Evalam

Product catalog

AB-AR

What is AB-AR?

AB-AR is a structural interlayer developed by EVALAM with high-performance mechanical resistance that provides post-breakage passive safety when tempered glass is used. AB-AR is highly efficient above 50°C, which makes it the perfect solution in areas where these temperatures are commonly seen for the greater part of the year.

AB-AR has a better performance than other products in high-temperature environments, supported by the test carried out by the Institute of Structural Engineering of the **University of the Bundeswehr** in Munich, which demonstrates how a glass which is laminated with AB-AR after being broken, supports without problems a weight of 400 kilograms in an environment of 50°C for 24 hours, while other structural products on the market such as ionomers collapse after 53 minutes and applying only 300 kilos of load.

AB-AR is a technical solution that offers compositions that are 50% lighter than glass-only solutions, obtaining the same resistance in applications that require extra security, especially in public spaces or with high linear loads. These qualities make AB-AR the ideal solution for structures of all kinds, whether for use in glass facades, structural windbreaks, walkable floors, stairs, ceilings, railings, as well as anti-vandal security.

Test carried out by the Bundeswehr University in Munich. Reports available upon request

der Bundeswehr Universität München

AB-AR Benefits

Product benefits

Good post-breakage behaviour

Even though both sheets of glass are tempered, the composition does not lose its rigidity when broken

Resistance to impact in crowded areas

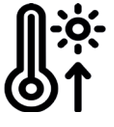
Breakage of one or more components does not affect the laminated glass structure, protecting people who happen to be in the vicinity. AB-AR's unique characteristics of ensure that the glass remains stable against impact caused by a crowd, even after breakage.

Lighter

It is a technical solution that weighs 50% less than glass-only compositions with the same strength.

UV filtering

By combining AB-AR and Evalam in lamination, the composition provides UV filtering and protects the people and objects behind it.



Improved behaviour at temperatures above 50°C

Ionomers lose their characteristic strength and rigidity properties when this threshold is exceeded. AB-AR does not.

Extra safety

Benefits in the process

Does not require climate-controlled conditions for its maintenance

The only product with structural performance classified as Family-2 and with post-breakage stability without the need for special climate control in storage.

No expiration

AB-AR does not lose product qualities over time. This means that it can be stored without fear that the passage of time will affect its yields.

Hurricane protection

AB-AR has undergone rigorous testing to ensure compliance with the safety standards established by Miami-Dade County.

The Miami-Dade County certificate assures homeowners and investors that their buildings and hurricane protection systems are designed to withstand the impacts of hurricanes and minimize damage in the event of a strong storm, ensuring the safety and protection of structures and the people who use them.

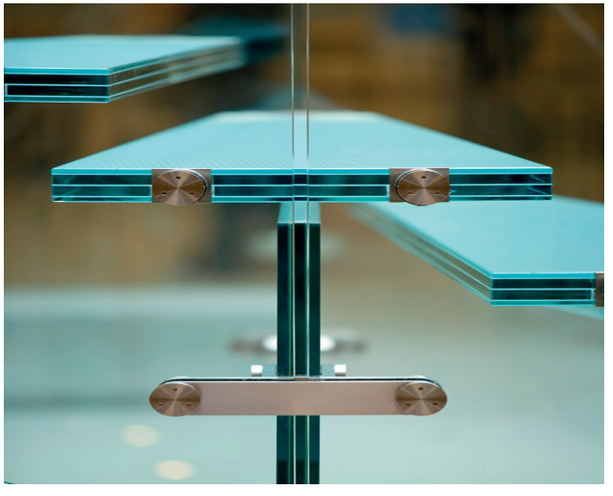
Miami-Dade County's certification is one of the most demanding in the world and is widely recognized as an indicator of quality and safety.

MIAMI-DADE COUNTY
APPROVED

Applications

1. Walkable floors

AB-AR laminated glass walkable floors have a great visual appearance, they help create the feeling of spaciousness and extra space. In addition, they improve interior lighting considerably.



2. Stairs

It is an innovative design solution resulting from creative architecture. Its application brings modernity and elegant design to projects. AB-AR provides security and resistance.

3. Railings

The security provided by AB-AR, especially in terms of stability and resistance to surges of people, makes it the perfect product to be used as a railing, whether for use in public places such as stadiums, shopping centers or public facilities such as airports or stations, but also use in private homes.

4. Facades

AB-AR is the optimal solution for use in facades, due to its lightness and excellent behaviour at high temperatures, the strength and rigidity properties remain intact even above 50ºC. In combination with EVA EVALAM, it is also possible to provide a high UV filter.

5. Canopies

The AB-AR installation as a laminated glass solution for canopies combines design with peace of mind in the event of breakage due to falling objects, or snow accumulation...

6.Swimming pools

To achieve the most impressive pool designs. AB-AR is the ideal product since it can be integrated as a retaining wall..

In addition, in combination with **Evalam Visual**, has perfect behaviour against humidity, so it can be installed with an open edge without causing delamination problems.

Interlayer properties of AB-AR

Classification of the AB-AR interlayer into stiffness families

Load Case & Load Condition	EL [Mpa]	hmono,LI 1 [mm]	hmono,LI 2 [mm]	hmono,LI 3 [mm]	hmono [mm]	omega [-]	Evaluation acc. to EN 16612	
							omega limit Family 2	Stiffness Family
1. Wind gust load (Mediterranean areas)	11,00	8,20	8,00	8,00	8,07	0,730	0,5	2
2. Wind gust load (other areas)	19,95	8,25	8,00	8,00	8,08	0,736	0,7	2
3. Wind storm load (Mediterranean areas)	8,01	8,10	7,85	7,85	7,93	0,683	0,1	2
4. Wind storm load (other areas)	14,17	8,20	7,85	8,10	8,05	0,724	0,5	2
5. Balustrade loads - no crowds	11,53	8,20	7,95	7,95	8,03	0,718	0,5	2
6. Balustrade loads - crowds	10,05	8,20	7,95	8,00	8,05	0,724	0,3	2
7. Maintenance loads	6,00	8,00	7,80	7,80	7,87	0,660	0,1	2
8. Snow load - external canopies, roofs of unheated buildings	20,51	8,25	8,15	8,15	8,18	0,772	0,3	2
9. Snow load roofs of heated buildings	9,66	8,20	7,95	8,00	8,05	0,724	0,1	2
10.Climatic loads on insulating glass units: summer	5,05	8,00	7,75	7,85	7,87	0,660	0,1	2
11.Climatic loads on insulating glass units: winter	11,16	8,20	8,00	8,00	8,07	0,730	0,3	2
12. Permanent loads	1,11	7,25	7,00	7,00	7,08	0,418	0	2

AB-AR can be categorized effectively in stiffness family 2 for all load cases.

Table of Young's Moduli of AB-AR for different temperatures and load durations

Interlayer Young's Modulus [MPa] AB-AR*

Load Duration	Temperature [°C]									
	- 30	- 20	- 10	0	10	20	25	30	40	50
3 s	1692	1482	865	186	39,7	19,3	15,4	12,6	8,91	5,99
30 s	1672	1340	597	101	29,3	16,4	13,4	11,2	7,81	5,11
5 min	1612	1148	362	60,0	23,3	14,3	11,9	9,84	6,82	4,20
10 min	1589	1089	308	51,4	21,6	13,7	11,4	9,45	6,46	3,98
30 min	1538	970	237	43,7	19,8	12,7	10,8	8,88	5,96	3,63
1 h	1503	889	188	38,8	18,9	12,4	10,3	8,52	5,77	3,35
6 h	1403	689	120	30,7	16,6	11,2	9,31	7,81	5,05	2,50
12 h	1356	603	96,5	28,1	16,0	10,9	8,94	7,47	4,79	2,13
24 h	1311	536	81,2	26,0	15,2	10,5	8,53	7,16	4,48	1,92
5 days	1171	367	58,1	22,5	14,0	9,40	7,83	6,39	3,90	1,62
3 weeks	720	121	30,1	16,3	11,0	7,38	5,91	4,73	2,02	1,11
1 year	677	109	29,1	16,0	10,8	7,23	5,80	4,59	1,94	1,11
10 years	469	68,5	23,8	14,2	9,50	6,36	5,07	3,86	1,57	1,11
50 years	312	48,4	20,3	12,8	8,71	5,76	4,45	3,25	1,30	1,11

Table of Shear Moduli of AB-AR for different temperatures and load durations

Interlayer Shear Modulus [MPa] AB-AR*

Load Duration	Temperature [°C]									
	-30	-20	-10	0	10	20	25	30	40	50
3 s	592	518	302	64,4	13,8	6,65	5,31	4,33	3,01	2,01
30 s	585	468	209	34,9	10,2	5,67	4,62	3,84	2,64	1,72
5 min	564	401	127	20,8	8,02	4,92	4,07	3,35	2,29	1,40
10 min	556	381	108	17,8	7,46	4,72	3,91	3,21	2,17	1,33
30 min	538	339	82,3	15,2	6,82	4,38	3,69	3,02	2,00	1,21
1 h	525	311	65,4	13,5	6,51	4,23	3,54	2,88	1,92	1,12
6 h	491	241	41,7	10,6	5,73	3,85	3,17	2,62	1,68	0,83
12 h	474	211	33,5	9,76	5,51	3,72	3,04	2,51	1,60	0,71
24 h	458	188	28,2	8,97	5,25	3,58	2,90	2,40	1,49	0,64
5 days	409	128	20,2	7,76	4,78	3,22	2,66	2,14	1,30	0,54
3 weeks	252	42,2	10,5	5,63	3,75	2,51	2,00	1,58	0,67	0,37
1 year	237	38,2	10,0	5,52	3,69	2,46	1,96	1,53	0,65	0,37
10 years	164	24,0	8,19	4,88	3,25	2,15	1,70	1,29	0,52	0,37
50 years	109	16,9	7,01	4,40	2,96	1,93	1,48	1,08	0,43	0,37

Table of Poisson's ratios of AB-AR for different temperatures and load durations

Poisson's Ratio [-] AB-AR*

Load Duration	Temperature [°C]									
	-30	-20	-10	0	10	20	25	30	40	50
3 s	0,43	0,43	0,43	0,44	0,44	0,45	0,45	0,46	0,48	0,49
30 s	0,43	0,43	0,43	0,44	0,44	0,45	0,45	0,46	0,48	0,49
5 min	0,43	0,43	0,43	0,44	0,45	0,45	0,46	0,47	0,49	0,50
10 min	0,43	0,43	0,43	0,44	0,45	0,45	0,46	0,47	0,49	0,50
30 min	0,43	0,43	0,44	0,44	0,45	0,45	0,46	0,47	0,49	0,50
1 h	0,43	0,43	0,44	0,44	0,45	0,46	0,46	0,48	0,50	0,50
6 h	0,43	0,43	0,44	0,44	0,45	0,46	0,47	0,49	0,50	0,50
12 h	0,43	0,43	0,44	0,44	0,45	0,46	0,47	0,49	0,50	0,50
24 h	0,43	0,43	0,44	0,45	0,45	0,46	0,47	0,49	0,50	0,50
5 days	0,43	0,43	0,44	0,45	0,46	0,46	0,47	0,49	0,50	0,50
3 weeks	0,43	0,43	0,44	0,45	0,46	0,47	0,48	0,50	0,50	0,50
1 year	0,43	0,43	0,45	0,45	0,46	0,47	0,48	0,50	0,50	0,50
10 years	0,43	0,43	0,45	0,45	0,46	0,48	0,49	0,50	0,50	0,50
50 years	0,43	0,43	0,45	0,45	0,47	0,49	0,50	0,50	0,50	0,50

*Testing Institute:

Universität der Bundeswehr München, Inst. f. Konstruktiven Ingenieurbau, Germany (February 2020)

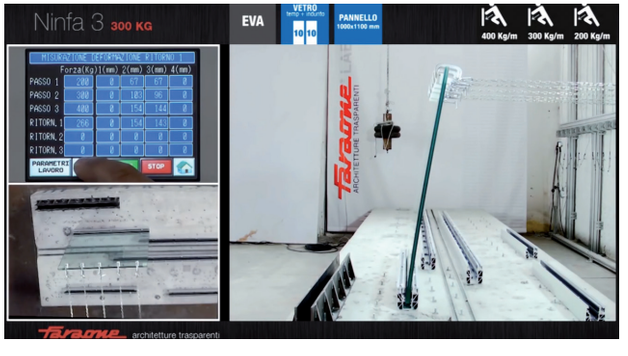
Combined approach of DMTA and bending measurements (Dec)/ M&M Networking
Reports and Scientific Analysis available on request

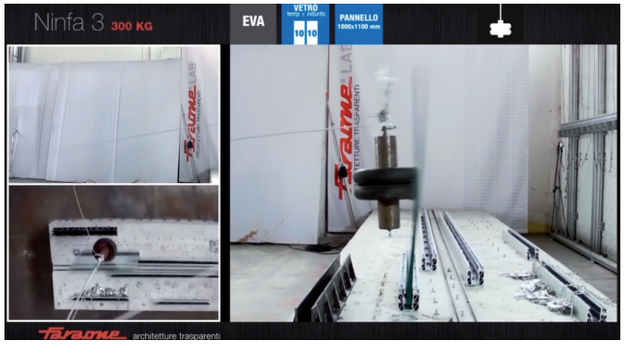
Balustrades classification

Comparative table of test and results

Per thickness and classification

Glass & Interlayer Features	Pendulum Springs 150 J	Pendulum body springs 600 J (1B1)	Thrust SLU DM2008 Cat C2 (2kN/m)	Thrust SLU DM2008 Cat C3 (3kN/m)	Thrust SLU CNR210 Cat C2 (2kN/m)	Thrust SLU CNR210 Cat C3 (3kN/m)	Arrow SLE CNR210 Cat C2 Less 100mm"	Arrow SLE CNR210 Cat C3 Less 100mm	Load Pre-Breakage (kN/m)	Last Load Pre-Breakage w/hammmer (kN/m)	Further Resistance post critical breakage of all plates	RAILING SYSTEM by FARAONE
8T +1.5 ABAR + 8T (HGlass = 1.100mm)	PASS	PASS	PASS	PASS	PASS	PASS	Not OK (102mm)		2,7	2 (220mm)	PASS	NINFA 100
8T +2.5 ABAR + 10T (HGlass = 1.100mm)	PASS	PASS	PASS	PASS	PASS	PASS	PASS	Not OK (115mm)	3	2 (198mm)	PASS	
10T +1.5 ABAR + 10T (HGlass = 1.100mm)	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	4,5	2 (164mm)	PASS	NINFA 4
10T +2.5 ABAR + 10T (HGlass = 1.100mm)	PASS	PASS	PASS	PASS	PASS	PASS	PASS	PASS	4,8	2 (145mm)	PASS	





Packaging

Kit AB-AR

Kit AB-AR 1.5 mm	Kit content	Sizes
	FILM AB-AR 0,5 mm	1,30 x 30 m
	EVALAM VISUAL 0,48 mm	1,30 x 60 m
KIT AB-AR 2.0 mm	**kit content**	**Sizes**
	FILM AB-AR 1,0 mm	1,30 x 30 m
	EVALAM VISUAL 0,48 mm	1,30 x 60 m
KIT AB-AR 2.5 mm	**kit content**	**Sizes**
	FILM AB-AR 1,0 mm	1,30 x 30 m
	EVALAM VISUAL 0,76 mm	1,30 x 60 m

AB-AR Sheet

Material	Sizes
FILM AB-AR 1 mm (Sheet)	3.05 x 2.05
FILM AB-AR 1.5 mm (Sheet)	3.05 x 2.05
FILM AB-AR 4 mm (Sheet)	2.5 x 2.0

Evalam

"Our ambition is to get the best solution for each need, there is no limit in glass creation"

Jorge Pujol
CEO Pujol Group

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V1- March- 2024