WPSF100 Chemical Anchoring System

Universal chemical anchoring system for non-cracked concrete and masonry

Walraven Injection System

Foil-pack Cartridge
WPSF100 300ml

System Accessories
WIS Brush
WIS Blow Pump
WIS Perforated Sleeves
WIS Dispensing Guns
WIS Standard Nozzles
WIS Extension Pipes
BIS Threaded Rods

- WPSF100 is a universal styrene-free chemical anchoring system for medium to heavy loads. It is approved for installations in non-cracked concrete, solid masonry and hollow masonry.
- WPSF100 has a market-leading performance in its class.

Features and benefits

- ETA Option 7 approval for non-cracked concrete
- ETA ETAG029 approval for hollow and solid masonry
- Installations in wet and flooded holes without loss of load capacity
- Reduced concrete edge and anchor spacing distances
- Reduced drilling diameter for M20 and M24, resulting in 50% product saving during installation
- For use with standard silicone dispensing guns
- Cartridge may be used up over several times (each installation after a break requires a new mixing nozzle)
- Always correct mixing ratio thanks to the static mixer nozzle
- Tested according to LEED 2009 EQ c4.1, SCAQMD rule 1168 (2005)
- A+ VOC emissions class

Suitable base materials


Concrete (non-cracked)


Hollow concrete blocks


Solid bricks


Sand-lime bricks


Hollow bricks


Hollow sand-lime bricks

Approvals and certificates

- European Technical Assessment Non-cracked concrete, M8-M24 — ETA-16/0542, of 27/06/2016
- European Technical Assessment Masonry units, M8-M12 — ETA 16/0541, of 27/06/2016
- Test report – LEED — G22816D_04, of 21/06/2016
- VOC Emissions Test Report — G15564revB_04, of 21/06/2016

Storage conditions and shelf life

Store in cool, dry place, out of direct sunlight or other sources of heat, within +5 ºC to +25 ºC temperature. Expiry date and batch number are printed on each cartridge.

1. Product and packaging details

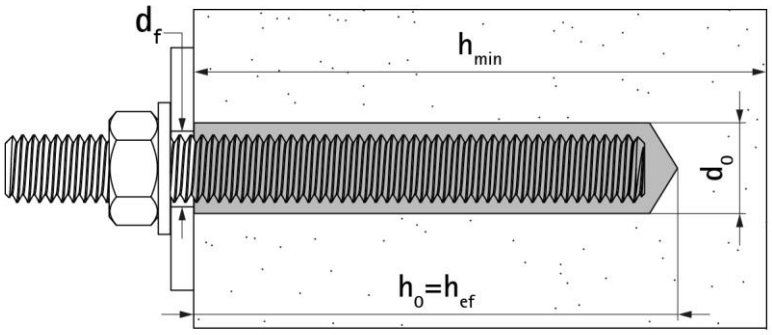
Article	Description	Pack 1		Pack 2	
		[pcs]	EAN13	[pcs]	EAN13
6099113	WPSF100 300ml	1	8712993142132	12	8712993157945

2. System accessories

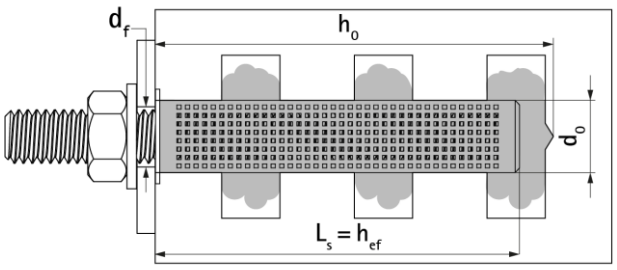
Article	Description	For	Pack 1	
			[pcs]	EAN13
6099986	WIS Dispenser Gun	WPSF100 300ml & WVSF200 300ml	1	8712993142132
6099990	WIS Standard Nozzle	WPSF100 & WVSF200	12	8712993160082
6099992	WIS Extension Pipe	WIS Standard Nozzle	10	8712993160105
6099980	WIS Brush M8/10	M8/M10 hole	1	8712993160143
6099981	WIS Brush M12/16	M12/M16 hole	1	8712993160150
6099982	WIS Brush M20/24	M20/M24 hole	1	8712993160167
6099985	WIS Blow Pump	Cleaning drill holes	1	8712993160174
6097017	WIS PS 16x85	M8, M10	10	8712993160112
6097018	WIS PS 16x130	M8, M10	10	8712993160129
6097020	WIS PS 20x85	M12	10	8712993160136

3. Installation data

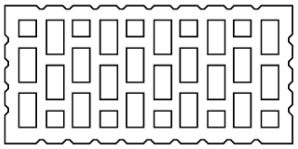
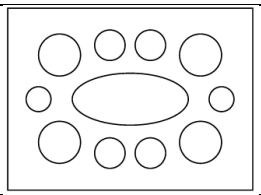
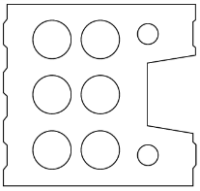
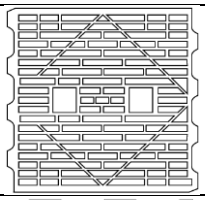
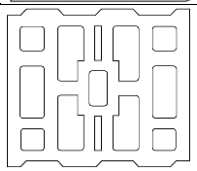
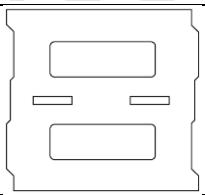
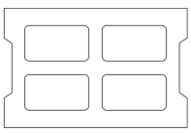
3.1 Installation parameters for non-cracked concrete

Anchor Type					WPSF100			
Anchor Size			M8	M10	M12	M16	M20	M24
Drill hole diameter	d_0	[mm]	10	12	14	18	22	26
Fixture hole diameter	d_f	[mm]	10	12	14	18	22	26
Diameter of cleaning brush	d_b	[Nm]	14	14	20	20	29	29
Installation torque	T_{inst}	[mm]	10	20	40	80	150	200
$h_{ef,min}$ = 8d								
Depth of drill hole	h_0	[mm]	64	80	96	128	160	192
Min. edge distance	C_{min}	[mm]	35	50	50	65	80	96
Min. spacing	S_{min}	[mm]	35	50	50	65	80	96
Min. concrete member thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm				h_{ef} + 2d_0	
$h_{ef,max}$ = 12d								
Depth of drill hole	h_0	[mm]	96	120	144	192	240	288
Min. edge distance	C_{min}	[mm]	50	60	70	95	120	145
Min. spacing	S_{min}	[mm]	50	60	70	95	120	145
Min. concrete member thickness	h_{min}	[mm]	h_{ef} + 30 mm ≥ 100 mm				h_{ef} + 2d_0	
Installation data is provided for two anchoring depths: $h_{ef,min}$ = 8d and $h_{ef,max}$ = 12d, that is 8 and 12 times the diameter of the anchor. Any anchoring depth h_{ef} in between $h_{ef,min}$ and $h_{ef,max}$ is allowed and the intermediate values can be interpolated.								

3.2 Installation parameters for masonry

Anchor type			Anchor Rod					
Anchor size			**M8**	**M10**	**M12**	**M8**	**M10**	**M12**
Masonry type			Solid			Hollow		
Sieve sleeve	L_s	[mm]	-	-	-	85	85	85
	d_s	[mm]	-	-	-	16	16	20
Nominal drill hole diameter	d_0	[mm]	15	15	20	16	16	20
Diameter of cleaning brush	d_b	[mm]	20±1	20±1	22±1	20±1	20±1	22±1
Depth of the drill hole	h_0	[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					
			Installations in perforated or hollow masonry units require the use of WIS PS perforated sleeves.					

3.3 Types and dimensions of tested bricks and blocks

Brick Type	Drawing
Brick No. 1 Hollow clay brick HLz 12-1,0-2DF according to EN 771-1 length/width/height = 235mm/112mm/115mm $f_b \geq 12$ N/mm^2 / $\rho \geq 1{,}0$ kg/dm^3	
Brick No. 2 Hollow sand lime brick KSL 12-1,4-3DF according to EN 771-2 length/width/height = 240mm/175mm/113mm $f_b \geq 12$ N/mm^2 / $\rho \geq 1{,}4$ kg/dm^3	
Brick No. 3 Hollow sand lime brick KSL 12-1,4-8DF according to EN 771-2 length/width/height = 250mm/240mm/237mm $f_b \geq 12$ N/mm^2 / $\rho \geq 1{,}4$ kg/dm^3	
Brick No. 4 Solid clay brick Mz 12-2,0-NF according to EN 771-1 length/width/height = 240mm/116mm/71mm $f_b \geq 12$ N/mm^2 / $\rho \geq 2{,}0$ kg/dm^3	
Brick No. 5 Solid sand lime brick KSL 12-1,4-3DF according to EN 771-2 length/width/height = 240mm/115mm/70mm $f_b \geq 12$ N/mm^2 / $\rho \geq 2{,}0$ kg/dm^3	
Brick No. 6 Hollow clay brick HLzW 6-0,7-8DF according to EN771-1 length/width/height = 250mm/240mm/240mm $f_b \geq 6$ N/mm^2 / $\rho \geq 0.8$ kg/dm^3	
Brick No. 7 Lightweight concrete hollow block Hbl 2-0,45-10DF according to EN771-3 length/width/height = 250mm/300mm/248mm $f_b \geq 2{,}0$ N/mm^2 / $\rho \geq 0{,}45$ kg/dm^3	
Brick No. 8 Ligtweight concrete hollow block Hbl 4-0,7-8DFF according to EN771-3 length/width/height = 250mm/240mm/248mm $f_b \geq 4{,}0$ N/mm^2 / $\rho \geq 0{,}7$ kg/dm^3	
Brick No. 9 Concrete masonry unit Hbn 4-12DF according to EN771-3 length/width/height = 370mm/240mm/238mm $f_b \geq 4$ N/mm^2 / $\rho \geq 1{,}2$ kg/dm^3	

f_b = normalised mean compressive strength of masonry unit
ρ = bulk density of masonry unit

3.4 Edge distances and anchor spacing in masonry

Anchor rod									
	M8			M10			M12		
Critical and minimum anchor spacing and edge distances	$c_{cr} = c_{min}$	$s_{cr\,II} = s_{min\,II}$	$s_{cr\perp} = s_{min\perp}$	$c_{cr} = c_{min}$	$s_{cr\,II} = s_{min\,II}$	$s_{cr\perp} = s_{min\perp}$	$c_{cr} = c_{min}$	$s_{cr\,II} = s_{min\,II}$	$s_{cr\perp} = s_{min\perp}$
Base material	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
Brick No. 1	100	235	115	100	235	115	120	235	115
Brick No. 2	100	240	113	100	240	113	120	240	113
Brick No. 3	100	250	237	100	250	237	120	250	237
Brick No. 4	128	255	255	128	255	255	128	255	255
Brick No. 5	128	255	255	128	255	255	128	255	255
Brick No. 6	100	250	240	100	250	240	120	250	240
Brick No. 7	100	250	248	100	250	248	-	-	-
Brick No. 8	100	250	248	100	250	248	120	250	248
Brick No. 9	100	370	238	100	370	238	120	370	238

$s_{cr,II} = s_{cr}$ II paralel to the horizontal joint $s_{cr,\perp} = s_{cr}$ ⊥ perpendicular horizontal joint

3.5 Gelling and curing times

Base material temperature [°C]	Working time t_{work} [min]	Curing time t_{cure} [min]
5	18	145
5 - 10	10	145
10 - 20	6	85
20 - 25	5	50
25 - 30	4	35

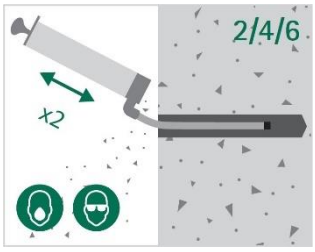
Working time relates to the highest temperature in the range. Curing time relates to the lowest temperature in the range. Cartridge must be conditioned to a minimum of +5 °C before use.

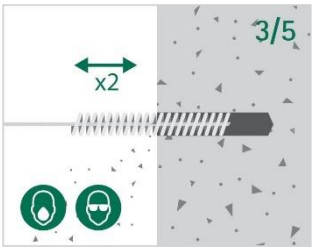
3.7 Installation procedure for concrete and bricks

Drill hole to correct diameter d_0 and depth h_0

In concrete: hammer drilling mode

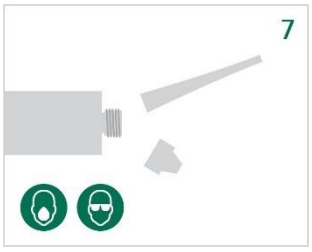
In bricks: rotary drilling mode

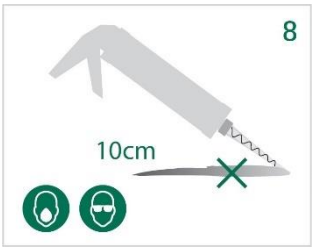




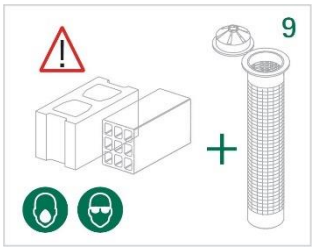
Clean the hole using blow pump and cleaning brush

Observe cleaning sequence 2-3-4-5-6

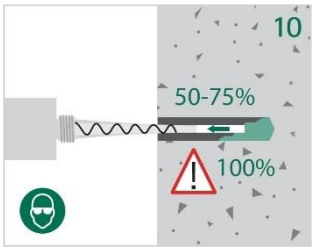




Apply mixer nozzle and dispense first part to waste

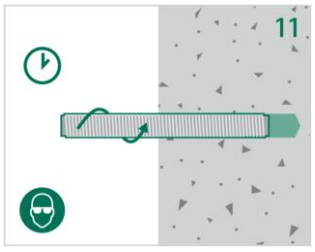


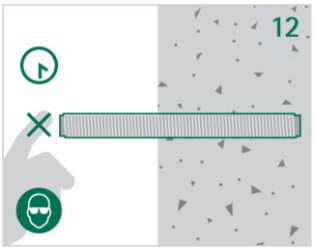
For installations in hollow bricks or blocks, use plastic mesh sleeve WIS PS

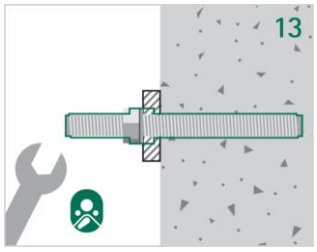


In concrete and solid bricks: inject hole 50-75%

In hollow-bricks: inject plastic mesh sleeve 100% full and close the cap







Insert threaded rod with a slight twisting motion within working time t_{work}

Do not disturb the anchor and allow curing time t_{cure} to pass

Load the anchor using correct tightening torque T_{inst}

4. Performance information

4.1 Recommended loads in non-cracked concrete

Recommended loads presented in paragraphs 4.1.1 and 4.1.2 apply to:

- correctly installed anchors.
- non-cracked C20/25 concrete.
- threaded rod made of steel grade 5.8
- holes drilled with a hammer drill.
- anchors not affected by anchor spacing or edge influence.
- anchor in-service temperature range of -40°C to +80°C.
- recommended loads include partial safety factor and an overall partial safety factor for action of 1.4. The partial safety factor for action depends on the type of loading and shall be taken from national regulations. All anchor failure modes and the entire relevant product European Technical Assessment must be considered during anchor design.

4.1.1 Recommended tension loads in non-cracked concrete

Anchor type			**WPSF100**					
Anchor size			M8	M10	M12	M16	M20	M24
Embedment depth	**$h_{ef,8d}$**	**[mm]**	**64**	**80**	**96**	**128**	**160**	**192**
Concrete member thickness	h	[mm]	100	110	126	158	204	244
Recommended tension load	N_{rec}	[kN]	5.42	8.59	12.92	22.98	31.87	43.08
Embedment depth	**$h_{ef,10d}$**	**[mm]**	**80**	**100**	**120**	**160**	**200**	**240**
Concrete member thickness	h	[mm]	110	130	150	190	244	292
Recommended tension load	N_{rec}	[kN]	6.78	9.97	16.16	28.72	39.86	53.80
Embedment depth	**$h_{ef,12d}$**	**[mm]**	**96**	**120**	**144**	**192**	**240**	**288**
Concrete member thickness	h	[mm]	126	150	174	222	284	340
Recommended tension load	N_{rec}	[kN]	8.14	11.97	19.39	34.47	47.84	64.61

4.1.2 Recommended shear loads in non-cracked concrete

Anchor type			**WPSF100**					
Anchor size			M8	M10	M12	M16	M20	M24
Recommended shear load	V_{rec}	[kN]	5.14*	8.57*	12.00*	22.28*	34.85*	50.28*

*steel failure

4.2 Characteristic bond resistance for combined pullout and concrete cone failure in non-cracked C20/25 concrete

Anchor type					**WPSF100**			
Anchor Size				M8	M10	M12	M16	M20	M24
Characteristic bond resistance in dry, wet and flooded holes (temperature range 50/80°C)		τ_{Rk}	[N/mm²]	8.5	8.0	9.0	9.0	8.0	7.5
Partial safety factor		γ_{Mc}	[-]	1.8					
Factor for concrete	C30/37	ψ_c	[-]	1.12					
	C40/45			1.90					
	C50/60			1.30					

Characteristic bond resistance data allows calculations of resistance for combined pull-out and concrete cone failure in non-cracked C20/25 concrete at any allowed anchoring depth.

4.3 Recommended tension and shear loads in bricks

Given recommended loads apply to single anchors without influence of anchor spacing or edge distance and include safety factor for material γ_M=2.5 (in absence of other national regulations) and safety factor for action γ_F=1.4.

Base Material	Anchor rod		
	Recommended tensile and shear loads $N_{Rec} = V_{Rec}$ [kN][1]		
	M8	**M10**	**M12**
Brick No. 1	0.71	0.57	0.57
Brick No. 2	0.21	0.34	0.14
Brick No. 3	0.21	0.34	0.14
Brick No. 4	0.42	0.42	0.85
Brick No. 5	0.21	0.25	0.42
Brick No. 6	0.34	0.34	0.25
Brick No. 7	0.17	0.08	-
Brick No. 8	0.17	0.42	0.34
Brick No. 9	0.71	0.42	0.71

[1]For anchor design according ETAG 029, Annex C.

4.4 Steel failure information for threaded bars

Steel failure – characteristic resistance values to tension load								
Anchor Size			M8	M10	M12	M16	M20	M24
Steel grade 5.8	$N_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	$\gamma_{Ms,N}$	[-]	1.50					
Steel grade 8.8	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	$\gamma_{Ms,N}$	[-]	1.50					
Steel grade 10.9	$N_{Rk,s}$	[kN]	37	58	84	157	245	353
Partial safety factor	$\gamma_{Ms,N}$	[-]	1.40					
Stainless steel grade A4-70	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	$\gamma_{Ms,N}$	[-]	1.90					
Stainless steel grade A4-80	$N_{Rk,s}$	[kN]	29	46	67	126	196	282
Partial safety factor	$\gamma_{Ms,N}$	[-]	1.60					
Stainless steel grade 1,4529	$N_{Rk,s}$	[kN]	26	41	59	110	172	247
Partial safety factor	$\gamma_{Ms,N}$	[-]	1.50					

Steel failure – characteristic resistance values to shear load with lever arm								
Anchor Size			M8	M10	M12	M16	M20	M24
Steel grade 5.8	$V_{Rk,s}$	[kN]	9	15	21	39	61	88
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.25					
Steel grade 8.8	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.25					
Steel grade 10.9	$V_{Rk,s}$	[kN]	18	29	42	79	123	177
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.50					
Stainless steel grade A4-70	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.56					
Stainless steel grade A4-80	$V_{Rk,s}$	[kN]	15	23	34	63	98	141
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.33					
Stainless steel grade 1,4529	$V_{Rk,s}$	[kN]	13	20	30	55	86	124
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.25					

Steel failure – characteristic resistance values to shear load with lever arm								
Anchor Size			M8	M10	M12	M16	M20	M24
Steel grade 5.8	$M^0_{Rk,s}$	[kN]	19	37	66	166	325	561
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.25					
Steel grade 8.8	$M^0_{Rk,s}$	[kN]	30	60	105	266	519	898
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.25					
Steel grade 10.9	$M^0_{Rk,s}$	[kN]	37	75	131	333	649	1123
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.50					
Stainless steel grade A4-70	$M^0_{Rk,s}$	[kN]	26	52	92	233	454	786
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.56					
Stainless steel grade A4-80	$M^0_{Rk,s}$	[kN]	30	60	105	266	519	898
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.33					
Stainless steel grade 1,4529	$M^0_{Rk,s}$	[kN]	26	52	92	233	454	786
Partial safety factor	$\gamma_{Ms,V}$	[-]	1.25					

5.0 Additional product information

5.1 Chemical resistance

Chemical environment	Concentration	Result
Aqueous Solution Acetic Acid	10%	✓
Acetone	100%	×
Aqueous Solution Aluminium Chloride	Saturated	✓
Aqueous Solution Aluminium Nitrate	10%	✓
Ammonia Solution	5%	×
Jet Fuel	100%	×
Benzene	100%	×
Benzoic Acid	Saturated	✓
Benzyl Alcohol	100%	×
Sodium Hypochlorite Solution	5 - 15%	✓
Butyl Alcohol	100%	C
Calcium Sulphate Aqueous Solution	Saturated	✓
Carbon Monoxide	Gas	✓
Carbon Tetrachloride	100%	C
Chlorine Water	Saturated	×
Chloro Benzene	100%	×
Citric Acid Aqueous Solution	Saturated	✓
Cyclohexanol	100%	✓
Diesel Fuel	100%	✓
Diethylene Glycol	100%	✓
Ethanol	95%	×
Ethanol Aqueous Solution	20%	C
Heptane	100%	C

Chemical environment	Concentration	Result
Hexane	100%	C
Hydrochloric Acid	10%	✓
Hydrochloric Acid	15%	✓
Hydrochloric Acid	25%	C
Hydrogen Sulphide Gas	100%	✓
Isoproyl Alcohol	100%	×
Linseed Oil	100%	✓
Lubricating Oil	100%	✓
Mineral Oil	100%	✓
Paraffin / Kerosene (Domestic)	100%	C
Phenol Aqueous Solution	1%	×
Phosphoric Acid	50%	✓
Potassium Hydroxide	10% / pH13	C
Sea Water	100%	C
Styrene	100%	×
Sulphur Dioxide Solution	10%	✓
Sulphur Dioxide (40°C)	5%	✓
Sulphuric Acid	10%	✓
Sulphuric Acid	50%	✓
Turpentine	100%	C
White Spirit	100%	✓
Xylene	100%	×

✓ = Resistant to 75°C with at least 80% of physical properties retained.
C = Contact only to a maximum of 25°C.
× = Not resistant.

5.2 Physical properties

Property		Unit	Value	Test Standard
Density		g/cm^3	1.7	ASTM D 1875 @ +20°C
Compressive Strength	24 hours	N/mm^2	60	ASTM D 695 @ +20°C
	7 days		70	
Tensile Strength	24 hours	N/mm^2	11.5	ASTM D 638 @ +20°C
	7 days		12.2	
Tensile Strength	24 hours	%	0.1	ASTM D 638 @ +20°C
Elongation at Break	7 days		0.1	
Tensile Modulus	24 hours	GN/m^2	3.4	ASTM D 638 @ +20°C
	7 days		4.5	
Flexural Strength	7 days	N/mm^2	28.3	ASTM D 790 @ +20°C
HDT	7 days	°C	80-90	ASTM D 648 @ +20°C