SPECIFICATION SHEET TABLE FOR DIFFERENT BUILDING MATERIALS:

Walls, Roofs, and Insulation

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Compiled in accordance with SANS 10400 building standards of South Africa

WALLS

Materials Specification Sheet

Specifications	Concrete Blocks	Compressed Earth Blocks (CEB)	Hempcrete Blocks	Fired Bricks	*Loti Bricks	Metal Cans	Plastic Bricks	Sandstone	Compressed Straw
Dimensions (mm) (Width x Height x Depth)	190x190x390	150x290x300	110x190x390	73x106x222	73x106x222	58x145 (diameter x height)	110x70x210	300x300x500	355x380x1000
Density (kg/m³)	1400-2000	1800-2100	340	1330	Approx. 1500	2700	Approx. 890	2000-2600	80
Thermal conductivity (W/m°C)**	0.87-0.92	1.1	0.076	0.64	0.5-1.0	162	0.7	1.0-2.8	0.075
R-Value (m^2K/W)	0.21 @190mm	0.14 @150mm	1.45 @110mm	0.11 @73mm	0.097 @ 73mm	0.00004 @ 0.6mm	0.16 @ 110mm	0.103 @300mm	4.74 @ 355mm
U-Value (W/m^2K)	4.76	7.14	0.69	9.09	10.31	0. 25000	6.25	9.71	0.21
Acoustics (dB)	Approx. 40	Approx. 56	Approx. 37-45	5-35	Approx. 20	53	Approx. 48	Approx. 15	Approx. 28
Water absorption (%-24h)	Average is 0.5-2%	6%	Approx. 10.5%	between 4.5 and 12%	≤10%	0%	≤0.1%	2.7%	8-22%(Varies between summer and exposure to winter rain)
Compressive strength (MPa)	11.3-28	2-3	0.7	≥36	≥30	0.55-0.61	2.21-9.72	37.14	0.017
Tensile strength (MPa)	1.1-2.8	2-5	0.5-3.5	13-20	7.5-10	158 - 174	0.1-0.15	12.0-15.9	0.257
Relative wear resistance (kg/m^2)	1.7-2.6	<5	Approx. 1.25	<2-5	0.77-1.07	Not Available	<3.5	<5.8	<0.017
Fire resistance SANS 10400	High	High	Medium	High	High	High	Very Low	Very High	Extremely Low
Material Lifespan	60+ years	60+ years	60+ years	60+ years	100+ years	60+ years	30+ years	100+ years	+50 years
Cost	Medium	Medium	Medium	High	Medium	Low	Low	High	Low

WALL NOTES

- Loti clay bricks are tested for quality using SANS 227 standard, therefore some of the testing parameters appearing on the table do not form part of the tests we perform. Loti Brick's testing parameters, including those we have shown in the table under Loti Brick, are as follows: Linear Shrinkage 5%-7%, Volume Shrinkage 17%-20%, Water-Soluble salts /Vanadium Attack, Efflorescence (mild) and Warpage 5mm>.
- Loti Brick is the main manufacturer of clay bricks in Lesotho. Only the finest quality clay and water found in the valleys of Lesotho are used to manufacture environmentally friendly, durable, fade resistant and aesthetic clay bricks. Loti Brick was registered as a limited company on the 25th of August 1978 and commenced operations for the production of semi clay face bricks in 1980. It is based at Thetsane Industrial Area, Kofi Annan Road, about 4.4 kilometres from main town Maseru.
- This was tested and certified according to the SANS 227 standard. These standards are used by all members of the Clay Brick Association of Southern Africa of which Loti Brick is a member
- Thermal conductivity refers to the ability of a material to conduct heat from one side to another. The lower the conductivity, the better the insulation of the material.
- Cost is based relative to the initial cost price of the material

INSULATION

Materials Specification Sheet

Specifications	Sheep's Wool	Rockwool	Polystyrene Boards	Compressed Straw	Cellulose
Density (kg/m³)	10-25	60-150	20	100-125	38-45
Thermal Conductivity (W/m°C)*	0.035	0.032	0.038	0.075	0.04
R-Value (m^2K/W)	7.71@ 270mm	4.22 @ 135mm	5.26 @ 200mm	4.74 @ 355mm	3.375 @ 135mm
U-Value (W/m^2K)	0.13	0.24	0.19	0.21	0.296
Acoustics (dB)*	Approx. 50	≥40	Approx. 45	Approx. 28	Approx. 24
Vapor permeability (μ is the water vapor resistance fa**ctor)**	36μ	3.5μ	2.5-5μ	2.0-2.5μ	3.8μ
Compressive strength (MPa)	0.05-0.2	0.07	0.15-0.2	0.09-0.11	0.36
Fire resistance SANS 10400	High	High	Medium	extremely low	High
Lifespan (Years)	60	60	60	50	30
Cost	Medium	High	High	Medium	Medium

INSULATION NOTES

- *Thermal conductivity and acoustic performance depends on the density of the insulation material.
- Cost is based relative to the initial cost price of the material
- All insulation will be pet resistant when treated with the correct treatments according to the specific material

ROOF

Specifications	IBR (Inverted Box Rib galvanized steel sheets)	Corrugated Metal Sheets	Thatch	Clay Tiles
Thermal Conductivity (W/m^{o}C)	60	60	Reed - 0.09 Straw - 0.07	0.84
R-Value (m^{2}K/W)	0.00001 @ 0.6mm steel sheet	0.00001@ 0.6mm steel sheet	Reed - 5.0 @ 450mm Straw - 5.0 @ 350mm	0.015 @ 13mm
Water Absorption (% - 24h)	0	0	0.143	0.0014
Freeze-thaw resistance	Not available	Not Available	Not Available	Level 1: minimum 150 cycles. BS EN 539-2:2013
Hail/impact resistance	≤Class 4 UL standard 2218	≤Class 4 UL standard 2218	Not Available	FM4473 Pass (3.2cm ball @ 80mph) Class 3/4
Recyclable (Yes/No)	Yes	Yes	No	Yes
Lifespan (Years)	60	60	2 - 60+ years - Depending on location and climate	60
Cost	Medium	Medium	High	Medium

ROOF NOTES

- The Freeze Thaw resistance values were not available as very little research was found on the three materials, namely IBR, Corrugated metal sheets and Thatch
- Cost is based relative to initial cost price of the material
- The water absorption has no major effect on the materials because most of it will run-off, except in the case of thatch. Thatch should be built with a steep slope, preferably 45° to encourage runoff

LIST OF DEFINITIONS

- **Thermal conductivity:** refers to the ability of a material to conduct heat from one side to another. The lower the conductivity, the better the insulation of the material
- **U-Value:** is the rate of transfer of heat through a structure divided by the difference in temperature across the material. The lower the U value, the better the insulation
- **R-Value:** The material's insulation ability to resist heat flow through the cross-section (thickness). The higher the R value, the better the insulation performance
- **Acoustics:** The ability of the material to insulate sound. The higher the value, the lower the quality of insulation
- **Relative Wear Resistance:** Wear resistance is the ability of a material to resist the progressive loss of volume from its surface through mechanical actions such as repeated rubbing, sliding, or scraping.
- **SANS 10400:** The South African National Standards (SANS) 10400-XA provides for the application of Regulation XA, or the minimum requirements of the South African National Building Regulations on energy efficiency and environmental sustainability in building design.
- **Cellulose:** Fibre or fibrous or granulated insulation material derived from paper, paper stock, and/or wood, leaf, or stalk strings with or without binders.

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