4. APPENDIX 1

SABS STANDARDS [Wegelin: 2000]

SABS ENV 197-1:1992 Cement-composition, specifications and conformity criteria
Part 1: Common cements

SABS 198:1992 Functional control and safety valves for pressurized water supply systems

SABS 226:1987 Water taps [metallic]

SABS 227:1986 Burnt clay masonry units

SABS 242:1973 Stainless steel sinks with draining boards [for domestic use]

SABS 248:1973 Bituminous damp-proof courses

SABS 266:1982 Gypsum plasterboard

SABS ENV 413-1:1994 Masonry cement
Part 1: Specification

SABS 435:1972 Mild steel rivets

SABS 457:1994 Wooden poles, droppers, guardrail posts and spacer blocks, Part 1:1994 General requirements
Part 2: Softwood species Part 3: Hardwood species

SABS 460:1985 Copper tubes for domestic plumbing services

SABS 497:1991 Glazed ceramic sanitary ware

SABS 515:1972 Decorative paint for interior use

SABS 539:1980 Wood preserving creosote [Lurgi-gasification process]

SABS 542:1990 Concrete roofing tiles

SABS 543:1992 Fire hose reels [with hose]

SABS 545:1989 Wooden doors

SABS 558:1973 Cast iron surface boxes and manhole and inspection covers and frames

4. APPENDIX 1

SABS 657 Steel tubes for non-pressure purpose

Part 1:1989 Steel tubes for scaffolding and for structural and general engineering purpose

Part 4:1987 Steel tubes of round, oval, square and rectangular section for furniture

SABS 678:1973 Primers for wood for interior and exterior use

SABS 680:1979 Glazing putty for wooden and metal window frames

SABS 681:1997 Undercoats for paints

SABS 684:1972 Structural steel paint

SABS 727:1981 Windows and doors made from rolled mild-steel sections

SABS 731 Road-markings

SABS 752:1988 Float valves

SABS 763:1988 Hot-dip [galvanized] zinc coatings

SABS 767 Earth leakage protection units

SABS 791:1986 uPVC sewer and drain pipes and pipe fittings

SABS 820:1974 Mild steel nails

SABS 878:1983 Ready-mixed concrete

SABS 887:1972 Varnish for interior use

SABS 920:1985 Steel bars for reinforcement

SABS 934:1969 Hot-dip [galvanized] zinc coating on steel sheets and strip

SABS 940:1969 Emulsion paint for new galvanized iron

SABS 950:1985 uPVC rigid conduit and fittings

SABS 952:1985 Polyolefin film for damp-proofing in buildings

SABS 1015:1974 Fire-resisting door units for record rooms

SABS 1039:1975 Wooden ceiling

4.APPENDIX 1

SABS 1083:1994 Aggregates from natural sources
SABS 1084:1976 Cover plates for wall outlet boxes
SABS 1090:1996 Aggregates from natural sources-fine aggregates for plaster and mortar
SABS 1091:1975 National standards for paint
SABS 1115:1976 Cast iron gratings for gullies and storm water drains
SABS 1129:1977 Steel door frames
SABS 1143:1977 Bolts and nuts
SABS 1149:1977 Flat and taper steel washers
SABS 1171:1993 Metal screws for wood
SABS 1186 Symbolic safety signs
SABS 1215:1984 Concrete masonry units
SABS 1240:1979 Automatic shut-off flush valves for water closets and urinals
SABS 1253:1994 Fire-doors and fire-shutters
SABS 1263 Safety and security glazing materials for buildings
SABS 1273:1979 Fasteners for roof and wall coverings in the form of sheeting
SABS 1282:1982 High-strength bolts, nuts, and washers for friction-grip joints
SABS 1288:1994 Preservative-treated timber
SABS 1307:1992 Domestic solar water heaters
SABS 1321 Non-metallic waste traps
SABS 1381 Materials for thermal insulation of buildings
SABS 1383:1983 Rigid urethane and isocyanurate foams for use in thermal insulation
SABS 1385:1983 Kitchen cupboards
SABS 1415:1997 Textile floor coverings

4.APPENDIX 1

SABS 1419 Carpets underlay

SABS 1431: 1987 Weldable structural steel

SABS 1449:1996 Ceramic wall and floor tiles

SABS 1460:1988 Laminated timber

SABS 1504:1990 Prestressed concrete lintels

SABS 1508:1990 Expanded polystyrene thermal insulation boards

SABS 1528 Furniture

SABS 1586:1995 Emulsion paints

SABS 1700:1996 Fasteners

SABS 1783: 1997 Sawn softwood timber

SABS 1575:1993 Burnt clay paving units

SABS 1549:1992 Raised access flooring

SABS 927:1969 Precast concrete kerbs and channels

SABS 949:1997 Strongroom and vaults doors

SABS 794:1973 Aggregates of low density

4. APPENDIX 2

ENERGY MEASURES [Jourbert:2007]

1. Use low-energy fluorescent lights: Higher energy efficiency: e.g, a 15W compact fluorescent light bulb (CFL) gives off as much light as a 75W filament light bulb, public transport, organic matter composting, disposal of warm water (or air) vs. heat recovery.

2. MATERIALS

Aluminium is very high in embodied energy and is mostly very recyclable. Steel has high embodied energy but much stronger per unit mass than brick or concrete.

Insulation material also has embodied energy, but due to operational energy savings,is justified.

3.**SOLAR ENERGY**

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Climate data

Pretoria

Position: 25° 44' S 28° 11' E
Height: 1330m
Period: 1961-1990
This climatological information is the normal values and, according to World Meteorological Organization (WMO) prescripts, based on monthly averages for the 30-year period 1961 – 1990

Month	Temperature (° C)				Precipitation		
	Highest Recorded	Average Daily Maximum	Average Daily Minimum	Lowest Recorded	Average Monthly (mm)	Average Number of days with >= 1mm	Highest 24 Hour Rainfall (mm)
January	36	29	18	8	136	14	160
February	36	28	17	11	75	11	95
March	35	27	16	6	82	10	84
April	33	24	12	3	51	7	72
May	29	22	8	-1	13	3	40
June	25	19	5	-6	7	1	32
July	26	20	5	-4	3	1	18
August	31	22	8	-1	6	2	15
September	34	26	12	2	22	3	43
October	36	27	14	4	71	9	108
November	36	27	16	7	98	12	67
December	35	28	17	7	110	15	50
Year	**36**	**25**	**12**	**-6**	**674**	**87**	**160**

National Weather

Weather by Province:

Select Province Go

Expected Weather

- Weather summary
- Minimum and maximum temperatures

UVB Graphs

Select City: Go

Past Weather

- Articles on significant weather
- Daily rainfall
- 10-day rainfall
- Monthly rainfall
- Daily weather bulletin
- Climate Extremes

Climate Data for Selected Centres

Select City/Town

190.Pretoria climatic data.

Over 300 days of sunshine recorded per year in South Africa. The insolation rate is of the worlds' highest over the Kalahari Desert. There is a part of the earth's surface that receives more than 6kWh/m2 solar energy per winter's day, of which 49% is in South Africa. We have the best reason to install solar powered grid electricity in future and use solar water heaters at present.

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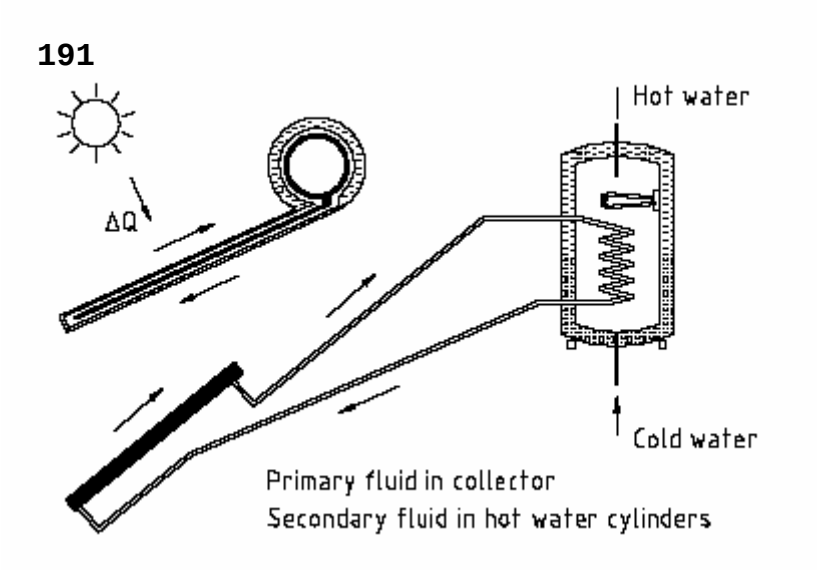
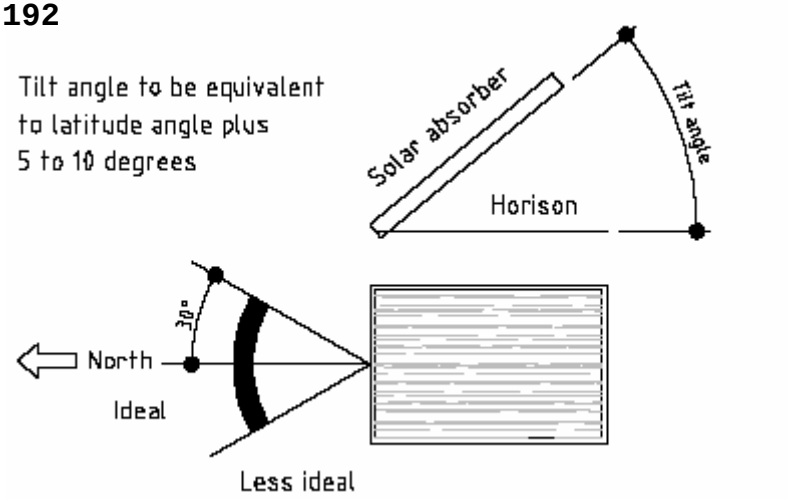


South Africa lies between 22° and 35° latitude. Ideal tilt angle range for solar absorbers would be 27° to 45°. A collector should face true north, or less than 30degrees off true north. In summer the sun travels overhead, but in winter it travels further north. For a year-round optimum performance, a collector should be tilted towards the equator at roughly the latitude angle of the site plus 5 to 10 degrees18. The angle of tilt is measured relative to the horizon.

191.Solar water heater:Use of secondary fuids to protect absorber components.

192



To raise the temperature of 200 litres water by 43°C (as typically consumed by a family of four per day) one needs 10kWhr of energy20. A typical (200 litre) hot water storage tank may need to warm water from 17°C to 60°C. Water has a high specific heat (C) of 4200J/kgK and a density of 1kg/litre.

DQ=mCDT, where DQ=heat required (Joule), m=mass (kg), C=specific heat of fluid (J/kgK), DT=change

in temperature (K), thus Heat Required = 200kg*4200J/kgK*43K = 36,120,000 J » 36 MJ

One kWh of energy is 3,6 MJ, thus 10 kWh = 36 MJ.

21 Surface area required = Energy sought/energy available per unit area = 22 kWhr/5kWhr/sqm » 4 sqm

192.Orientation of solar collectors.

According to catalogues, typical commercial systems produce 60 to 70 litres hot water per square metre collector, i.e. a 200 litre water tank would require 3m2 collector area.

4. **RAINWATER HARVESTING**

Problems

1. Availability of rainfall
2. Rainwater could de defiled by dust, organic matter and bird droppings

Advantages

1. Could be used in toilets, size of storage tank for 80% of month of maximum rainfall (e.g.

Pretoria 130mm = size for 105mm).

2. Can be used in the garden.

Measures to be taken

1. Storage tank must be dark inside to prevent algal growth.
2. Allow for overflow.

Calculation of storage tank volume:

Volume of a rectangular tank = length * width * height

Volume of a circular tank = pi * radius2 * height

Standard

1.“GUIDANCE ON USE OF RAINWATER TANKS”

as published by the Australian Government 2004

ISBN 0 642 82443 6

2.Average indoor use per household is estimated to be

in the range of 300–740 L per day or alternatively about 100–200 L per person per day.

5. **VENTILATION**

The volume flow rate through an opening or duct is related

to the area of an opening and the air speed as follows:

$V = 0.6*A*v$

where V is the volume flow rate (m3/s), A is area of the opening or duct (m2), and v is the air speed (m/s). 0.6 is a factor to compensate for frictional effects.

The heat gain (in Watt) through ventilation is given by:

$q = 1250*V*(To - Ti)$

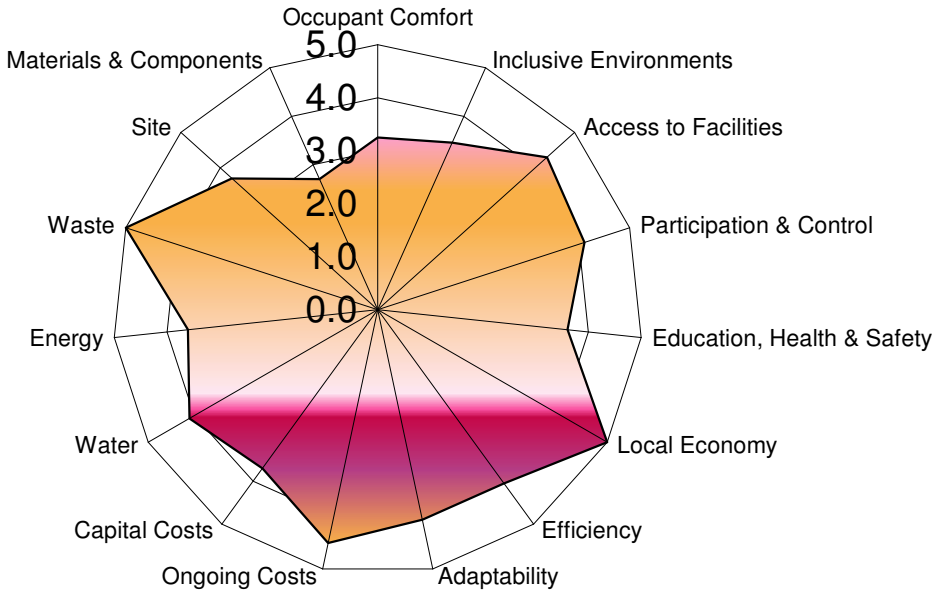
where 1250 is the volumetric heat capacity of air (J/m3K), V is the volume flow rate (m3/s), To and Ti are the outside and inside air temperatures respectively. Note that latent heat content is not taken into account.

Air speed in ducts is in the range of 2-7m/s, with most cases it being 5m/s. The volume flow requirement can be found according to the occupancy in the SANS0400.

6.**BASELINE**: SBAT [see tables from pages 127-130]

SUSTAINABLE BUILDING ASSESSMENT TOOL (SBAT- P) V1

PROJECT		ASSESSMENT	
Project title:	HOUSING AFRICAN FAMILIES	Date:	23-Oct-08
Location:	MAMELODI	Undertaker	Emmanuel Nkambule
Building type:	RESIDENTIAL, INDUSTRIAL, COMMERCIAL	Company / organisation	University of Pretoria
Internal area (m2):		Telephone:	787611008 Fax:
Number of us	500	Email:	mbongiseni@tuks.co.za



Social	3.7	Economic	4.3	Environmental	3.8
Overall	3.9	Classification	GOOD		

ɟ Performance - Social

Criteria	Indicative performance measure	Measured	Points	Notes
Occupant Comfort			3.3	
Daylighting	% of occupied spaces that are within distance 2H from window, where H is the height of the window or where there is good daylight from skylights	60	0.6	
Ventilation	% of occupied spaces have equivalent of opening window area equivalent to 10% of floor area or adequate mechanical system, with upolluted air source	70	0.7	
Noise	% of occupied spaces where external/internal/reverberation noise does not impinge on normal conversation (50dbA)	50	0.5	
Thermal comfort	Tempreture of occupied space does not exceed 28 or go below 19oC for less than 5 days per year (100%)	60	0.6	
Views	% of occupied space that is 6m from an external window (not a skylight) with a view	85	0.9	
Inclusive Environments			3.5	
Public Transport	% of building (s) within 400m of disabled accessible public transport	90	0.9	
Information	High contrast, clear print signage in appropriate locations (100%)	70	0.7	
Space	% of occupied spaces that are accessible to ambulant disabled / wheelchair users	35	0.4	
Toilets	% of space with fully accessible toilets within 50m	80	0.8	
Fittings & Furniture	% of commonly used furniture and fittings (reception desk, kitchenette, auditorium) fully accessible	70	0.7	
Access to Facilities			4.3	
Children	All users can walk (100%) / use public transport (50%) to get to their childrens' schools and creches	90	0.9	
Banking	All users can walk (100%) / use public transport (50%) to get to banking facilities	100	1.0	
Retail	All users can walk (100%) / use public transport (50%) to get to food retail	80	0.8	
Communication	All users can walk (100%) / use public transport (50%) to get to communication facilities (post, telephone and internet)	95	1.0	
Exercise	All users can walk (100%) / use public transport (50%) to get to recreation / excersise facilities	65	0.7	
Participation & Control			4.1	
Environmental control	% of occupied spaces able to control their thermal environment (adjacent to openable windows/thermal controls)	80	0.8	
Involvement	% of users actively involved in the design process (workshops / meetings with models / large format drawings)	50	0.5	
Social spaces	Social informal meeting spaces (parks / staff canteens / cafes) provided locally (within 400m) (100%)	100	1.0	
Sharing facilties	5% of facilities shared with other users / organisations on a weekly basis (100%)	100	1.0	
User group	Active representative user group involved in the management of the building / facilities / local environment (100%)	80	0.8	
Education, Health & Safety			3.6	
Education	Two percent or more space/facilities available for education (seminar rooms / reading / libraries) per occupied spaces (75%). Construction training provided on site (25%)	90	0.9	
Safety	All well used routes in and around building well lit (25%), all routes in and around buildings (25%) visually supervised, secure perimeter and access control (50%), No crime (100%)	100	1.0	
Awareness	% of users who can access information on health & safety issues (ie HIV/AIDS), training and employment opportunities easily (posters/personnel)	80	0.8	
Materials	All materials/components used have no negative effects on indoor air quality (100%)	90	0.9	
Accidents	Method in place for recording all occupational accidents and diseases and addressing these	0	0.0	

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Building Performance - Economic

	Criteria	Indicative performance measure	Measured	Points	Notes
EC 1	**Local economy**			5.0	
EC 1.1	Local contractors	% value of the building constructed by local (within 50km) small (employees<20) contractors	100	1.0	
EC 1.2	Local materials	% of materials (sand, bricks, blocks, roofing material) sourced from within 50km	100	1.0	
EC 1.3	Local components	% of components (windows, doors etc) made locally (in the country)	100	1.0	
EC 1.4	Local furniture/fittings	% of furniture and fittings made locally (in the country)	100	1.0	
EC 1.5	Maintenance	% of maintenance and repairs by value that can, and are undertaken, by local contractors (within 50km)	100	1.0	
EC 2	**Efficiency**			4.1	
EC 2.1	Capacity	% capacity of building used on a daily basis (actual number of users / number of users at full capacity*100)	80	0.8	
EC 2.2	Occupancy	% of time building is occupied and used (actual average number of hours used / all potential hours building could be used (24) *100)	70	0.7	
EC 2.3	Space per occupant	Space provision per user not more than 10% above national average for building type (100%)	85	0.9	
EC 2.4	Communication	Site/building has access to internet and telephone (100%), telephone only (50%)	100	1.0	
EC 2.5	Material & Components	Building design coordinated with material / component sizes in order to minimise wastage. Walls (50%), Roof and floors (50%)	70	0.7	
EC 3	**Adaptability**			4.3	
EC 3.1	Vertical heights	% of spaces that have a floor to ceiling height of 3000mm or more	100	1.0	
EC 3.2	External space	Design facilitates flexible external space use (100%)	80	0.8	
EC 3.3	Internal partition	Non loadbearing internal partitions that can be easily adapted (loose partioning (100%), studwall (50%), masonary (25%)	50	0.5	
EC 3.4	Modular planning	Building with modular stucture, envelope (fenestration) & services allowing easly internal adaptaptation (100%)	100	1.0	
EC 3.5	Furniture	Modular, limited variety furniture - can be easily configured for different uses (100%)	100	1.0	
EC 4	**Ongoing costs**			4.5	
EC 4.1	Induction	All new users receive induction training on building systems (50%), Detailed building user manual (50%)	100	1.0	
EC4.2	Consumption & waste	% of users exposed on a monthly basis to building performance figures (water (25%), electricity (25%), waste (25%), accidents (25%)	50	0.5	
EC 4.2	Metering	Easily monitored localised metering system for water (25%) and energy (75%)	100	1.0	
EC4.3	Maintenance & Cleaning	Building can be cleaned and maintained easily and safely using simple equipment and local non-hazardous materials (100%)	100	1.0	
SO 4.5	Procurement	% of value of all materials/equipment used in the building on a daily basis supplied by local (within the country) manufacturers	100	1.0	
EC 5	**Capital Costs**			3.7	
EC 5.1	Local need	Five percent capital cost allocated to address urgent local issues (employment, training etc) during construction process (100%)	100	1.0	
EC5.2	Procurement	Tender / construction packaged to ensure involvement of small local contractors/manufacturers (100%)	70	0.7	
EC 5.3	Building costs	Capital cost not more than fifteen % above national average building costs for the building type (100%)	100	1.0	
EC5.4	Sustainable technology	3% or more of capital costs allocated to new sustainable/indigenous technology (100%)	100	1.0	
EC 5.5	Existing Buildings	Existing buildings reused (100%)	0	0.0	

Building Performance - Environmental

	Criteria	Indicative performance measure	Measured	Points	Notes
EN 1	**Water**			4.1	
EN 1.1	Rainwater	% of water consumed sourced from rainwater harvested on site	90	0.9	
EN 1.2	Water use	% of equipment (taps, washing machines, urinals showerheads) that are water efficient	70	0.7	
EN 1.3	Runoff	% of carparking, paths, roads and roofs that have absorbant/permeable surfaces (grassed/thatched/looselaid paving/ absorbant materials)	100	1.0	
EN 1.4	Greywater	% of water from washing/relatively clean processes recycled and reused	70	0.7	
EN 1.5	Planting	% of planting (other than food gardens) on site with low / appropriate water requirements	80	0.8	
EN 2	**Energy**			3.6	
EN 2.1	Location	% of users who walk / use public transport to commute to the building	90	0.9	
EN 2.2	Ventilation	% of building ventilation requirements met through natural / passive ventilation	100	1.0	
EN 2.3	Heating & Cooling	% of occupied space which has passive environmental control (no or minimal energy consumption)	50	0.5	
EN 2.4	Appliances & fittings	% of appliances / lighting fixtures that are classed as highly energy efficient (ie energy star rating)	70	0.7	
EN 2.5	Renewable energy	% of building energy requirements met from renewable sources	50	0.5	
EN 3	**Waste**			5.0	
EN 3.1	Toxic waste	% of toxic waste (batteries, ink cartridges, flourescent lamps) recycled	100	1.0	
EN 3.2	Organic waste	% of organic waste recycled	100	1.0	
EN 3.3	Inorganic waste	% of inorganic waste recycled.	100	1.0	
EN 3.4	Sewerage	% of sewerage recycled on site	100	1.0	
EN 3.5	Construction waste	% of damaged building materials / waste developed in construction recycled on site	100	1.0	
EN 4	**Site**			3.7	
EN 4.1	Brownfield site	% of proposed site already disturbed / brownfield (previously developed)	40	0.4	
EN 4.2	Neighbouring buildings	No neighbouring buildings negatively affected (access to sunlight, daylight, ventilation) (100%)	100	1.0	
EN 4.3	Vegetation	% of area of area covered in vegetation (include green roofs, internal planting) relative to whole site	60	0.6	
EN 4.4	Food gardens	Food gardens on site (100%)	100	1.0	
EN 4.5	Landscape inputs	% of landscape that does not require mechanical equipment (ie lawn cutting) and or artificial inputs such as weed killers and pesticides	70	0.7	
EN 5	**Materials & Components**			2.7	
EN 5.1	Embodied energy	Materials with high embodied energy (aluminium,plastics) make up less than 1% of weight of building (100%)	60	0.6	
EN 5.2	Material sources	% of materials and components by volume from grown sources (animal/plant)	50	0.5	
EN 5.3	Ozone depletion	No materials and components used requiring ozone depleting processes (100%)	50	0.5	
EN 5.4	Recyled / reuse	% of materials and components (by weight) reused / from recycled sources	70	0.7	
EN 5.5	Construction process	Volume / area of site disturbed during construction less than 2X volume/area of new building (100%)	40	0.4	

Instructions

Objective

The objective of the tool is to provide an indication of the performance of a building or the design of a building in terms of sustainability

Scope

The tool should ideally be used on a building that has just been completed.
It can be used at other stages of a building's lifecycle but some criteria may not be relevant
The tool can be used on most building types such as schools, housing and offices, conventionally used by people to live and work in

Instructions

Step One **Setting the Project Up**
Complete the *project* and *assessment* sections of the *A. Report* section
Refer to *definitions* below

Step Two **Entering Measurements**
Complete each of the sections *B. Social, C. Economic* and *D. Environmental*
Under the column *Measured* indicate the percentage compliance from 0 to 100 % for each of the relevant criteria
If you do not have the information required for the criteria enter O%
Should you have any queries about criteria, refer to Notes adjacent to the criteria
Should you wish to make limited comments please note these in red under the Notes section
Detailed technical performance information on your building should be entered direcly into the powerpoint accommpanying this document

Step Three **Reading the Report**
On completion return to the A. Report section. The spidergraph should now have filled and values should have appeared in all boxes.

Social provides an indication of the social performance of the building in terms of sustainability
Economic provides an indication of the economic performance of the building in terms of sustainability
Environmental provides an indication of the environmental performance of the building in terms of sustainability
Overall provides an indicatotion of the overall building performance in terms of sustainability

To rate the building use the scale below and enter the relevant building classification (Very Poor to Excellent)

Overall value	0-1	1-2	2-3	3-4	4-5
Classification	Very Poor	Poor	Average	Good	Excellent

Definitions

Occupied Space: Space that is normally used by people for living or working in
User: People who regularly use the building

Contact

Should you wish to comment on this tool, please contact:
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Email: jgibberd@csir.co.za