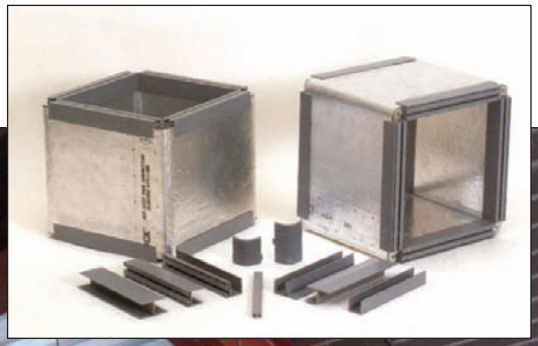
KIMMCO

ALUGLASS DUCT SYSTEM (KADS)

A NEW GENERATION PRODUCT



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A subsidiary of Alghanim INDUSTRIES

ALUGLASS DUCT SYSTEM (KADS)

APPLICATION

KIMMCO Aluglass duct system used for air distribution in HVAC system in high rise & other commercial buildings is operating at:

Max operating temperature	121° C (250° F)
Max air velocity (erosion test)	20 m/s (5000 fpm)
Static pressure	= 4″ wg (996 Pa)

DESCRIPTION

KIMMCO Aluglass duct system is fabricated from the rigid board composed of resin bonded fine pure spun glass fibers faced with a foil glass cloth laminate (ALUGLASS) water vapor barrier on the outer face, and a reinforced Foil Kraft laminate (FSK) or Foil Kraft laminate (FK) on the interface to provide a smooth air flow and easy cleaning.

Specialty fire retardant plastic profiles are used for joining various sections of the duct system in order to ensure no thermal bridge, no air leakage and to provide additional mechanical strength to KIMMCO Aluglass duct system.

BENEFITS

KIMMCO Aluglass duct system provides a wide range of benefits for both commercial and residential buildings, including:

✓ **Energy Conservation**

KIMMCO Aluglass duct system reduces HVAC system operating costs by controlling heat loss or gain through duct walls. As the joints are airtight when properly assembled and sealed, the amount of energy wasted due to duct leakage is negligible.

✓ **No thermal bridge**
Plastic profiles used for joining various sections of the duct system are made from specialty fire retardant plastic and ensure no thermal bridge.

✓ **Enhanced mechanical strength**
Specialty fire retardant plastic profiles and Aluglass facing provide additional mechanical strength to KIMMCO Aluglass duct system.

✓ **Noise control**
KIMMCO Aluglass duct system distributes air quietly. The built-in thermal/acoustical insulation absorbs noise generated by central air handling equipment and air movement through the ducts.
The insulation also reduces noise transfer drastically, such as cross-talk, from one room to another through the ducts.

✓ **Excellent condensation control due to zero water vapor permeance**
KIMMCO Aluglass ducts outer facing (Aluglass) achieves zero water vapor permeance and controls moisture condensation in the air handling system. It reduces the risk of water damage.

Good insulation qualities minimize condensation on the exterior of the duct.

✓ **Fire safe**
KIMMCO Aluglass ducts made of non-combustible fiberglass do not emit any toxic smoke in case of fire and are hence fire safe.

✓ **Indoor Environmental Quality (IEQ)**
KIMMCO Aluglass duct system helps enhance the comfort level of building occupants by providing quiet, efficient air delivery and improved indoor air quality.

✓ **For Contractors**
KIMMCO Aluglass duct system is light in weight to handle, easy to fabricate and saves time of installation.

PERFORMANCES

LONG–TERM DURABILITY
KIMMCO Aluglass duct system

- Is dimensionally stable under varying conditions of temperature and humidity.
- Is rot proof, odorless and non-hygroscopic.
- Does not breed or sustain mold, fungus, bacteria or rodents.
- Is resistant to any effect due to environment (UV rays) and does not deteriorate, hence no aging.
- Has more life than that of the building in which it has been installed. Even its performance remains consistent and uniform throughout its life.

FIRE SAFETY
KIMMCO Aluglass duct system

- Is made of glass fibers which are non-combustible when tested in accordance to BS 476 (part 4) and ASTM E 136.
- Is resistant to flame spread from external or internal fire sources and is classified as “Class 1” materials when tested in accordance to BS 476 part 7 and “Class O” when tested as per BS 476 (Part 6 & 7).
- When tested as per UL 723 through ASTM E 84, it achieves flame spread index of < 25 and smoke developed index of < 50.
- Withstands the flame penetration test without collapsing or evidence of perforation which would allow direct passage of flame or gases, and without combustion on the exterior surface of the sample.

STRUCTURAL INTEGRITY
KIMMCO Aluglass duct system

- Shows excellent structural integrity which exceeds that required in actual installations when determined by static load test.
- Is puncture-resistant.
- Successfully withstands positive and negative pressure test 2.5 times higher than rated operating pressure. This far surpasses the fifty percent margin required in most installation.

- Does not break away, flake off or show any other evidence of continued erosion or structural damage under elevated air velocity when tested in accordance to UL 181.

MOISTURE ABSORPTION

KIMMCO Aluglass duct system

- Absorbs less than 1% by volume when tested in accordance with ASTM C 1104.
- Does not absorb moisture from the ambient air nor water by capillary attraction.

VAPOR PERMEANCE

KIMMCO Aluglass duct system is supplied with ALUGLASS (foil/glass cloth laminate) water vapor barrier facing on external surface. This facing has a permeability rating of zero perms and hence no water vapor can permeate through it.

ACOUSTICAL PERFORMANCE

KIMMCO Aluglass duct system is made of 25mm thick fiberglass insulation rigid board that has an NRC of 0.55. KIMMCO Aluglass duct system is also available on request with KCL (KIMMCO CLEAN LINER) facing which has NRC value of 0.80.

Type of facing on inner surface	Sound absorption coefficient at the 1/3 octave frequencies in Hz					
	125	250	500	1000	2000	4000
FSK	0.09	0.17	0.61	0.85	0.54	0.29
KCL	0.06	0.28	0.85	0.98	1.00	0.80

Sound attenuation per linear meter of duct is shown in the following table. The data mentioned in the table is for 5m long straight duct sections. Beyond 5m, insertion loss decreases. Additional attenuation is obtained at turns in the duct.

With FSK facing on inner surface

Duct size (outside) mm	Perimeter cross section factor	Attenuation in dB per linear meter for 5m long duct section at frequencies in Hz					
		125	250	500	1000	2000	4000
200 x 200	26.67	0.96	2.34	14.02	22.30	11.82	4.95
300 x 400	13.71	0.49	1.21	7.21	11.47	6.08	2.55
400 x 500	10.16	0.37	0.89	5.34	8.50	4.50	1.89
400 x 700	8.79	0.32	0.77	4.62	7.35	3.90	1.63
500 x 1000	6.55	0.24	0.58	3.44	5.48	2.90	1.22

To obtain perimeter cross section factor, divide the inside duct perimeter (in meter) by the cross sectional area of the duct (in square meter).

With KCL facing on inner surface

Duct size (outside) mm	Perimeter cross section factor	Attenuation in dB per linear meter for 5m long duct section at frequencies in Hz					
		125	250	500	1000	2000	4000
200 x 200	26.67	0.55	4.71	22.30	27.22	28.00	20.49
300 x 400	13.71	0.28	2.42	11.47	14.00	14.40	10.54
400 x 500	10.16	0.21	1.79	8.50	10.37	10.67	7.80
400 x 700	8.79	0.18	1.55	7.35	8.97	9.23	6.75
500 x 1000	6.55	0.13	1.16	5.48	6.69	6.88	5.03

THERMAL PERFORMANCE

Thickness	Mean temperature °C	Thermal conductivity W/m.k.	Thermal resistance m^2K/W
25 mm	10	0.032	0.781
	25	0.035	0.714
	50	0.040	0.625

NON TOXIC

KIMMCO GLASS DUCT IS NOT HAZARDOUS TO HEALTH (see KIMMCO MSDS).

CONFORMITY TO STANDARDS

KIMMCO Aluglass duct system complies with the following standards:

AMERICAN STANDARDS

ASTM C 167, 168, 177, 411, 423, 518, 665 § 13.8 & 13.9, 1045, 1104/1104M, 1136 (types 1&2), 1335, 1338; E 84, 96,136, 795

UL 181, 181A, 723

F.S. HH-B-100B (type 1)

NFPA 255, NFPA 90A & 90B

NAIMA standards

ASHARE 90.1 & 90.2 requirements

SMACNA

BRITISH STANDARDS

BS 476 (part 4, 6 & 7), 874, 2972, 3533, 3600, 3958 (part 5), 5643, 5720

GERMAN STANDARDS

DIN 18165 52612

ISO

354, 1182, 8301, 8302, 9229, 9291

APPLICATION LIMITATION

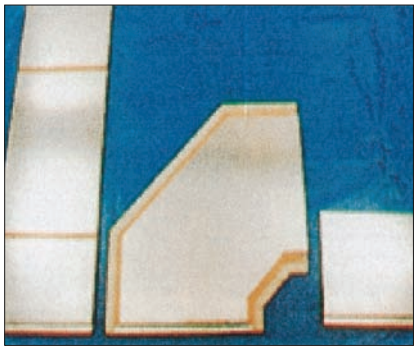
The use of Aluglass duct system should not be recommended for the following applications:

- ✓ With equipment of any type which does not include automatic maximum temperature controls and where an operating temperature of 121 deg C may be exceeded.
- ✓ In kitchen or fume exhaust ducts, or duct conveying solid or corrosive gases.
- ✓ In concrete or buried below grade.
- ✓ With coal or wood fueled equipment.
- ✓ In outdoors without cladding.
- ✓ As casing and/or housing of built up equipment.
- ✓ Immediately adjacent to high temperature electric heating coils without radiation protection.
- ✓ In any application where the duct liner may come in direct contact with liquid water (such as cooling coils, humidifiers, evaporative coolers) unless protected from the water source.
- ✓ Inside fire damper sleeves.
- ✓ In variable air volume systems on the high pressure side unless reinforced to stand the full fan pressure.

FABRICATION

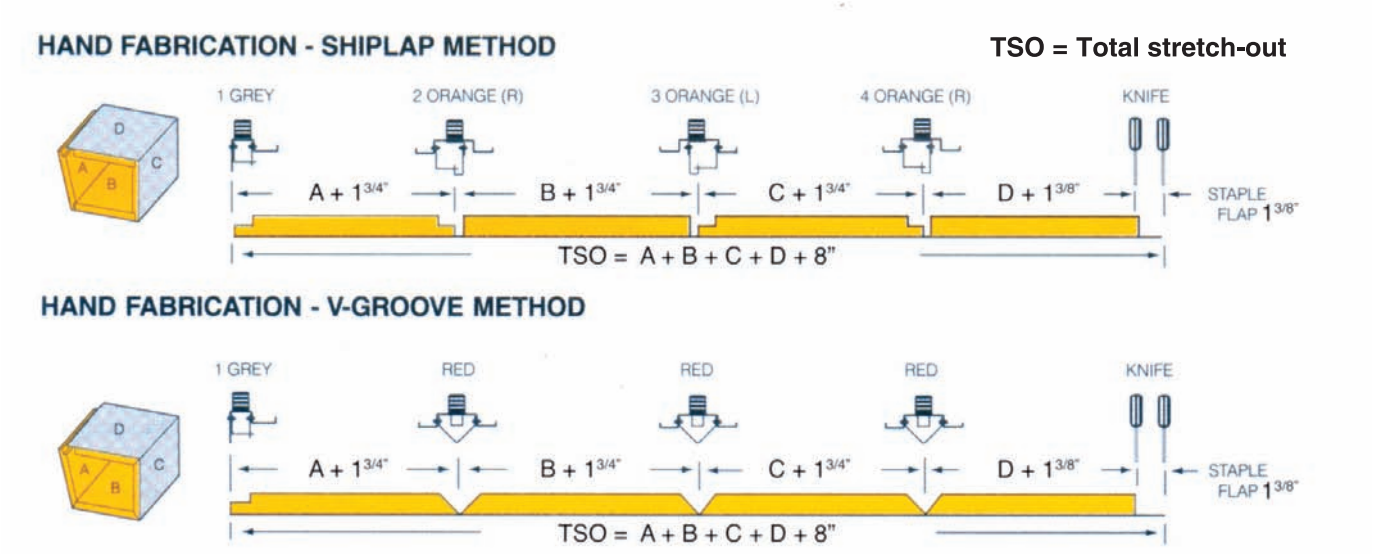
The following 5 steps are required for fabrication:

1. Marking & cutting
2. Assembly
3. Aluminum tape application
4. Sealant silicone application
5. Profile application



Step 1: Marking & Cutting

- Determine the length of the Aluglass duct board to make a duct section of the specified size.
- Cut along left edge of Aluglass duct board using female shiplap edge.
- Start from edge of board and measure first inside duct dimension plus add on allowance of $1^{3/4"}$. Draw first corner groove centerline.
- From there measure second inside duct dimension plus add on allowance of $1^{3/4"}$. Draw second corner groove centerline.



- From there measure same as first inside duct dimension plus add on allowance of $1^{3/4"}$. Draw third corner groove centerline.
- From there measure same as second inside duct dimension plus add on allowance of $1^{3/4"}$. Draw fourth corner groove centerline.
- From there measure $1^{3/4"}$ and draw line locating edge of closure flap. The board is ready to be grooved.
- Cut along first corner groove centerline with grooving tool and remove groove scrap. This is done if board is slightly lifted.
- Repeat this step for other corner groove centerline.
- Using straight knife, cut along fourth corner break through insulation only.
- Do not cut through score the facing.
- Peel insulation from flap. The board is now ready for assembly.

Step 2: Assembly

- Fold to form the duct section, make sure ends are flush and seated properly.
- While holding the duct canted over at about 30 degrees, staple the longitudinal flap or by using cross tabs made from 8" length closure tape.

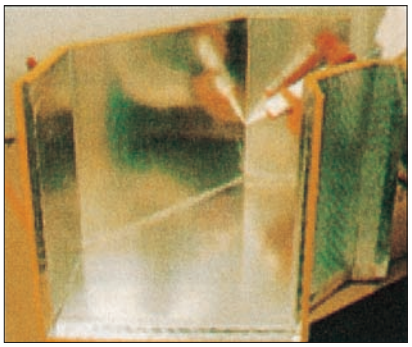
Step 3: Aluminum Tape Application

- Using minimum 2.5" wide tape, position the tape along the edge of the flap in a manner that will allow 1" overlap on adjacent surfaces.

- Rub tape firmly with a plastic sealing tool until the facing reinforcement shows through the tape.

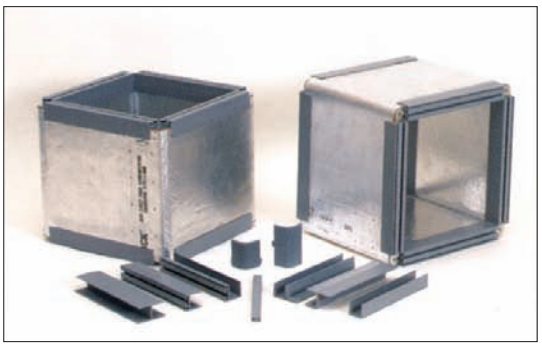
Step 4: Sealant Silicone Application

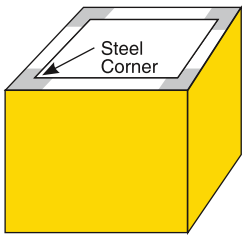
- A thin coat of silicone shall be applied to seal all internal corner of the duct to prevent any fiber migration from the insulation.

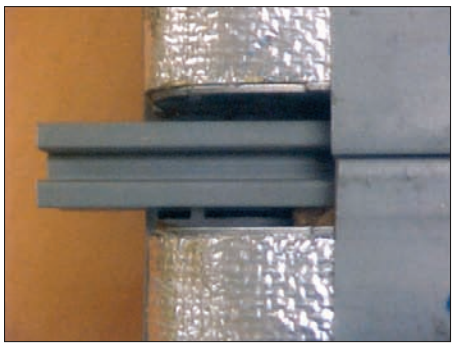


Step 5: Profiles Application

- For fixing the profiles first, the steel corner plates are to be fixed with the help of glue on the duct corners.
- Lengths of profiles are to be cut as per internal dimensions of Aluglass duct.
- Fix the plastic profiles over the Aluglass duct which assures close fitting, smooth joints when duct sections are joined.
- Two straight duct sections and various other sections having ‘C’ or ‘T’ profiles are joined/connected together by inserting ‘I’ profile.







For more details on duct reinforcement, fabrication & hanging, SMACNA's "Fibrous Glass Ducts Construction Standards" and/or NAIMA's "Duct construction manual" can also be referred to.

CONNECTION TO AHU

PICTURES EXHIBITING ONE OF THE CONNECTION METHODS:

Fig. 2

Fig. 1

Fig. 3

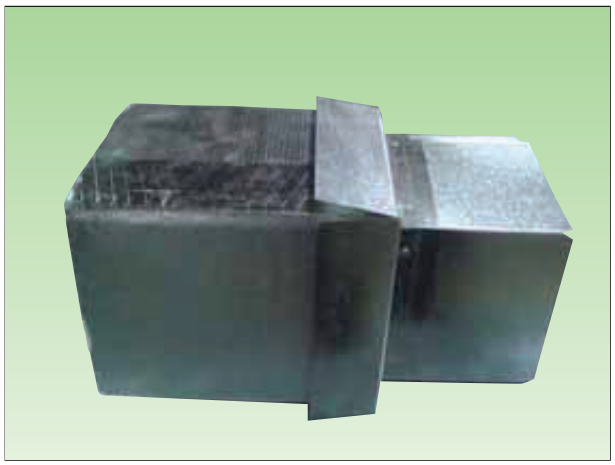
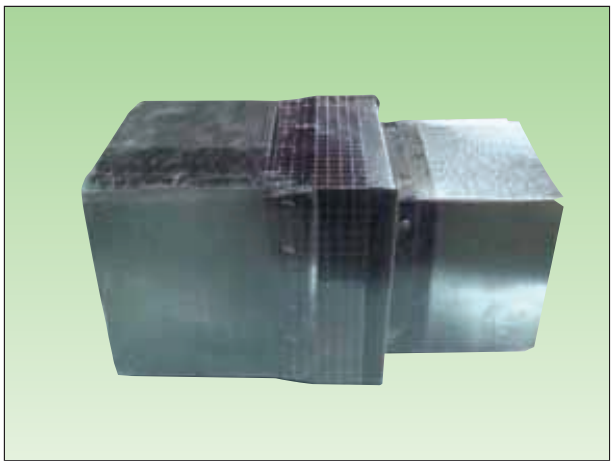
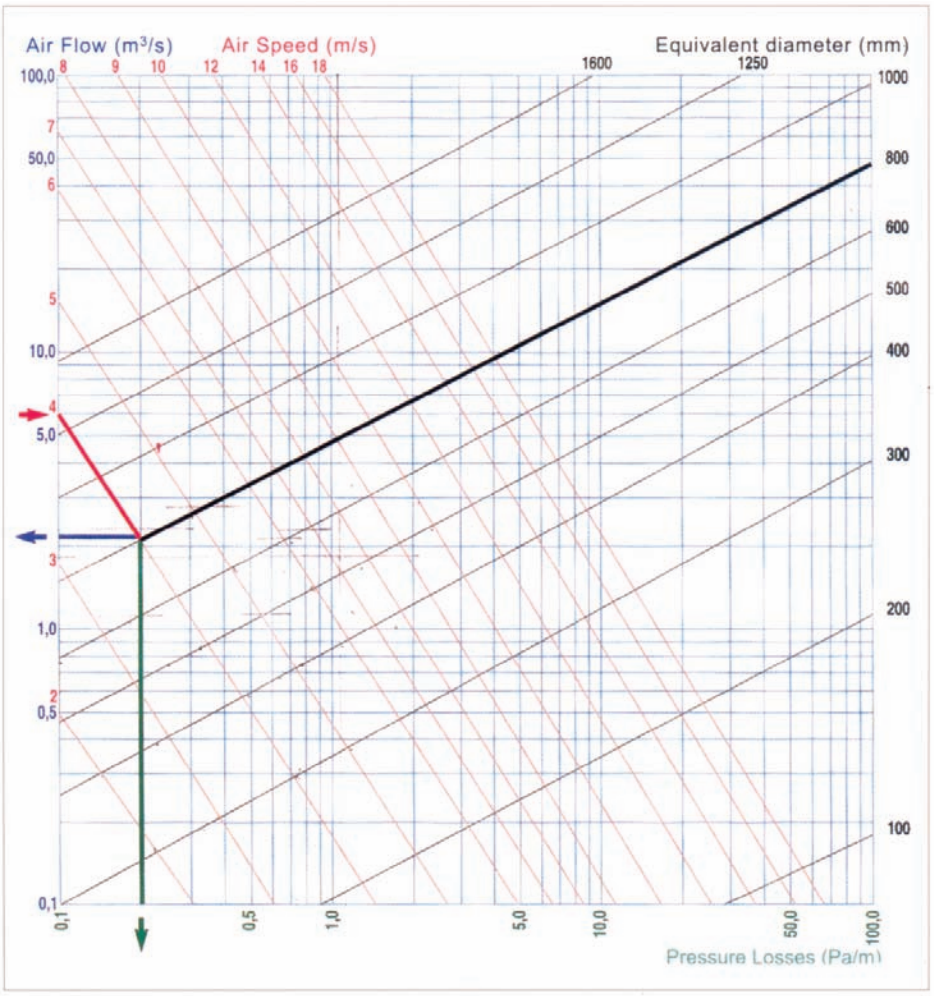


Fig. 4

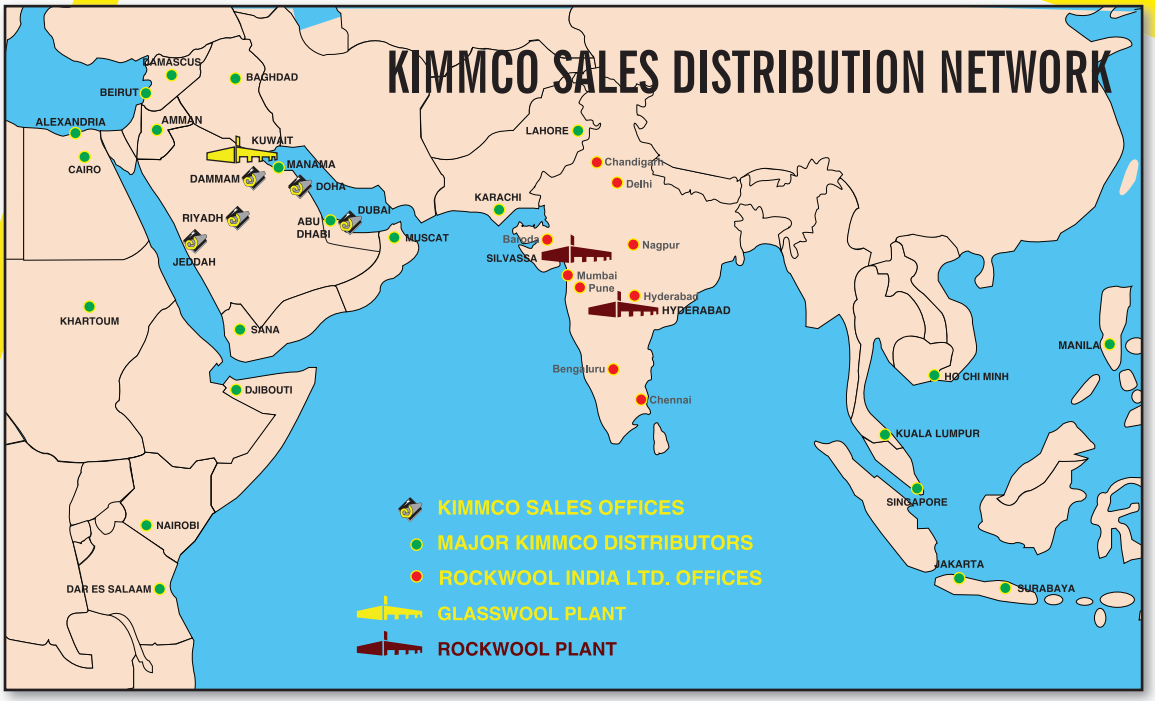


PRESSURE LOSSES



TEST RESULTS OBTAINED FROM INDEPENDENT LABS

Ser. No.	Test	Test Method	Testing Laboratory	Test Result
1.	Dimension & density	ASTM 303	Dubai Central Laboratory	Density= 110 kg/m^3
2.	Compressive resistance	ASTM C 165	Dubai Central Laboratory	2.3 kPa at 10% deflection
3.	Thermal performance	ASTM C 518	Kuwait Institute of Scientific Research (KISR)	0.035 W/m.K at 25 °C
4.	Thermal performance -R value	ASTM C 518	Dubai Central Laboratory	0.819 m^2.K/W at 25 °C for measured thickness of 28.8 mm
5.	Water vapor permeance (External Surface)	ASTM E 96	Dubai Central Laboratory	0 perms
6.	Static pressure	UL 181	Intertek, NY	4.8-inches of water
7.	Leakage test	UL 181	Intertek, NY	The total volume of air leakage over the one-hour period did not exceed the requirement
8.	Static load test	UL 181	Intertek, NY	No evidence of rupture, broken, torn, ripped or separations was found
9.	Air erosion test	UL 181	Intertek, NY	No evidence of continued erosion, cracking, flaking, peeling or delamination
10.	Sound absorption test (NRC value)	ASTM C 423	Intertek, NY	0.55
11.	**Fire Rating**			
	(a) Surface burning characteristic on FSK face	UL 723	Underwriters Labs Inc.	Flame spread = 15 Smoke developed = 0
	(b) Surface burning characteristic on Aluglass face	ASTM E 84	BRE, UK	Flame spread = 0 Smoke developed = 10
	(c) Surface spread of flame (Test on FSK Face)	BS 476 Part 7	BRE, UK	Class 1
	(d) Surface spread of flame test on Aluglass face	BS 476 Part 7	BRE, UK	Class 1
	(e) Fire propagation index on FSK Face	BS 476 Part 6	BRE, UK	5.5
	(f) Fire propagation index on Aluglass face	BS 476 Part 6	BRE, UK	4.5
	(g) Fire class	BS 476 Part 6 & Part 7	BRE, UK	Class 0



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