

PROJECT: VODAPRUF - LIGHTWEIGHT SCREED

DETAILS: PE DESIGN FOR LIGHTWEIGHT SCREED

DESIGN FOR: VODAPRUF PTE LTD

**PROJECT TITLE: PROPOSED FIT-OUT WORKS TO FACTORY UNIT AT FOOD
HUB @ SENOKO, UNIT #07-01**



GNG Consultants Pte Ltd

3791 Jalan Bukit Merah, E-Centre @ Redhill #10-23, Singapore 159471

Tel: 6274 0311, Fax: 6274 0310, Email: gng@gng.com.sg

Date: 08/04/2021

DESIGN INFORMATION & CRITERIA

1. Design Information

Code of Practice:

- SS EN 1991-1-1 : Actions on structures –General actions - Densities, self-weight and imposed loads for buildings
SS EN 1991 : Actions on structures –General actions
SS EN 1993 : Design of steel structures

2. Strength of Materials

a. Lightherm (Provided by Vodaprufl)

DENSITY Kg/m ³	250
Mass after 28 days Kg/m ³	~265
Thermal conductivity - λ W/mk	0.067
Compressive resistance N/mm ² (UNI EN 1015-11:2007)	0.83
Flexural strength N/mm ² (UNI EN 1015-11:2007)	0.46
Cohesion kPa	82.62
Hot-sealed membrane rupture N/50mm	57.00
Cold-sealed membrane rupture N/50mm	35.00
Elasticity module N/mm ²	235.80
Permeability to water vapour - μ	11.50
Shrinkage (NBN) - mm/m	0.427
Specific heat - kJ/kgK	1.40
Impact sound reduction at 500Hz - Δ_L	14 dB thickness 5cm
Impact sound pressure level measure in situ UNI EN ISO 717-2 - $L_{p,w}(G_i)$	61 dB
Fire reactivity class	A2 (UNI EN 13501-1)
Smoke production class	S1 (UNI EN 13501-1)
Observations of drops or inflamed particles	D0 (UNI EN 13501-1)

(Source: Lightherm Product Brochure)

b. Concrete Grade

C20/25 (For 50mm cement screed)

c. Rebar Strength (A6 BRC)

Fyk = 500 N/mm²

3. Loading Adopted

Max Load = 2.5 ton

4. Loading Combination

FOS = 1.5



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DRAWING

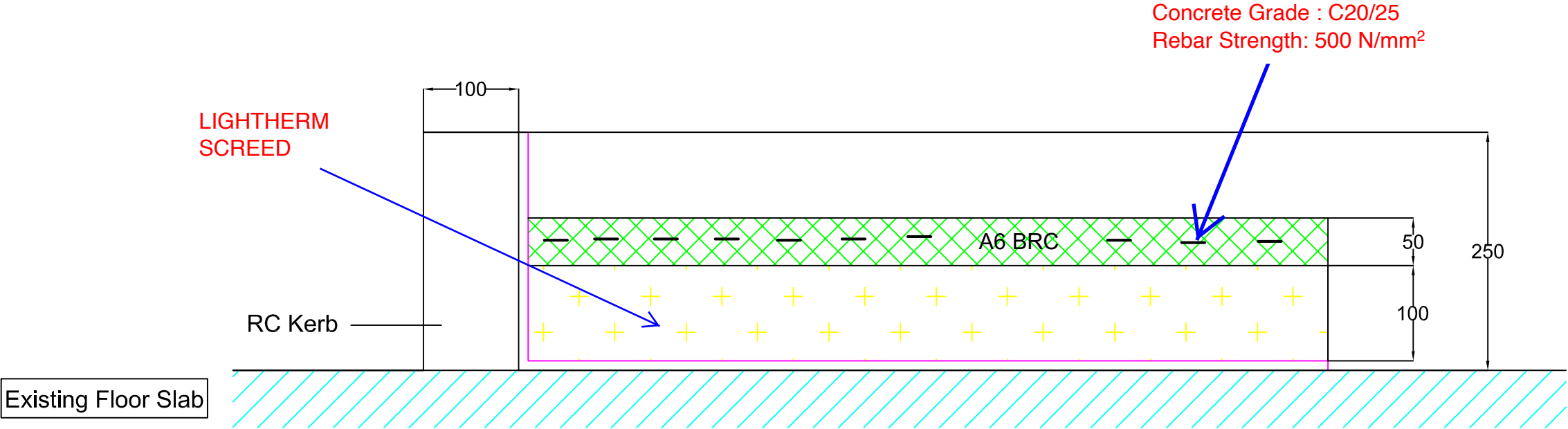
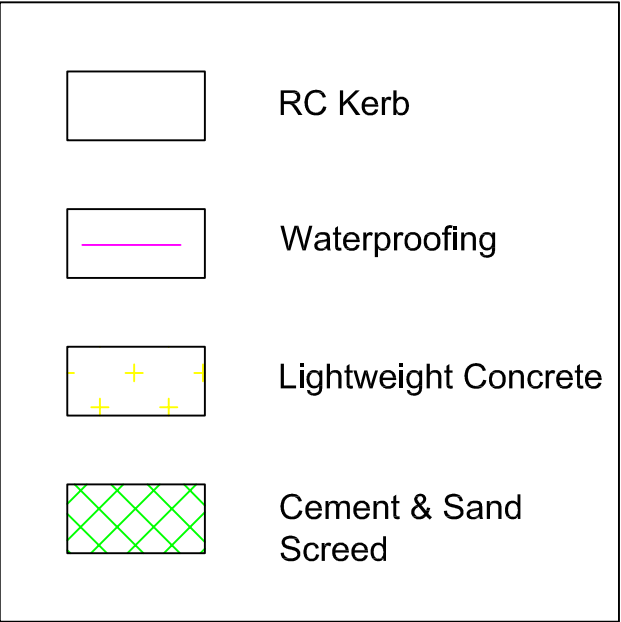


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TECHNICAL CHARACTERISTICS

Lightherm Screed prepared with Lightherm/Lightherm Mini.

DENSITY Kg/m ³	250
Mass after 28 days Kg/m ³	~265
Thermal conductivity - λ W/mK	0.067
Compressive resistance N/mm ² (UNI EN 1015-11:2007)	0.83
Flexural strength N/mm ² (UNI EN 1015-11:2007)	0.46
Cohesion kPa	82.62
Hot-sealed membrane rupture N/50mm	57.00
Cold-sealed membrane rupture N/50mm	35.00
Elasticity module N/mm ²	235.80
Permeability to water vapour - μ	11.50
Shrinkage (NBN) - mm/m	0.427
Specific heat - kJ/kgK	1.40
Impact sound reduction at 500Hz - Δ_L	14 dB thickness 5cm
Impact sound pressure level measure in situ UNI EN ISO 717-2 - $L'_{nTW}(C_1)$	61 dB
Fire reactivity class	A2 (UNI EN 13501-1)
Smoke production class	S1 (UNI EN 13501-1)
Observations of drops or inflamed particles	D0 (UNI EN 13501-1)

PREPARATION OF LIGHTHERM SCREED 250KG/M³

**No sand required!*



* Cement Portland 32.5 Cem I or Cem II limestone. Any brand of Ordinary Portland Cement is possible.

Note: 1) Always quantify Lightherm by volume, not by weight

2) Water over dosage will cause segregation



Preparation with cement mixer.
Mix for 5 minutes.



Preparation with Lightherm
machine. Mix for 5 minutes.



Purchase Lightherm Screed in
the form of ready mix. Mix for 5
minutes.

CALCULATION



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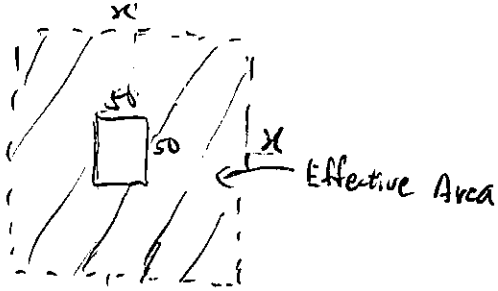
Date: 08/04/2021

$$\text{Max Loading} = 25 \text{ kN} [2.5 \text{ ton}]$$

$$\text{FOS} = 1.5$$

$$\frac{25 \times 1000 \times 1.5}{\text{Area}} = 0.83 \text{ N/mm}^2$$

$$\text{Area} = 45180.7 \text{ mm}^2$$



$$\text{Max Strength} = 0.83 \text{ N/mm}^2 \text{ [Lighten Sreed]}$$

$$x^2 = 45180.7 \text{ mm}^2$$

$$x = 212.6 \text{ mm}$$

$$\text{Effective Area} = 45180.7 \text{ mm}^2$$

$$\text{UDL} = 0.83 \text{ N/mm}^2 \times 212.6 \text{ mm}$$

$$= 176.5 \text{ N/mm}$$



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Continuous Beam: 1 (Code of Practice : Eurocode 2 - 2004)

6/4/2007 6:11:48 AM

**Input Tables**

fck(MPa)	20
fy (MPa)	500
fyv (MPa)	250
% Redistribution	0
Downward/Optimized redistrib.	D
Cover to centre top steel(mm)	40
Cover to centre bot.steel(mm)	40
Dead Load Factor	1.35
Live Load Factor	1.5
Density of concrete (kN/m ³)	24
% Live load permanent	25
Ø (Creep coefficient)	2
Ecs (Free shrinkage strain)	300E-6
cot (Θ) - Eurocode Shear	2.5

Sec No.	Bw (mm)	D (mm)	Bf-top (mm)	Hf-top (mm)	Bf-bot (mm)	Hf-bot (mm)	Y-offset (mm)	Web offset	Flange offset
1	212	50							

Span No	Section Length(m)	Sec No Left	Sec No Right
1	0.212	1	

Sup No.	Code C,F	Column Below			Code F,P	Column above			Code F,P
		D(mm)	B(mm)	H(m)		D(mm)	B(mm)	H(m)	
1	F								
2	C								

Case D,L	Span	Wleft (kN/m)	Wright (kN/m)	a (m)	b (m)	P (kN)	a (m)	M (kNm)	a (m)	Load Description
L	1	176								

Span	M left (kNm)	M right (kNm)

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C O N T I N U O U S B E A M Ver W3.1.09 - 13 Nov 2019

Title : 1
 Data File : H:\LIGHTERM PROJECT\1.C01
 Date/Time : 6/4/2007
 Code of Practice : Eurocode 2 - 2004

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BENDING MOMENTS & REINFORCEMENT

SPAN 1

PROVIDED REINFORCEMENT :
A6

Position(m) Min.Moment (kNm) Max.Moment (kNm) As-top(mm2) As-bot(mm2)

0.000	-5.94	-0.01	0.00	35.18
0.010	-5.94	-0.01	0.00	31.83
0.020	-4.87	-0.01	0.00	28.76
0.030	-4.38	-0.01	0.00	25.80
0.040	-3.91	-0.01	0.00	22.99
0.050	-3.47	-0.00	0.00	20.33
0.060	-3.05	-0.00	0.00	17.84
0.070	-2.67	-0.00	0.00	15.51
0.080	-2.30	-0.00	0.00	13.33
0.090	-1.97	-0.00	0.00	11.32
0.100	-1.66	-0.00	0.00	9.46
0.106	-1.49	-0.00	0.00	8.42
0.116	-1.22	-0.00	0.00	6.82
0.126	-0.98	-0.00	0.00	5.37
0.136	-0.76	-0.00	0.00	4.09
0.146	-0.58	-0.00	0.00	2.96
0.156	-0.41	-0.00	0.00	1.99
0.166	-0.28	-0.00	8.23	1.18
0.176	-0.17	-0.00	16.54	0.53
0.186	-0.09	-0.00	22.83	0.04
0.196	-0.03	-0.00	8.31	0.00
0.212	-0.00	0.00	0.00	0.00

SHEAR FORCES & REINFORCEMENT

SPAN 1

Position (m)	Minimum Shear (kN)	Maximum Shear (kN)	Shear Capacity (kN)	Asv/Sv (mm2/mm)	Asv/Sv (nom) (mm2/mm)
0.000	0.07	56.04	7.80	0.00	0.30
0.010	0.07	53.40	0.94	0.00	0.30
0.020	0.07	50.75	0.94	0.00	0.30
0.030	0.06	48.11	0.94	0.00	0.30
0.040	0.06	45.47	0.94	0.00	0.30
0.050	0.06	42.82	0.94	0.00	0.30
0.060	0.05	40.18	0.94	0.00	0.30
0.070	0.05	37.54	0.94	0.00	0.30
0.080	0.05	34.89	0.94	0.00	0.30
0.090	0.04	32.25	0.94	0.00	0.30
0.100	0.04	29.61	0.94	0.00	0.30
0.106	0.04	28.02	0.94	0.00	0.30
0.116	0.03	25.38	0.94	0.00	0.30
0.126	0.03	22.73	0.94	0.00	0.30

APPENDIX (CATALOG FOR LIGHTHERM)



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LIGHTHERM[®]

Superlight aggregates for the preparation of
lightweight insulation screed



A Singapore Product



PSB Singapore
Certified

VODAPRUF

KEY FEATURES



Ultra Lightweight, $\rho = 250\text{kg/m}^3$

Reduce structural weight and optimize design



High Thermal Insulation, $\lambda = 0.067\text{W/mK}$

Energy efficient and cost saving



Acoustic Insulation, 14dB reduction*

**with 50mm thickness application, 14dB impact sound reduction at 500Hz*

Increase comfort level



- Lightherm has acquired COC (Certificate of Conformity) issued by TÜV SÜD-PSB Singapore
- Listed in Singapore PSB Product Listing Scheme

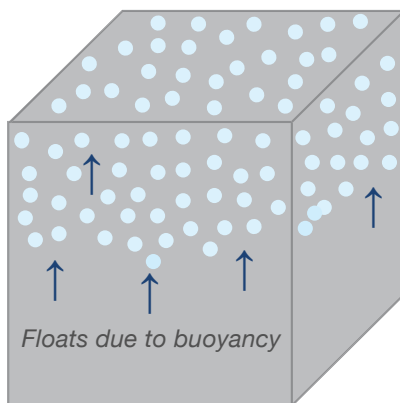
EN 13501-1
Fire Classification
A2-S1-D0

PRODUCTS DETAILS

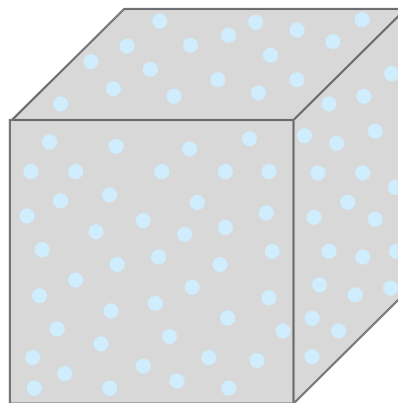
Lightherm is a lightweight aggregate specially treated with our patented VOD additives. Lightherm when mixed with cement, becomes a lightweight screed (Lightherm Screed) - density of only 250kg/m³. It achieved thermal conductivity - as low as 0.067 W/mk. Lightherm Screed has acquired COC (Certificate of Conformity) issued by TÜV SÜD PSB Singapore. Lightherm Screed is suitable for indoor and outdoor applications.



Normal lightweight aggregates



Lightherm aggregates



- ✓ No Floating
- ✓ Guarantee Blends Well
- ✓ No Additive Required

LIGHTHERM[®]



- granulometry **3-6mm**;

LIGHTHERM[®] MINI

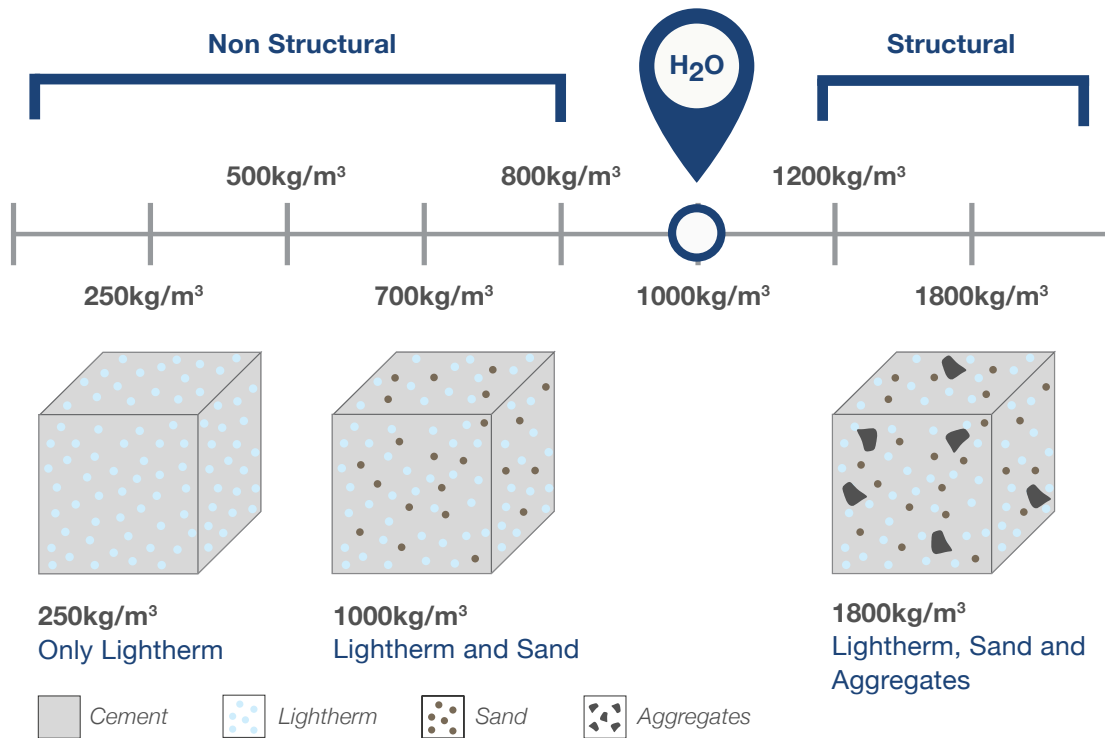


- granulometry **2mm**;

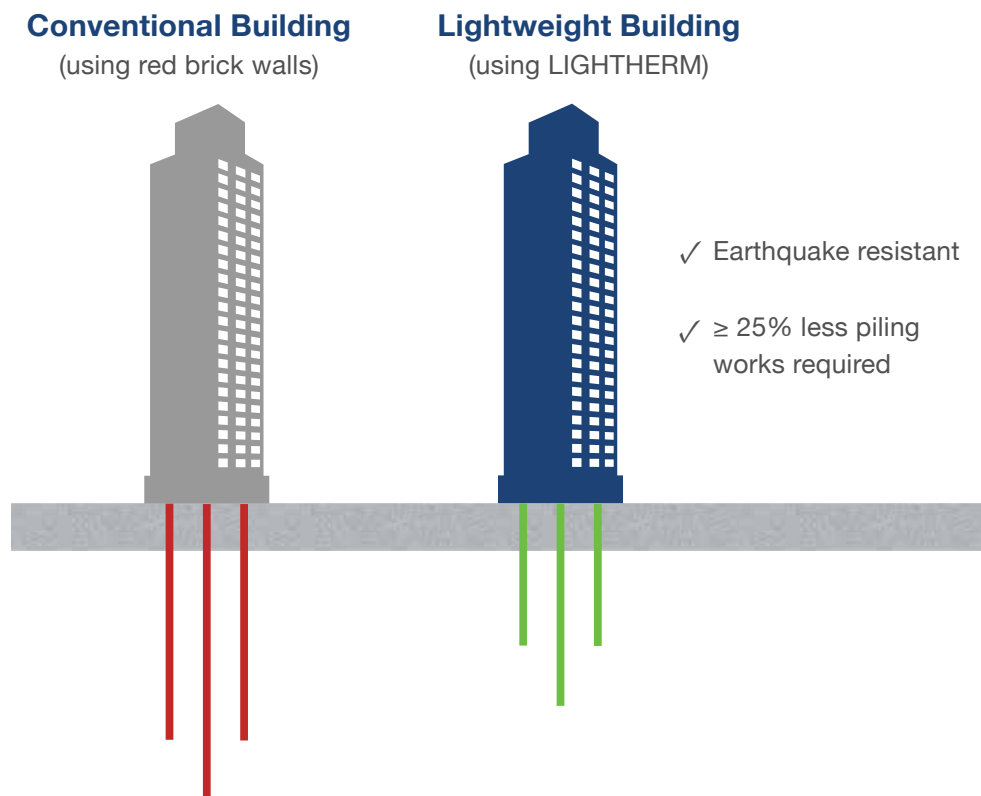
Refer to page 22 for mixing procedure

SOME EXAMPLES OF DIFFERENT LIGHTERM MIXTURE

As LIGHTERM blends well with no segregation, concrete/screed with all kinds of density can be made!



COMPARISON OF BUILDINGS



EXAMPLE OF APPLICATION

Lightherm Screed is used for its thermal insulation, acoustic insulation and lightweight properties.

