

VON ARDENNE 

ARCHITECTURAL & VEHICLE GLASS VACUUM COATING EQUIPMENT & SOLUTIONS

# ARCHITECTURAL & VEHICLE GLASS

VACUUM COATING  
EQUIPMENT & SOLUTIONS

Energy-saving coatings on glass  
for buildings & vehicles with highly  
productive & durable equipment

# ENERGY-SAVING COATINGS ON GLASS

## FOR BUILDINGS & VEHICLES

Buildings and vehicles account for a high proportion of our society's energy consumption. However, glass offers a great potential for improving their energy balance – through functional coating.

Coated glass reduces the energy consumption of buildings and vehicles and enables efficient thermal and solar control. It also offers modern aesthetics, daylight and transparency.

We provide our customers with coating systems and technologies that enable them to manufacture these products. And we ensure that productivity and quality remain very high over a long period of time.

The world's leading manufacturers of architectural and automotive glass work with VON ARDENNE equipment and process solutions. They can adapt our modular glass coating systems to their needs. And the equipment allows for necessary changes during the course of its long service life.

To guarantee the reliability and durability of the systems and components, our customers can rely on comprehensive and conscientious service. And with a portfolio of digital products, we support our customers on the road to the smart factory.

### Highest productivity

at high quality with sustainable equipment



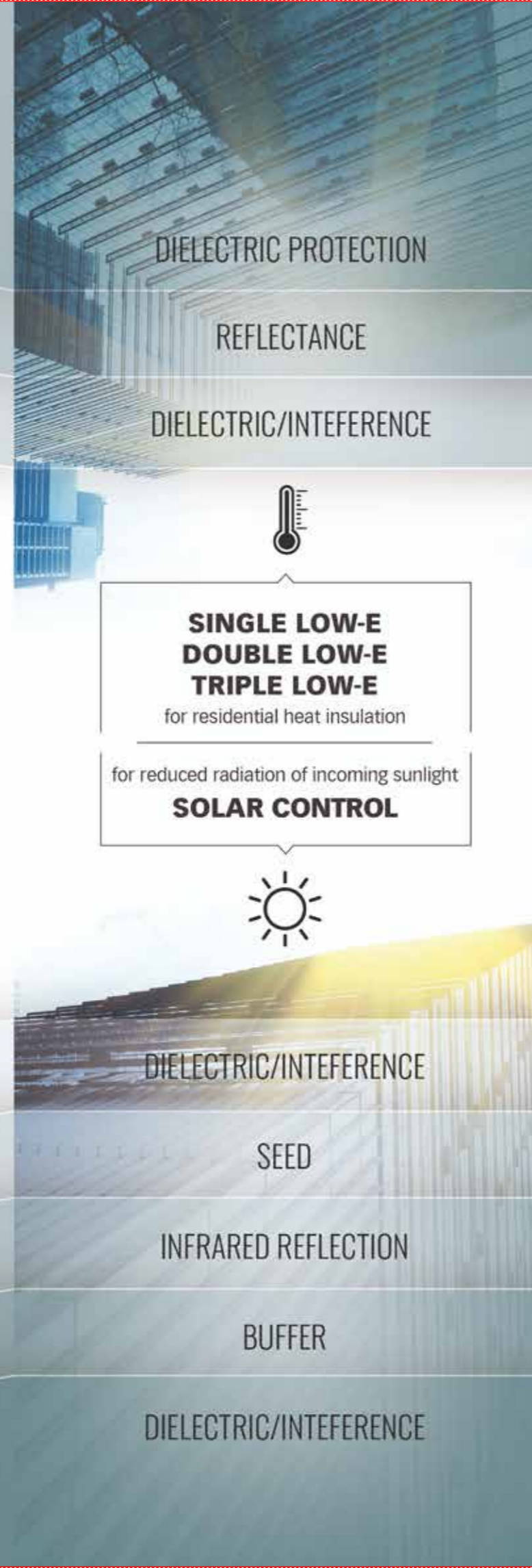
### Best technological performance

through experience, expertise & service



### Software-based support

for processes and operation of the systems





## WINDOWS & FACADES

Reliable coating of architectural glass  
meeting the highest demands for efficiency & aesthetics

As a manufacturer or coater of architectural glass, you have to master production processes at the edge of what is technically possible. And it is important that the ratio between costs, quality and delivery time is right.

With our glass coating equipment, we offer you stability for the production of a high-quality product portfolio of architectural glass for all global markets.

We offer comprehensive system solutions from a single source. This ranges from the equipment, magnetrons and optical measurement technology to software and service.

No matter if it's solar control, single, double or triple Low-E coatings: With our equipment, you will achieve the desired visible transmittance and infrared reflectance, as well as the best optical performance.

**Homogeneous color effect of the glazing**



due to high process stability

**Low product costs**



due to highest productivity & availability

**System solution from a single source**



from equipment to magnetrons & measuring technology to software & service



GC330H, GC280H & GC254H  
Glass Coating Systems



## WINDSHIELD & SUNROOF

Reliable coating of automotive glass  
meeting the highest standards of efficiency & aesthetics

As a manufacturer or coater of architectural glass, you have to master production processes at the edge of what is technically possible. And it is important that the relationship between costs, quality and delivery time is right. Moreover, you must achieve these goals with limited resources over the entire service life of a coating system. You expect for your equipment to assist in adjusting the process.

With our durable glass coating systems, we offer you stability for the production of a high-quality product portfolio. For flat glass, the GC254H glass coating system is a suitable platform.

We also offer the leading system solutions for coating films laminated with automotive glazing and window films.

**Homogeneous color effect of vehicle glazing**



due to high process stability

**Outstanding product properties**



even for the most demanding layer systems due to advanced process control concepts

**System solution from a single source including expert support**



for the coating process & the entire coating line



FOSA CX  
Roll-to-Roll Vacuum Web  
Coating System



GC330H, GC280H &  
GC254H  
Glass Coating Systems



## SMART GLASS

Reliable coating of switchable glass  
at highest uniformity

As a manufacturer or coater of switchable glass, you need coating equipment that is adapted to your process. This also applies to processes with heated substrates. Here, it comes down to the best technical solution to ensure a consistent process with low energy requirements.

We offer coating systems tailored to your needs, with which you can apply transparent conductive oxide (TCO) coatings. An example of such coatings is indium tin oxide (ITO), which enables dynamic switching of an applied electrical voltage.

**Market-leading experience**



with equipment for coating heated glass substrates

**Expertise for transparent conductive oxides**



especially ITO

**Flexible equipment platform for vertical coating**



with & without carrier



GC120V  
Vertical Coating System



## BUILDING-INTEGRATED PHOTOVOLTAICS

Turning buildings into generators  
with functional layers for integrated solar cells

With integrated photovoltaics, the building envelope performs two functions: Protecting the building and generating electricity. However, the creative freedom for architects should not be lost in the process. For this reason, the requirements for the cell and the front glass of the solar module are extremely high.

We offer vacuum coating systems that enable you to meet these requirements. Our systems ensure your production process, both for cell production and for glass coating. With extremely precise layer distribution of our deposition processes, even the highest demands on aesthetics can be met. In addition, you can also produce chromatic layers according to your specifications. The optical result is reproducible at any time with our equipment.

**Aesthetic surfaces**



due to extremely high layer thickness homogeneity

**Lower material costs**



due to high target utilization

**High reproducibility**



of the different layers



XEANOVA  
Inline Coating System



GC330H, GC280H &  
GC254H  
Glass Coating Systems

GC330H, GC280H, GC254H

# HIGHLY PRODUCTIVE MULTI-TALENTS

for industrial glass coating

With the GC330H, GC280H and the GC254H, we offer you coating systems for the production of high-quality architectural and automotive glass for all markets in the world. More than 70 of these systems are currently in operation with our customers worldwide.

VON ARDENNE GC330H, GC280H and GC254H have a modular design. They can be flexibly configured to meet all your requirements with process components from a single source.

These inline systems are suitable for all common glass formats, including 100-inch, jumbo and super jumbo.

In addition, we offer market-leading Industry 4.0 solutions for data analysis, process control and operational optimization with the VA INDIGO software product family.

Fast adaptation to new requirements & layer stacks



through flexible configuration at any time

Easy to maintain & short downtimes



due to easily accessible maintenance concept

Stable product quality



and fast reproducibility during product changes



## APPLICATIONS



Building-Integrated PV



Windshield & Sunroof



Windows & Facades



## TECHNICAL DATA

Subject to change without notice due to technical improvement.

### Substrate

Material: flat glass

Thickness: 2 mm to 19 mm

### Coating area

GC330H: up to 3300 mm x 7800 mm (Super Jumbo)

GC280H: 2800 mm x 5000 mm

GC254H: 2540 mm x 3810 mm

### Cycle time

GC330H / GC280H / GC254H: < 20 s

### Base pressure in sputter chamber

$\leq 5 \times 10^{-6}$  mbar

### utilities and supply

Utility requirements: between 0,5 and 5 MVA, depending on application and throughput

Mainconnections: 400 VAC, 50 Hz oder 480 VAC, 60 Hz

# GC120V

## PROVEN VERTICAL COATING SYSTEM

with high productivity

With the GC120V, we offer you a reliable system for the deposition of thin metal and oxide layer systems on flat glass or substrates made of other materials.

The substrates are guided vertically through the system in a carrier. After coating, the carrier is transported back to the start by a return system. This saves you time and manpower.

VON ARDENNE is a leader in developing and manufacturing of large-area coating lines. Therefore, we were able to incorporate our extensive knowledge and experience with PVD technologies into this platform. The reliability of the system has been proven and confirmed in the display industry.

### High productivity

due to scalability, modular design & short cycle times



### Small footprint

due to vertical chamber orientation



### Low defect rates

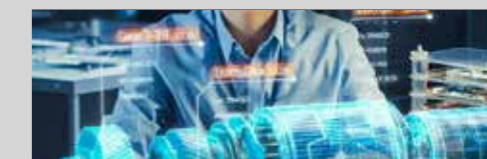
due to vertical orientation



## APPLICATIONS



Automotive Displays



Displays for Consumer Electronics



Thin-Film Photovoltaics



Smart Glass



## TECHNICAL DATA

Subject to change without notice due to technical improvement.

### Substrates

Material: flat glass

Thickness: 0.5 mm to 4 mm  
(others on request)

Pretreatment: linear ion source  
or plasma glow discharge

### Coating area

Up to 1280 mm x 1650 mm

### Cycle time

30 s

### Transport type

Inline, carrier-based

Orientation of the substrate: -7° / 0° / +7° vertical,  
LEL, SEL

Speed: ≤ 3.5 m/min

### Loading & unloading

Optional automation by robot

### System control

Siemens SPS and WinCC

# XEANOVA

## HIGHLY PRODUCTIVE & HIGHLY PROFITABLE

double-sided coating on large areas

If you are looking for a highly productive and flexible production system combined with proven technology and design, the XEANOVA is the perfect choice.

The inline coating system is based on our patented coating technology for large substrate areas. The large system width allows the simultaneous processing of many substrates. Therefore, it is particularly suitable for applications with high productivity at very low costs. With the XEANOVA, you can coat silicon wafers or other small substrates. It is also suitable for very thin substrates.

Thanks to its modular design, the XEANOVA can be equipped with rotatable magnetrons for the sputter deposition of high performance TCO layers or various other materials such as metals and metal oxides. It can also be adapted for other deposition technologies. Substrates can also be pre-treated in the system by cleaning or etching, either under vacuum or before entering the vacuum.

Exceptionally  
productive  
due to large width



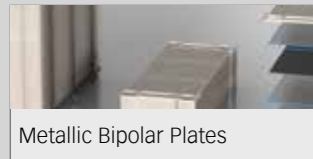
Easily adaptable to  
new processes &  
requirements  
due to flexible & modular  
design



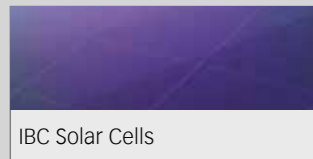
High uptime  
due to quick and easy  
maintenance



### APPLICATIONS



Metallic Bipolar Plates



IBC Solar Cells



Building-Integrated PV



TOPCon Solar Cells



Heterojunction Solar Cells



Perovskite Tandem Solar Cells



## HIGHLY PRODUCTIVE ROLL-TO-ROLL COATING

with compact equipment

The FOSA CX is a compact production system for the roll-to-roll deposition of thin functional layers on polymer films. It is ideal for high-volume production and is optimized for single drum applications.

Furthermore, it benefits from a freely configurable compartment structure and can be maintained easily from two sides. The FOSA CX is engineered for long production campaigns with minimal operator intervention.

VON ARDENNE is a leading supplier of large-area coating systems that have been proven in the industry. Therefore, we were able to incorporate extensive technological knowledge and experience in handling film substrates into this platform.

Saves floor space  
due to compact single-  
chamber design



Selection of cooling  
drums available  
depending on the  
application



Low downtime  
due to quick & easy  
maintenance



### APPLICATIONS



Lithium-Ion Batteries



Windshield & Sunroof

## COMPONENTS FOR SPUTTER PROCESSES

from individual components to complete magnetrons

If you are using thin-film coating for your production, two questions are crucial: How high is the productivity and how good is the quality of the product? In the end, they determine the achievable revenue and the success of your company.

Our coating components can help you answer both questions with "very good".

Increase the availability of your equipment: Use industry-proven components with long uptime, high reliability and maximum utilization of coating materials.

And improve your product quality by using coating sources that give you excellent coating properties. We can help you find exactly the right components for your application.

Industry-leading layer uniformity & target utilization



in rotatable and planar magnetrons

Highest reliability & experience



from thousands of installations worldwide

Comprehensive technology solutions



from individual components to complete magnetrons

### BOOST YOUR YIELD

when sputtering with planar targets



### HIGH-UTILIZATION PLANAR CATHODE

Long uptimes



due to highest possible target utilization

Best coating uniformity



in the market

Low target costs compared to cylindrical cathodes



through easier manufacturing method

### BOOST YOUR YIELD IN SPUTTERING

through longer target lifetime



### ROTATABLE MAGNETRONS

Longer production time



due to extended target lifetime

High process stability



due to low redeposition zone

Best coating results



in terms of rate & layer uniformity

### HIGH THROUGHPUT - MINIMAL HEAT EXPOSURE

for homogeneous layers



### LINEAR EVAPORATOR

Inline processing of organic devices



at high throughput

Minimizes heat impact on evaporant & substrate



when processing sensitive materials

Superior homogeneity & stability



of the layers

### END BLOCKS YOU CAN RELY ON

with long uptimes & low costs



### X-SERIES END BLOCKS

Long uptime



through use of proven technical solutions

Low operating costs



due to low maintenance requirements & low-wear materials

Quick & safe maintenance procedures



due to plug & play cartridge design

### ALWAYS UP TO DATE

with long uptimes & low costs



### Y-SERIES END BLOCKS

Long uptime



through use of proven technical solutions

Low operating costs



due to low maintenance requirements & low-wear materials

Quick & safe maintenance procedures



due to plug & play cartridge design

## BOOST YOUR YIELD

when sputtering with rotatable targets



## MAGNET BARS

Long campaign duration  
due to maximum target utilization



Best coating uniformity in the market  
due to optimally designed magnetic field



Selectable magnetic field strength  
for optimum coating properties



## COATING AT HIGH DEPOSITION RATES

with long uptimes



## DUAL ANODE SPUTTERING

Long uptime – even with insulating layers  
due to cyclic cleaning of the anode



Flexible arrangement for your system  
due to scalable design



Patented technical solution for innovative operation  
and for differentiation from market participants



## BOOST YOUR YIELD

in Reactive Sputtering



## VA PROCOS 2

Reliable & industry-proven control  
for reactive sputtering of all common layer systems



Easily configurable with external components  
for all reactive sputtering applications



Continuous quality assurance  
and parameter control



## JOINT TESTING, SAMPLING & IMPROVEMENT

from simulation to pilot production

### Sampling & Layer Development

At our Technology & Application Center (TAC), we work together with you on the next generation of your coating applications.

From the simulation of layer stacks and their functionality, to sample production on a laboratory and pilot scale, to the measurement and evaluation of coating and substrate properties: We are prepared to meet a wide range of requirements.

This gives you the opportunity to test the function of the coating for your product in advance on relevant sample sizes.



Gaining knowledge through simulation  
of layer composition & properties



Risk reduction & quicker market maturity  
through industrial trials



Individual access to a variety  
of coating materials & services



Optimal equipment configuration  
through testing in a scalable process



Technology & Application Center Dresden

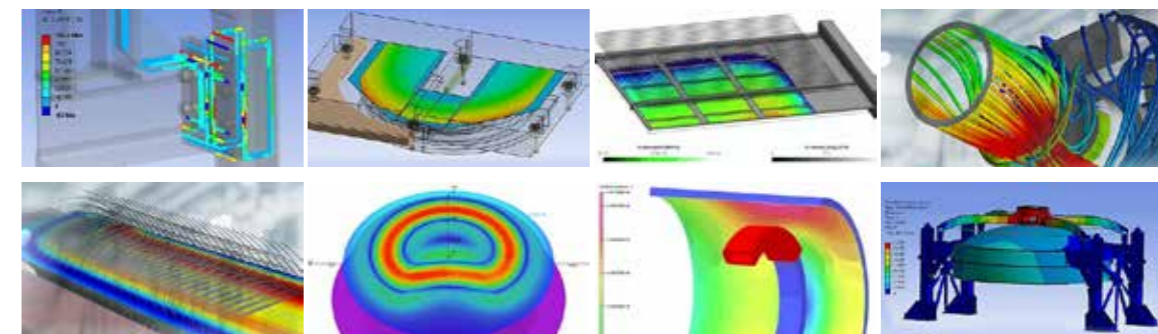
## SIMULATION

helps you understand your process

You want to accelerate your product development? And you know that the answer is multi-physical simulation and modeling? You want accurate results. But which solution is right for you?

We can accelerate your product development and upgrade process by reducing engineering effort with state-of-the-art modeling and simulation. This allows you to design your custom vacuum solution or perform feasibility studies for upgrading a running system.

We have outstanding expertise in multiscale simulation and have leveraged it to ensure highly optimized system performance and best process quality.



# OUR STRENGTHS

## In-House Technology & Application Center

- Sample coatings of customer applications
- Development of customized layer stacks
- Product & process verification and optimization
- Testing of new technologies and components

## Professional Simulation Support

We offer professional simulation technology to ensure best process quality with regards to plasma, heat and cooling. Furthermore, our simulation tools help demonstrate, develop and improve layer properties and define or optimize processes, details and the performance of our systems.

## Close Partnership

VON ARDENNE has a network of partners for even more profound R&D work and to identify future technologies. It consists of:

- Fraunhofer Institutes
- Institutes of the Helmholtz Association
- Universities
- Companies

## Global Project Experience

VON ARDENNE equipment is used in over 50 countries. We have established an installed base of hundreds of coating systems worldwide, ranging from small tools to equipment for large-area coating applications for several markets.

## Comprehensive Service Portfolio

- VON ARDENNE service hubs around the world
- On-site service
- Remote access by our technology department
- Regular technical and technological trainings
- Spare & wear part warehouse close to customers
- Lifecycle extension of wear parts

## Upgrades & Retrofits

As soon as your business is growing, your VON ARDENNE equipment will grow accordingly - thanks to its modular design and the upgrades we provide. We will also supply you with the necessary technology upgrades if you decide to change your applications. Furthermore, when your equipment is ageing, we will retrofit your systems with new components, no matter if they are VONARDENNE or third-party machines.

# WHO WE ARE & WHAT WE DO

VON ARDENNE develops and manufactures industrial equipment for vacuum coatings on materials such as glass, wafers, metal strip and polymer films. These coatings give the surfaces new functional properties and can be between one nanometer and a few micrometers thin, depending on the application. Our customers use these materials to make high-quality products such as architectural glass, displays for smartphones and touchscreens, solar modules and heat protection window film for automotive glass.

We supply our customers with technologically sophisticated vacuum coating systems, extensive expertise and global service. The key components are developed and manufactured by VON ARDENNE itself. Systems and components made by VON ARDENNE make a valuable contribution to protecting the environment. They are vital for manufacturing products which help to use less energy or to generate energy from renewable resources.

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Company



Career



Applications



Products



Service