



PREFA KOMPOZITY

We make your load lighter



PRODUCT CATALOG

www.prefa-kompozity.cz

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1.2 INTRODUCTION

PREFA KOMPOZITY, a.s. – Manufacturer of composite materials and structures
Prefa Brno began manufacturing composite materials (materials composed of resin and reinforcing fibers) in Brno, Czech Republic, through its Composites division in 1996.

Subsequently, the subsidiary joint stock company PREFA KOMPOZITY was founded, the sole stockholder being Prefa Brno.

PREFA KOMPOZITY was entered into the Commercial Registry of the Regional Court of Brno, File B-4276, on January 3, 2005.

PREFA KOMPOZITY is headquartered at Kulkova 10, Brno; the manufacturing plant and warehouse are located at Havránkova 11 in the Dolní Heršpice borough of Brno.

The Company's business registration number (IČ) is 26949881; its VAT registration number (DIČ) is CZ26949881.

As of December 31, 2016, the Company had registered capital in the amount of CZK 18,659,000. (Approximately EUR 720,000 at the time.)

The Company is organized into Production, Technology & Sales, and Development & Innovation divisions.

Key points of PREFA KOMPOZITY's business include:

European manufacturer of composite materials and structures with decades of experience

Sole stockholder is Prefa Brno, a Czech joint stock company with registered capital exceeding CZK 200 million (ca. EUR 7.8 million)

Close collaboration with the Technical University of Brno (Vysoké učení technické v Brně, VUTB), a leading Czech technical university: including shared R&D, guest lectures by our staff, topics offered for master's theses and dissertations, membership on various academic boards, conference participation, support of young scientists

Company certified for quality (CSN EN ISO 9001) and environmental management (ČSN EN ISO 14001)

All standard products certified

In-house Development & Innovation division (develops new materials, products, and technologies)

Several well-equipped construction teams

Composites are made by pultrusion and (unlike many materials available on the market) have a polyester subsurface veil for higher durability

Product range includes a variety of enhanced composites, e.g. fire-retardant, antistatic, high-tensile-strength, chemically resistant, specific resin types, etc., as well as innovative products such as composites for composite rebar, ballistic barriers, prepreg reinforcements (SMC), and glues
Our products and leadership received awards at several prestigious competitions and exhibitions

Major references include utility tunnel renovations, structures for chemical and energy industry, motorway and railway bridge fittings, structures for wastewater treatment plants, and others

Membership in several major Czech economic and research organizations

Development and Innovation

PREFA KOMPOZITY product development targets specific applications to satisfy customer requirements and maintain leadership in new, innovative composite materials and products.

Our current development activities include:

- Development of manufacturing know-how in new composite materials satisfying strict fire safety and fire-retardancy criteria. We collaborate with external partners in several ongoing development projects in this area.
- Guest university lectures as part of the European Social Fund program
- Development results published in academic journals and presented at industry fairs and conferences



1.3 PROPERTIES

WHAT ARE COMPOSITE MATERIALS?

Generally speaking, a composite is any material consisting of at least two principal components with significantly different physical properties. PREFE KOMPOZITY manufactures composite materials consisting of a binder matrix and fiber reinforcement. Most of our materials use organic polymer resins as the matrix and glass fiber as reinforcement; that is, they are fiber-reinforced plastics. Our fiber-reinforced plastics are sold under the trade name PREFEN.

Aside from production technology, the key parameters determining the properties of composite materials are:

Matrix type

- Polyester – the most common resin type, frequently used in construction
- Vinylester – more demanding applications, including chemically corrosive environments and high mechanical and thermal load
- Epoxide – applications most demanding on mechanical and electrical properties and chemical stability

Reinforcing fiber type

- Glass – standard mechanical properties
- Carbon – high elastic modulus and high dynamic load applications
- Other fibers (principally aramid and basalt) for specific applications

Admixtures

- The matrix resin may include a variety of admixtures to improve the properties of the resulting material; these include e.g. fire-retardants, UV stabilizers, electrical conductivity enhancers, etc.

Subsurface veil

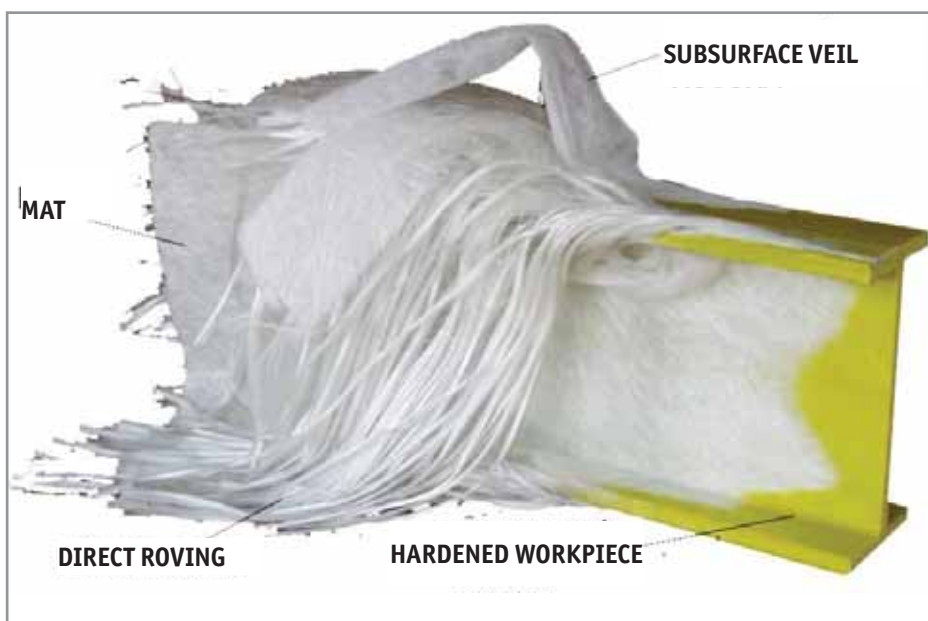
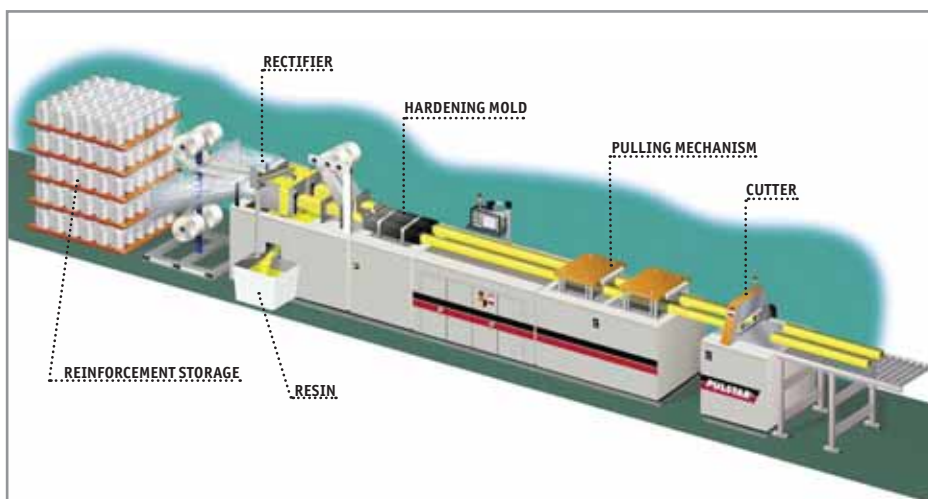
- An often underappreciated feature of composite materials, the veil enhances the product's appearance and has a variety of practical functions; it is particularly essential in chemically corrosive environments and UV-intensive applications

PULTRUSION TECHNOLOGY

Pultrusion is a process for the continuous production of reinforced resins of varied shapes and lengths by pultrusion. The input material is a mix of liquid resin and reinforcing fiber. The material is machine-drawn over a heated steel mold. The reinforcing material – usually glass fiber – is input as rovings and mats. Rovings, which are spools of wound fiber, are loaded into the rectifier, which distributes the rovings evenly throughout the workpiece cross-section and aligns the position of the mats. All PREFEN profiles except solid bars have a thin subsurface polyester veil, saturated in resin. This serves to confine the reinforcing fibers to the interior of the piece and improves the chemical and UV resistance of the material, as well as its appearance. In the event of damage, the veil prevents the fibers from protruding out.

The next machine in the line soaks the fiber, mat, and veil in a liquid mix of resin, filler, coloring, catalyst, and optionally further admixtures to improve the material's physical properties. Once out of the bath, the workpiece has the general shape of the final product. It then enters another rectifier, which presses out excess resin and further shapes the piece, which is then passed to the hardening mold. The heated mold is where the thermosetting reaction takes place and the piece hardens. The finished material is machine-drawn out of the mold and cut into bars of required length – usually 6,000 mm.

PULTRUSION MANUFACTURING LINE



KEY FEATURES OF PREFEN PROFILES

Low weight

Easy and safe handling – up to 4 times lighter than steel (nominal density 1,800 kg / m³)

Flexible

Unlike metals, composite does not permanently deform when subjected to impact or overload

Chemically stable

Composites are highly resistant against a variety of chemicals, do not corrode in air, and do not require painting or other protective finishing

Electrically non-conductive

Composite structures do not need grounding and are suitable for applications with electrocution, lightning, and wandering current risks

Easy machining

Composites are easy to machine, with a cutting resistance on par with hardwood. Furthermore, composite machining does not create the hazardous sharp edges and splinters produced by steel.

UV resistant

Ultraviolet radiation is a natural component of sunlight and generally tends to degrade organic materials. PREFEN composites feature three-level UV protection: The resin includes UV stabilizing agents, the subsurface polyester veil absorbs some UV, and structures for high-exposure applications are painted with polyurethane to prevent long-term discoloration.

High service life

The useful service life of composite materials depends on a variety of factors, the most important of which are aggressive chemicals, weather conditions (temperature, humidity, subzero conditions), UV exposure, and high-temperature environments. Our technology department will review your requirements and propose a suitable material solution. Assuming operational requirements are met, composite materials generally last for the lifetime of the structure.

Hygienically safe

PREFEN is officially attested safe for immersion in potable water.

Excellent mechanical strength

Tensile strength from 240 to 1,000 MPa with glass fiber; up to 3,000 MPa with carbon fiber

Fire-retardant

Thanks to fire-retardant admixtures, we can supply materials with fire interaction class (pursuant to CSN EN 13501-1) B_{f1} – s1 for flooring materials; C – s2, d0 for other materials

Nominal thermal conductivity

As low as 0.19 W.m⁻¹.K⁻¹ in materials with thermal bridge suppression requirements

Sustained thermal resistance

Between 100 and 180 °C, depending on resin type

Surface resistivity

Standard materials on the order of 10¹² Ohm; upon request as low as 10⁶ Ohm

Visit www.prefa-kompozity.cz for further references, material specifications, calculation software for composite load-bearing elements, material attestations and certificates, and more.



PRODUCT CHARACTERISTICS

PREFEN profiles are thermoset elements composed primarily of two different materials – a resin binder and fiber reinforcement – manufactured using pultrusion technology.

PROFILE TYPES

By binder

- Polyester resin – most common
- Vinylester resin
- Epoxy resin

By reinforcement

- Glass fiber – most common
- Carbon fiber
- Basalt fiber

By production technology

- Pultrusion – most common
- Winding

By shape

- Standard shapes (see below)
- Custom shapes – consult our technology department

KEY FEATURES

- High tensile strength
- Low density
- Corrosion resistant
- Electrically non-conductive
- EM transparent

DRAWBACKS

- Low elastic modulus
- Cannot be welded or bent

No.	Dimensions h x v/t [mm]	Weight [kg/meter length]
I beams		
1	I 115×70/5	2.3
2	I 103×100(60)/6	3.0
3	I 140×140/10	6.9
4	I 152×80/10	4.8
5	I 200×100/10	7.2
6	DWB 280×180/12 (2 legs)	18.0

U beams		
1	Uc 40×15/4	0.5
2	U 56.5×58/3 (Round handle)	0.8
3	U 60.5×65/5 (Round handle)	1.4
4	U 60×55/5	1.4
5	U 76×22/6	1.3
6	U 102×35/5	1.4
7	U 103×60/6	2.6
8	U 152×43/10	3.7
9	U 180×60/8	4.3
10	U 200×55/10	5.0
11	U 280×70/12	9.3

TT beams		
1	TT 100×140/5	3.8
2	TT 100×140/6.35	4.6

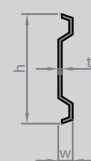
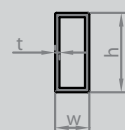
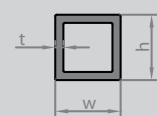
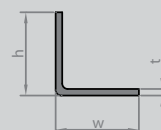
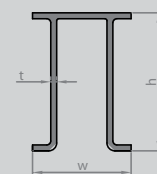
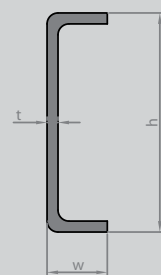
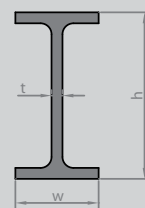
L beams		
1	L 50×30/5	0.7
2	L 50×35/5	0.7
3	L 51×51/6	1.1
4	L 76×76/6	1.7
5	L 100×100/8	3.0

Square tubes		
1	ST 40×40/4	1.1
2	ST 50×50/3.5	1.1
3	ST 50×50/5	1.8
4	STR 50×50/5 (D tubes)	1.5
5	ST 51×51/6	2.1
6	ST 76×76/6	3.3
7	ST 100×100/10	5.8

Rectangular tubes		
1	RET 58×25/3.2	0.8
2	RET 58×25/3/5	1.1
3	RET 63×41/3.2	1.1
4	RET 65×30/3.0	1.1

Round tubes		
1	RT 32/3	0.5
2	RT 38/5	1.0
3	RT 40/3	0.6
4	RT 40/4	0.8
5	RT 63/4	1.3

Kick-plate		
1	KP 110/3 (Trapeze-shaped)	1.0
2	KP 150/4 (Trapeze-shaped)	1.3





GLASS FIBERS REINFORCING A COMPOSITE PROFILE

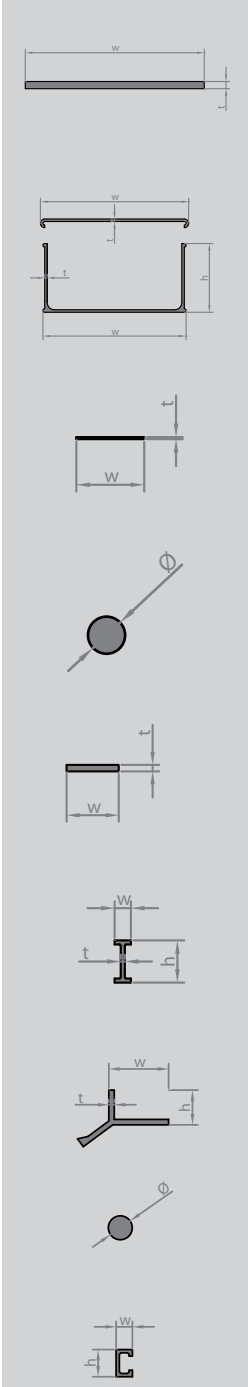


CUSTOM PROFILE SHAPES



DOUBLE WEB BEAM

No.	Dimensions h x v/t [mm]	Weight [kg/meter length]
Plates		
1	P 250/3.2	1.4
2	P 200/10	3.8
3	P 250/10	4.3
Cable boxes		
1	CB 400×100/5.5 + Lid	10.1
2	CB 300×150/4.5 + Lid	7.1
3	CB 300×100/4.5 + Lid	5.5
4	CB 200×100/3.5 + Lid	3.2
Structural reinforcements		
1	PrefaCarb carbon lamella FB 30/1.0	0.09
2	PrefaCarb carbon lamella FB 50/1.2	0.18
3	PrefaRebar composite reinforcement Ø6mm	0.07
4	PrefaRebar composite reinforcement Ø8mm	0.12
5	PrefaRebar composite reinforcement Ø10mm	0.19
6	PrefaRebar composite reinforcement Ø12mm	0.26
7	PrefaRebar composite reinforcement Ø14mm	0.35
8	PrefaRebar composite reinforcement Ø16mm	0.46
9	PrefaRebar composite reinforcement Ø18mm	0.58
Flat bars		
1	FB 6.4/5	0.1
2	FB 18/6	0.2
3	FB 40/5	0.4
Grating beams		
1	TT 50×25	0.7
2	I 26×5	0.3
3	I 30×8	0.3
4	I 30×12	0.4
5	I 40×12	0.4
Y profiles (frames)		
1	Y 55×32/5	1.1
2	Y 55×35/5	1.1
Round full rods		
1	RR 12	0.2
2	RR 14	0.3
3	RR 16	0.4
4	RR 22	0.8
C Profiles		
1	C 25×15	0.4



2.2 COMPOSITE GRATINGS

PRODUCT CHARACTERISTICS

Our gratings are made of resin-fiber composites. They are highly durable and make an excellent replacement for metal gratings, particularly in corrosive environments.

GRRATINGS TYPES

- PREFAPOR assembled gratings composed of pultruded beams; contain up to 70% glass fiber.
- PREFAGRID molded gratings; contain up to 40% glass fiber.

ACCESSORIES

Stainless steel gratings anchors, shaped to match anchor eye (moulded gratings) or support leg (assembled gratings) thickness.

COLORS

The standard color is grey; for larger orders, consult our sales department for custom colors (green, yellow, and others).

PREFAPOR ASSEMBLED GRATINGS

KEY FEATURES

- **Pultrusion technology allows the use of subsurface veil, which protect the material from corrosive environments.**
- **Up to 70% glass fiber; allows the use of fiber mats**
- **Longer service life**
- **Higher shock resistance**
- **Panels of arbitrary length can be made (unlike moulding, which is limited by mold size)**
- **Anti-slip surface**

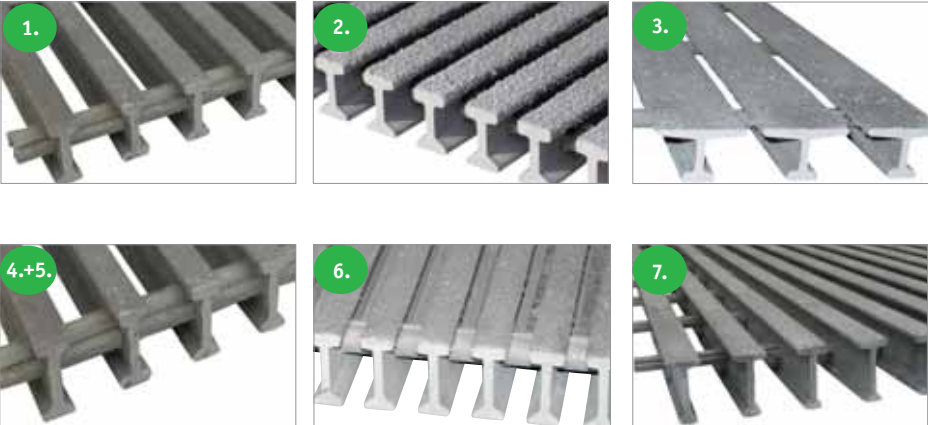
DRAWBACKS

- Can only be supported perpendicular to load-bearing element axis
- Not suitable for pipe pass-through apertures

type	plate width [mm]	gap width [mm]	height [mm]	weight [kg/m ²]
1. PREFAPOR 15 × 23/ 25	15	23	25	12.0
2. PREFAPOR 15 × 10/ 25	15	10	25	15.0
3. PREFAPOR 40 × 10/ 25	40	10	25	13.0
4. PREFAPOR 15 × 23/ 32	15	23	32	13.5
5. PREFAPOR 15 × 23/ 38	15	23	38	16.1
6. PREFAPOR 15 × 10/ 38	15	10	38	22.0
7. PREFAPOR 25 × 25/ 50	25	25	50	15.1

NOTE: Custom sizes available (length in load-bearing direction up to 4,000 mm; width up to 1,500 mm)

ASSEMBLED GRATINGS TYPES



ASSEMBLED GRATINGS ANCHORING



PREFAGRID MOULDED GRATINGS

KEY FEATURES

- Higher stiffness (reinforcing fibers laid in two perpendicular axes)
- Can be supported at all four sides
- Can be cut to any shape
- Pipe pass-through apertures can be cut
- Anti-slip surface

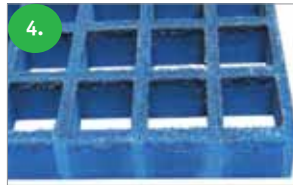
DRAWBACKS

- Moulding technology is incompatible with subsurface veil
- Reinforcing fiber share is only about half that of assembled gratings
- Lower shock resistance
- Maximum dimensions limited by available molds

type	eye size [mm]	height [mm]	weight [kg/m²]	standard panel sizes [mm]
1. PREFAGRID 44 × 44/14	44 × 44	14	5.8	1,220 × 3,660
2. PREFAGRID 30 × 30/20	30 × 30	20	10.0	1,220 × 3,660
3. PREFAGRID 30 × 30/25	30 × 30	25	12.0	920 × 2,800, 1,007 × 2,800, 1,000 × 3,000, 1,220 × 3,660, 1,220 × 4,000
4. PREFAGRID 30 × 30/30	30 × 30	30	14.6	920 × 2,800, 920 × 3,050, 1,000 × 3,000, 1,000 × 4,000, 1,220 × 2,100, 1,220 × 3,660
5. PREFAGRID 30 × 30/38	30 × 30	38	19.5	1,000 × 3,660, 1,000 × 4,000, 1,220 × 2,100, 1,220 × 3,660, 1,220 × 4,000
6. PREFAGRID 44 × 44/50	44 × 44	50	23.5	970 × 2,250, 970 × 3,660, 1,220 × 3,660
7. PREFAGRID 30 × 30/60	30 × 30	60	50.0	770 × 1,383, 1,000 × 3,660, 1,220 × 3,660

NOTE: Custom shapes and sizes available upon request

MOULDED GRATINGS TYPES

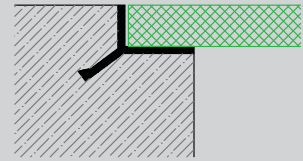


MOULDED GRATINGS ANCHORING

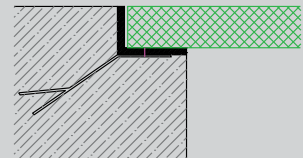


GRATING MOUNTING OPTIONS

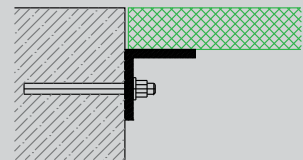
Y profile frame for installation in concrete



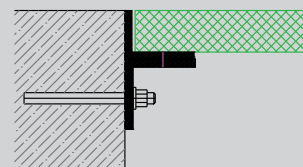
Angle frame for installation in concrete, steel anchors



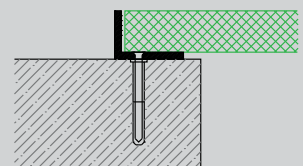
Angle frame for side mounting, mechanical anchors



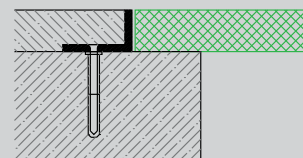
2 x angle frame for side mounting, mechanical anchors



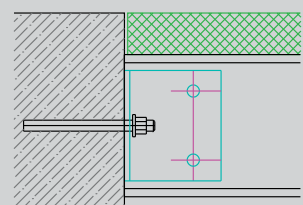
Angle frame for top mounting, dowels



Angle frame for top mounting with extra cement, dowels



Placing on composite beam



2.2 COMPOSITE GRATINGS

PREFAPOR ASSEMBLED GRATING MAXIMUM LOAD

CONTINUOUS LOAD [kg/m²]

TYPE	SPAN BETWEEN SUPPORTS [mm]							
	500	600	700	800	900	1,000	1,100	1,200
PREFAPOR 15x23/25	5,820	3,370	2,120	1,330	830	550	370	260
PREFAPOR 15x10/25	8,530	4,940	3,110	1,950	1,220	800	550	390
PREFAPOR 40x10/25	10,460	6,050	3,810	2,390	1,490	980	670	470
PREFAPOR 15x23/32	11,640	6,730	4,240	2,660	1,660	1,090	750	530
PREFAPOR 15x23/38	13,240	9,010	5,670	3,560	2,230	1,460	1,000	700
PREFAPOR 15x10/38	14,120	9,260	6,860	4,310	2,690	1,760	1,210	850
PREFAPOR 25x25/50	16,340	11,820	8,430	6,230	3,890	2,550	1,740	1,230

NOTE: For two-support mounting. Criterion: sagging $l/125$, max. 6 mm.

ISOLATED FORCE LOAD [kg]

TYPE	SPAN BETWEEN SUPPORTS [mm]							
	500	600	700	800	900	1,000	1,100	1,200
PREFAPOR 15x23/25	920	500	320	240	190	150	110	90
PREFAPOR 15x10/25	1,310	810	530	380	280	210	160	130
PREFAPOR 40x10/25	910	590	410	270	190	170	130	100
PREFAPOR 15x23/32	1,150	670	450	320	240	190	140	110
PREFAPOR 15x23/38	1,940	1,180	790	570	420	330	250	200
PREFAPOR 15x10/38	2,910	1,830	1,250	890	670	500	400	320
PREFAPOR 25x25/50	2,360	1,620	1,060	800	620	480	380	310

NOTE: Values for two-support mounting with load applied at grating geometric center, pursuant to EN 124. For load applied to unsupported edge, the deformation is about twice the value listed.
Criterion: sagging $l/125$, max. 6 mm.

PREFAGRID MOULDED GRATINGS MAXIMUM LOAD

CONTINUOUS LOAD [kg/m²]

TYPE	SPAN BETWEEN SUPPORTS [mm]							
	500	600	700	800	900	1,000	1,100	1,200
PREFAGRID 30x30/25	1,450	840	530	330	210	140	90	70
PREFAGRID 30x30/30	2,780	1,610	1,010	640	400	260	180	130
PREFAGRID 30x30/38	4,270	2,470	1,550	980	610	400	270	190
PREFAGRID 44x44/50	7,660	5,220	3,290	2,060	1,290	850	580	410
PREFAGRID 30x30/60	20,180	14,180	10,510	6,600	4,120	2,700	1,850	1,300

NOTE: For two-support mounting. Criterion: sagging $l/125$, max. 6 mm.

ZATÍŽENÍ OSAMĚLOU SILOU [kg]

TYPE	SPAN BETWEEN SUPPORTS [mm]							
	500	600	700	800	900	1,000	1,100	1,200
PREFAGRID 30x30/25	350	210	150	100	70	60	50	40
PREFAGRID 30x30/30	760	450	270	190	140	110	80	60
PREFAGRID 30x30/38	1,030	670	420	290	210	160	120	100
PREFAGRID 44x44/50	2,270	1,370	940	650	490	340	280	220
PREFAGRID 30x30/60	4,880	3,300	2,060	1,440	1,130	790	640	510

NOTE: Values for two-support mounting with load applied at grating geometric center, pursuant to EN 124. For load applied to unsupported edge, the deformation is about twice the value listed.
Criterion: sagging $l/125$, max. 6 mm.



LOAD BEARING GRATINGS IN DUKOVANY NUCLEAR POWER PLANT DEPOT

BRIDGE GAP COVER – MOTORWAY BRIDGE ON PRAGUE CIRCUIT HIGHWAY



2.3 COMPOSITE COVERS

PRODUCT CHARACTERISTICS

Composite walk-over and load-bearing covers are resin-fiber sandwich or pressed plates, suitable for corrosive and other environments.

COVER TYPES

By shape:

- Rectangular – most common
- Other shapes, e.g. circular – consult our technical staff
- Manhole covers: DN 600 mm circular only

By design:

- Closed-edges covers consist of a moulded grating and double surfacing; edges are closed by a U beam frame; walk-over side has anti-slip finish of silicate sand suspended in resin
- Opened-edges covers use the same design, except not all sides are closed
- Circular manhole covers are made by pressing

By load:

- Walk-over covers (maximum load 250 kg/m²)
- Load-bearing covers of class A, B, C, D pursuant to CSN EN 124

KEY FEATURES

- Low weight (5 x lighter than cast iron)
- Highly durable, resistant against corrosive environments
- Maintenance-free
- Not accepted at salvage yards (lower likelihood of theft)
- Electrically non-conductive
- Variable dimensions

COVER ACCESSORIES

- Frames
- Handles
- Tongue locks, padlocks
- Hinges
- Rubber seals
- Insulation
- Ventilation manholes
- Logos
- Pneumatic lifters

WALK-OVER CLOSED-EDGES COVER



WALK-OVER OPENED-EDGES COVER



WALK-OVER COVER FOR WATERWORKS SHAFTS



LOAD-BEARING COVER A 15 - D 400



MANHOLE COVER DN 600 D 400, WITH COMPOSITE FRAME AND SEAL



MANHOLE COVER DN 600 A 15 - D 400, WITH COMPOSITE FRAME



PREFAPLATE WALK-OVER COVERS WITH COMPOSITE FRAMES

MAX LOAD [kg/m²]	TYPE	ACCESSORIES	HEIGHT [mm]	HEIGHT WITH FRAME [mm]	MAX. APERTURE SIZE [mm]	WEIGHT [kg/m²]
250	Prefaplate closed-edges cover	logo, ventilation, muffle lining, locks	30	35	1,000	16.5
	Prefaplate opened-edges cover					16.5

PREFAPLATE RECTANGULAR LOAD-BEARING COVERS WITH COMPOSITE FRAME

MAX LOAD	TYPE	ACCESSORIES	HEIGHT [mm]	HEIGHT WITH FRAME [mm]	MAX. APERTURE SIZE IN LOAD-BEARING AXIS [mm]	WEIGHT [kg/m²]
B	Prefaplate B 125	frame, logo, locks, handles, ventilation, rubber seal	54	60	600	33
B	Prefaplate B 125		64	72	1,200	60
C	Prefaplate C 250		66	82	1,000	60
D	Prefaplate D 400		66	82	600	70

RECTANGULAR LOAD-BEARING COVERS – DIMENSIONS

LOAD CLASS	APERTURE, SIZE, , [mm],							
B 125	500/500	500/600	500/700	500/800	500/900	500/1,000	500/1,100	500/1,200
C 250								
D 400								
B 125	600/600	600/700	600/800	600/900	600/1,000	600/1,100	600/1,200	
C 250								
D 400								
B 125	700/700	700/800	700/900	700/1,000	700/1,100	700/1,200		
C 250								
B 125	800/800	800/900	800/1,000	800/1,100	800/1,200			
C 250								
B 125	900/900	900/1,000	900/1,100	900/1,200				
C 250								
B 125	1,000/1,000	1,000/1,100	1,000/1,200					

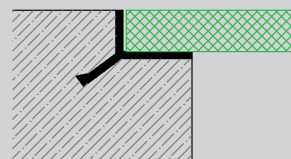
NOTE: The table lists standard sizes. Consult us for custom sizes.

PREFAPLATE DN 600 CIRCULAR MANHOLE COVERS WITH COMPOSITE FRAME

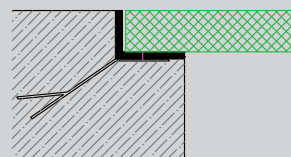
LOAD CLASS	TYPE	ACCESSORIES	COVER HEIGHT [mm]	HEIGHT WITH FRAME [mm]	APERTURE SIZE DN [mm]	WEIGHT [kg/unit]
A	Prefaplate A 15	logo, locks	26	40	600	12
B	Prefaplate B 125		26	40	600	22
C	Prefaplate C 250	logo, ventilation, muffle lining, locks	40	100	600	50
D	Prefaplate D 400		40	100	600	50

COVER MOUNTING OPTIONS

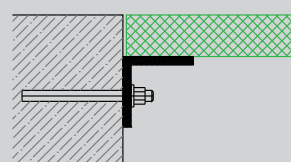
Y profile frame for installation in concrete



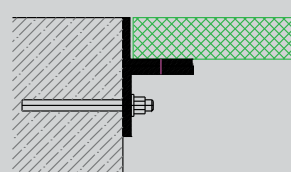
Angle frame for installation in concrete, steel anchors



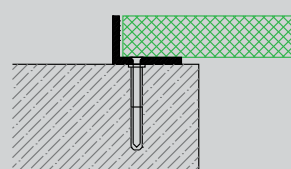
Angle frame for side mounting, mechanical anchors



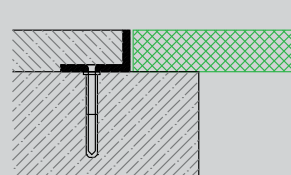
2 x angle frame for side mounting, mechanical anchors



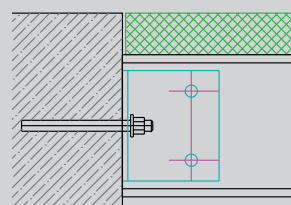
Angle frame for top mounting, dowels



Angle frame for top mounting with extra cement, dowels

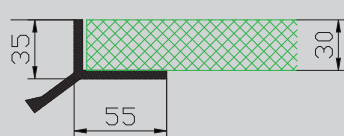
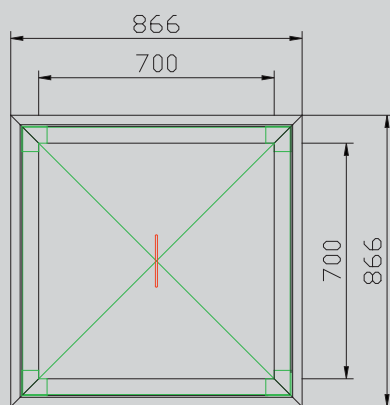


Placing on composite beam

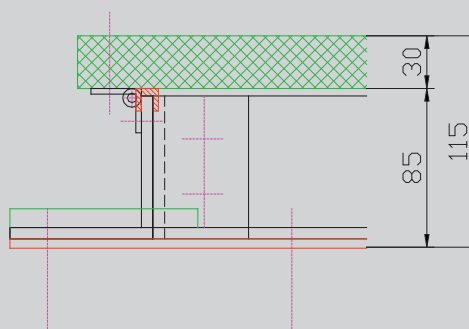
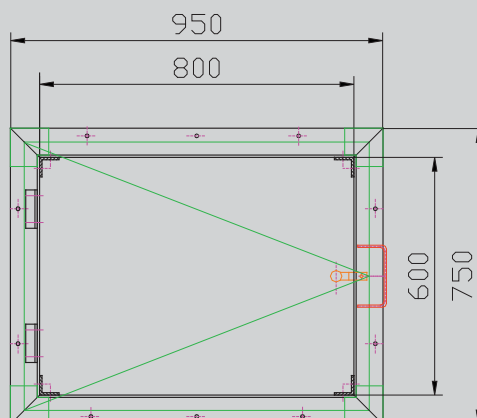


2.3 COMPOSITE COVERS

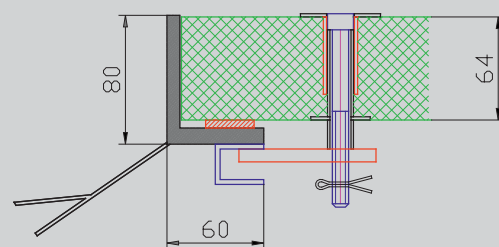
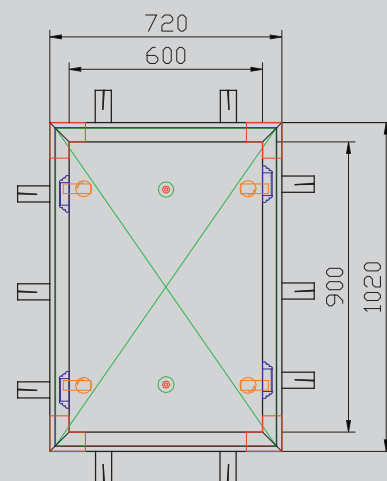
**WALK-OVER COVER WITH Y PROFILE FRAME
FOR CONCRETE MOUNTING**



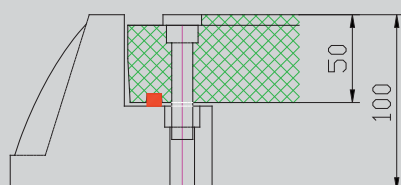
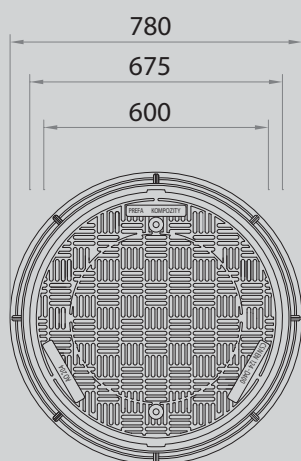
**WATERWORKS COVER
WITH RAISED ANGLE PROFILE FRAME**



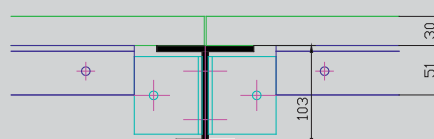
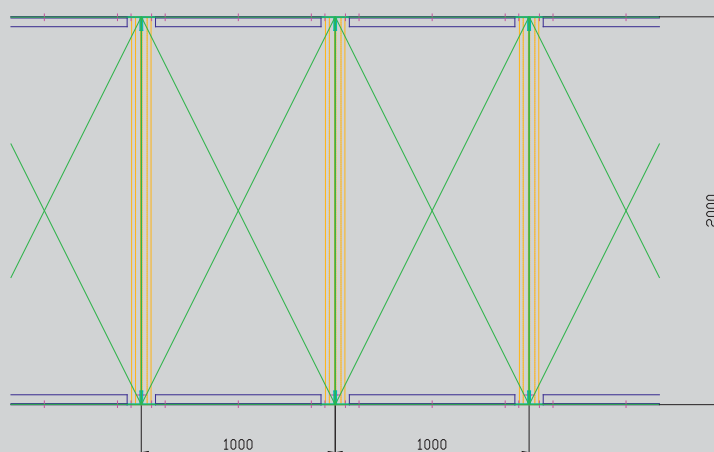
**C 250 LOAD-BEARING COVER WITH FRAME
AND ANCHORS FOR CONCRETE MOUNTING**



**DN 600, D 400 MANHOLE COVER,
COMPOSITE FRAME**



WALK-OVER CHANNEL COVER WITH COMPOSITE SUPPORTS AND WALL ANCHORS





DN 600 D400 MANHOLE COVER – MAJERHIK STREET, BRATISLAVA, SLOVAKIA



D 400 LOAD-BEARING COVER, FLOOD CONTROL CHAMBER – PEZINOK, SLOVAKIA

WALK-OVER COVERS WITH CONCRETE-MOUNTED FRAMES – BUDAPEST WASTEWATER PLANT, HUNGARY



2.4 COMPOSITE RAILINGS

PRODUCT CHARACTERISTICS

Railings made of pultruded composites are integral systems for staircases, pedestrian and road bridges, and other pedestrian surfaces; the structure itself may be composite as well.

TYPES

By design:

- Single horizontal interior bar
- Double horizontal interior bars
- Vertical interior bars
- Horizontal stainless steel cables
- With kick-plate
- No kick-plate

By anchoring:

- Top with feet (anchors / bolts)
- Side (anchors / bolts)
- Top in concrete pocket

By load:

- Loads up to 0.5 kN/m
- Loads up to 1.0 kN/m

By footprint:

- Straight
- Curved (segmented)

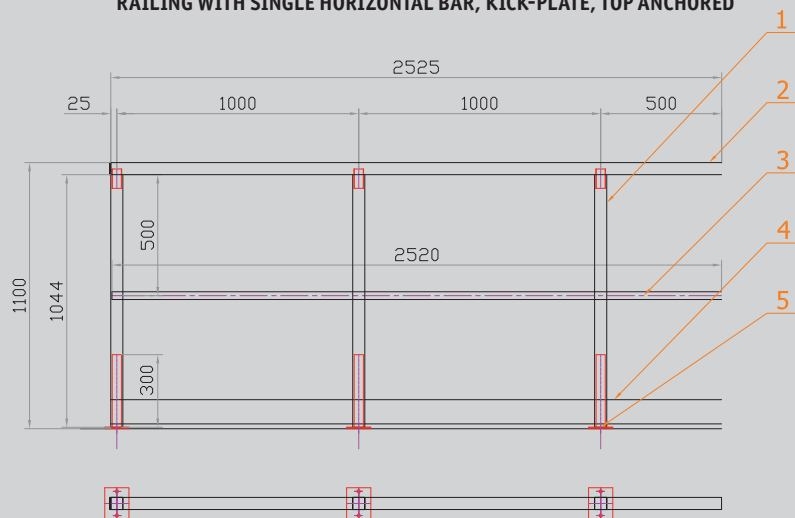
By application:

- Interior – standard profiles
- Exterior – painted profiles

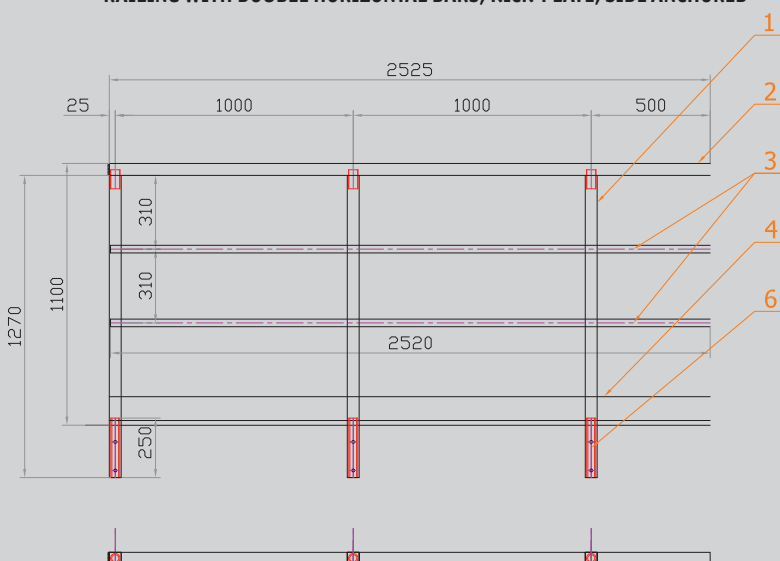
KEY FEATURES

- Highly chemically stable and UV resistant
- Low weight, simple installation
- Attractive appearance
(color combinations possible)

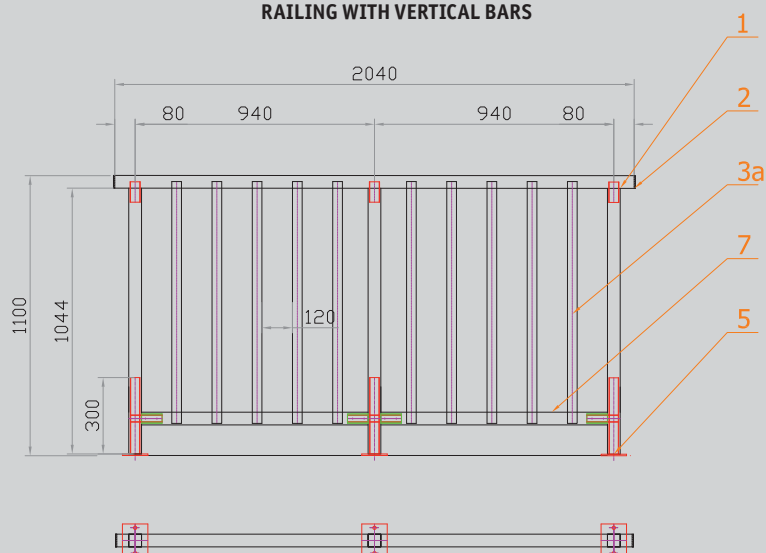
RAILING WITH SINGLE HORIZONTAL BAR, KICK-PLATE, TOP ANCHORED



RAILING WITH DOUBLE HORIZONTAL BARS, KICK-PLATE, SIDE ANCHORED



RAILING WITH VERTICAL BARS



- 1 – Support: square tube ST 50x50/5 or ST 51x51/6
 2 – Top rail: D tube STR 50x50/5 or U 60.5x65/5
 3 – Horizontal interior bar: round tube RT 32/3
 3a – Vertical interior bar: round tube RT 32/3
 4 – Kick-plate: KP 110/3
 5 – Anchor point: P6–100x130 + Tr 40x3–300 (stainless steel)
 6 – Support reinforcement: round tube RT 40/3 or RT 38/5
 7 – Horizontal profile: square tube ST 50x50/5 or ST 51x51/6



RAILINGS WITH HORIZONTAL STAINLESS STEEL CABLE, D8 PRAGUE



RAILINGS – TOP RAIL U 60.5 X 65/5 IN WASTEWATER TREATMENT PLANT, PRAGUE – ORDER VOLUME: 5.5 KM



RAILINGS – TOP RAIL D 50X50/5 IN BUDAPEST WASTEWATER TREATMENT PLANT, HUNGARY – ORDER VOLUME: 10 KM

2.5 WALL-MOUNTED AND FREE-STANDING COMPOSITE LADDERS

PRODUCT CHARACTERISTICS

Pultruded composite ladders are a suitable replacement for aluminum and steel ladders particularly in corrosive environments. As the material is certified hygienically safe, they can also be used in potable water tanks.

WALL-MOUNTED LADDER TYPES

- Standard wall ladder, 400 mm wide
- Shaft wall ladder, 300 mm wide
- Wide top
- Top handles
- With safety cage
- Custom (as required)

FREE-STANDING LADDER TYPES

- Round composite rungs
- Flat metal rungs
- Double
- Telescoping

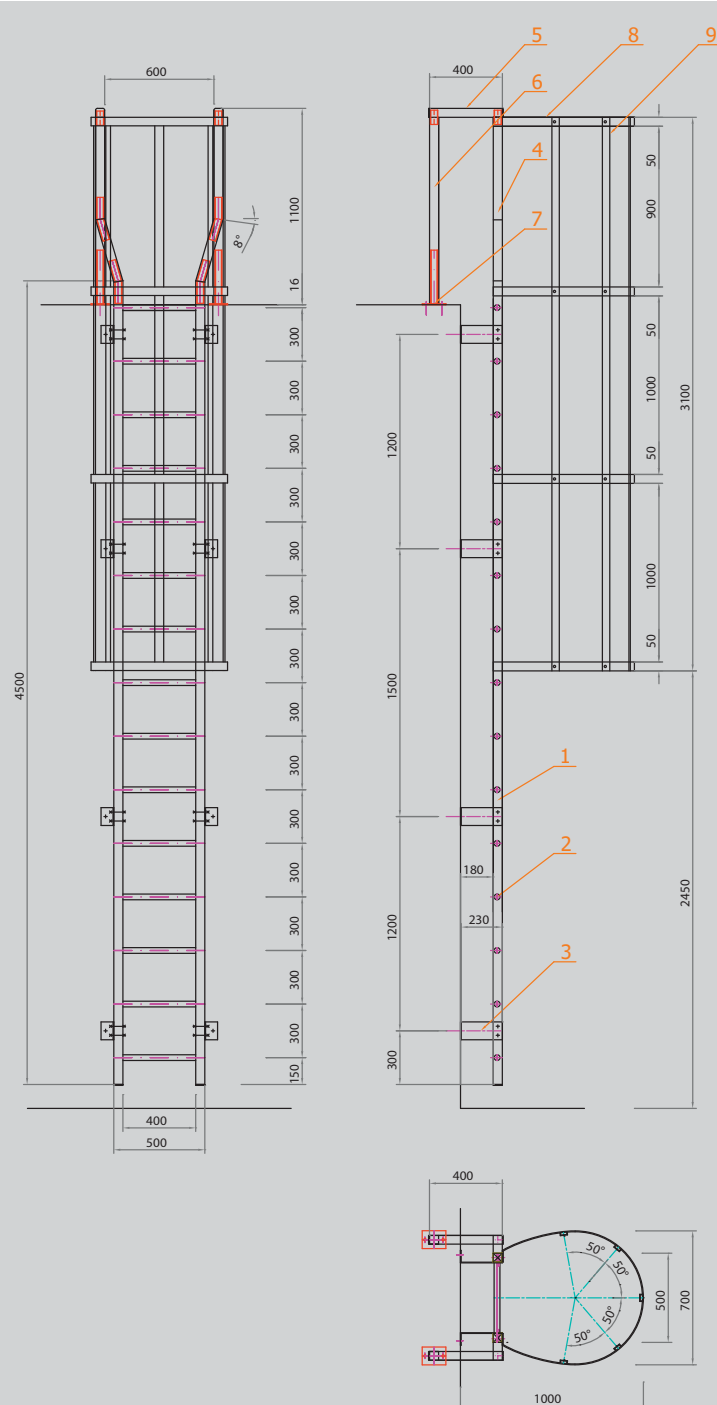
KEY FEATURES

- Safety (anti-slip rung finish)
- Low weight, simple installation
- High durability, maintenance-free material
- Electrically non-conductive
- Certified hygienically safe

DESIGN

- Rails are made of composite square tubes and end in kick-plate or attach to wide top or top handles or connect to railing.
- Rungs are made of round composite tubes and finished in silicate sand suspended in resin for excellent grip even when wet.
- Safety cages are made of steel girders and composite verticals.

COMPOSITE LADDER WITH SAFETY CAGE AND TOP HANDLES



- 1 – Rail: square tube ST 50x50/5
- 2 – Rungs: round tube RT 32/3
- 3 – Anchor mount L70x230x4-100 (stainless steel)
- 4 – Wide top: square tube ST 50x50/5
- 5 – Handle: D tube STR 50x50/5
- 6 – Support: square tube ST 50x50/5
- 7 – Anchor P6-100x130+Tr ø40x3-300 (stainless steel)
- 8 – Safety cage girder, 700 mm diameter
- 9 – Safety cage verticals: U beam, 40x15/4



COMPOSITE LADDER WITH SAFETY CAGE – MODRA WASTEWATER TREATMENT PLANT, SLOVAKIA



WIDE TOP WITH RAILING CONNECTION

SHAFT LADDERS IN VÝSTAVNÍ STREET, PRAGUE, CZECH REPUBLIC



2.6 COMPOSITE STAIRCASES

PRODUCT CHARACTERISTICS

Staircases made of pultruded composite profiles are an integral structural system that may also be installed as part of wider composite pedestrian systems.

TYPES

By design:

- Customer-supplied design
- Portable steps and platforms, incl. industrial-grade

By step type:

- PREFAGRID moulded grating
- PREFAPOR assembled grating

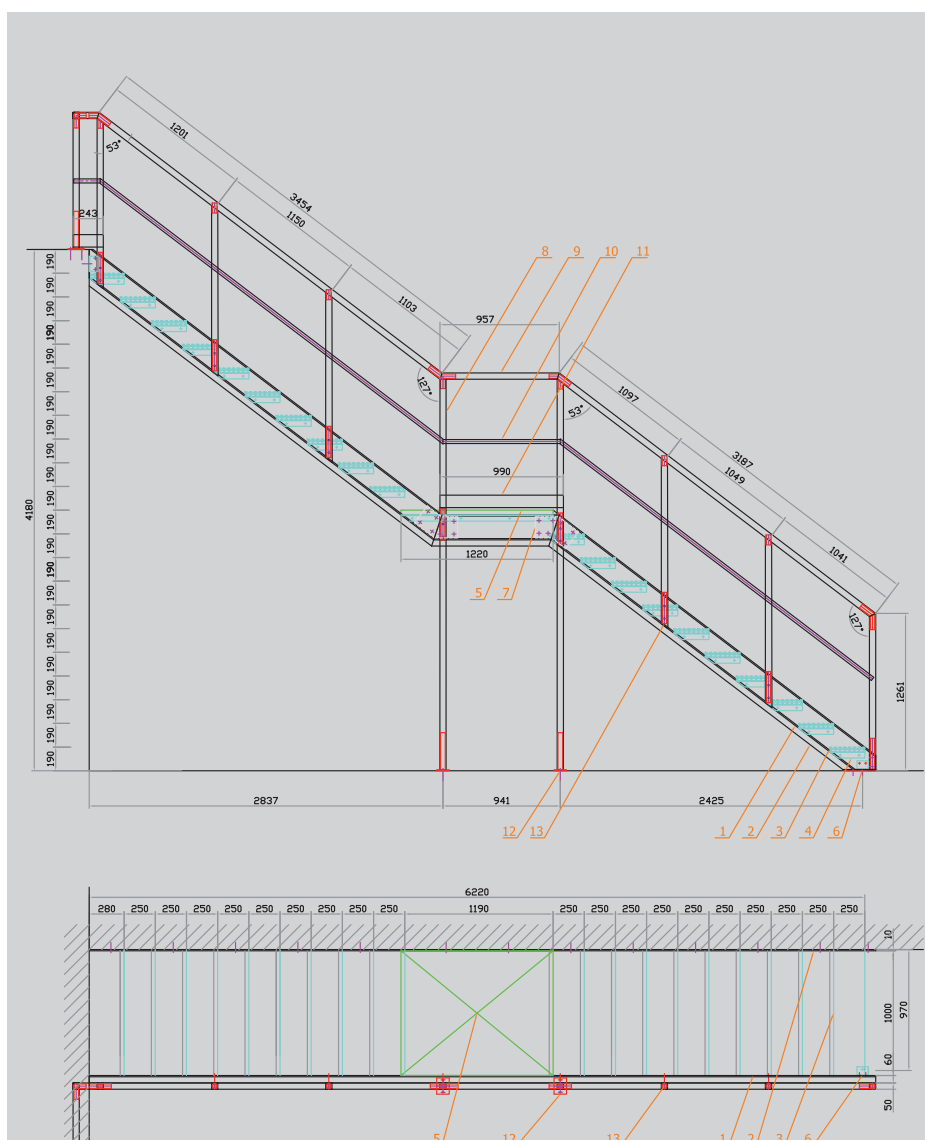
KEY FEATURES

- Simple installation, modularity
- Safety (anti-slip steps)
- Highly chemically stable and UV resistant

DESIGN

- Staircases consist of standardized composite profiles and other products (step bases, steps, supports, landings, railings), depending on project requirements and customer needs.
- Steps made of assembled grating are particularly suitable for staircases over 1,000 mm wide.
- Portable steps are a self-supporting design and may include railing and / or a platform. They are generally custom products made to order.

TWO-FLIGHT COMPOSITE STAIRCASE WITH LANDING, WALL-ANCHORED



1 – Support rail: U beam 200x60/10

2 – Wall-side rail: P plate P 200/10

3 – Step: PREFAGRID moulded grating or PREFAPOR assembled grating

4 – Step support: angle profile 51x51/6

5 – Landing: PREFAGRID moulded grating or PREFAPOR assembled grating

6 – Stainless steel anchors

7 – Composite connecting plate

8 – Support: square tube ST 50x50/5

9 – Handrail: D tube STR 50x50/5

10 – Interior rail: round tube RT 32/3

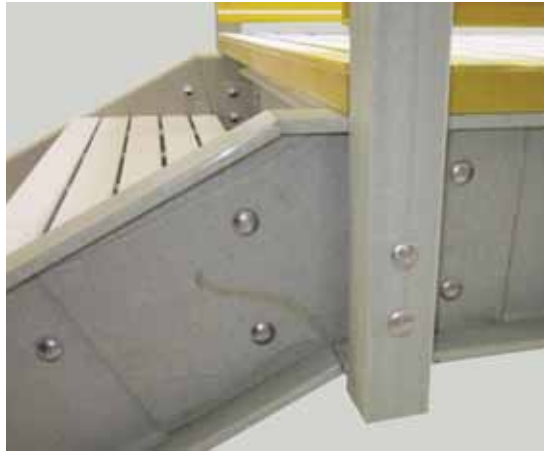
11 – Kick-plate: KP 110/3

12 – Stainless steel anchor

13 – Support reinforcement: round tube RT 40/3



SUPPORT RAIL ANCHORING DETAIL



COMPOSITE CONNECTING PLATE DETAIL
IN MULTI-FLIGHT STAIRCASE



STEP ANCHORING DETAIL

ALL-COMPOSITE FREESTANDING STAIRCASE – MUNICIPAL WASTEWATER TREATMENT PLANT, BUDAPEST, HUNGARY



2.7 COMPOSITE FOOTBRIDGES

PRODUCT CHARACTERISTICS

Composite footbridges are composite structures made to order from standardized parts. Common uses include public infrastructure (pedestrian and light vehicle bridges), chemical industry, and water treatment plants.

BASIC FOOTBRIDGE COMPONENTS

- Load-bearing frame
- Walk-over gratings or covers
- Railing

ADDITIONAL OPTIONS

- Staircases
- Ladders

LOAD-BEARING FRAME

made of PREFEN composite profiles. Table lists maximum loads (by span) for a pair of supports (of the same material) with load applied midway between them. An allowed sagging of 1/250 of span is assumed. For large spans and / or complex designs, please consult your project needs with our technical staff.

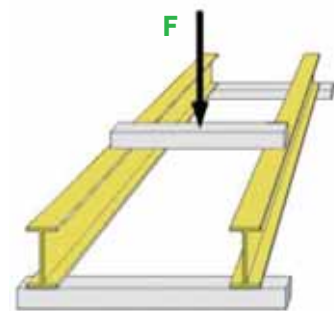
WALK-OVER GRATINGS

- For industrial applications, we recommend PREFAGRID moulded grating, which come with anti-slip finish.
- For pedestrian use, we recommend wide-beam PREFAPOR assembled grating with gap width of 10 mm.

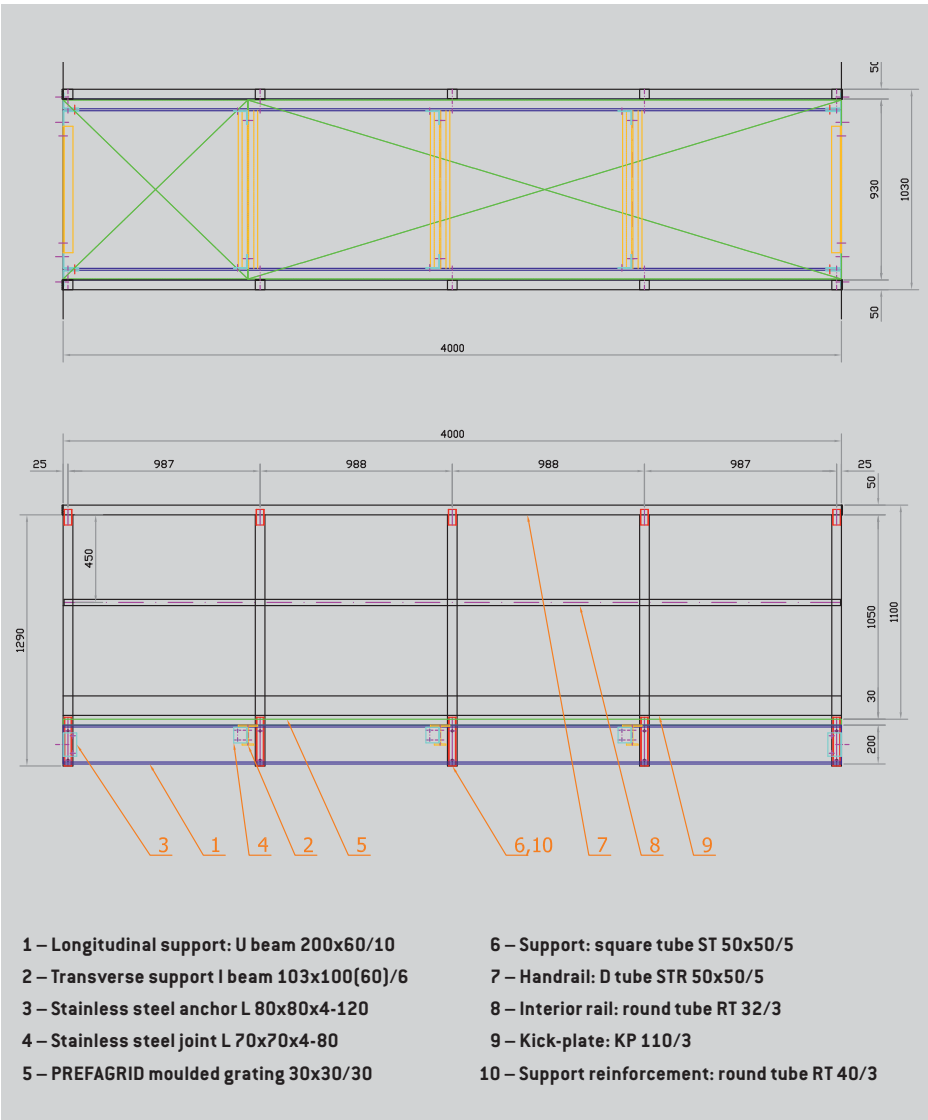
KEY FEATURES

- Low weight, simple installation
- Highly durable, corrosion resistant, chemically stable
- Maintenance-free

LOADING SCHEMATIC



COMPOSITE FOOTBRIDGE



FOOTBRIDGE MAXIMUM LOAD

SUPPORT TYPE	PYLON SPAN [mm]				
	2,000	3,000	4,000	5,000	6,000
I 103x100(60)/6	550	270	-	-	-
I 152x80/10	1,640	820	480	310	220
I 200x100/10	3,320	1,750	1,050	700	490
I 280x140/12	8,800	5,140	3,260	2,200	1,580
U 103x60/6	310	-	-	-	-
U 152x43/10	1,050	500	290	-	-
U 180x60/8	1,640	820	480	310	220
U 200x60/10	2,500	1,250	740	480	340
U 280x70/12	6,500	3,480	2,110	1,400	1,000

NOTE: Listed values are for a pair of pylons loaded by an isolated force (in kg) acting at span midpoint; assumed allowed sagging is 1/250 of span. For larger pylon spans, the effective span needs to be shortened using diagonal composite supports (we recommend consulting your specifications with our technical staff).



WALKWAY OVER WATER TANKS – WASTEWATER TREATMENT PLANT KRUPINA, SLOVAKIA



WALKWAY AT GALANTA RESERVOIR, SLOVAKIA

ALL-COMPOSITE WALKWAYS IN KOMORA NAD LOMOM, BRATISLAVA, SLOVAKIA



2.8 WATERWORKS STRUCTURES

Due to their high durability and dampness tolerance, composite products have a variety of uses in the waterworks industry. These products are generally made to the customer's order.

Most common product types include:

- Flood control inlet gratings
- River screens
- Scumboards
- Water level meters

FLOOD CONTROL INLET GRATINGS

Flood control inlets include large gratings, which can be implemented e.g. in PREFAGRID composite. These gratings consist of a composite angle profile outer frame and a moulded grating 60 mm thick. We offer flood control inlet gratings in loading classes B 125 and C 250.

RIVER SCREENS AND BASKETS

Screens consist of pultruded composite profiles. The outer frame is made of ST 50x50/5 square tubes, while the interior has vertical 22 mm bars or tubes (e.g. 32/3). Screening baskets are usually used at sewage pumping station inlets, where they catch large pieces of detritus to protect the pumps. The basket is suspended on two guide rails and equipped with a motorized lifter. The bottom can be hinged to allow easy emptying. The size and fineness of the basket is based on customer specifications.

SCUMBOARDS

Scumboards consist of a load-bearing frame made of pultruded composite profiles and interior screens made of 4-6 mm composite plate (manually laminated or sprayed). For scumboards exposed to higher water pressures, the thin plates can be replaced by sandwich plates (which consist of a moulded grating laminated on both sides). We recommend consulting the design of the load-bearing frame with our technical staff.

WATER LEVEL METERS

Water level meters are made of pultruded composite plates 160 mm wide, with mark intervals of 20 mm. The length and angle from vertical (if required) depend on customer specification. You can purchase only the meter bar for mounting on an existing structure, or a bar mounted on a load-bearing composite U beam [180x60/10].

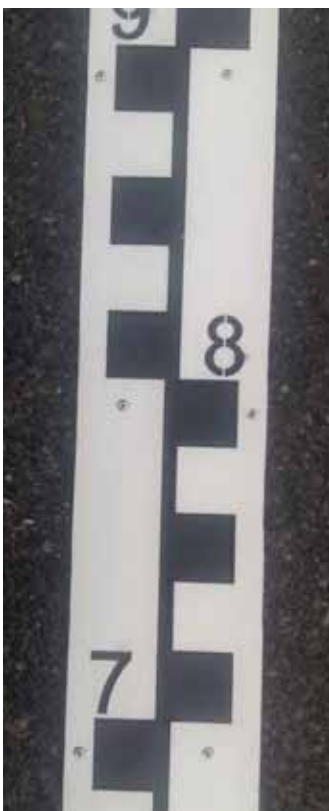
FLOOD CONTROL INLETS

NAME	SIZE [mm]		HEIGHT WITH FRAME [mm]	LOADING CLASS [kN]	WEIGHT [kg]
	OUTER FRAME DIMENSIONS	INLET DIMENSIONS			
PREFAGRID 60	1,400/790	1,270/650	70	B 125 C 250	60



FLOOD CONTROL INLET

INCLINED WATER METER DETAIL



WATER METER MARKED WITH LOCAL FLOOD THRESHOLDS – KOJETÍN, CZECH REPUBLIC





SCREEN AT JESENICE RETENTION RESERVOIR, NEAR PRAGUE, CZECH REPUBLIC



SCREEN BASKET

SCUMBOARD IN RAINWATER SEDIMENTATION TANK, PRAGUE, CZECH REPUBLIC



2.9 SHAFT, TANK, AND PUMPING STATION EQUIPMENT

Sewer shafts and pumping stations usually include fittings to enable inspection and maintenance access to machinery. Due to their dampness resistance, composite materials are ideal for use in shafts.

PRODUCT TYPES

- Shaft ladders
- Manhole covers
- Ladder-top handles
- Platforms and landings
- Railings
- Staircases
- Load-bearing frames
- Dividing walls

KEY FEATURES

- Safety (ladders and gratings have anti-slip finish)
- Low weight, simple installation
- Maintenance-free



SHAFT LANDING IN BRNO, CZECH REPUBLIC

SHAFT ACCESS EQUIPMENT INCL. DIVIDING WALL – SHAFT IN VÝSTAVNÍ STREET, PRAGUE, CZECH REPUBLIC



2.10 ENERGY INDUSTRY PRODUCTS

Due to their non-conductivity, composite products made of PREFEN pultruded profiles or moulded or manually laminated composite have varied uses in the energy industry.

PRODUCT TYPES

- Assembled and moulded walk-over gratings
- Walk-over and drive-over covers
- Free-standing and wall-mounted ladders
- Transformer station accessories
- Cable supports and structural members for utility ducts
- Other structures

KEY FEATURES

- **Electrically non-conductive**
- **Low weight (4 x lighter than steel)**
- **High durability**

For details on individual products see the applicable section above.



NON-CONDUCTIVE FENCE – MODŘICE TRANSFORMER STATION, CZECH REPUBLIC

NON-CONDUCTIVE FLOOR – TRANSFORMER STATION IN BRNO, CZECH REPUBLIC



2.11 CABLE RUNS

PRODUCT CHARACTERISTICS

PREFATRAY composite cable management systems are made of pultruded composite profiles and can be used for industrial cable bridges, trays, and runs.

KEY FEATURES

- High tensile strength, shock resistance
- Electrically non-conductive
- Low weight, simple installation

CABLE BRIDGES

Cable bridges are built from composite angle profile side rails and flat connecting beams. Rail-connector joints are riveted. We recommend consulting the beam type with our technical staff based on projected load.

CABLE BOXES

Made of open U beams, with optional lids

CABLE SUPPORTS

We offer two basic designs of cable supports:

- Pylons and support beds made of square tube
- Pylons made of double-L angle profile, support beds made of square tube

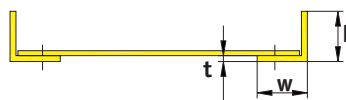
SUSPENSION SYSTEMS

The system consists of a vertical tray and support beds. The tray is anchored to the load-bearing structure from below using stainless steel anchors. Standard products use the following beam types:

- Vertical tray – square tube ST 50x50/5; bed – round tube ST 32/2.5
- Vertical tray – round tube RT 38/5; bed – round full rod, 14 mm diameter

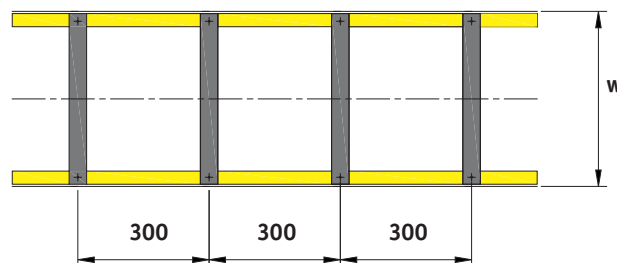
RECOMMENDED SIDE BEAM LOADS

TYPE	BEAM	DISTANCE OF SUPPORTS		
		L = 1 m	L = 1,5 m	L = 2 m
1	L 50 x 30 / 5	800 N/m	400 N/m	200 N/m
2	L 30 x 50 / 5	2,400 N/m	900 N/m	400 N/m
3	L 51 x 51 / 6	2,500 N/m	1,100 N/m	500 N/m
4	L 76 x 76 / 6	4,000 N/m	2,200 N/m	1,000 N/m



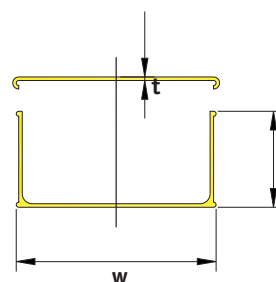
RECOMMENDED CONNECTING BEAM LOADS

TYPE	BEAM	RUN WIDTH			
		200 mm	300 mm	400 mm	500 mm
1	I 26/5	900 N/m	300 N/m	120 N/m	75 N/m
2	I 30/8	2,550 N/m	750 N/m	300 N/m	165 N/m
3	flat bar 30/5	3,000 N/m	900 N/m	450 N/m	210 N/m
4	I 40/12	6,000 N/m	1,800 N/m	900 N/m	420 N/m



CABLE BOXES SELECTION

TYPE	NAME	DIMENSIONS [mm]	WEIGHT [kg/m]
1	Cabel box CBc	400 x 100 / 5.5	10.01
2	Cabel box CBc	300 x 150 / 4.5	7.15
3	Cabel box CBc	300 x 100 / 4.5	6.28
4	Cabel box CBc	200 x 100 / 3.5	3.89





CABLE BOXES – UTILITY BRIDGE NEAR THE MAIN TRAIN STATION BRNO, CZECH REPUBLIC



CABLE SUPPORTS WITH ADJUSTABLE BEDS – UTILITY TUNNEL IN PRAGUE, CZECH REPUBLIC

CABLE BRIDGES AND SUPPORTS – UTILITY TUNNEL IN DOWNTOWN OSTRAVA, CZECH REPUBLIC



2.12 PREFABRICATED REBAR COMPOSITE REINFORCEMENT

FRP composite reinforcement for concrete is a heterogeneous material consisting of two principal components – load-bearing unidirectional fibers suspended in a polymer matrix. The material properties of the resulting composite depend principally on the type and ratio of the components. Compared to standard steel rebar, composite reinforcement is considerably more resistant against corrosives (acids, chlorides, etc.). Composite rebar is corrosion-resistant, very light, electrically non-conductive, EM-transparent, inert when exposed to wandering current, etc. It is ideal for use in concrete structures for the chemistry, energy (power conduits, pipe runs, utility runs), and transportation (resistant to road salt) industries, as well as in foundations.

PRODUCT CHARACTERISTICS AND KEY FEATURES

- **Chemically stable:** Composite rebar resists chemical corrosion and is suitable for chemical production facilities and wastewater treatment plants. Composites do not react with chlorides and have minimal interaction with acidity (pH).
- **Composites do not corrode in air**, and as such do not need to be insulated from it. This enables material savings, as the final structural element is less massive.
- **Composite materials have minimal thermal conductivity** and do not form thermal bridges.
- **Composite materials are electrically non-conductive** and do not corrode when exposed to wandering current.
- **Composite materials are transparent to electromagnetic waves**; i.e., composite structures do not degrade EM signals. Composite rebar can be used in structures adjacent to high-voltage power lines and transformers.

COMPOSITE REBAR DESCRIPTION AND TYPES

We produce several basic types of composite rebar for different applications. The reinforcing fibers are glass or carbon, all laid longitudinally. Fiber types include glass (AR or E type), carbon, and others (e.g. basalt). The proportion of fiber in the finished material is 75–80% by weight. The matrix is vinylester, polyester, or epoxy resin. The surface is spiral-wound to maintain its shape; above this is a layer of silicate sand suspended in resin to improve bonding with the surrounding concrete.

PREFABRICATED REBAR

REINFORCEMENT TYPE					
Fiber type			E-CR glass	E-CR glass,	HS carbon
Resin			Epoxy / Vinylester		
Finish: Wound subsurface layer			Sand-and-resin surface		
Diameters available [mm]			6–18	12–18	6–18

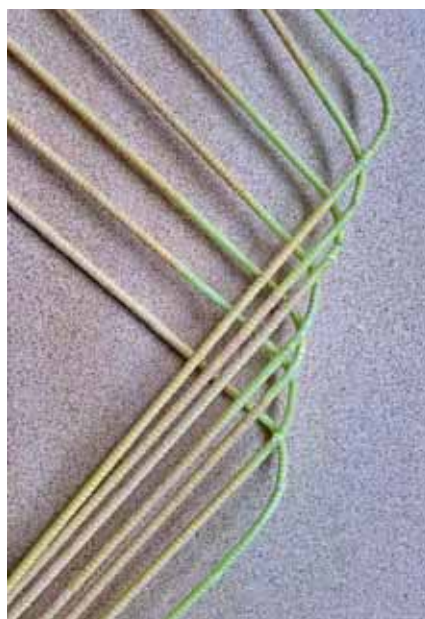
MECHANICAL AND PHYSICAL PROPERTIES					
			GFRP	C-GFRP	CFRP
Tensile strength (mean)	f _{t,m}	[MPa]	> 1,100*	> 1,100*	>1,850*
Tensile strength (characteristic)**	f _{t,k}	[MPa]	> 1,050*	> 1,050*	>1,700*
Elastic modulus (mean)	E _{t,m}	[GPa]	> 50*	> 75*	> 94*
Torsion / shear strength (mean)	f _{s,m}	[MPa]	150	175	220
Torsion / shear strength (characteristic)**	f _{s,k}	[MPa]	125	150	170
Thermal expansion – longitudinal	α _L	[K ⁻¹]	6 × 10 ⁻⁶	6 × 10 ⁻⁶	≈ 0,0
Thermal expansion – transverse	α _r	[K ⁻¹]	3 × 10 ⁻⁵	3 × 10 ⁻⁵	3 × 10 ⁻⁵
Density (ρ)	ρ	[kg.m ⁻³]	2,100	2,100	1,700
Characteristic number [EC]			1.3	1.3–1.0	1.0
Environmental reduction factor					

* depending on diameter

** pursuant to CSN EN 1990 considered to be the 5% quantile

PARAMETERS OF PREFABRICATED REBAR REINFORCING RODS

Nominal diameter [mm]	Diameter with adhesion layer [mm]	Cross-section [mm ²]	Weight [g/meter length]
6	8	28.3	67
8	10	50.3	120
10	12	78.5	190
12	14	113.1	260
14	16	153.9	350
16	18	201.1	455
18	20	254.5	580



ANGLE PROFILE



GLASS FIBER REINFORCEMENT



FRP COMPOSITE REINFORCEMENT, POLDER NEAR LUKA N. J., CZECH REPUBLIC



FRP COMPOSITE WEB, POLDER NEAR LUKA N. J., CZECH REPUBLIC

REBARS PRODUCTION LINE



2.13 PRESSED AND LAMINATED PRODUCTS

We also offer a range of pressed and laminated composite products. In 2015, we invested in machinery for SMC, BMC, and glue production, as well as a pressing machine.

Lamination technology type:

- Pressing
- Manual lamination
- Spraying (may be combined with manual)

PRESSING

This method is mainly used to manufacture flat products such as covers and cover plates. For details about our range of pressed covers see “Covers” above. Pressing technology is only suited to series production of standardized parts. This is mainly due to the costs of pressing molds and of operating the pressing machinery.

Pressing machine specifications:

- Pressing table surface 1,120 x 1,320 mm
- Maximum pressing force 1,000 tons
- Hardening temperatures up to 200 degrees Celsius



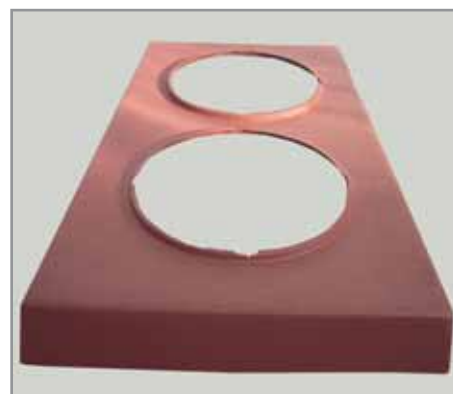
A DN 600 MANHOLE COVER BEING PRESSED

MANUAL LAMINATION

Manual lamination consists of adding successive layers of resin and fiber into a mold. The matrix is usually polyester resin; the reinforcing fiber is glass, mainly mats, optionally with rovings. We use manual lamination to manufacture all cover surfaces and edges; complex shapes are also possible. This method allows affordable production of small orders that would otherwise suffer from machinery setup costs.

SPRAYING

Spraying consists of using a spraying machine to deposit a mix of resin and short glass fibers into a mold or directly onto a surface. This method requires a degree of skill and experience in spraying, preparing the surface to be sprayed, and preparing the liquid material. We primarily use spraying to manufacture bulky parts and to repair damaged surfaces of other materials (mainly concrete and metal).



A CHIMNEY HOOD BEING MADE BY MANUAL LAMINATION



A CHIMNEY SEGMENT BEING MADE BY SPRAYING



CHIMNEY EXTENSION ASSEMBLY – WROCLAW, POLAND

2.14 SMC, BMC, GLUES

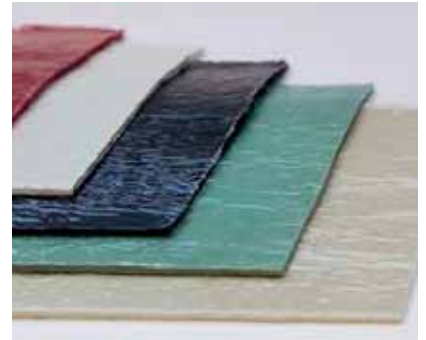
We newly offer composite semiproducts made from pre-impregnated reinforcement (SMC prepreg and BMC materials), including pressed products. We also offer chemical adhesives for construction and other industries. Products are developed in an in-house Development & Innovation lab.

SMC PREPREG

- Width up to 1,150 mm
- Reinforced with fibers 12.5 to 50 mm long, weaves, or mats (glass, carbon, aramid)
- Thickness 1.8 to 4 mm
- Reinforcement proportion 20–55% by weight
- Polyester or vinylester resin



SMC PREPREG MANUFACTURE



SMC PREPREG MATERIALS

BMC MATERIALS

- Reinforced with shredded fibers 2 to 12 mm long
- Reinforcement proportion 10–30% by weight
- Polyester or vinylester resin

CONSTRUCTION GLUES

- Two-component glues
- **Component A:** 290–370 ml
- **Component B:** 35–100 ml
- Polyester, vinylester, epoxy, acrylic, and other resins
- Filled and unfilled systems
- Sold in tubes or foil



CONSTRUCTION GLUES

BMC AND GLUE PRODUCTION LINES





PIER FRAMES – PUBLIC WATER PARK IN OSTRAVA, CZECH REPUBLIC

DRIVE-OVER GRATINGS – BRIDGE IN ČTYŘKOLY, CZECH REPUBLIC





STAIRCASE, RAILINGS, AND FOOTBRIDGE IN PRECIOSA CHEMICAL PLANT, CZECH REPUBLIC

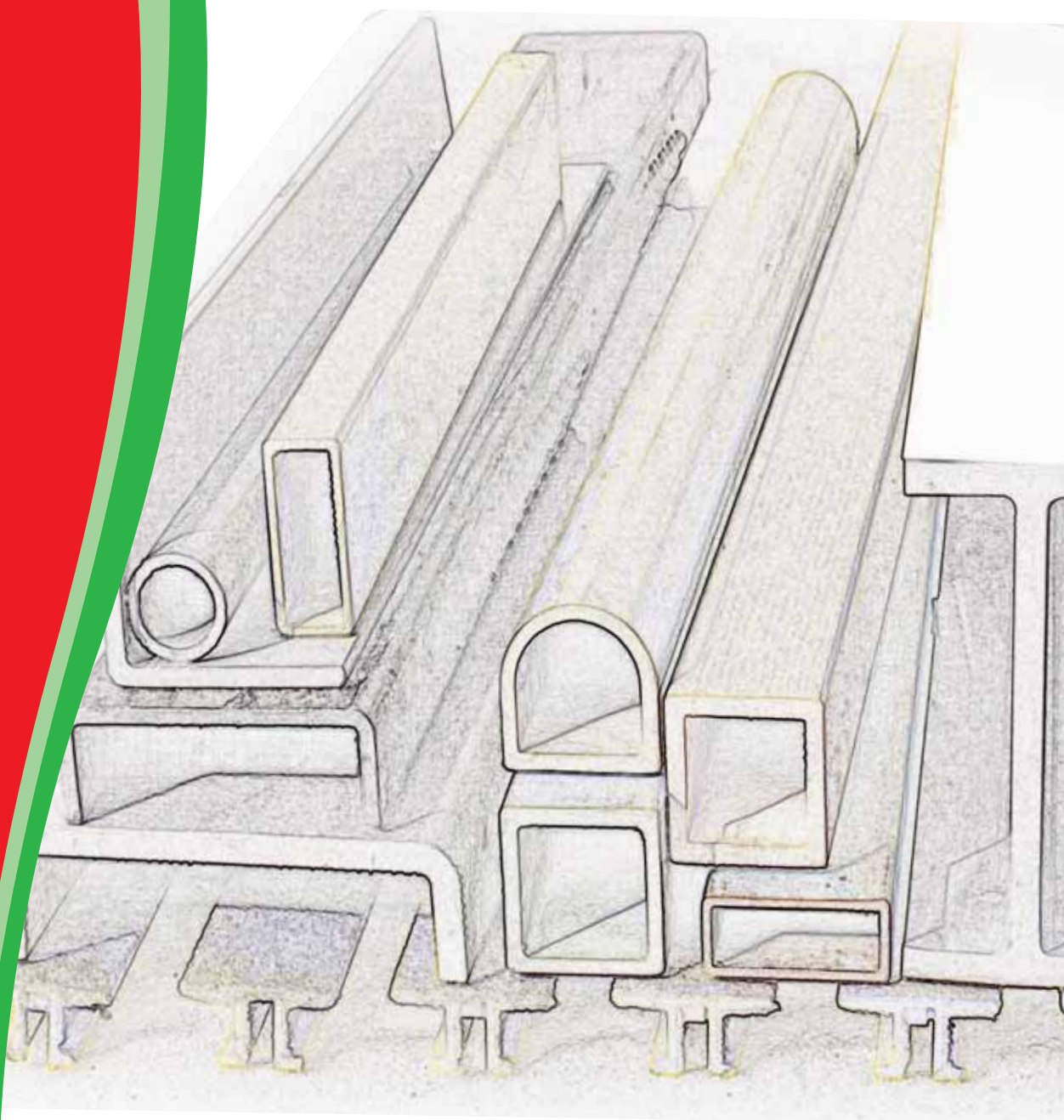
ELIMINATOR FRAMES IN DUKOVANY NUCLEAR POWER STATION, CZECH REPUBLIC





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