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VF18
FAST CURE MEDIUM STRENGTH CHEMICAL ANCHOR

CERTIFICATION | TDS | MSDS

Technical Data Sheet

For additional design information please download **Allfasteners AFOS®** design software.

allfasteners.com.au/afos

NCC COMPLIANT AS 5216

100 YEAR

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VF18

VF18 is a chemical anchoring system with improved performance for anchoring into solid substrates. It is suitable for overhead installations, as well as for use in dry, wet and flooded holes. Formulated free of styrene, VF18 has a very low odor and is ideal for use in confined spaces and indoors.

VF18 mixes green and fades to stone in colour indicating the open working time.

Assessed and tested to meet the requirements for NCC and AS 5216 standards for bonded anchoring in un-cracked concrete, masonry and post-installed connections.

Key Features

- Anchors may be placed close to free edges
- Suitable for dry, wet & flooded holes with no loss of performance.
- Reduced drilling diameters i.e. M20 only requires a 22mm hole making it an economical injection system.
- Variable embedment depths
- Available in co-axial cartridges (410ml)
- Mixes green and fades to stone

Applications

- Fixing into concrete, solid & voided rock and solid & hollow masonry
- Structural concrete
- Canopies, boilers, bicycle racks, hand rails, masonry supports, safety barriers, balcony fences, racking and machinery

Approvals & Certifications

- ETA according to EAD 330499-00-0601 (old TR029) for uncracked concrete.
- ETA according to EAD 330076-00-0604 (Old ETAG029) for masonry installations.
- ETA according to EAD 330087-00-0601 (old TR023) for post-installed rebar connections,
- AS 5216 compliant: The ETA document meets anchor testing and reporting requirements of AS 5216:2021, essential for compliance with the NCC.
- A+ classification according to compulsory French VOC emissions regulation
- Tested according to LEED 2009 EQ c4.1, SCAQMD rule 1168 (2005)

Application Times

Temp. (°C)*	5°	10°	15°	20°	30°
Working Time (mins.)	18'	10'	6'	5'	4'
Cure Time (mins.)	145'	85'	50'	40'	35'

*Base material & cartridge temperature. Cartridge must be conditioned to minimum 5°C.

Storage

Cartridges should be stored in their original packaging, the correct way up, in cool conditions (+5°C to +25°C) out of direct sunlight. When stored correctly, the product shelf life will be 12 months from the date of manufacture.

Safety

For health and safety information, please refer to the relevant Safety Data Sheet.

Chemical Resistance

Chemical mortar has undergone extensive chemical resistance testing. The results are summarised in the table below.

Chemical Environment	Concentration	Result
Aqueous Solution Acetic Acid	10%	C
Aqueous Solution Aluminium Chloride	Saturated	✓
Aqueous Solution Aluminium Nitrate	10%	✓
Benzoic Acid	Saturated	✓
Butyl Alcohol	100%	×
Sodium Hypochlorite Solution	5-15%	✓
Butyl Alcohol	100%	C
Calcium Sulphate Aqueous Solution	Saturated	✓
Carbon Monoxide	Gas	✓
Carbon Tetrachloride	100%	C
Citric Acid Aqueous Solution	Saturated	✓
Cyclohexanol	100%	✓
Diesel Fuel	100%	C
Diethylene Glycol	100%	✓
Ethanol Aqueous Solution	20%	C
Heptane	100%	C
Hexane	100%	C
Hydrochloric Acid	10%	✓
	15%	✓
	25%	C

Chemical Environment	Concentration	Result
Hydrogen Sulphide Gas	100%	✓
Linseed Oil	100%	✓
Lubricating Oil	100%	✓
Mineral Oil	100%	✓
Paraffin / Kerosene (Domestic)	100%	C
Phosphoric Acid	50%	✓
Potassium Hydroxide	10% / pH13	✓
Sea Water	100%	C
Sulphur Dioxide Solution	10%	✓
Sulphur Dioxide (40°C)	5%	✓
Sulphuric Acid	10%	✓
	50%	✓
Turpentine	100%	C
White Spirit	100%	✓

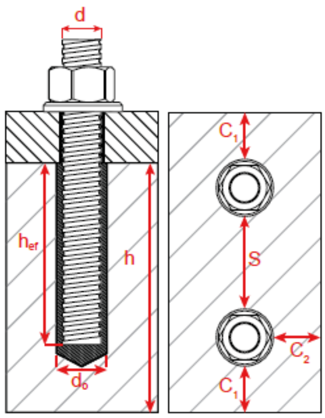
✓ = Resistant to 75°C with at least 80% of physical properties retained.

C = Contact only to a maximum of 25°C.

× = Not resistant.

Installation Parameters - Threaded Rods

Size			M8	M10	M12	M16	M20	M24
Nominal Drill Hole Diameter	d_o	mm	10	12	14	18	22	26
Diameter of Cleaning Brush	d_b	mm	14	14	20	20	29	29
Torque Moment	T_{inst}	Nm	10	20	40	80	150	200
Minimum Embedment Depth	h_{ef}	mm	64	80	96	128	160	192
Minimum Edge Distance	c_{min}	mm	35	40	50	65	80	96
Minimum Spacing	s_{min}	mm	35	40	50	65	80	96
Minimum Member Thickness	h_{min}	mm	h_{ef} + 30 mm ≥ 100mm			$h_{ef} + 2d_o$		



Using VF18 with Threaded Rods in Uncracked Concrete

Combined pullout and concrete cone failure in uncracked concrete C20/25 (Temperature Range: -40°C to +80°C)

Size			M8	M10	M12	M16	M20	M24
Characteristic Bond Resistance in Dry/Wet Concrete	$\tau_{Rk, uncr}$	N/mm²	10	8.0	9.0	9.5	8.5	8.5
Partial Safety Factor	γ_{Mp}	-	1.8	1.8	1.8	1.8	1.8	1.8
Factor for Concrete	Ψ_c	C30/37	1.12					
		C40/45	1.19					
		C50/60	1.30					

Design Loads for Threaded Rods in Uncracked Concrete

Tension load calculations for combined pullout and concrete cone failure at various embedment depths using threaded rods in dry/wet, 20MPa uncracked concrete (Temperature Range: -40°C to +80°C)

Property	Symbol	Unit	Anchor Size					
			M8	M10	M12	M16	M20	M24
Effective embedment Depth = 8d	h_{ef}	mm	64	80	96	128	160	192
Design Load	N_{Rd}	kN	8.9	11.2	18.1	34.0	47.3	68.4
Partial Safety Factor	γ_{Mp}	-	1.80	1.80	1.80	1.80	1.80	1.80
Effective embedment Depth = 10d	h_{ef}	mm	80	100	120	160	200	240
Design Load	N_{Rd}	kN	11.1	14.8	22.6	42.4	59.3	85.5
Partial Safety Factor	γ_{Mp}	-	1.80	1.80	1.80	1.80	1.80	1.80
Effective embedment Depth = STD	h_{ef}	mm	80	90	110	128	170	210
Design Load	N_{Rd}	kN	11.1	12.6	20.7	34.0	50.4	74.8
Partial Safety Factor	γ_{Mp}	-	1.80	1.80	1.80	1.80	1.80	1.80
Effective embedment Depth = 12d	h_{ef}	mm	96	120	144	192	240	288
Design Load	N_{Rd}	kN	13.4	16.8	27.1	50.9	71.2	102.5
Partial Safety Factor	γ_{Mp}	-	1.80	1.80	1.80	1.80	1.80	1.80

1. Characteristic loads are valid for combined concrete cone and pullout failure as defined by AS 5216 only. All other failure modes, including steel failure, detailed in AS 5216 as well as including combined effects of tension and shear, must be considered in accordance with AS 5216.
2. Characteristic loads are valid for single anchors without close edge, anchor spacing or eccentric loading considerations.
3. Tabulated values are valid for temperature range -40°C to +80°C (Max LTT = +50°C; Max STT = +80°C).
4. Tabulated values are only valid for the installation conditions stated. Other conditions, such as different temperature ranges, may affect the performance of the product.
5. Long term temperatures are those that remain roughly constant over prolonged periods. Short term temperatures occur over brief intervals, eg: diurnal cycling.
6. The compressive strength of the concrete (f'c) is assumed to be 20 N/mm².
7. Tabulated values assume that the geometry of the anchor(s) and concrete member is sufficient to avoid splitting failure.

For additional design information please download Allfasteners AFOS® design software.

Threaded Rods - Characteristic Values for Steel Failure (Tension)

Size			M8	M10	M12	M16	M20	M24
Steel Grade 5.8	$N_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial Safety Factor	γ_{Ms}	[-]	1.50					
Steel Grade 8.8	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial Safety Factor	γ_{Ms}	[-]	1.50					
Steel Grade 10.9*	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial Safety Factor	γ_{Ms}	[-]	1.40					
Stainless Steel Grade A4-70	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial Safety Factor	γ_{Ms}	[-]	1.90					
Stainless Steel Grade A4-80	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial Safety Factor	γ_{Ms}	[-]	1.60					

* Galvanised rods of high strength are sensitive to hydrogen induced brittle failure unless a special process is used for galvanisng.

Threaded Rods - Characteristic Values for Steel Failure (Shear – without lever arm)

Size			M8	M10	M12	M16	M20	M24
Steel Grade 5.8	$V_{Rk,s}$	[kN]	9	15	21	39	61	88
Partial Safety Factor	γ_{Ms}	[-]	1.25					
Steel Grade 8.8	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial Safety Factor	γ_{Ms}	[-]	1.25					
Steel Grade 10.9	$V_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial Safety Factor	γ_{Ms}	[-]	1.50					
Stainless Steel Grade A4-70	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial Safety Factor	γ_{Ms}	[-]	1.56					
Stainless Steel Grade A4-80	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial Safety Factor	γ_{Ms}	[-]	1.33					

* Galvanised rods of high strength are sensitive to hydrogen induced brittle failure unless a special process is used for galvanisng.

Threaded Rods - Characteristic Values for Steel Failure (Shear – with lever arm)

Size			M8	M10	M12	M16	M20	M24
Steel Grade 5.8	$M^{O}_{Rk,s}$	[N.m]	19	37	66	166	325	561
Partial Safety Factor	γ_{Ms}	[-]	1.25					
Steel Grade 8.8	$M^{O}_{Rk,s}$	[N.m]	30	60	105	266	519	898
Partial Safety Factor	γ_{Ms}	[-]	1.25					
Steel Grade 10.9	$M^{O}_{Rk,s}$	[N.m]	37	75	131	333	649	1123
Partial Safety Factor	γ_{Ms}	[-]	1.50					
Stainless Steel Grade A4-70	$M^{O}_{Rk,s}$	[N.m]	26	52	92	233	454	786
Partial Safety Factor	γ_{Ms}	[-]	1.56					
Stainless Steel Grade A4-80	$M^{O}_{Rk,s}$	[N.m]	30	60	105	266	519	898
Partial Safety Factor	γ_{Ms}	[-]	1.33					

* Galvanised rods of high strength are sensitive to hydrogen induced brittle failure unless a special process is used for galvanisng.

POST-INSTALLED REBAR

Design Bond Strength Values For Hammer Drilled or Compressed Air Drilled Holes.

Design values of the ultimate bond resistance f_{bd} in N/mm2 for rotary hammer drilling and compressed air drilling for good bond conditions.

Rebar Ø (mm)	Concrete Class								
	C12/15	C16/20	C20/25	C25/30	C30/37	C35/45	C40/50	C45/55	C50/60
10	1.6	2.0	2.3	2.7	2.7	2.7	2.7	2.7	2.7
12	1.6	2.0	2.3	2.7	2.7	2.7	2.7	2.7	2.7
14	1.6	2.0	2.3	2.7	2.7	2.7	2.7	2.7	2.7
16	1.6	2.0	2.3	2.7	2.7	2.7	2.7	2.7	2.7
20	1.6	2.0	2.3	2.3	2.3	2.3	2.3	2.3	2.7

Tabulated values are valid for good bond conditions according to EN 1992-1-1. For all other bond conditions multiply the values of f_{bd} by 0.7.

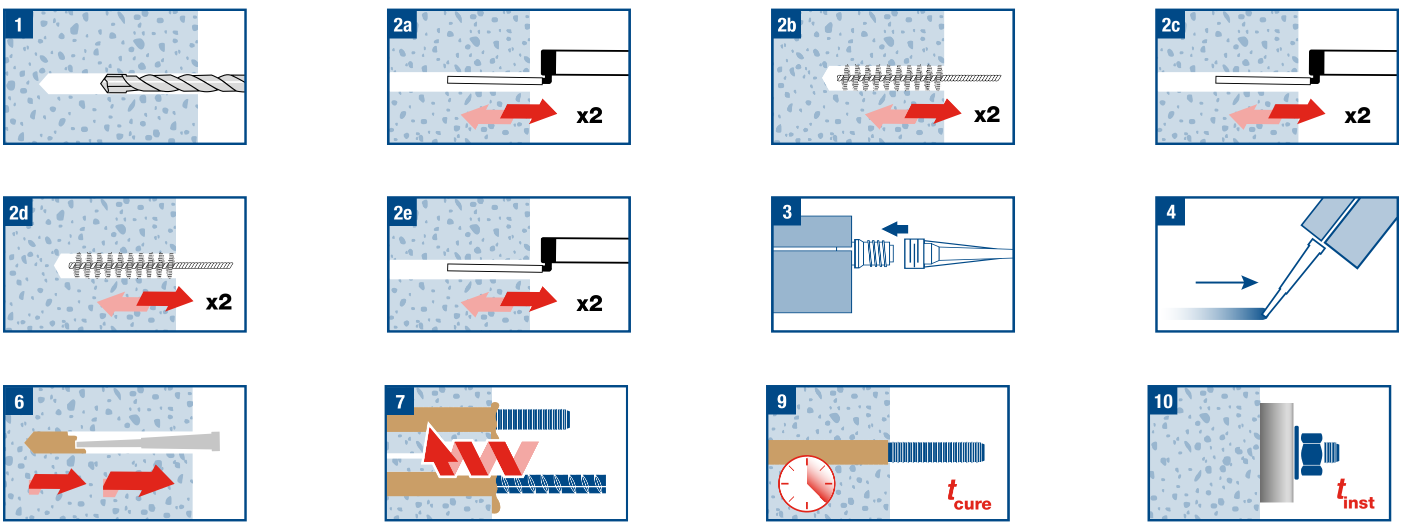
INSTALLATION INSTRUCTIONS

Solid Substrate Installation Method

1. **Drill the** hole to the correct diameter and depth. This can be done with either a rotary percussion or rotary hammer drilling machine depending upon the substrate.
2. **Thoroughly clean** the hole in the following sequence using a brush with the required extensions and a source of clean compressed air. For holes of 400mm or less deep, a blow pump may be used:

   Blow Clean x2 → Brush Clean x2 → Blow Clean x2 → Brush Clean x2 → Blow Clean x2.

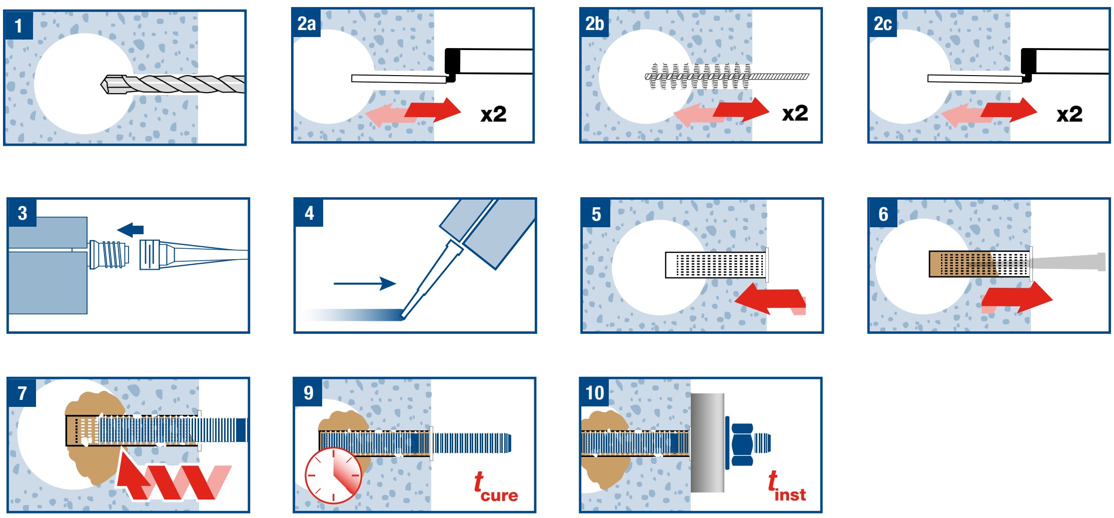
   If the hole collects water, the current best practice is to remove standing water before cleaning the hole and injecting the resin. **Ideally, the resin should be injected into a properly cleaned, dry hole**.
3. **Select the** appropriate static mixer nozzle for the installation, open the cartridge/foil pack and screw nozzle onto the mouth of the cartridge. Insert the cartridge into a good quality applicator.
4. **Extrude the** first part of the cartridge to waste until an even colour has been achieved without streaking in the resin.
5. **If necessary,** cut the extension tube to the depth of the hole and push onto the end of the mixer nozzle, and (for rebars 16mm dia. or more) fit the correct resin stopper to the other end. Attach extension tubing and resin stopper.
6. **Insert the** mixer nozzle (resin stopper / extension tube if applicable) to the bottom of the hole. Begin to extrude the resin and slowly withdraw the mixer nozzle from the hole ensuring that there are no air voids as the mixer nozzle is withdrawn. Fill the hole to approximately ½ to ¾ full and withdraw the nozzle completely.
7. **Insert the** clean threaded bar, free from oil or other release agents, to the bottom of the hole using a back and forth twisting motion ensuring all the threads are thoroughly coated. Adjust to the correct position within the stated working time.
8. **Any excess** resin will be expelled from the hole evenly around the steel element showing that the hole is full. This excess resin should be removed from around the mouth of the hole before it sets.
9. **Leave the** anchor to cure. Do not disturb the anchor until the appropriate loading time, has elapsed depending on the substrate conditions and ambient temperature.
10. **Attach the** fixture and tighten the nut to the recommended torque. **Do not over-tighten**.



Hollow Substrate Installation Method

1. **Drill the** hole to the correct diameter and depth. This should be done with a rotary percussion drilling machine to reduce spalling.
2. **Thoroughly clean** the hole in the following sequence using a brush with the required extensions and a source of clean compressed air. For holes of 400mm or less deep, a blow pump may be used:

   Blow Clean x2 → Brush Clean x2 → Blow Clean x2 → Brush Clean x2 → Blow Clean x2.
3. **Select the** appropriate static mixer nozzle for the installation, open the cartridge/foil pack and screw nozzle onto the mouth of the cartridge. Insert the cartridge into a good quality applicator.
4. **Extrude the** first part of the cartridge to waste until an even colour has been achieved without streaking in the resin.
5. **Select the** appropriate perforated sleeve and insert into the hole.
6. **Insert the** mixer nozzle to the bottom of the perforated sleeve, withdraw 2-3mm then begin to extrude the resin and slowly withdraw the mixer nozzle from the hole ensuring that there are no air voids as the mixer nozzle is withdrawn. Fill the perforated sleeve and withdraw the nozzle completely.
7. **Insert the** clean threaded bar, free from oil or other release agents, to the bottom of the hole using a back and forth twisting motion ensuring all the threads are thoroughly coated. Adjust to the correct position within the stated working time.
8. **Any excess** resin will be expelled from the hole evenly around the steel element showing that the hole is full. This excess resin should be removed from around the mouth of the hole before it sets.
9. **Leave the** anchor to cure. Do not disturb the anchor until the appropriate loading time, has elapsed depending on the substrate conditions and ambient temperature.
10. **Attach the** fixture and tighten the nut to the recommended torque. **Do not over-tighten**.



MASONRY

Installation Parameters in Solid & Hollow Masonry

Anchor Type			Anchor Rod							
Size			**M8**	**M10**	**M12**	**M8**		**M10**		**M12**
Sieve Sleeve	l_s	mm	-	-	-	85		85		85
	d_s	mm	-	-	-	15	16	15	16	20
Nominal Drill Hole Diameter	d_o	mm	15	15	20	15	16	15	16	20
Diameter of Cleaning Brush	d_b	mm	$20^{\pm1}$	$20^{\pm1}$	$20^{\pm1}$	$20^{\pm1}$		$20^{\pm1}$		$22^{\pm1}$
Depth of the drill hole	h_o	mm	90							
Effective anchorage depth	h_{ef}	mm	85							
Diameter of clearance hole in the fixture	$d_f \leq$	mm	9	12	14	9		12		14
Torque moment	T_{inst}	Nm	2							

Edge Distances and Spacing

Base Material	Anchor Rod								
	M8			**M10**			**M12**		
	$C_{cr} = C_{min}$	$S_{cr\,II} = S_{min\,II}$	$S_{cr}\perp = S_{min}\perp$	$C_{cr} = C_{min}$	$S_{cr\,II} = S_{min\,II}$	$S_{cr}\perp = S_{min}\perp$	$C_{cr} = C_{min}$	$S_{cr\,II} = S_{min\,II}$	$s_{cr}\perp = s_{min}\perp$
	mm	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**	**mm**
Brick N° 1	100	235	115	100	235	115	120	235	115
Brick N° 2	100	370	238	100	370	238	120	370	238
Brick N° 3	128	255	255	128	255	255	128	255	255
Brick N° 4	100	373	238	100	373	238	120	373	238
Brick N° 5	100	250	240	100	250	240	120	250	240
Brick N° 6	128	255	255	128	255	255	128	255	255
Brick N° 7	100	245	110	100	245	110	120	245	110

Characteristic Resistance Under Tension and Shear Loading

Base Material	Anchor Rods $N_{Rk} = V_{Rk}$ [kN] [1]		
	M8	**M10**	**M12**
Brick No 1	2.0	2.0	2.0
Brick No 2	2.0	1.5	2.5
Brick No 3	1.5	1.5	2.5
Brick No 4	1.2	1.2	1.2

Base Material	Anchor Rods $N_{Rk} = V_{Rk}$ [kN] [1]		
	M8	**M10**	**M12**
Brick No 5	1.2	0.9	0.9
Brick No 6	0.75	0.75	1.2
Brick No 7	0.75	0.5	0.5

1) For design according TR 054: $N_{Rk} = N_{Rk,p} = N_{Rk,b} = N_{Rk,s}$; $N_{Rk,pb}$ according to TR 054. For $V_{Rk,s}$ see Annex C1, Table C2; Calculation of $V_{Rk,pb}$ and $V_{Rk,c}$ according to TR 054

Characteristic Bending Moment

Steel Grade			Anchor Diameter		
			M8	M10	M12
Steel Grade 5.8	$M_{Rk,s}$	(N.m)	19	37	66
Steel Grade 8.8	$M_{Rk,s}$	(N.m)	30	60	105
Steel Grade 10.9	$M_{Rk,s}$	(N.m)	37	75	131
Stainless Steel A2-70, A4-70	$M_{Rk,s}$	(N.m)	26	52	92
Stainless Steel A4-80	$M_{Rk,s}$	(N.m)	30	60	105

Displacements under tension and shear load

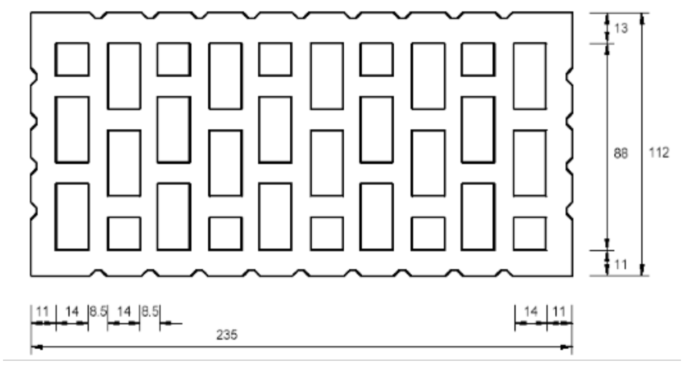
Base Material	F (kN)	δN0 [mm]	δN∞ [mm]	δV0 [mm]	δV∞ [mm]
Solid Bricks	NRk / (1.4 · γM)	0.6	1.2	1.0	1.5
Perforated & hollow bricks		0.14	0.28	1.0	1.5

β - factors for job site tests according to TR 053

Brick No.	No 1	No 2	No 3	No 4	No 5	No 6	No 7
β- factor	0.62	0.6	0.48	0.65	0.43	0.26	0.65

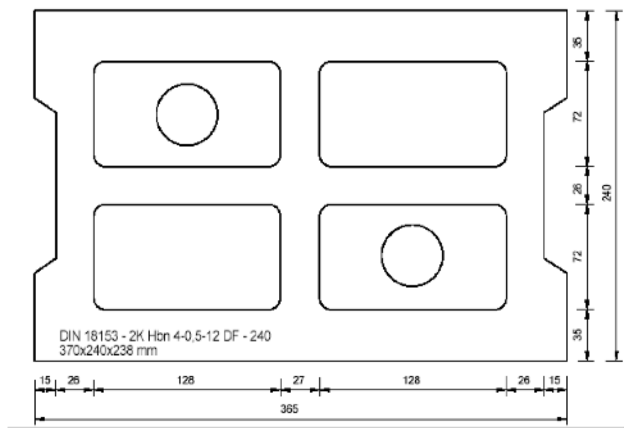
Types & Dimensions of Blocks & Bricks

Brick N° 1



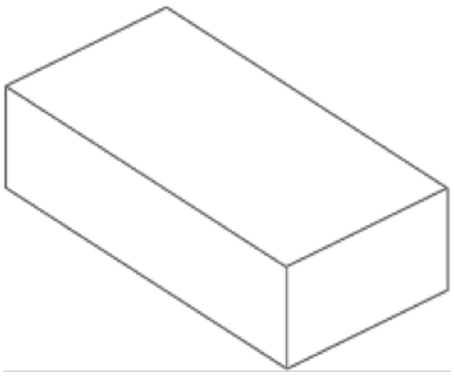
Hollow clay brick HLz 12-1,0-2DF
according to EN 771-1
length/width/height = 235 mm/112 mm/115 mm
fb ≥ 12 N/mm² / ρ ≥ 1,0 kg/dm³

Brick N° 2



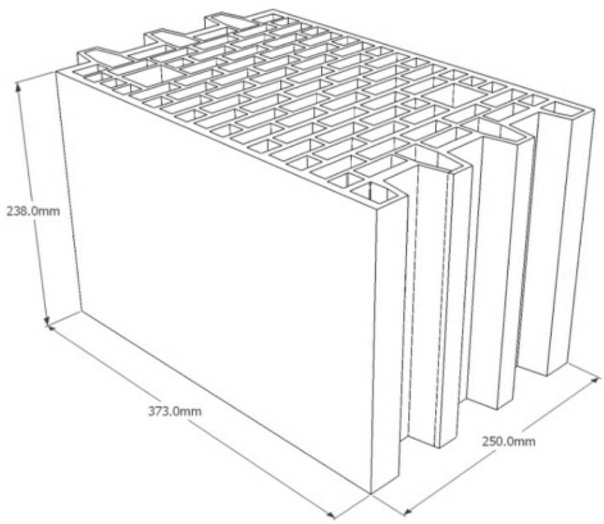
Concrete masonry unit Hbn 4-12DF
according to EN 771-3
length/width/height = 370 mm/240 mm/238 mm
fb ≥ 4 N/mm² / ρ ≥ 1,2 kg/dm³

Brick N° 3



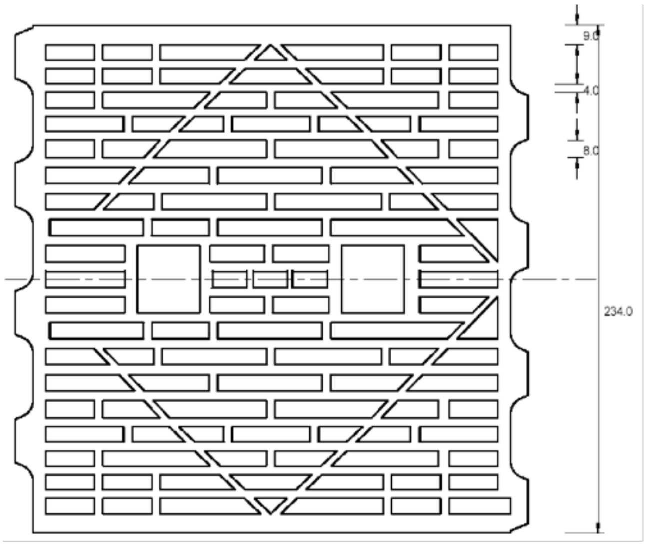
Solid clay brick Mz 12-2,0-NF
according to EN 771-1
length/width/height = 240 mm/116 mm/71 mm
f_b ≥ 12 N/mm² / ρ ≥ 2,0 kg/dm³

Brick N° 4



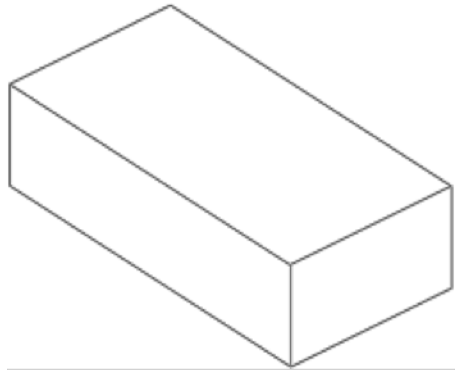
Hollow clay brick Porotherm 25 P+W KL15
according to EN 771-1
length/width/height = 373 mm/250 mm/238 mm
fb ≥ 12 N/mm² / ρ ≥ 0,9 kg/dm³

Brick N° 5



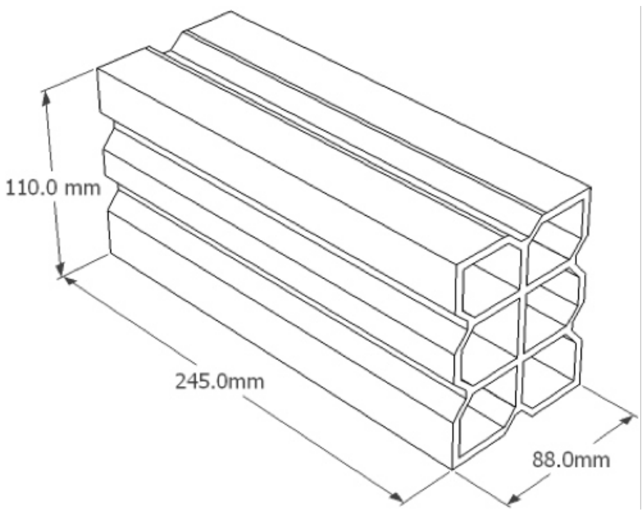
Hollow clay brick HLzW 6-0,7-8DF
according to EN 771-1
length/width/height = 250 mm/240 mm/240 mm
$f_b \geq 6\ N/mm^2$ / $\rho \geq 0{,}8$ kg/dm3

Brick N° 6



Solid sand lime brick KS 12-2,0-NF
according to EN 771-2
length/width/height = 240 mm/115 mm/70 mm
$f_b \geq 12$ N/mm2 / $\rho \geq 2{,}0$ kg/dm3

Brick N° 7



Hollow clay brick Hueco Doble
according to EN 771-1
length/width/height = 245 mm/110 mm/88 mm
$f_b \geq 2{,}5\ N/mm^2$ / $\rho \geq 0{,}74$ kg/dm3

IMPORTANT NOTES

Use in Porous Substrates

This bonded anchor is not intended for use as a cosmetic or decorative product. When anchoring into porous or reconstituted stone it is recommended that technical assistance is sought. Due to the nature of the product, migration of the monomer in the resin may cause staining in certain materials. If you are still uncertain, it is advisable to test the resin by applying it in a small, discrete area and testing before using the resin on the project.

Important Note

Whilst all reasonable care is taken in compiling technical data on the Company's products, all information, recommendations or suggestions regarding the use of such products are made without guarantee, since the conditions of use are beyond the control of the Company. It is the customer's responsibility to satisfy himself that each product is fit for the purpose for which he intends to use it, that the actual conditions of use are suitable and that, in the light of our continual research and development program the information relating to each product has not been superseded.