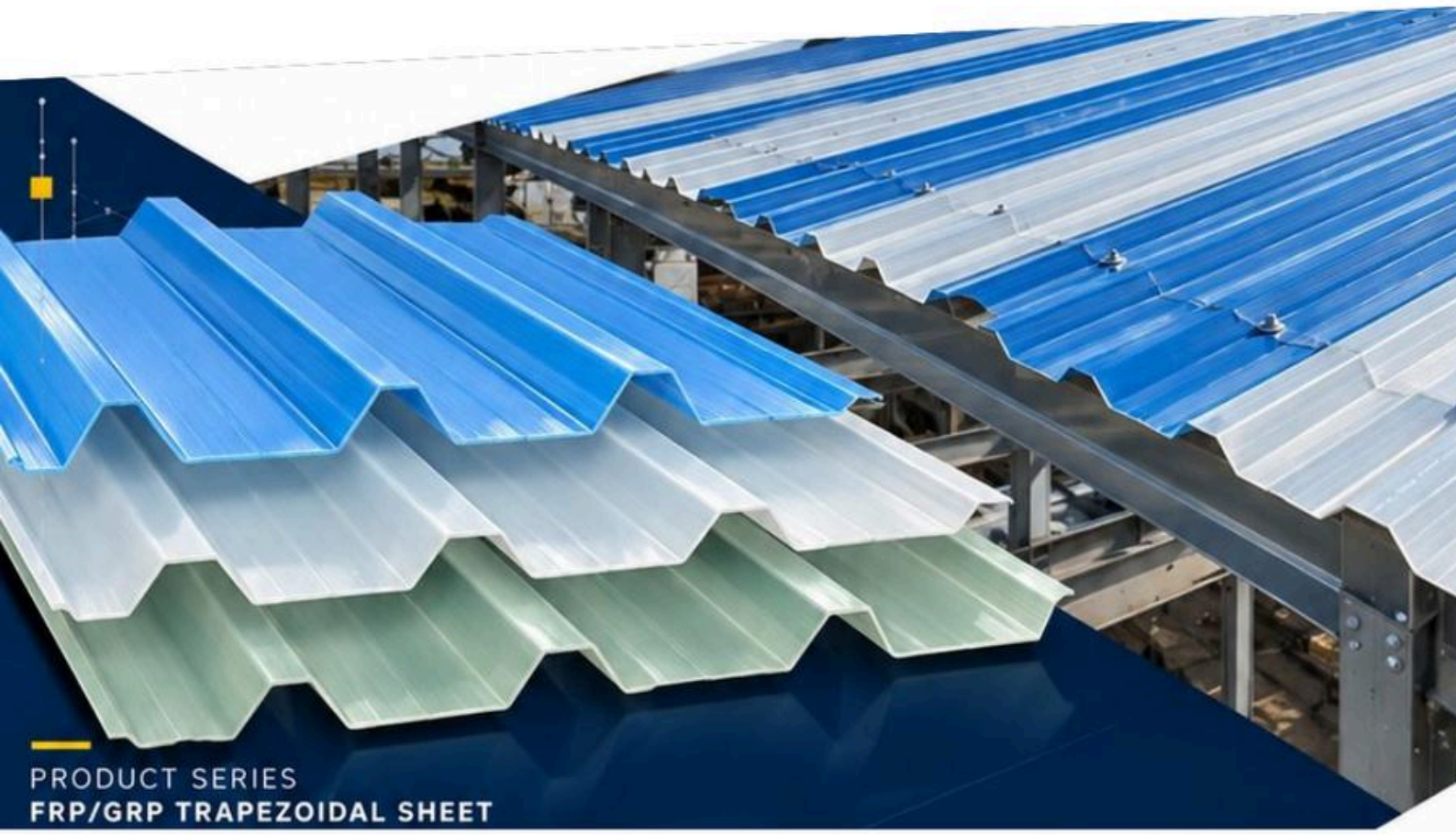
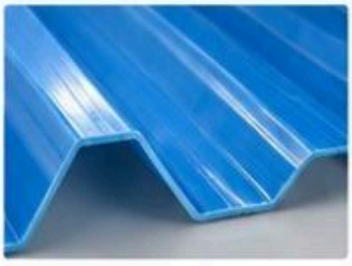
TECHNICAL DATA SHEET
Product Data · Design Formulas · Applications

FRP Trapezoidal Sheet

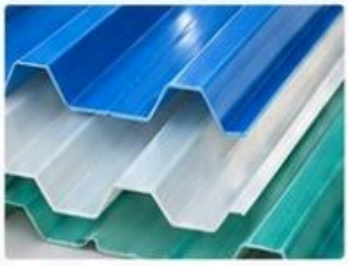
GFRP SKYLIGHT SHEET FOR INDUSTRIAL BUILDINGS



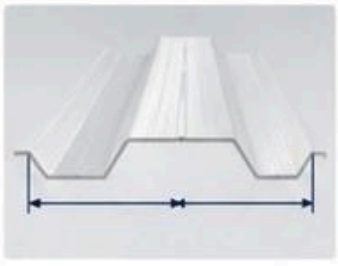
PRODUCT SERIES
FRP/GRP TRAPEZOIDAL SHEET



Specifications



Types & Sizes



Profiles & Details



Applications

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NABAK COMPOSITE trapezoidal fiberglass sheet (FRP / GRP Trapezoidal Sheet) is a translucent ribbed GFRP composite sheet produced to exactly match the trapezoidal metal sheets of industrial buildings. Used as roof and wall rooflights in industrial buildings, warehouses, factories and sports halls, it brings daylight in without glare and, alongside galvanized or pre-painted sheet, creates a continuous, corrosion-resistant roof.

3 – 8	20 – 45 mm	≤ 1450 mm	U ≈ 3.0
Ribs per metre width	Rib height	Purlin spacing	Double-skin rooflight (W/m²K)

What is trapezoidal fiberglass sheet (trapezoidal FRP sheet)?

Trapezoidal fiberglass sheet, also known as **trapezoidal GRP sheet**, **trapezoidal FRP sheet**, **trapezoidal composite sheet**, **trapezoidal rooflight**, **industrial rooflight** and **ribbed fiberglass sheet**, is made from glass-fibre mat and unsaturated polyester resin by continuous lamination and is cured in forming moulds into a profile with flat crowns (ribs), inclined webs and wide pans. FRP is the general name for fibre-reinforced polymers, and GFRP (or GRP) is FRP made with glass fibre.

The main difference between trapezoidal and corrugated fiberglass sheet is its **ribbed geometry**: tall webs and flat crowns increase the moment of inertia for the same weight and allow longer purlin spacing. More importantly, trapezoidal GFRP sheet has the same profile as the metal roof sheet and sits over it at the side lap without gaps or leaks — which is why it is the standard rooflight for metal-clad buildings.

Layered structure of trapezoidal composite sheet

Outer UV-protective layer	GFRP laminate	Smooth inner layer	Second skin (optional)
UV-stabilising film or gelcoat that prevents yellowing, dulling and fibre blooming.	Glass-fibre mat at 25 to 35% by weight in polyester resin; the load-bearing, light-diffusing element.	Smooth, glossy inner surface that stays clean and reflects light better into the space.	A second sheet on spacers for an insulated double-skin rooflight that prevents condensation.

Benefits of trapezoidal fiberglass sheet

- **Same profile as metal sheet:** a rooflight strip continuous with galvanized, pre-painted sheet or sandwich panels; no change to the building frame.
- **High stiffness:** tall ribs keep trapezoidal FRP sheet stable at typical industrial purlin spacings (1 to 1.4 m).
- **Diffused daylight:** lower lighting electricity use during the day, without harsh shadows or glare.
- **Corrosion-resistant:** composite sheet does not rust in chemical fumes, ammonia, humidity or salt — unlike the metal sheet beside it.
- **Low expansion:** thermal expansion about half that of polycarbonate; better compatibility with steel sheet and fasteners.
- **Insulated double-skin version:** double-skin trapezoidal rooflight with U ≈ 3 W/m²K for heated buildings.

Applications of trapezoidal fiberglass sheet

Industrial building rooflights	Warehouses and logistics centres	Buildings with sandwich panels
FRP rooflight strips between galvanized and pre-painted sheets	Lower daytime lighting energy with trapezoidal GFRP rooflights	Double-skin trapezoidal rooflights matching the sandwich-panel skin
Chemical and fertiliser plants	**Industrial poultry and livestock houses**	**Sports halls and industrial facades**
Trapezoidal composite sheet resistant to corrosive fumes	Rooflights resistant to ammonia and humidity	Wall rooflight strips with trapezoidal fiberglass sheet

Profiles of trapezoidal fiberglass sheet

Table 1 — Geometry of common trapezoidal FRP sheet profiles (cover width 1000 mm)

Profile code	Rib pitch p (mm)	Rib height h (mm)	Crown width (mm)	Pan width (mm)	Ribs per cover width	Distributed-load coefficient k	Application
NBK-T20/125	125	20	30	65	8	1.16	Building walls, canopies
NBK-T35/200	200	35	40	110	5	1.18	Standard industrial rooflights
NBK-T40/250	250	40	50	140	4	1.16	Industrial roofs, warehouses
NBK-T45/333	333	45	60	213	3	1.15	Long-span purlin roofs, sandwich panels

Profile codes are indicative. Trapezoidal fiberglass sheet is always produced to the project's metal-sheet profile (pitch, height, crown and pan width and number of ribs); to order, send a sample or a section drawing of the metal sheet. The k factor is calculated with Formula 2 (page 4).

Thickness and weight of trapezoidal composite sheet

Table 2 — Areal weight of trapezoidal GFRP sheet by thickness (ρ = 1.45 g/cm³)

Thickness (mm)	Flat sheet weight (g/m²)	T20/125 (kg/m²)	T35/200 (kg/m²)	T40/250 (kg/m²)	T45/333 (kg/m²)
1.0	1450	1.68	1.71	1.68	1.66
1.2	1740	2.02	2.05	2.02	1.99
1.5	2175	2.52	2.57	2.52	2.49
2.0	2900	3.36	3.42	3.36	3.32

Trapezoidal fiberglass sheet length is made to order, up to 12 m in one piece. For roofs where foot traffic is possible, a heavier sheet (≥ 2.4 kg/m²) and a roof fragility assessment (ACR[M]001 method) are recommended.

Trapezoidal rooflight types and colours

Table 3 — Trapezoidal fiberglass sheet options (1.2 mm per skin)

Type	Visible light transmission	U value (W/m²K)	Recommended use
Single-skin clear	75 – 85%	≈ 6.9	Unheated warehouses and buildings, canopies
Single-skin opal	50 – 65%	≈ 6.9	Production halls with soft light, reduced radiant heat
Single-skin coloured (blue, green)	35 – 60%	≈ 6.9	Matching metal-sheet colour, canopies
Double-skin with spacers	60 – 70%	≈ 3.0	Heated buildings, with sandwich panels
Triple-skin	45 – 55%	≈ 1.9	Cold stores, halls with energy requirements

Trapezoidal fiberglass sheet is supplied in **clear, opal, blue and green** and in custom colours matching the metal sheet. U values are calculated with Formula 6 (page 5).

> **Ordering a matching profile:** the smallest difference in rib pitch or height causes leaks at the side lap. To order trapezoidal fiberglass sheet, send a 30 cm piece of the project's metal sheet or an accurate section drawing (pitch, height, crown and pan width, number of ribs and overlap edge type) so the rooflight mould is set to exactly the same size.

Mechanical and physical properties of trapezoidal FRP sheet

Table 4 — Reference properties of the GFRP laminate in trapezoidal fiberglass sheet

Property	Test standard	Unit	Typical value
Glass fibre content (by weight)	ASTM D2584	%	25 – 35
Density	ASTM D792	g/cm³	1.4 – 1.5
Tensile strength	ASTM D638	MPa	70 – 110
Flexural strength	ASTM D790	MPa	120 – 180
Flexural modulus	ASTM D790	GPa	5 – 7
Coefficient of thermal expansion	ASTM D696	10^{-6} /°C	25 – 35
Thermal conductivity	—	W/m·K	0.18 – 0.25
Solar energy transmittance g (clear / opal)	EN 410	—	0.75 – 0.80 / 0.55 – 0.65
Service temperature range	—	°C	-40 to +90

The g value is the ratio of total solar energy transmitted through the sheet (solar heat gain coefficient). Values are common reference ranges of the FRP and GFRP composites industry and are not NABAK COMPOSITE's own laboratory results.

Trapezoidal fiberglass rooflight compared with other options

Table 5 — Trapezoidal FRP sheet vs trapezoidal polycarbonate and metal roof sheet

Feature	Trapezoidal fiberglass sheet	Trapezoidal polycarbonate	Galvanized steel sheet
Light transmission	50 – 85%, diffused	Up to 90%, clear and direct	Zero
Expansion coefficient (10^{-6} /°C)	25 – 35	65 – 70	12
Relative movement against steel sheet over 6 m at ΔT = 50 °C	≈ 4 – 7 mm	≈ 16 – 17 mm	—
Resistance to chemical fumes and ammonia	**Excellent**	**Poor**	**Corrosion**
Stability under high roof temperatures	**Good (up to ≈ 90 °C)**	**Good**	**Excellent**
Profile match with metal sheet	**Complete (to order)**	**Limited profiles**	—

Reference standards for trapezoidal fiberglass sheet

Table 6 — Common standards and tests for composite rooflights

Topic	Reference standard	Relevance to trapezoidal GFRP sheet
Single-skin profiled rooflight sheets	EN 1013	Dimensional, mechanical, optical and durability requirements for FRP sheet
Rooflights with metal-sheet profiles	EN 14963	Continuous rooflights and compatibility with roof cladding
Glass-fibre-reinforced polyester sheet	ASTM D3841	Classification of light transmission, weathering and fire
Roof performance under external fire	EN 13501-5 / BS 476-3	B_{roof} class for the fire-retardant grade
Roof fragility	ACR[M]001	Safety assessment against falls through rooflights

Trapezoidal or corrugated? If the building roof is clad with trapezoidal metal sheet or sandwich panels, the rooflight must be trapezoidal fiberglass sheet of the same profile. Corrugated fiberglass sheet suits roofs with corrugated sheets, greenhouses and canopies better. Trapezoidal sheet is stiffer for the same weight and spans further between purlins.

Thin-walled section formulas for trapezoidal sheet

1. Horizontal width of the inclined web

$$w = \frac{p - a - b}{2}\ ,\quad l_w = \sqrt{(\,w^2 + h^2\,)}$$

a crown width, b pan width. T35/200: w = (200 - 40 - 110)/2 = 25 mm and $l_w \approx 43$ mm

2. Developed-length factor of a ribbed profile

$$k = \frac{a + b + 2\,l_w}{p}$$

T35/200: (40 + 110 + 2 × 43.0) / 200 ≈ 1.18; areal weight $w_s = \rho \cdot t \cdot k$

3. Moment of inertia of a thin-walled section (line-element method)

$$\bar{y} = \frac{\Sigma\, l_i\, y_i}{\Sigma\, l_i}\ ,\quad I = \Sigma\, t\, l_i\,(\,\frac{\Delta y_i^2}{12} + (y_i - \bar{y})^2\,)\ ,\quad I_w = I \cdot \frac{1000}{p}$$

l_i length of each element (crown, web, pan), y_i height of its centre, Δy_i height difference between its two ends. T35/200 with t = 1.2: $I_w \approx 2.90\times10^5$ mm⁴/m. In wide pans, local buckling reduces the effective width; Table 7 covers this effect with a conservative stress limit.

4. Sheet deflection between purlins

$$\delta = \frac{5\,q\,L^4}{384\,E\,I_w} \le \frac{L}{150}$$

E ≈ 6 GPa, q snow load or wind suction (N/mm per metre width)

5. Bending stress in crown or pan

$$\sigma = \frac{q\,L^2 \cdot c}{8\,I_w} \le \frac{\sigma_u}{3}$$

c = max(ȳ, h - ȳ) distance to the extreme fibre, $\sigma_u \approx 130$ MPa

Purlin spacing table for trapezoidal fiberglass sheet

Table 7 — Maximum purlin spacing (mm) on two supports, deflection limit L/150 and stress $\sigma_u/3$

Profile / thickness	Load 0.75 kPa	Load 1.0 kPa	Load 1.5 kPa
T20/125 — 1.2 mm	740	670	580
T20/125 — 1.5 mm	790	720	630
T35/200 — 1.2 mm	1050	960	840
T35/200 — 1.5 mm	1140	1030	900
T40/250 — 1.5 mm	1240	1120	980
T45/333 — 1.5 mm	1320	1200	1040
T45/333 — 2.0 mm	1450	1320	1150

Calculated with Formulas 3 to 5 and E = 6 GPa. The table is a calculation example; a sheet continuous over several purlins may span further, and in snowy regions the snow load of Part 6 of the Iranian National Building Regulations determines the table column. If the building's purlin spacing exceeds the table, a thicker sheet or an auxiliary purlin under the rooflight strip is recommended.

Full example — T35/200 rooflight, 1.2 mm thick, on purlins at 1000 mm under 1 kPa:

$I_w \approx 2.90\times10^5$ mm⁴/m ; q = 1.0 N/mm (per m width)

$\delta = 5 \times 1.0 \times 1000^4 / (384 \times 6000 \times 2.90\times10^5) \approx 7.5$ mm ≤ L/150 = 6.7 mm ✗

→ L = 960 mm: $\delta \approx 6.35$ mm ≤ L/150 = 6.4 mm ✓ (matches Table 7)

In this case either a 1.5 mm sheet (purlins up to 1030 mm) is chosen or the purlin spacing under the rooflight strip is reduced slightly.

Thermal and condensation-control formulas for industrial rooflights

6. Thermal transmittance of the rooflight

$$U = \frac{1}{R_{si} + \Sigma\, t_i/\lambda + \Sigma\, R_{air} + R_{se}}$$

R_{si} = 0.10, R_{se} = 0.04, λ ≈ 0.20, R_{air} ≈ 0.18 m²K/W. Single-skin ≈ 6.9; double-skin ≈ 3.0; triple-skin ≈ 1.9 W/m²K

7. Inner surface temperature of the sheet

$$T_{si} = T_i - U \cdot R_{si} \cdot (T_i - T_o)$$

T_i = 20 °C, T_o = 0 °C: single-skin T_{si} ≈ 6.3 °C; double-skin ≈ 14.0 °C; triple-skin ≈ 16.1 °C

8. Dew point of indoor air (Magnus formula)

$$\gamma = \ln(RH/100) + \frac{17.27\,T}{237.7 + T}, \quad T_d = \frac{237.7\,\gamma}{17.27 - \gamma}$$

20 °C and 60% humidity → T_d ≈ 12.0 °C. Because single-skin T_{si} (6.3) is below T_d, condensation occurs; double-skin (14.0) is condensation-free.

9. Heat loss through the rooflight strip

$$Q = U \cdot A \cdot \Delta T$$

100 m² of rooflight, ΔT = 20 °C: single-skin ≈ 13.7 kW; double-skin ≈ 6.0 kW; saving ≈ 56% with a double-skin trapezoidal rooflight

10. Daylight factor of the building

$$DF = \frac{E_{in}}{E_{out}} \times 100 \approx \tau \cdot \frac{A_s}{A_f} \cdot \eta \times 100$$

Typical target DF = 2 to 5%. τ = 0.70, η = 0.6, rooflights 8% of roof → DF ≈ 3.4%

11. Relative movement of rooflight and steel sheet

$$\Delta L_{\text{rel}} = (\alpha_{FRP} - \alpha_{st}) \cdot L \cdot \Delta T$$

6 m sheet, $\alpha_{FRP} = 30\times10^{-6}$, $\alpha_{st} = 12\times10^{-6}$, ΔT = 50 °C → ≈ 5.4 mm; screw holes 3 to 4 mm larger than the screw diameter

Installation details for trapezoidal fiberglass sheet

1. **Rooflight layout:** place FRP sheets in regular strips between metal sheets; keep rooflights at least one purlin away from the eaves and ridge.
2. **Side lap:** lay the fiberglass sheet over the downstream metal sheet and under the upstream metal sheet, with a full-rib overlap and butyl tape.
3. **End lap:** at pitches ≥ 10°, 150 mm overlap; at 5 to 10° pitch, 250 mm with two rows of sealing tape.
4. **Fixing:** on roofs fix through the rib crown with self-drilling screws, metal-EPDM washers and spacer bushes so the rib is not crushed; on walls fix in the pan.
5. **Double skin:** fit composite or insulating spacers between the two skins and close the edges with profiled foam fillers.
6. **Safety:** do not walk on rooflights; provide access routes with boards across the purlins and, where needed, safety mesh under the rooflight.

Do fiberglass rooflights make the building hotter?

Clear sheet has a g value of about 0.75; for buildings in hot climates, opal rooflights with g of about 0.6 or a rooflight area below 10% of the roof are recommended.

Why do water droplets collect under industrial rooflights?

This is condensation: the inner surface temperature of a single-skin rooflight is below the dew point (Formulas 7 and 8). A double-skin rooflight and building ventilation solve the problem.

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Request a quote for trapezoidal fiberglass sheet: send the metal-sheet profile drawing or sample, thickness, single or double skin, colour, length and number of sheets, purlin spacing and building type. Nabak Saze Gostar | nabakcomposite.com | +98 21 4881 2124 | Mobile +98 912 396 3078 | Instagram @nabak.composite

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