator – Not a Procurement Advantage

Where an offer appears abnormally low, EU procurement law requires examination of the price or cost proposed.

The assessment expressly extends to:

- **the economics of the manufacturing process**
- **exceptionally favourable supply conditions**
- **technical solutions capable of explaining the cost advantage**
- **originality capable of explaining the advantage**
- **the possible existence of State aid**

A commercially exceptional price may be entirely legitimate where supported by identifiable and economically credible circumstances.

Strategic pricing, reference-project pricing or reduced commercial margin may explain a price advantage — provided that the underlying manufacturing economics remain credible.

Where the apparent advantage cannot be reconciled with the supplier's manufacturing economics, financial condition or identifiable commercial circumstances, enhanced verification of the source and sustainability of that advantage is required.

PRICE MUST BE EXPLAINABLE.

FUNDING MUST BE TRACEABLE.

PERFORMANCE MUST BE SUSTAINABLE

Directive 2014/24/EU — Article 69

Declared Use & Conditions Of Use

Certification Does Not Mean Unrestricted Use

A product may be certified, tested and legally placed on the market.

THIS DOES NOT MEAN THAT IT IS SUITABLE FOR EVERY APPLICATION, EVERY CONFIGURATION OR EVERY INSTALLATION CONDITION.

The manufacturer defines the product's declared use and the documented conditions of use under which the product is intended to perform.

THE ACTUAL INSTALLATION MUST REMAIN WITHIN THE MANUFACTURER'S DOCUMENTED CONDITIONS OF USE.

Before specification, approval or installation, verify:

DECLARED USE
Is the intended application covered?

CONDITIONS OF USE
Are the actual operating and environmental conditions covered?

INSTALLATION CONFIGURATION
Does the actual geometry, orientation, inclination, mounting and integration comply with the manufacturer's documented requirements?

SAFETY & DURABILITY
Are the required installation, maintenance and inspection conditions defined and followed?

SHOW THE DECLARED USE.

SHOW THE CONDITIONS OF USE.

SHOW THAT THE ACTUAL INSTALLATION MATCHES THEM.

A CERTIFICATE DOES NOT OVERRIDE THE MANUFACTURER'S CONDITIONS OF USE.

Regulation (EU) 2024/3110

Declared Use · Conditions of Use · Annex IV

Warranty, Guarantees & Financial Backing

A 30–Year Warranty has no value for a condition it excludes

LONG–TERM WARRANTY & FINANCIAL BACKING

A LONG–TERM WARRANTY IS NOT FINANCIAL SECURITY

Long–life energy infrastructure may create performance obligations extending decades beyond the original procurement.

Before reliance on a 25—30 year product or performance warranty, due diligence should establish:

- who legally carries the warranty obligation
- financial capacity and continuity of the warrantor
- identity and creditworthiness of any guarantor or insurer
- scope, exclusions and duration of third–party financial backing
- whether the specific project is effectively covered
- treatment of the obligation following insolvency, restructuring, disposal or cessation of manufacturing

A GUARANTEE DOES NOT REMOVE RISK.
IT TRANSFERS RISK TO THE GUARANTOR.

The financial capacity of that guarantor therefore becomes part of the long–term risk assessment.

THE WARRANTY PERIOD MAY BE 30 YEARS

THE WARRANTOR MAY NOT BE

Foreign financial support may itself require regulatory scrutiny where it improves the competitive position of an undertaking or enables an unduly advantageous tender.

EU rules identify among the categories most likely to distort the Internal Market:

- **support to an ailing undertaking without a viable restructuring plan**
- **unlimited guarantees for debts or liabilities**
- **non–compliant export financing**
- **foreign financial contributions enabling an unduly advantageous tender**

THE SOURCE OF FINANCIAL STRENGTH IS PART OF THE RISK.

- **installation conditions affecting warranty validity**
- **exclusions for hail, wind and extreme weather**
- **coverage of the actual inclination and mounting configuration**

Regulation (EU) 2022/2560 — Articles 4—6 & 27—32
Directive 2014/24/EU — Article 69

EU Construction Product Law

CONSTRUCTION DIGITAL PRODUCT PASSPORT
CHAPTER X — ARTICLE 75

Digital access to verifiable product information:

Performance · Compliance · Safety · Traceability · Lifecycle Data

Mandatory implementation is subject to the applicable delegated acts, product scope and transitional provisions.

EU MARKET SURVEILLANCE
ARTICLE 63 — CPR COMPLAINT PORTAL

Potential non-compliance may be reported to the European Commission and, where relevant, referred to the competent national market-surveillance authorities.

REGULATORY LIABILITY & ENFORCEMENT
ARTICLES 13(2) & 92

Declared performance and conformity carry legal responsibility under Union and national law.

Non-compliance is subject to effective, proportionate and dissuasive penalties.

SAFETY EXTENDS TO OCCUPANTS.
LIABILITY EXTENDS TO COMPLIANCE.

Regulation (EU) 2024/3110 — Article 13(2) · Annex I · Articles 63, 75 & 92

REGULATION (EU) 2024/3110

Construction Products Regulation

VERIFIED PERFORMANCE

DOCUMENTED SAFETY

PRODUCT TRACEABILITY

MARKET SURVEILLANCE

EU Whole–Life Building Rules

BY 1 JANUARY 2027

MEMBER STATES — NATIONAL ROADMAP
LIFE–CYCLE GWP LIMIT VALUES
Targets from 2030 · Progressive downward trend

2028

NEW BUILDINGS > 1,000 m^2
LIFE–CYCLE GWP
CALCULATION + EPC DISCLOSURE

2030

ALL NEW BUILDINGS
LIFE–CYCLE GWP
CALCULATION + EPC DISCLOSURE

BUILDING PERFORMANCE IS MOVING
FROM OPERATIONAL EFFICIENCY
TO WHOLE–LIFE PERFORMANCE

50–Year

REFERENCE STUDY PERIOD

DIRECTIVE (EU) 2024/1275
ENERGY PERFORMANCE OF BUILDINGS

WHOLE–LIFE ASSESSMENT

CONSTRUCTION PRODUCTS · TRANSPORT · CONSTRUCTION
OPERATION MAINTENANCE · REPLACEMENT · END OF LIFE ·
REUSE · RECYCLING

Directive (EU) 2024/1275 · Articles 7(2), 7(5) · Annex III
Commission Delegated Regulation (EU) 2026/52

EU Solar Energy in Buildings

DIRECTIVE (EU) 2024/1275 · ARTICLE 10

ALL NEW BUILDINGS

DESIGNED TO OPTIMISE
SOLAR ENERGY GENERATION POTENTIAL

Based on the solar irradiance of the site — enabling subsequent cost–effective installation of solar technologies.

31 DECEMBER 2026

NEW PUBLIC & NON–RESIDENTIAL BUILDINGS

>250 m²

SUITABLE SOLAR ENERGY INSTALLATIONS

31 DECEMBER 2027

EXISTING NON–RESIDENTIAL BUILDINGS

>500 m²

Major renovation — or permit–requiring building renovation, roof works or installation of a technical building system.

>250 m²
>500 m²

EXISTING PUBLIC BUILDINGS

>2,000 m² · 31 DEC 2027
>750 m² · 31 DEC 2028
>250 m² · 31 DEC 2030

31 DECEMBER 2029

ALL NEW RESIDENTIAL BUILDINGS

ALL NEW ROOFED CAR PARKS
PHYSICALLY ADJACENT TO BUILDINGS

DEPLOYMENT CONDITION

TECHNICALLY SUITABLE
ECONOMICALLY FEASIBLE
FUNCTIONALLY FEASIBLE

National criteria govern practical implementation and possible exemptions.

REFERENCE

Directive (EU) 2024/1275 – Article 10(1), 10(3)–(4)

European Green Claims Compliance Notice

LEGAL FRAMEWORK

Directive (EU) 2024/825

Empowering Consumers for the Green Transition

Amending:

- **Directive 2005/29/EC (Unfair Commercial Practices)**
- **Directive 2011/83/EU (Consumer Rights)**

Application Date

27 September 2026

PROHIBITED CLAIMS

- Generic environmental claims without scientific evidence
- Unsupported sustainability claims
- Use of terms such as **"Green", "Eco", "Environmentally Friendly"** without verification
- Misleading sustainability labels
- Claims that cannot be technically demonstrated

REFERENCES

Directive (EU) 2024/825

Directive 2005/29/EC

Directive 2011/83/EU

ENFORCEMENT

Competent Authorities may require:

- Technical documentation
- Scientific substantiation
- Verification of every environmental claim

STATUTORY MAXIMUM FINES — EU MINIMUM REQUIREMENTS

For infringements subject to Article 13(3)–(4) of Directive 2005/29/EC, Member States must provide for maximum fines of at least 4% of the trader's annual turnover in the Member State(s) concerned.

Where turnover information is unavailable, the statutory maximum must be at least €2,000,000.

These figures define minimum requirements for statutory maximum penalties — not automatic or mandatory fines for individual infringements.

Directive 2005/29/EC — Article 13(3)–(4), as amended.

EU Regulatory Control & Verification

DIRECTIVE (EU) 2024/1275

ENERGY PERFORMANCE OF BUILDINGS

ARTICLE 27 · ANNEX VI

INDEPENDENT CONTROL

RANDOM SAMPLING

25% THIRD-PARTY VERIFICATION
where control is delegated to non-governmental bodies

TARGETED SAMPLING
for poor-quality certificates

INPUT DATA VERIFICATION

10% ON-SITE VERIFICATION to validate input data:

Product Certificates · Technical Specifications
Building Plans · The Building

ORIGINATOR TRACEABILITY
for monitoring and verification purposes

ARTICLE 34 · PENALTIES

EFFECTIVE · PROPORTIONATE · DISSUASIVE

CERTIFICATION DOES NOT EXEMPT REGULATORY VERIFICATION.

Directive (EU) 2024/1275 · Art. 27 · Annex VI · Art. 34
Regulation (EU) 2019/1020 · Art. 14(4)(d)–(j) · Regulation (EU) 2024/3110

. LEED®

. BREEAM®

. EPC

. EDGE

. WELL®

. DGNB

. HQE™

. GSAS

. CASBEE

. BEAM PLUS

. GREEN STAR

. GREEN MARK

. GREEN GLOBES

REGULATION (EU) 2019/1020

MARKET SURVEILLANCE & COMPLIANCE

ARTICLE 14(4)(d)–(e)

UNANNOUNCED ON-SITE INSPECTIONS

PHYSICAL PRODUCT CHECKS

ACCESS TO PREMISES

EVIDENCE COLLECTION

ARTICLE 14(4)(f)

EX OFFICIO INVESTIGATION

Investigations may be initiated by market-surveillance authorities on their own initiative.

ARTICLE 14(4)(g)–(j)

CORRECTIVE ACTION

RESTRICTION · WITHDRAWAL · RECALL

PENALTIES

REGULATION (EU) 2024/3110 · CONSTRUCTION PRODUCTS

PERFORMANCE · CONFORMITY · TRACEABILITY · ENFORCEMENT

beyond Infrastructure

The next generation of sustainability systems should not remain hidden technical equipment disconnected from architecture, public space and human experience.

Renewable infrastructure can evolve into publicly visible landmarks.

Energy systems can become part of civic identity.

Architectural sustainability can move beyond compliance and contribute to the long-term cultural and environmental presence of cities, waterfronts and internationally visible destinations.

A COMPLETE ARCHITECTURAL ENERGY FRAMEWORK

was created around a simple principle:

The most meaningful sustainability systems of the future will not only generate energy.

They will also generate:
- **presence,**
- **interaction,**
- **emotion,**
- **and long-term identity.**

By combining selected international renewable and architectural systems within curated flagship environments, the framework aims to contribute to a new generation of publicly visible sustainability landmarks designed for enduring environmental, architectural and civic value.

WHO VERIFIES THE VERIFIER?

Independent assessment requires

independence, impartiality and oversight.

VERIFICATION MUST ITSELF BE VERIFIABLE

Regulation (EU) 2024/3110

Articles 42–46 · 53–56

Sustainability is no longer only performance – It is becoming part of architecture itself

designed for

GOVERNMENTS & PUBLIC AUTHORITIES

ASSET OWNERS & INVESTORS

ARCHITECTS, ENGINEERS & CONSULTANTS

CONTRACTORS & PROCUREMENT TEAMS

BANKS & FINANCIAL INSTITUTIONS

INSURERS & RISK PROFESSIONALS

Designed to support informed decision-making, risk prevention and long-term asset protection through technical and regulatory verification, product identity and traceability, warranty and lifecycle assessment, procurement transparency, public-safety considerations and clear accountability across the project decision chain.

Master Energy

ertex solar – engineered without compromise

The world's most advanced custom-made BIPV platform

- The world's only handcrafted photovoltaic modules
- The longest BIPV experience in the industry
- Backed by VINCI Group
- Made in Austria
- Over 3,000 custom architectural projects worldwide
- World-record module dimensions & unlimited architectural freedom
- The industry's most comprehensive portfolio of international certifications
- Certified for the world's most demanding structural, safety and durability requirements
- Proven under the most extreme real-world conditions
- Walkable. Overhead. Coastal. Landmark.
- Built for iconic architecture.

Certified Manufacturing Excellence



We are committed to the highest standards of integrity, transparency, and technical excellence.

Our bids are structured to reflect the actual project requirements and technical specifications, ensuring full alignment with International Compliance Standards and ESG (Environmental, Social and Governance) reporting mandates.

We strictly adhere to anti–fraud and anti–corruption policies. Each bid is intended for the authentic implementation of the project and provides a reliable basis for Audit Committees, financial institutions, and certification bodies (e.g. LEED).

We do not participate in or facilitate practices that may misrepresent the project cost or jeopardize the legal status of the final investor or the structural integrity of the final construction.

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Identity

Innovation

Imagination

masterpieces for a life time