



NABAK COMPOSITE

PULTRUDED FRP GRATING **ENGINEERING CATALOG**

Design • Materials • Load & Deflection • Installation • Standards

NABAKCOMPOSITE.COM

TECHNICAL EDITION • 2026



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Thirty technical sections for selection, design, specification, installation and quality assurance.

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01 • ENGINEERING SECTION

PRODUCT INTRODUCTION

Pultruded FRP Grating for Industrial Infrastructure

NABAK COMPOSITE pultruded FRP grating is a structural flooring system made from glass-fiber-reinforced polymer profiles. Continuous pultrusion aligns the primary reinforcement along the load direction, while engineered I-shaped bearing bars provide high bending stiffness at low self-weight.

Unlike metallic grating, corrosion resistance is inherent to the composite system and is not dependent on a sacrificial coating. This helps reduce inspection, repainting and replacement requirements throughout the project life cycle.

Key property	Engineering benefit
Low weight	Lower transport, lifting and installation demand; reduced dead load
Corrosion resistance	Suitable for wet and chemically aggressive environments
Electrical insulation	Improved safety around electrical equipment
Slip resistance	Concave or grit surfaces help reduce slip risk
Long service life	Lower life-cycle maintenance requirements

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02 • ENGINEERING SECTION

FRP COMPOSITE TECHNOLOGY

Fiber Reinforcement and Polymer Matrix

FRP combines a load-carrying fiber phase with a protective polymer matrix. E-glass fibers provide tensile and flexural capacity, stiffness and dimensional control. The resin transfers stress between fibers, protects them from moisture and chemicals, and defines the final environmental performance.

Resin system	Typical application
Polyester	General industrial service
Vinyl Ester	Highly corrosive, acidic and demanding chemical environments
Phenolic	Fire-sensitive applications requiring lower flame spread and smoke
Epoxy	Special engineered applications requiring high adhesion and performance

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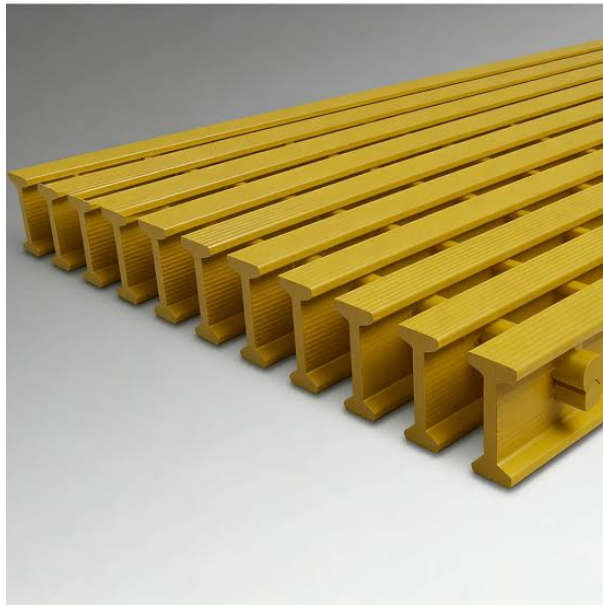
03 • ENGINEERING SECTION

PRODUCT DEFINITION

Structural Arrangement of Pultruded Grating

The panel consists of longitudinal load-bearing I-bars connected by transverse members. The bearing bars transfer bending actions to the supports; transverse bars maintain spacing, provide lateral stability and create an integrated panel.

Because the primary fibers are oriented along the profile length, pultruded grating is directionally optimized. Bearing-bar orientation must therefore be shown on project drawings and respected during installation.



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04 • ENGINEERING SECTION

MANUFACTURING PROCESS

Controlled Continuous Pultrusion

Pultrusion is a continuous manufacturing method that provides repeatable profile geometry and controlled fiber alignment.

Step	Process control
1. Fiber preparation	E-glass rovings and mats are selected and arranged to the product design
2. Resin wet-out	Reinforcement is thoroughly impregnated with the specified resin system
3. Heated die forming	The composite enters a precision die and assumes its final section
4. Thermal curing	The thermoset resin cures under controlled temperature
5. Cutting and assembly	Profiles are cut, machined, connected and assembled into grating panels

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05 • ENGINEERING SECTION

I-BAR ENGINEERING

How the Structural Section Carries Load

The flanges resist the principal bending stresses and increase the second moment of area. The web transfers shear and maintains the separation of the flanges. Under downward loading, the upper flange is predominantly in compression and the lower flange in tension.

Section height, flange geometry, web thickness, glass content and resin system all influence capacity and deflection. Final selection must be supported by project-specific load data.

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06 • ENGINEERING SECTION

PULTRUDED VS. MOLDED

Selecting the Appropriate FRP Grating Type

Parameter	Pultruded FRP	Molded FRP
Manufacturing	Continuous pultrusion	Open-mold molding
Primary structure	I-shaped bearing profiles	Integral square mesh
Fiber direction	Longitudinal and controlled	Multi-directional
Flexural stiffness	High in bearing direction	Moderate and two-directional
Typical span	Generally longer	Generally shorter
Cut-outs	Require engineering review and reinforcement	More tolerant of local openings
Typical use	Engineered industrial structures and higher loads	General flooring and complex cut-outs

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07 • ENGINEERING SECTION

ENGINEERING DESIGN BASIS

Inputs Required Before Product Selection

A valid design starts with the clear span, load type, support arrangement, environmental exposure and serviceability criteria. The grating should not be selected from panel length and width alone.

Design input	Required decision
Clear span	Determines section height and stiffness demand
Distributed load	Personnel, stored items and uniformly applied equipment loads
Concentrated load	Wheels, legs, maintenance equipment and local impact
Environment	Moisture, chemicals, UV, salt water and operating temperature
Serviceability	Allowable deflection, comfort and vibration
Safety factors	Project code, consequence of failure and uncertainty

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08 • ENGINEERING SECTION

MECHANICAL CALCULATIONS

Bending Stress and Section Capacity

Pultruded grating is analyzed as a system of parallel beams. Bending, shear, deflection and connection behavior must be checked for the governing load case.

The basic bending relationship is $\sigma = M / Z$, where σ is bending stress, M is bending moment and Z is section modulus. Calculated stress must remain below the project design resistance after all applicable reduction and safety factors.

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09 • ENGINEERING SECTION

DEFLECTION CONTROL

Serviceability and User Confidence

Strength alone is not sufficient. Deflection must be limited to maintain walking comfort, drainage geometry, equipment alignment and a visible sense of safety. For a simply supported member, deflection depends strongly on load, span, elastic modulus and second moment of area.

A project may specify a limit such as $L/200$. At a clear span of 2,000 mm, $L/200$ corresponds to 10 mm. The governing criterion must always come from the contract documents or responsible engineer.

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PRELIMINARY LOAD GUIDE

Typical Depth Selection for Early Design

The following heights are preliminary application guides only. Final selection requires verified span, bearing-bar spacing, load cases and allowable deflection.

Nominal depth	Preliminary use
25 mm	Light-duty walkways and general access
38 mm	General industrial floors and work platforms
50 mm	Industrial platforms, higher loading and longer spans

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PHYSICAL PROPERTIES

Material Characteristics Relevant to Projects

Property	Typical behavior
Density / self-weight	Substantially lower than steel grating
Water absorption	Low when correctly manufactured and sealed
Corrosion behavior	No rusting; resin-dependent chemical resistance
Thermal conductivity	Lower than metals
Thermal expansion	Directional and generally lower than many plastics
UV resistance	Can be enhanced through additives and protective veil
Strength-to-weight ratio	High
Magnetic behavior	Non-magnetic

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MECHANICAL PROPERTIES

Typical Engineering Ranges

Values vary with profile geometry, glass content, test direction, resin system and production specification. Use certified project data for final calculations.

Property	Typical range
Longitudinal tensile strength	250-500 MPa
Flexural strength	300-600 MPa
Longitudinal elastic modulus	20-40 GPa
Shear strength	50-100 MPa

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13 • ENGINEERING SECTION

THERMAL PERFORMANCE

Temperature Effects and Resin Selection

FRP does not conduct heat like metal, but strength and stiffness remain temperature-dependent. Continuous and peak temperatures, solar heating, thermal cycling and proximity to hot equipment must be stated during selection.

Polyester is suited to general service, Vinyl Ester to more demanding corrosive and thermal conditions, and Phenolic systems to special fire-sensitive applications. Project limits must be confirmed from the selected resin data sheet.

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CHEMICAL RESISTANCE

Corrosion Performance Is Resin-Dependent

Chemical resistance is a primary reason for selecting FRP in oil and gas, petrochemical, water treatment and coastal facilities. Performance depends on chemical identity, concentration, temperature, exposure duration, immersion or splash conditions, cleaning practice and mechanical stress.

A written chemical-service review is required for aggressive or mixed exposures. “FRP” alone is not a complete chemical specification.

Environment	Preliminary resin direction
General industrial humidity	Polyester or project-specified system
Acidic / highly corrosive duty	Vinyl Ester
Fire-sensitive corrosive duty	Phenolic or qualified fire-retardant system
Marine and salt-water exposure	Corrosion-resistant system with UV package

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15 • ENGINEERING SECTION

ELECTRICAL AND SAFETY

Non-Conductive, Non-Magnetic Access Systems

FRP grating is electrically non-conductive under normal dry service and can improve safety around electrical installations. It is also non-magnetic and does not create the same spark concerns as ferrous grating.

Electrical behavior can change with contamination, moisture and conductive deposits. Site cleaning and the project electrical-risk assessment remain essential.

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ANTI-SLIP SYSTEMS

Surface Options for Wet and Oily Areas

Surface	Use
Grit Top	Mineral aggregate bonded to bearing-bar flanges for the highest traction
Concave / Meniscus	Textured profile surface supporting drainage and regular access
Standard profile	Controlled dry environments where enhanced traction is not required



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17 • ENGINEERING SECTION

FIRE BEHAVIOR

Resin Choice, Flame Spread and Smoke

FRP is an organic composite and does not behave like non-combustible steel. Fire performance must be specified using tested resin systems and the project's fire strategy.

Phenolic resins can provide lower flame spread and smoke for demanding applications. Fire-retardant polyester or Vinyl Ester systems can improve performance for general industry. Industry data may classify qualified flame-retardant systems to ASTM E84 Class 1, with a flame-spread index of 25 or less; certification must match the supplied product.

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COMPARISON WITH GALVANIZED STEEL

Life-Cycle Selection in Corrosive Service

Criterion	Pultruded FRP	Galvanized steel
Corrosion resistance	Inherent and resin-dependent	Dependent on coating integrity
Weight	Low	High
Electrical conductivity	Non-conductive	Conductive
Maintenance	Typically low	Inspection, coating repair and replacement may be required
Fabrication	Diamond tools and sealed cuts	Metal cutting, welding and coating repair
Fire behavior	Resin-dependent	Non-combustible but strength falls at elevated temperature

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COMPARISON WITH STAINLESS STEEL

Technical and Commercial Trade-Offs

Criterion	Pultruded FRP	Stainless steel
Corrosion resistance	Excellent with correct resin	Excellent with correct alloy
Weight	Low	High
Electrical / thermal conduction	Low / non-conductive	High
Initial cost	Project-dependent	Often high
Life-cycle cost	Favorable in many corrosive environments	Favorable where alloy is correctly selected
Design behavior	Anisotropic composite	Isotropic metal

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PRODUCT CONFIGURATIONS

NABAK COMPOSITE Supply Options

Product configuration is defined by section height, bearing-bar spacing, cross-rod system, panel size, resin, color, UV package and surface finish. Fabricated stair treads, platforms, covers and custom panels may be supplied to approved drawings.

Every quotation should state the bearing direction and the technical basis of selection.

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21 • ENGINEERING SECTION

GEOMETRY AND DIMENSIONS

Dimensions That Control Structural Behavior

Panel length and width are fabrication dimensions; they do not by themselves establish capacity. Structural behavior is governed by clear span, bearing-bar height and thickness, bearing-bar spacing, transverse restraint and support bearing length.

Nominal depths commonly considered are 25, 38 and 50 mm. Actual geometry and tolerances must be confirmed on the project data sheet.

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ENGINEERING SELECTION GUIDE

A Practical Decision Sequence

Use the following sequence: project information → load analysis → support/span verification → material and resin selection → section selection → deflection check → connection detailing → approval.

Project condition	Priority
Chemical environment	Confirm chemical, concentration, temperature and resin
Marine exposure	Corrosion-resistant resin plus UV provisions
Long span / higher load	Increase section stiffness and verify deflection
Wet or oily floor	Specify Grit Top or qualified anti-slip surface
Electrical area	Maintain cleanliness and confirm site electrical requirements

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23 • ENGINEERING SECTION

INSTALLATION AND CONNECTIONS

Support, Fastening and Cut-Edge Practice

Panels must bear on a continuous, stable and correctly aligned support. Bearing direction must be perpendicular to the principal supports. Provide project-specified bearing length, edge clearance and expansion allowance.

Use compatible hold-down clips and corrosion-resistant fasteners. Prevent panel uplift, rocking and differential movement. Cut only with suitable diamond tooling, protect workers from dust and reseal exposed cut surfaces with a compatible resin.

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24 • ENGINEERING SECTION

OIL, GAS AND PETROCHEMICAL

Typical High-Value Applications

Typical uses include access platforms, pipe-rack walkways, tank-area flooring, maintenance routes, trench covers and stairs. FRP can reduce corrosion-related maintenance in areas exposed to salt, humidity, process splash and chemical vapors.

The project review must still address fire zone, electrostatic requirements, concentrated maintenance loads, dropped-object risk and compatibility with the specific chemical inventory.

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25 • ENGINEERING SECTION

POWER, WATER AND WASTEWATER

Wet-Service Infrastructure

Power facilities benefit from low weight and electrical insulation around selected equipment. Water and wastewater facilities benefit from resistance to continuous humidity, treatment chemicals and biological exposure.

Applications include channels, screens, clarifier access, pump-station floors, cable access routes, platforms and covers. Resin selection must reflect actual chemical dosing and temperature.

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26 • ENGINEERING SECTION

QUALITY CONTROL

From Raw Materials to Finished Panel

Control stage	Key checks
Raw materials	E-glass, resin, additives, UV and flame-retardant packages
Pultrusion process	Die temperature, line speed, fiber/resin ratio and pulling stability
Profile inspection	Dimensions, straightness, surface, cure and defects
Panel assembly	Spacing, alignment, connections and squareness
Final release	Dimensions, appearance, marking, documents and project tests

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27 • ENGINEERING SECTION

STANDARDS AND EVALUATION

Common Technical References

Reference	Use
ASTM D790	Flexural strength and modulus of plastics/composites
ASTM D638	Tensile properties
EN 13706	Specifications for pultruded profiles
ASTM E84	Surface-burning characteristics
DIN 51130	Slip resistance classification for floor surfaces
ASTM F1677	Slip-resistance evaluation (legacy/reference use as specified)

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CONSOLIDATED DATASHEET

Typical Pultruded FRP Grating Data

Item	Typical / selectable value
Material	E-glass reinforced thermoset polymer
Manufacturing method	Pultrusion and panel assembly
Resin	Polyester / Vinyl Ester / Phenolic / special system
Nominal depth	25 / 38 / 50 mm
Surface	Standard / Concave / Grit Top
Color	Project-selected; industrial yellow commonly supplied
UV performance	Enhanced with additives / veil as specified
Tensile strength	250-500 MPa, longitudinal typical range
Flexural strength	300-600 MPa, typical range
Elastic modulus	20-40 GPa, longitudinal typical range
Shear strength	50-100 MPa, typical range

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29 • ENGINEERING SECTION

PROJECT CHECKLIST

Information Required for Quotation and Approval

Category	Required information
Geometry	Installation area, clear span, panel size, support arrangement, bearing direction
Loads	Distributed load, concentrated load, wheel/footprint, impact and maintenance loads
Environment	Chemical list, concentration, temperature, marine exposure, UV and immersion
Performance	Allowable deflection, anti-slip need, fire requirement and electrical considerations
Product	Depth, resin, surface, color, fasteners, clips and fabrication drawings
Documentation	Calculations, test certificates, inspection plan and delivery marking

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ENGINEERING CONCLUSION

Specify a System, Not Only a Panel

Pultruded FRP grating is not merely a substitute for metal. It is an engineered structural system whose performance depends on the relationship between load, span, section geometry, fiber orientation, resin, environment, supports and connections.

NABAK COMPOSITE supports designers, consultants, contractors and asset owners with product selection, project-specific fabrication and technical documentation. Final structural acceptance remains with the responsible project engineer.

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