GUIDELINES

MELAKA GREEN SEAL

MELAKA GREEN TECHNOLOGY CORPORATION
SECOND EDITION 2021

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1. INTRODUCTION

This reference guide was prepared to help developers / building owners to obtain green building certification for buildings in Melaka State using the Melaka Green Seal Reference Guide.

This reference guide aims to give clarification on the criteria and general standards in obtaining green building certification using the Melaka Green Seal Reference Guide.

Melaka State Government has introduced its own green building rating tool namely Melaka Green Seal since February 2012. This tool has been developed by Melaka Green Technology Corporation or Perbadanan Teknologi Hijau Melaka (PTHM) and Melaka Green Development Organisation (MGDO). Similar to the rating of green building in developed countries, Melaka Green Seal is also designed with a holistic approach plan and has the basic characteristics of a green building. This rating is based on official documentation such as: -

- Uniform Building By-Law (UBBL)
- Malaysian Standards (MS) 1525 - Energy Efficiency
- Ventilation for Acceptable Indoor Air Quality (ASHRAE)
- Green Government Procurement
- Water Efficiency Product Labelling Scheme

2. SCOPE

This reference guide consists of 5 main criteria: -

a) Energy Efficiency
b) Indoor Environment Quality
c) Sustainable Planning & Management
d) Material & Resources
e) Water Efficiency

3. OTHERS

This reference guide will be updated from time to time according to technological changes or government policy and also feedback from concerned parties.

CHAPTER 1

ENERGY EFFICIENCY

1.1 EXTERNAL BUILDING THERMAL ENVELOPE

Objective

To establish awareness on energy efficiency and to promote the application on MS1525.

Description

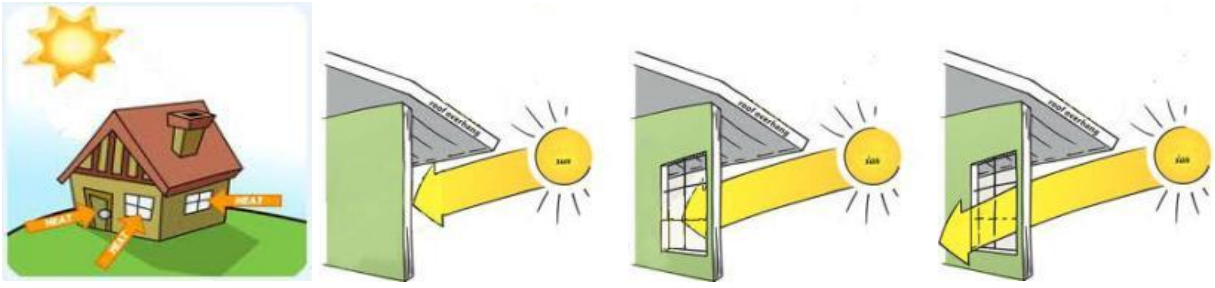
To set a minimum energy efficiency performance for buildings by reducing greenhouse gas emission to the atmosphere. This also refers to the minimum energy efficiency requirement as indicated in MS1525.

Melaka Green Seal Requirements

Building Envelope	:	The exterior portions of a building through which thermal energy is transferred.
OTTV	:	Overall Thermal Transfer Value is a measure of heat transfer (solar thermal load) transmitted into the building through its envelope excluding the roof.
Roof U value	:	Thermal Transmittance of the roof (opaque).
RTTV	:	It is a measure of heat transfer (solar thermal load) transmitted through the roof of the building.

$$OTTV_i = 15\alpha\ (1 - WWR)U_w + 6(WWR)U_f + (194 \times OF \times WWR \times SC)$$

Overall Thermal Transfer Value	Heat Conduction Through Wall	Heat Conduction Through Window	Solar Heat Gain Through Window



OTTV < 50 W/m^2 and

Roof U Value:

≤ 0.4 W/m^{2}K for light roof (roof structure not from concrete)

≤ 0.6 W/m^{2}K for heavy roof (roof structure from concrete)

RTTV ≤ 25 W/m^2

Wall insulator can be achieved by several methods such as using various insulating products in the market that has been combined with existing brick wall, multi-layered brick wall usage and other kinds of construction systems.

Structures using glass such as exterior walls and windows need to have optimum sizes. Usage of high-performance glass is recommended and not limited to low-e and insulated glazing only.

Roof structure and the insulator being used need to be suitable.

Reporting Requirements

Prepare documents and calculation as below:

OTTV

a) OTTV for every wall surface according to building orientation.
b) Floor plan
c) Elevation plan
d) Wall details includes U – value calculation
e) Spreadsheet calculation
f) Glazing properties / specification
g) Shading Coefficient (SC) from manufacturers
h) Orientation Factor (OF) from MS 1525 Table 2019

Solar Orientation Factors (MS 1525 Table 7 : 2019)

Orientation	Orientation Factors (OF)
North	0.90
North – East	1.09
East	1.23
South – East	1.13
South	0.92
South – West	0.90
West	0.94
North - West	0.90

Sample submission format & additional reference

Conduction : Wall	ELEVATION		FACADE AREA, (M^2)	WINDOW AREA,M^2	CONSTANT	SOLAR ABSORPTION FACTOR	WINDOW TO WALL RATIO(WWR)	(1-WWR)	U-VALUE W/M^2K	ORIENTATION CORRECTION FACTOR(CF)	EXTERNAL SHADING COEFF,SC2	THERMAL TRANSFER VALUE(OTTV), W/m^2	A*OTTV
	SOUTHWEST	Rear	85	57.00	15	0.25	0.67	0.33	2.89	N/A	N/A	3.58	303.92
	SOUTHEAST	Right	74	11.00	15	0.25	0.15	0.85	2.89	N/A	N/A	9.24	683.82
	NORTHEAST	Front	87	13.00	15	0.25	0.15	0.85	2.89	N/A	N/A	9.23	803.22
	NORTHWEST	Left	110	103.00	15	0.25	0.94	0.06	2.89	N/A	N/A	0.69	75.98
	TOTAL WALL OTTV						15*a*(1-WWR)*U						1,866.95
Conduction:Window	ELEVATION		FACADE AREA, (M^2)	WINDOW AREA,M^2	CONSTANT	SOLAR ABSORPTION FACTOR	WINDOW TO WALL RATIO(WWR)	(1-WWR)	U-VALUE W/M^2K	ORIENTATION CORRECTION FACTOR(CF)	EXTERNAL SHADING COEFF,SC2	THERMAL TRANSFER VALUE(OTTV), W/m^2	A*OTTV
	SOUTHWEST	Rear	85	57.00	6	N/A	0.67	N/A	2.8	N/A	N/A	11.27	957.60
	SOUTHEAST	Right	74	11.00	6	N/A	0.15	N/A	2.8	N/A	N/A	2.50	184.80
	NORTHEAST	Front	87	13.00	6	N/A	0.15	N/A	2.8	N/A	N/A	2.51	218.40
	NORTHWEST	Left	110	103.00	6	N/A	0.94	N/A	2.85	N/A	N/A	16.01	1,761.30
	TOTAL WINDOW OTTV						6*WWR*U						3,122.10
Window Solar Heat Gain	ELEVATION		FACADE AREA, (M^2)	WINDOW AREA,M^2	CONSTANT	SOLAR ABSORPTION FACTOR	WINDOW TO WALL RATIO(WWR)	(1-WWR)	U-VALUE W/M^2K	ORIENTATION CORRECTION FACTOR(CF)	SHADING COEFF (SC=SC1*SC2)	THERMAL TRANSFER VALUE(OTTV), W/m^2	A*OTTV
	SOUTHWEST	Rear	85	57.00	194	N/A	0.67	N/A	N/A	0.90	0.74	86.64	7,364.63
	SOUTHEAST	Right	74	11.00	194	N/A	0.15	N/A	N/A	1.13	0.51	16.64	1,231.27
	NORTHEAST	Front	87	13.00	194	N/A	0.15	N/A	N/A	1.09	0.74	23.38	2,034.25
	NORTHWEST	Left	110	103.00	194	N/A	0.94	N/A	N/A	0.90	0.74	120.98	13,308.01
	TOTAL SOLAR HEAT GAIN						194*WWR*CF*SC						23,938.16

Total Wall Heat Gain	1,866.95	6.5%
Total Window Heat Gain	3,122.10	10.8%
Total Solar Heat Gain	23,938.16	82.8%
Total Façade Area	356.00	
Overall Building OTTV	81.26	W/m^2

SC = SC1 x SC2

Where:

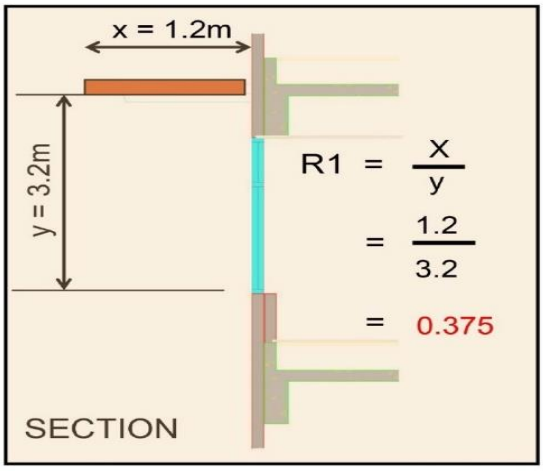
SC is the effective shading coefficient of the fenestration system;

SC1 is the shading coefficient of glass; and

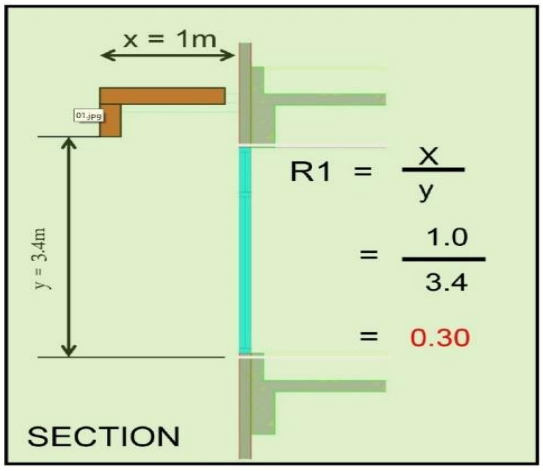
SC2 is the shading coefficient of external shading devices. Where there are no shading devices, SC2 = 1

Shading Coefficient of external shading device - Horizontal

Eg 1

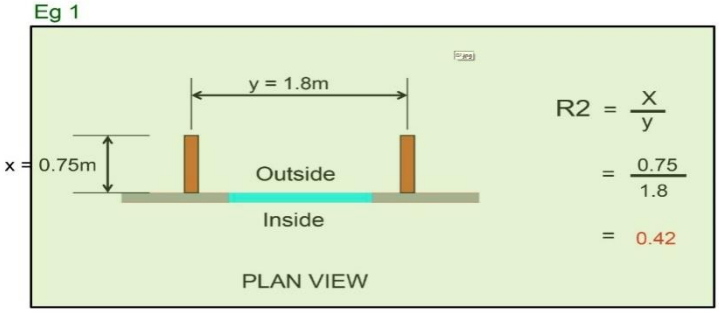


Eg 2



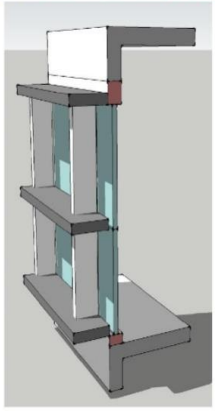
Shading Coefficient of external shading device - Vertical

Eg 1



Heat Conduction Through Walls

Shading Coefficient of external shading device – Egg-Crate

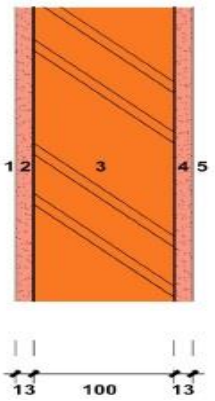


Solar Absorption Factor (MS 1525 Table 3 : 2019)

Black glass	0.99
Red brick, dark brown paint	0.88
Asphalt pavement	0.82
Bare uncoloured concrete	0.65
Green paint	0.47
White semi-gloss paint	0.25
Silver paint	0.25
Polished aluminium sheet	0.12

Concept of OTTV

Plastered Brickwall



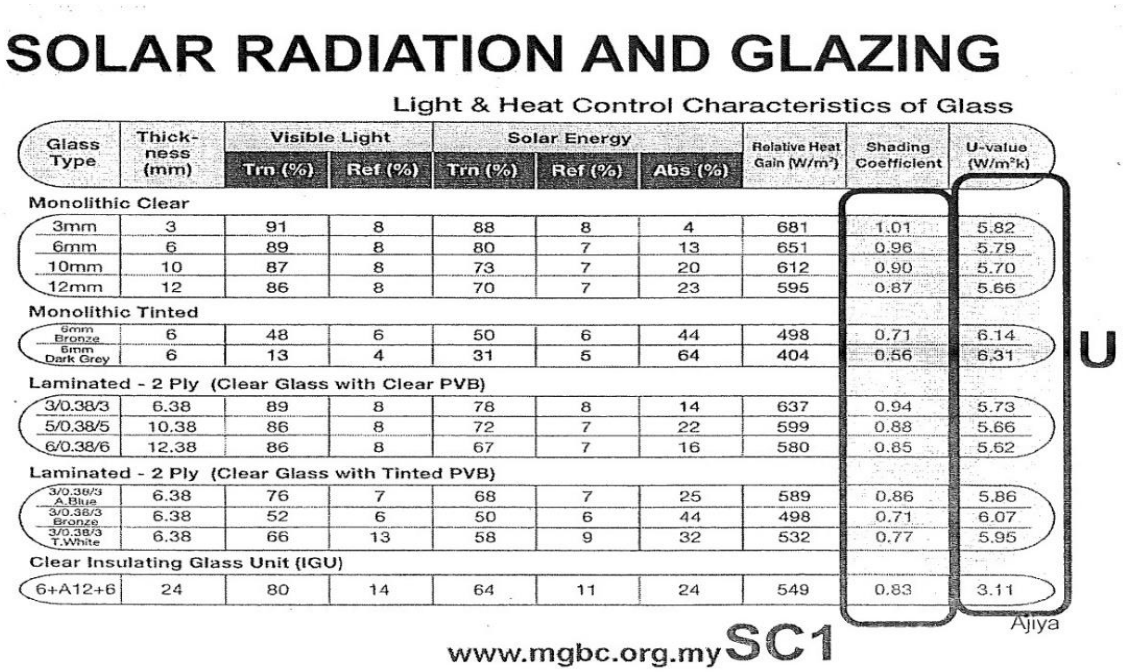
		THERMAL CONDUCTIVITY (W/mk)	R THERMAL RESISTANCE (m^2 k/W)
1	External surface	-	0.040
2	External wall plaster, 13mm thk	0.57	0.023
3	Brickwall, 100mm thk	0.77	0.132
4	Internal wall plaster, 13mm thk	0.57	0.023
5	Internal surface	-	0.130
		Total R	0.348

$$\text{U-Value} = \frac{1}{R} = \frac{1}{0.348} = 2.870\ W/m^2k$$

Glass Optical Performance Data

Item	Total Thickness (mm)	Glass Description	Visible Light (%)			Solar Energy(%)			Shading Coefficient	SHGC	U.value ($W/m^2/K$)
			Transmittance	Reflection		Transmittance	Ref	Abs			
				Out	In						
1	8.38	4mm NHG Clear Amealed Glass + 0.3mm Clear PVB + 4mm NHG PG Clear Low -E#4 Glass	80	10	11	61	8	30	0.76	0.66	2.80
2	10.38	5mm NHG Clear Amealed Glass + 0.3mm Clear PVB + 5mm NHG PG Clear Low -E#4 Glass	80	10	10	60	8	32	0.74	0.65	2.80

Solar Radiation & Glazing



SOLAR RADIATION AND GLAZING

Light & Heat Control Characteristics of Glass

Glass Type	Thick-ness (mm)	Visible Light		Solar Energy			Relative Heat Gain (W/m²)	Shading Coefficient	U-value (W/m²k)
		Trn (%)	Ref (%)	Trn (%)	Ref (%)	Abs (%)			
Monolithic Clear									
3mm	3	91	8	88	8	4	681	1.01	5.82
6mm	6	89	8	80	7	13	651	0.96	5.79
10mm	10	87	8	73	7	20	612	0.90	5.70
12mm	12	86	8	70	7	23	595	0.87	5.66
Monolithic Tinted									
6mm Bronze	6	48	6	50	6	44	498	0.71	6.14
6mm Dark Grey	6	13	4	31	5	64	404	0.56	6.31
Laminated - 2 Ply (Clear Glass with Clear PVB)									
3/0.38/3	6.38	89	8	78	8	14	637	0.94	5.73
5/0.38/5	10.38	86	8	72	7	22	599	0.88	5.66
6/0.38/6	12.38	86	8	67	7	16	580	0.85	5.62
Laminated - 2 Ply (Clear Glass with Tinted PVB)									
3/0.38/3 A.Blue	6.38	76	7	68	7	25	589	0.86	5.86
3/0.38/3 Bronze	6.38	52	6	50	6	44	498	0.71	6.07
3/0.38/3 T.White	6.38	66	13	58	9	32	532	0.77	5.95
Clear Insulating Glass Unit (IGU)									
6+A12+6	24	80	14	64	11	24	549	0.83	3.11

U

Ajiya

www.mgbc.org.my SC1

Roof U value

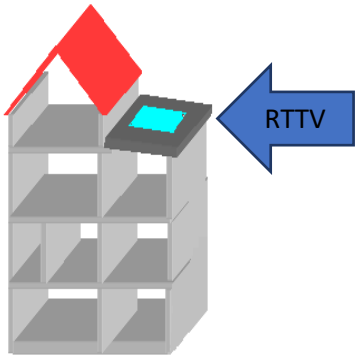
i) U value for every roof type

U-value Calculation Table

Project : Metal roof with 100mm mineral wool insulation

	Description	Thickness (b) in (m) * (A)	Thermal Conductivity K in (W/m) * (B)	Thermal Resistance R = b/K in (m^2 K/W)
1	Outside air			0.0550
2	0.42mm metal roof	0.00042	47.6	0.0000
3	Mineral wool insulation	0.100	0.037	2.7027
4	0.35mm metal roof	0.00035	47.6	0.0000
5	Internal air			0.1620
Total Thermal Resistance (RT) in m^2 K/W				2.9197
Thermal Transmittance (U-value) = 1/RT in (W/ m^2 K)				0.3425

j) RTTV for every roofing with skylight.



$$\text{RTTV} = \frac{\left(A_r \times U_r \times T_{Deq}\right) + \left(A_s \times U_s \times \Delta T\right) + \left(A_s \times SC \times SF\right)}{A_0}$$

where,

RTTV is the roof thermal transfer value (W/m^2);

A_r is the opaque roof area (m^2);

U_r is the thermal transmittance of opaque roof area (W/m^2 *K);*

TD_{eq} is the equivalent temperature difference *(K),* as from Table 10;

A_s is the skylight area (m^2);

U_s is the thermal transmittance of skylight area (W/m^2);

ΔT is the temperature difference between exterior and interior design conditions (5 K);

SC is the shading coefficient of skylight;

SF is the solar factor (W/m^2), see 5.6.5; and

A_o is the gross roof area (m^2) where $A_o = Ar + A_s$.

EXTERNAL BUILDING THERMAL ENVELOPE	Residential	Non-Residential
OTTV < 50 W/m^2 and Roof U value: • ≤ 0.4 W/m^{2}K for light roof (roof structure not from concrete) • ≤ 0.6 W/m^{2}K for heavy roof (roof structure from concrete) RTTV ≤ 25 W/m^2 (Compulsory if building roof have skylight)	1C	1C

1.2 ENERGY MANAGEMENT SYSTEM (EMS)

Objective

To implement a continual responsibility towards building energy management control system.

Description

To encourage the provision of energy submeter to facilitate energy use monitoring through Energy Management System (EMS).

Melaka Green Seal requirements

EMS usage for monitoring energy use through utility meter (water and electricity) such as temperature measuring, relative humidity, CO_2 pressure, equipment status (open/close), digital equipment control (start/stop), and analog adjustment control for valves, reducers, etc.

Scope for EMS usage depends on system capacity that is being used. It can be used for a housing unit, office, business complexes or high-rise buildings.

Reporting requirements

Prepare a schematic diagram (M&E) to locate EMS and the connections with submeter or other connections along with image references.

ENERGY MANAGEMENT SYSTEM (EMS)	Residential	Non-Residential
EMS installation	-	1A
EMS installation for energy use monitoring	-	1A

1.3 LIGHTING ZONE

Objective

To provide a flexible lighting control to optimize energy saving.

Description

To optimize the size of lighting zones to allow for a flexible lighting control. It can also able to reduce energy use and costs illuminating areas that are only necessary.

Melaka Green Seal requirements

a) To provide at least one control switch for every lighting area less than 100m^2.

b) To comply with MS1525 for lighting illuminance level and maximum allowable lighting power intensity for illumination.

Task & Application	Iluminance (Lux)	Minimum Colour Rendering Index (CRI)	Lighting Power Intensity (W/m^2)
Infrequently Used Area	20-300	30-80	3-11
Working Interior	150-750	60-85	5-24
Exacting Task	500-2000	80	18-60

c) Utilization of thermal, daylight, and motion sensors to control lighting automatically.

d) Softwares that can be used for simulation purposes are DIALux evo or any certified softwares.

i. Import drawing from .dwg file
ii. Select the location
iii. Convert from 2D to 3D
iv. Inputs all necessary parameters required i.e
    - Paint
    - Height
    - Furniture
    - Type of floor finishing
    - Type of ceiling finishing
    - Light fitting parameters
v. Simulate the report

Reporting requirements

a) Prepare a schematic diagram (M&E) that shows light switch control for every lighting zone that are less than 100m^2 along with real image references.

b) Prepare a table for every space at every building level (refer table below).

Calculation example:

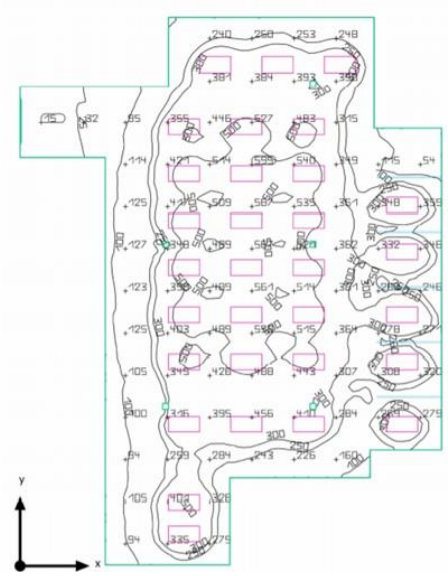
Level / Space	Area (m²)	Light power required (W)	Light power used (W)	Lux required	Lux used	Lighting Power Intensity (W/m²)
A	10	15W/m² x 10 m² = 150W	4 x 15W = 60W	300 – 400 Lux	4 x 1425 lum / 10 = 570 Lux	60W / 10m² = 6W/m²
B	20	15W/m² x 20 m² = 300W	8 x 15W = 120W	300 – 400 Lux	8 x 1425 lum / 20 = 570 Lux	120W / 20m² = 6W/m²
C	30	15W/m² x 30 m² = 450W	12 x 15W = 180W	300 – 400 Lux	12 x 1425 lum / 30 = 570 Lux	180W / 30m² = 6W/m²
D	40	15W/m² x 40 m² = 600W	16 x 15W = 240W	300 – 400 Lux	16 x 1425 lum / 40 = 570 Lux	240W / 40m² = 6W/m²

Where:

Level/Space	Every space of every window must be calculated
Area (m^2)	Measure every space area
Light power required (W)	Light power (Watt) used x Area
Light power used (W)	Light power (Watt) used x Quantity of lights
Lux required	Recommended Lux according to space functionality
Lux used	Quantity of lights x luminance / Area
Lighting Power Intensity	Light power used / Area

c) Prepare a schematic diagram that shows thermal, daylight, and motion sensors to control lighting automatically and provide real image references.

d) Sample Report



Summary

Results

	Symbol	Calculated	Target	Check
Workplane	Ē	321 lx	≥ 500 lx	✗
	g_1	0.038	-	-
Consumption values	Consumption	2900 kWh/a	max. 8200 kWh/a	✓
Lighting power density	Room	4.53 W/m²	-	-
		1.41 W/m²/100 lx	-	-

Utilisation profile: DIALux presetting, Standard (office)

Luminaire list

pcs.	Manufacturer	Article No.	Article name	P	Φ	Luminous efficacy
31	GOODLITE	GMF 2424 AL LED		34.1 W	2970 lm	87.0 lm/W

LIGHTING ZONE	Residential	Non-Residential
Lighting Zone	1C	1C
Illuminance (Lux)	-	1C
Lighting Power Intensity	-	1C
Daylight Sensors	1A	1A
Motion / Thermal Sensors	1A	1A

1.4 SUB-METERING

Objective

To monitor building energy use more thoroughly.

Description

To prepare sub-meters to facilitate building energy use monitoring by end-users.

Melaka Green Seal requirements

a) To prepare lighting and power sub-meters on each building floors for loads larger than 100 kVA.
b) To link the sub-meters to Energy Management System (EMS).
c) To separate distribution board (DB) and metering with main loads for air conditioning, lighting, plug, load, chiller, AHU, lifts, and water pump system.

Reporting requirements

Prepare a schematic diagram (M&E) to show sub-meter location for loads more than 100 kVA and including real image references.

SUB-METERING	Residential	Non-Residential
Lighting and power sub-meter on every building floor for loads more than 100 kVA	-	1A
Connect sub-meters to EMS	-	1A

1.5 RENEWABLE ENERGY

Objective

To promote and encourage the use of renewable energy to reduce environmental impacts and greenhouse gas emission.

Description

Use of renewable energy resources can reduce the dependability on non-renewable energy resources.

Melaka Green Seal requirements

a) Use of renewable energy resources such as solar photovoltaic, solar thermal applications, wind, small-scaled hydro, biomass to generate electricity to offset the utilisation of grid-connected electricity.
b) To contribute at least 1kWp (residential) or 5kWp (non-residential).
c) To comply the requirements of related guidelines.

Reporting requirements

Prepare

a) Descriptions on renewable energy resource used for building, including schematic diagram (M&E) and real image references
b) An installed renewable energy equipment certified by related agencies.

RENEWABLE ENERGY	Residential	Non-Residential
1kWp (Residential) / 5kWp (Non-Residential)	1A	1A

1.6 BUILDING ENERGY INTENSITY (BEI)

Objective

To encourage upgrades on building energy efficiency performances by reducing greenhouse gas emission.

Description

Ratio of average yearly energy use and building area to show energy efficiency performance.

Smaller BEI value will show a more efficient energy use.

Melaka Green Seal requirements

a) Building Energy Intensity (BEI) ≤ 200kWh/m²/yr for office buildings.
b) Building Energy Intensity (BEI) ≤ 300kWh/m²/yr for 4-star hotels;
   (BEI) ≤ 250kWh/m²/yr for 3-star hotels.
c) Building Energy Intensity (BEI) ≤ 150kWh/m²/yr for commercial buildings.

Reporting requirements

Prepare a BEI calculation for the whole building by referring MS 1525.

$$BEI_{benchmark} = \frac{(TBEC - CPEC) \times 52}{(GFA_{excl\ Carpark}) \times WOH}$$

Where:

TBEC denotes Total Building Energy Consumption in kWh/year
CPEC denotes Car Park Energy Consumption in kWh/year
GFA denotes Gross Floor Area in m^2
WOH denotes Weighted Weekly Operating Hour of the office in hrs/week

BUILDING ENERGY INTENSITY (BEI)	Residential	Non-Residential
BEI ≤ 200 kWh/m²/yr (Office Building) BEI ≤ 300 kWh/m²/yr (4-star Hotels) BEI ≤ 250 kWh/m²/yr (3-star Hotels) BEI ≤ 150 kWh/m²/yr (Commercial Buildings)	-	1C

1.7 ENHANCED COMMISSIONING / RECOMMISSIONING

Objective

To ensure systems related to building energy are designed and installed to realize the true potential of the system.

Description

Appoint a committee to monitor and validate the commissioning process of building energy system.

Melaka Green Seal requirements

To compile document planning to perform the followings:

i. Implement improvement plan
ii. Develop a commissioning or on-going commissioning plan
iii. Provide training for technical and management staffs
iv. Update Building Operating Manual

Reporting requirements

Prepare a report which contains information as per Melaka Green Seal requirements.

ENHANCED COMMISSIONING / RECOMMISSIONING	Residential	Non-Residential
Design Stage - Prepare required commissioning documents - Prepare commissioning implementation plan	1A	1C
Occupancy Stage - Provide training to technical staff - Update Building Operation Manual	1A	1C

1.8 SUSTAINABLE MANAGEMENT

Objective

To ensure building energy system keeps functioning even after building has passed the defects & liability period.

Description

Ensuring maintenance committee is taking part wholly in testing stage and commissioning stage and also, to understand the purpose of design.

Sustainable management programme needs to be prepared for a duration of three (3) years.

Melaka Green Seal requirements

a) Provide for a designated & proper building maintenance manual.
b) Provide evidence of documented plan for at least 3-year facility maintenance and preventive budget (inclusive of staffing and outsourced contracts).

Reporting requirements

Prepare a report which contains information as per Melaka Green Seal requirements.

SUSTAINABLE MANAGEMENT	Residential	Non-Residential
Prepare Building Maintenance Manual	1A	1A
Prepare a facility maintenance plan document and maintenance budget for a duration of three (3) years	1A	1A

CHAPTER 2

INDOOR ENVIRONMENT QUALITY

2.1 VENTILATION RATE

Objective

To provide a minimum performance to Indoor Air Quality in the building to enhance the quality of life of building occupants.

Description

Planning a building ventilation system to complete the minimum requirements as provided in ASHRAE 62.1 (latest update). Ensuring fresh air is enough and ready for the occupied spaces.

Melaka Green Seal requirements

To fulfil minimum requirements for indoor ventilation rate in ASHRAE 62.1 (latest update) / MS1525 / local building code.

Minimum Ventilation for Acceptable Indoor Air Quality (Office Building)
(ASHRAE STANDARD 62.1 & 62.2 or any latest update available)

	People Outdoor Air Rate Rp		Area Outdoor Air Rate
	Cfm/person	L/s person	Area (L/s.m²)
Breakroom	5	2.5	0.6
Main Office	5	2.5	0.3
Office Space	5	2.5	0.3
Reception Area	5	2.5	0.3

Sample Calculation:

Minimum Ventilation rate	
Building Area	= 15m x 10m = 150 m²
Minimum Ventilation	= 5*
Real Space	= 10 m² / person
Estimated Occupancy	= 150 / 10 = 15*
Required Ventilation Rate	= 15* x 5* = 75 cubic meter per minute (m^3m)

Reporting requirements

Prepare a report which includes information as per Melaka Green Seal requirements.

VENTILATION RATE	Residential	Non-Residential
In compliance with local building code / MS1525 / ASHRAE 62.1 & 62.2	1C	1C

2.2 SOUND INSULATION

Objective

To ensure designed and built buildings are retaining a comfortable acoustic environment for building occupants.

Description

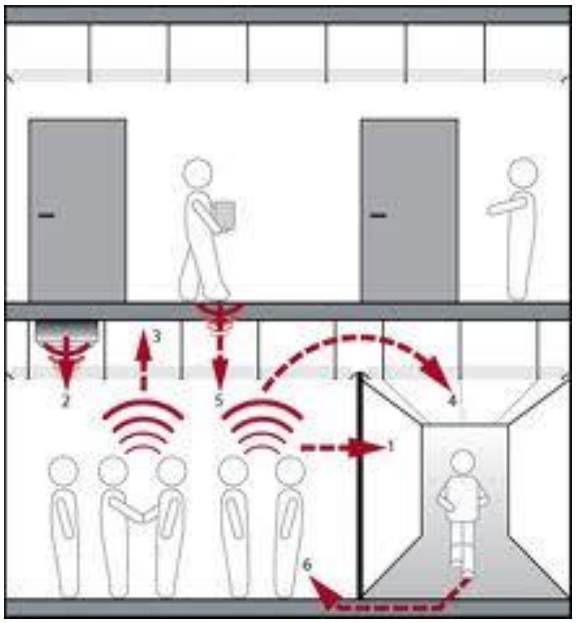
Excess noise can cause discomfort to occupants. Several solutions to ensure a permissible noise level is by:

- Installing acoustic ceiling
- Installing partition wall with insulated gypsum
- Using furniture with sound-absorbing surfaces
- Isolating photocopy machines and fax machines from the main office area
- Placing mechanical equipment rooms further away from main office area

Melaka Green Seal requirements

To reduce noise pollution between spaces and indoor areas by using enough sound-absorbing materials.

Source: URS Corporation, 2008



Noise range for office space

40 - 50dBA
Quiet Office Environment

Wall Types	Wall Thickness (Without Plaster)	Weight Inc External & Internal Rendering	Sound Reduction Value
	cm	Kg/m^2	dbA
Brickwork	25 12 6.5	480 245 155	50 45 42
Broken stone and concrete	25 12.5	420 240	49 45
Gypsum (12.5mm thickness) partition with 75mm mineral wool insulation in between	10	20.5	41
Hollow gypsum partition Cavity walls	10	100	40
In accordance with DIN 4109 65 mm brick wall…… + 50 mm cavity 95 or 104 mm breeze block…… + 50 mm cavity 70 mm gypsum board…… + 30 mm cavity 50 mm woodwool slabs…… + 60 mm cavity			50 – 53

Brickworks 120mm
245 kg/cu.m
Reduction ~45dBA

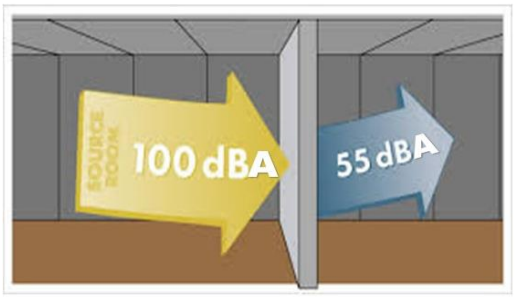


Figure 2.1 : Brickwork usage to reduce noise

1	Single door with threshold, not specially sealed	to	20 dBA
2	Heavy door with threshold, well-sealed	to	30 dbA
3	Double doors with threshold, not specially sealed, opening separately	to	30 dBA
4	Heavy double door with threshold, sealed	to	40 dBA
5	Single window, not specially sealed	to	15 dBA
6	Single window, well-sealed	to	25 dBA
7	Double windows, not specially sealed	to	25 dBA
8	Double windows, well-sealed	to	30 dBA

Air space in cm	3	4	5	6	8 - 12	15	20
Increased sound reduction in dBA	6	8	9	10	12	10	6

Heavy Double Door,
With Threshold, Sealed
Reduction ~40dBA

Figure 2.2 : Door usage to reduce noise

Reporting requirements

Prepare a list of sound insulating materials / items including a catalogue and location image for reference.

SOUND INSULATION	Residential	Non-Residential
Reducing noise pollution between and within spaces by providing sound-absorbing materials / items	1C	1C

2.3 QUALITY DAYLIGHTING

Objective

To promote the utilization of natural daylight in buildings.

Description

Building designs that includes the window surface area, façade shading, or light-reflecting equipment, opaque roofing and atrium spaces. Its purpose is to reduce energy used for lighting and illumination.

Melaka Green Seal requirements

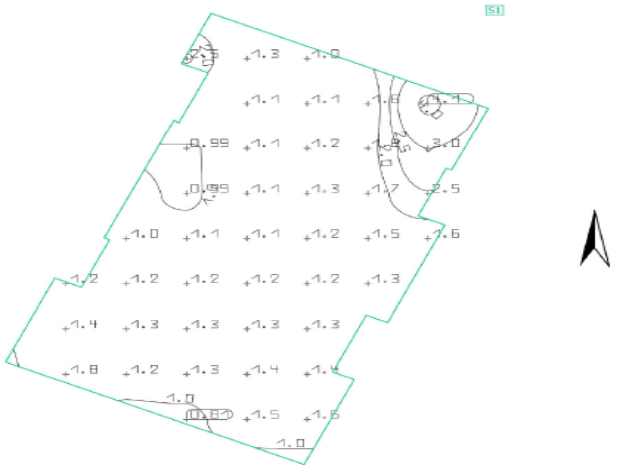
To demonstrate that non less than 30% of habitable spaces has daylight factor of 1.0% until 3.5%.

$$DF = \frac{E_{internal}}{E_{external}} \times 100\ \%$$

Daylight Factors & Impact

DF (%)	Lighting	Glare	Thermal Comfort
> 6.0	Intolerable	Intolerable	Uncomfortable
3.5 – 6.0	Tolerable	Uncomfortable	Tolerable
1.0 – 3.5	Acceptable	Acceptable	Acceptable
< 1.0	Perceptible	Imperceptible	Acceptable

- Software that can be used for simulation purposes is DIALux evo or any certified softwares.
- Simulation



Properties	D_m	D_{min}	D_{max}	g_1	g_2	Index
Daylight factor effective area (Office 01) Daylight factor Height: 0.850 m, Wall zone: 1.000 m	1.443 %	0.809 %	4.136 %	-	-	S1

Reporting requirements

Prepare a diagram of spaces that has the information of daylight factor and real image references.

QUALITY DAYLIGHTING	Residential	Non-Residential
To demonstrate that none less than 30% of habitable space has daylight factor of 1.0% until 3.5%	1A	1A

2.4 LOW EMISSION PAINTS/MATERIAL

Objective

To minimize bad health impacts to occupants from the use of materials/paints with Volatile Organic Compounds (VOC) and formaldehyde contents.

Description

Encouraging the use of paints and materials with low emission (low VOC and formaldehyde)

Melaka Green Seal requirements

Using paints and materials that has any certified standards labelling such as:

- Low VOC paints
- Low VOC adhesives & sealants
- Low VOC carpets or flooring

Reporting requirements

a) Prepare a list of low VOC paints and materials used within building with a catalogue and real image references.
b) Include Material Data Sheet
c) Include certified documentation or certification

LOW EMISSION PAINTS / MATERIALS	Residential	Non-Residential
Using low emission paints and materials within the building	1A	1A

2.5 ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL

Objective

To minimize Environmental Tobacco Smoke (ETS) exposure or cigarettes to building occupants.

Description

Preventing health problems related to tobacco smoke (cigarette smoke) to building occupants. Smoking ban in public buildings and air-conditioned areas has been a mandatory under the Malaysian legislation.

Enforcing smoking ban in buildings and public places with surveillance and signage. If smoking area is allocated outdoors, ensure that tobacco smoke (cigarette smoke) will not infiltrate indoors or into the air-conditioning system.

Melaka Green Seal requirements

To install 'No Smoking' signage in building and public places and identify smoking area.

Reporting requirements

a) Prepare diagram of 'No Smoking' signage locations including real image references
b) Allocate smoking area including real image references.

ENVIRONMENTAL TOBACCO SMOKE (ETS) CONTROL	Residential	Non-Residential
Installing 'No Smoking' signage in building and public places and/ or allocate smoking area	1A	1C

2.6 PRE-OCCUPANCY FLUSHING

Objective

To ensure clean air is circulated effectively through the building to flush out polluted air to achieve an improved indoor environment.

Description

A systematic pre-occupancy ventilation and incoming ventilation to ensure only clean air is inside the building.

Melaka Green Seal requirements

Conducting ventilation flushing as follows:

a) 10 times air change rate per hour (10 ACH) for a period of at least 30 minutes, or
b) At least 1-time air change rate per hour (1 ACH) continuously for the first 14 days of building occupancy, or
c) Ventilation flushing with natural ventilation for a period of 30 days or 7 days if low VOC additives are used – Residential buildings only.

Reporting requirements

Prepare descriptions and tables for pre-occupancy flushing method including real image references.

PRE-OCCUPANCY FLUSHING	Residential	Non-residential
Conducting building ventilation flushing	1C	1C

CHAPTER 3

SUSTAINABLE SITE PLANNING & MANAGEMENT

3.1 SITE PLANNING

Objective

To propose a development that is suitable with the surrounding environment and complying to Rancangan Tempatan (Local Plan, LP) and not straining the existing infrastructure.

Description

a) Preventing development on unsuitable sites.
b) Reducing environmental impacts that cause from any development activities on a site.

Melaka Green Seal requirements

Complying the Rancangan Tempatan on a development area and obtained the Kebenaran Merancang, KM (Planning Permission, PP).

Reporting requirements

Prepare a copy of the obtained Kebenaran Merancang document.

SITE PLANNING	Residential	Non-Residential
Complying the Rancangan Tempatan on a development area and obtained the Kebenaran Merancang, KM (Planning Permission, PP)	1C	1C

3.2 BUILDING EXTERIOR MANAGEMENT

Objective

To reduce environmental pollution when carrying out building exterior management activities.

Description

a) Reducing the risk of toxic exposure from harmful products.

b) Encouraging a correct building exterior management plan.

Melaka Green Seal requirements

a) Reducing environmental pollution upon conducting exterior building management activities by methods or chemical products that are non-polluting including maintenance equipment, chemicals, paints, adhesives and sealants.

b) Environmentally friendly maintenance products such as products that obtained Eco-Label certification like SIRIM Eco Label, MyHijau or EPA (USA).

Surface Cleaner
EPA (US)

Glass Cleaner
No phosphates, chlorine

Paint
Low dirt pick up, low odour

Reporting requirements

Prepare a report on cleaning and maintenance products as well as image references, product eco-label certification listings, catalogues and suppliers.

BUILDING EXTERIOR MANAGEMENT	Residential	Non-Residential
Reducing environmental pollution while conducting building exterior management activities.	1A	1A

3.3 GREEN VEHICLE PRIORITY

Objective

To reduce pollution and land development impacts from vehicle use.

Description

a) Encouraging car-pooling
b) Encouraging the use of hybrid and electric vehicles (green vehicles)
c) Reducing traffic congestion and road pollution impacts

Melaka Green Seal requirements

a) Dedicated parking space for van-sharing and car-pooling
b) Dedicated parking space for hybrid and electric cars (and charging stations, if any)
c) Dedicated parking for bicycle
d) Non-landed residential – Priority parking for residents with hybrid and electric vehicles

Reporting requirements

Provide diagram of allocated parking space location and real image references:

a) Van sharing and car-pooling
b) Hybrid and electric vehicles (and charging stations, if any)
c) Parking for bicycle

GREEN VEHICLE PRIORITY	Residential	Non-Residential
Dedicating parking space for car-pooling and green vehicles	1A	1C

3.4 GREENERY & ROOF

Objective

To minimize heat impacts towards humans, climate and wildlife habitat, improving outdoor air quality and encouraging the use of native or adaptive plants.

Description

Complying the requirements of Local Government Authority on providing greenery area, paved area and suitable roofing type.

Melaka Green Seal requirements

a) Providing 10% of overall site area with suitable greenery and plants.

b) At least 50% of overall hardscapes should cover:

   i. Shades - Provide shady trees within five (5) years of occupancy in building.

   ii. Paving material - *Surface Reflection Index* (SRI) for paving material should be at least 29 (or more)

   iii. Grid pavement - Provide an open pavement system / grass pavement

c) At least 50% of overall roof area should comply:

   i. Roof type - Using roofing material such as in table below:

Roof Type	Slope	SRI
Low Slope Roof	< 2:12 (9.5˚)	78
Steep Slope Roof	> 2:12 (9.5˚)	29

d) Roof surface - Combination of high albedo and vegetated roof surface

(Area of SRI Roof / 0.75) + (Area of Vegetated Roof / 0.5) ≥ Total Roof Area

Solar Performance of Roofing Materials

Material	*Albedo (%)*	*Emittance (%)*	*SRI*
White asphalt shingles	21	91	21
Black asphalt shingles	5	91	1
White granular-surface bitumen	26	92	28
Red clay tile	33	90	36
Red concrete tile	18	91	17
Unpainted concrete tile	25	90	25
White concrete tile	73	90	90
Galvanized steel (unpainted)	61	4	37
Aluminum	61	25	50
Siliconized white polyester over metal	59	85	69
Polyvinylidene fluoride (PVDF) white over metal	67	85	80
Black EPDM	6	86	-1
Gray EPDM	23	87	21
White EPDM	69	87	84
T-EPDM	81	92	102
Chlorosulfonated polyethylene (CSPE) synthetic rubber	76	91	95

Source: Lawrence Berkeley National Laboratory

MS 1525

Thermal resistance

Solar Reflectance Index (SRI)

SRI is an index that combines both solar reflectance and thermal emissivity in a single value. It is usually found in the specification for paint colours.

Colour/Material	Reflectance	Emissivity	SRI
Black paint	0.05	0.90	0
Deep Blue	0.17	0.83	11
Deep Red	0.39	0.84	41
Metallic Copper	0.51	0.85	59
Almond	0.65	0.82	77
Off White acrylic paint	0.76	0.84	90
Standard White	0.80	0.90	100

Reporting requirements

Prepare a site plan, roof cross section plan, material catalogue, real image reference and other related information as per Melaka Green Seal requirements.

GREENERY & ROOF	Residential	Non-Residential
a) Landscape	1C	1C
b) Hardscape		
i.) Shade (5 years occupancy)	1A	1A
ii.) Paving materials (At least SRI 29)	1A	1A
iii.) Open Pavement System	1A	1A
c) Roof Area – High SRI roofing	1A	1A
d) Roof surface – High Albedo & vegetated roof	1A	1A

3.5 BUILDING USER MANUAL

Objective

To document building design features and strategies for user information and guide to sustain performance during occupation.

Description

a) Upgrading building maintenance procedure.
b) Complete documentation for building upgrades in the future.

Melaka Green Seal requirements

a) Prepare a Building User Manual which contains every passive and active characteristics of a building as following:
   - Basic information of building
   - Operation, commissioning & maintenance
   - Building design purpose
   - Green building characteristics
   - Appendices: Drawings & Specifications

b) If there are any changes – prepare a site plan, roof plan, materials catalogue, real image, and related information (document proofs).

Reporting requirements

Prepare Building User Manual starting from design concept stage until construction stage.

BUILDING USER MANUAL	Residential	Non-Residential
Document building design features and strategies for user information and guide to sustain performance during occupation	1C	1C

CHAPTER 4

MATERIAL & RESOURCES

4.1 SUSTAINABLE POLICY

Objective

To have policies that comply all regulations and acts related to premise operation. The policies also need to encourage sustainable product use other than application of Green Government Procurement (GGP).

Description

- Establishing policies to comply all related regulations during operation to ensure compliance towards the environment.
- Establishing Green Government Procurement (GGP) for purchasing items, equipment and services.
- Any replacements for maintenance need to comply early design feature specifications or better specifications in compliance to Melaka Green Seal criteria.
- Encourage the use of available software for storage and easy reference for building information for future use, e.g.: Building Information Modelling (BIM).

Melaka Green Seal requirements

a) Green Government Procurement (GGP)

GGP is defined as procurement for products, services and jobs that includes the criteria and environmental standards to protect the environment and natural resources and to minimize or reduce negative impacts from human activities.

b) Purchasing Decision

- Products that can reduce greenhouse gas emission or made from renewable energy
- Products that can reduce chemical use that is harmful to the environment, occupational and public health
- Products that are highly recyclable
- Products that reduce air and water pollution
- Products that produce less waste
- Suppliers that make efforts in increasing environmental performance and provide products that are better for the environment
- Suppliers that documentate their Supply Chain Impact
- Products that are reusable
- Products that are multifunctional such as photocopy machines / printers and multipurpose cleaning products
- Products and services that are environmentally friendly

- Products for replacements need to comply early design feature specifications or better in fulfilling Melaka Green Seal criteria

c) Plastics
- Reducing plastic use
- Using recyclable or reusable plastics
- Avoiding single-use plastics

Reporting requirements

Prepare a Green Procurement Policy that is in practice

SUSTAINABLE POLICY	Residential	Non-Residential
Establish policies for: Complying all related regulations during operation to ensure compliance towards the environment. Green Government Procurement (GGP) for purchasing items, equipment and services. Any replacements for maintenance in order to comply early design feature specifications or better specifications in compliance to Melaka Green Seal criteria.	1C	1C

4.2 LOCAL MATERIALS

Objective

To encourage utilization of local materials to reduce impacts to the environment due to transportation.

Description

Developers / contractors need to utilize construction materials that are produced locally

Melaka Green Seal requirements

a) Purchasing and utilizing construction materials that are extracted fully within 500 km radius from construction site.
b) Total purchasing cost need to exceed 20% from total material value. This excludes mechanical, electrical, and plumbing components.
c) Only materials permanently installed in the project.

Reporting requirements

a) Prepare a list of construction materials, estimated quantity and price and purchase location.
b) Prepare calculation for local construction material cost percentage that were purchased and utilized.

LOCAL MATERIALS	Residential	Non-Residential
Encouraging use of local materials to reduce environmental impacts due to transportation	1C	1C

4.3 REFRIGERANTS & CLEAN AGENTS

Objective

To support the Government's efforts in reducing usage of ozone-depleting substances.

Description

Using refrigerants for air-conditioning system and clean agents (for fire-fighting) that are environmentally friendly or has Zero Ozone Depletion Potential (ODP).

Melaka Green Seal requirements

a) Using substances that have no or less potential to deplete the ozone.
b) Using synthetic refrigerants for air-conditioning system and clean agents (for fire-fighting) that are environmentally friendly
c) Using natural refrigerants for air-conditioning systems and clean agents (for fire-fighting) that are environmentally friendly

Reporting requirements

Prepare product listing with a catalogue

REFRIGERANTS & CLEAN AGENTS	Residential	Non-Residential
Using synthetic refrigerants (zero ODP) for air-conditioning system and clean agents (for fire-fighting) that are environmentally friendly	-	1C
Using natural refrigerants for air-conditioning system and cleaning agents (for fire-fighting) that are environmentally friendly	-	1A

CHAPTER 5

WATER EFFICIENCY

5.0 WATER EFFICIENCY

In establishing water efficiency, there are several requirements in achieving basic calculations as reference. These basic calculations are made based on the daily consumption by the occupants of a building that has been installed water equipment indoors and outdoors (for landscaping purposes). These basic calculations will be used to determine the requirement of water retained by Rainwater Harvesting System, the overall effectiveness of water efficiency equipment, and total savings that can be achieved by utilizing Rainwater Harvesting System and water efficiency system. Table 5.1 and 5.2 can be used as an example for basic consumption calculations for indoors and landscape.

Table 5.1: Water consumption – Typical installation

	Equipment type		Consumption
1	Basin Tap		3.0 litres/min
2	Bip Tap		4.0 litres/min
3	WC		4.3 litres/flush 2.8 litres/flush
4	Urinal		0.5 litres/flush
5	Showerhead		7.4 litres/min
6	Waterhose (landscape)		4.0 litres/min

Table 5.2 Landscape and Water Consumption

	Landscape type		Consumption
1	Ground cover/Lawn		3.1 litres/m^2/day
2	Shrubs		6.3 litres/m^2/day
3	Trees		24 litres/no/day

Basic consumption calculation example:

Table 5.3: Water consumption – Typical installation

		No. of person	Usage per day	Consumption			
				Fittings Types	Flow	Duration	L per day
WC	Male	500	1	Conventional WC	6	1	3,000
	Female	500	4	Conventional WC	6	1	12,000
Urinal	Male	500	3	Conventional Urinal	3.8	1	5,700
BibTap	50%	500	1	Conventional Bib Tap	0.15	20	1,500
Pantry	All	1,000	1	Sink Tap	0.15	15	2,250
WHBasin	All	1,000	4	Conventional WHB	0.15	15	9,000
Ablution	50%	500	2	Conventional Ablution Tap	0.15	30	4,500
Total Daily Volume (L)							37,950
Total Working Days Per Year							260
Total Annual Volume in Litres (X)							9,867,000

Table 5.4 Basic calculation for landscape (example)

Landscape Type	Area (m^2)	IE		Sprinkler Coefficient	Consumption (L)
Turfgrass	842.00	Water Hose	0.2	1.0	22,173
				Total Plant Water Applied (L/day)	22,173
				Total Annual Volume in Litres	8,093,228

Total water consumption in this building for a year is:

9,867,000 + 8,093,228 = 17,960,145 L = 17,960 m^3

5.1 RAINWATER HARVESTING SYSTEM

Objective

To encourage less water consumption from main clean water source by collecting, storing, and using rainwater.

Description

a) Reducing water demand from main water source.
b) Reducing land corrosion & flash flood risks.
c) Reducing peak flow discharge to main drainage system.

Melaka Green Seal requirements

Establishing Rainwater Harvesting System in building for watering plants, cleaning or secondary water consumption. Rainwater Harvesting System is a rainwater collection system that utilizes roof as catchment area. This system requires a separate water reserve and pressure-increasing equipment where necessary. Rainwater Harvesting System is recommended to be designed by utilizing gravity to prevent additional equipment, such as pressure-increasing equipment.

Rainwater harvesting to be at least 10% from the total potable water consumption (refer Table 5.3 and 5.4)

a) Rainwater Harvesting System design factor
    - Rainfall data
    - Rain distribution, i.e., rainy, dry period
    - Catchment area
    - Building water demand
    - Rainwater storage capacity

b) Rainwater Harvesting System components
    - Catchment – roof type, down pipes system
    - Filtration – pre-storage/post-storage
    - Storage Tank – size, type, location
    - Treatment – for intended use
    - Operation – distribution piping, pumps

c) Rainwater Harvesting System calculation

- Litres of Rainwater Captured Annually (m^3) =
  Rainfall (mm) X Catchment Area (m^2) X Run-off Coefficient (%) – Amount Diverted (L)
- Catchment Area & Coefficient Run-off

Pitched tile roof:	0.9
Asphalt/smooth/dense pavement:	0.9
Steel roof:	0.8
Block pavement (Wide joints):	0.7
Flat smooth roof:	0.5
Flat gravel or turf roof:	0.4
Gravel roadway:	0.3

Reporting requirements

Prepare a design diagram of the Rainwater Harvesting System including the location, calculation, and real image reference.

RAINWATER HARVESTING SYSTEM	Residential	Non-Residential
Reducing water consumption from main water source by collecting and using rainwater	1A	1A

Rainwater Harvesting System calculation example

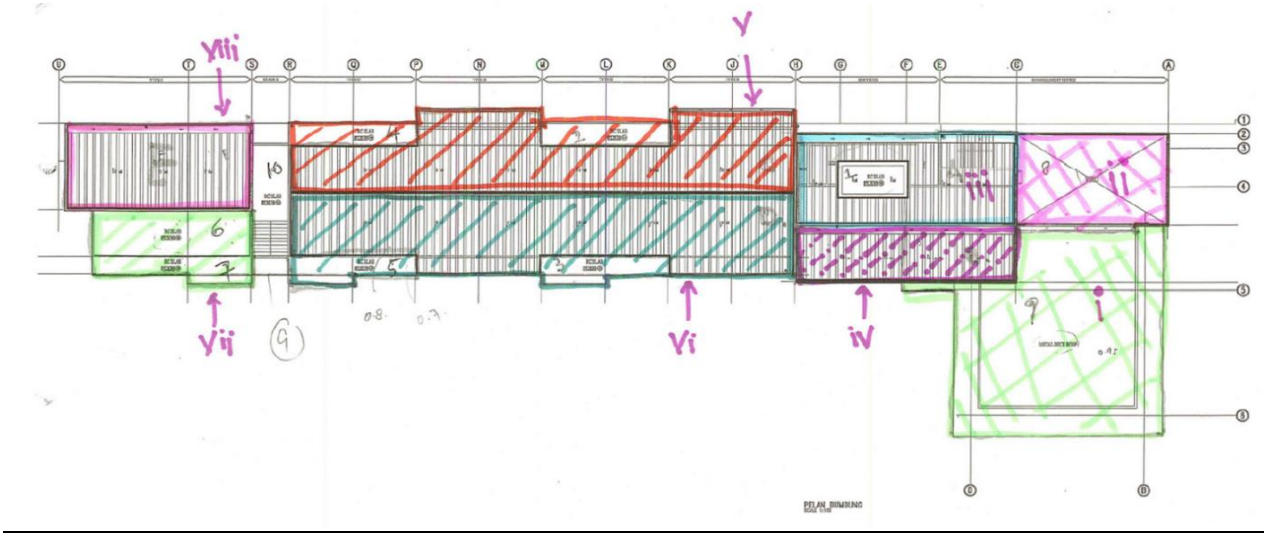


Table 5.5 Rainwater Harvesting System

Section	Rainfall (mm)	Rainfall (m)	Catchment Area (m^2)	Run-off Coeff. (%)	Volume of Rainfall from Catchment Area (m^3)	Volume of Rainfall from Catchment Area (L)	Amount Diverted (L) (Catchment Area*160)	Litres of Rainwater Captured per year
i	2,065	2	215.4	0.9	400.2	400,246.6	34,457.6	365,789.0
ii	2,065	2	74.5	0.9	138.5	138,495.4	11,923.2	126,572.2
iii	2,065	2	106.5	0.9	197.9	197,874.5	17,035.2	180,839.3
iv	2,065	2	66.8	0.9	124.1	124,092.0	10,683.2	113,408.8
v	2,065	2	201.5	0.9	374.5	374,506.3	32,241.6	342,264.7
vi	2,065	2	221.5	0.9	411.6	411,639.2	35,438.4	376,200.8
vii	2,065	2	57.5	0.9	106.9	106,882.3	9,201.6	97,680.7
viii	2,065	2	87.1	0.9	161.9	161,893.9	13,937.6	147,956.3
							Total	**1,750,711.9**

[1]Annual rainfall at Batu Berendam = 2065 mm

[2]Annual rainfall event = 160 days

Annual Rainwater Captured = 1,750,711.9 L = 1,751 m^3

5.2 LANDSCAPE IRRIGATION & EQUIPMENT EFFICIENCY

Objective

To reduce potable water consumption from main water source by utilizing installation, irrigation system and water-efficient landscape through an efficient landscape irrigation design and selection of plants that require minimal water source.

To prepare a system design that can reduce potable water consumption from main water source for landscape irrigation purposes.

Description

a) Utilizing water-efficient installation internally and externally.
b) Preparing efficient irrigation system design for watering grass, trees and landscape.
c) Utilizing landscape with a selection of plants that require minimal water source.

Melaka Green Seal requirements

Reducing potable water consumption for landscape irrigation by at least 50%.

a) Types of water efficiency equipment
   - Reducing main potable water consumption by utilizing water efficiency equipment. (refer Table 5.6)

b) Water efficiency equipment were tested with reference to schemes as following:
   - Water Efficiency Products Labelling Scheme – SPAN
   - Flow Rate Test – SIRIM QAS
   - Water Efficiency Labelling Scheme (Singapore)
   - Water Efficiency Labelling & Standards (Australia)

c) Types of water efficiency plants

Reporting requirements

Prepare information related to equipment installation, landscape design and irrigation and real image references.

LANDSCAPE IRRIGATION & EQUIPMENT EFFICIENCY	Residential	Non-Residential
Water efficiency equipment installation	1C	1C
Water-efficient landscape	1A	1A
Water-efficient irrigation	1A	1A

Savings from utilization of water efficiency equipment calculation example

Table 5.6: Water consumption – Water efficiency equipment

		No. of person	Usage per day	Consumption			
				Fittings Types	Flow	Duration	L per day
WC	Male	500	1	Low-Flow WC	4.5	1	2,250
	Female	500	4	Low-Flow WC	4.5	1	9,000
Urinal	Male	500	3	Waterless Urinal	0.02	1	30
Bib Tap	50%	500	1	Low-Flow Bib Tap	0.08	20	800
Pantry	All	1,000	1	Sink Tap	0.15	15	2,250
WHBasin	All	1,000	4	Low-Flow WHB	0.11	15	6,600
Ablution	50%	500	2	Low-Flow Ablution Tap	0.08	30	2,400
Total Daily Volume (L)							23,330
Total Working Days Per Year							260
Total Annual Volume in Litres (Y)							6,065,800

Table 5.7: Water consumption – Water efficiency irrigation

Landscape Type	Area (m^2)	IE		Sprinkler Coefficient	Consumption (L)	Annual Volume
Turfgrass	842.00	Water hose	0.2	1.0	22,173	8,093,228
		Timer Sprinkler	0.625		7,095	2,589,675
		Drip Irrigation			4,927	1,798,495

Table 5.8L: Water efficiency types

Ref	Fixture Types	Flowrate		Duration Per Use	
1	Conventional Water Closet	6	L/flush	1	Flush
2	Low-Flow FC	4.5	L/flush	1	Flush
3	Dual-Flush WC (Female)	3.5	Avg/flush	1	Flush
4	Conventional Urinal	3.8	L/flush	1	Flush
5	Waterless Urinal	0.02	L/flush	1	Flush
6	Conventional WHB	0.15	L/s	15	Seconds
7	Conventional WHB * Use of automatic self-closing faucets	0.15	L/s	12	Seconds*
8	Low-Flow WHB	0.11	L/s	15	Seconds
9	Low-Flow WHB	0.11	L/s	12	Seconds
10	Sink Tap	0.15	L/s	15	Seconds
11	Conventional Bib Tap	0.15	L/s	20	Seconds
12	Low-Flow Bib Tab	0.11	L/s	20	Seconds

5.3 WATER SAVING INDEX

Objective

To reduce potable water consumption for internal water fittings by using water-efficient devices.

Description

Reducing main water source consumption and cost-saving from consuming water.

Melaka Green Seal requirements

a) Provide sub-meter for commercial buildings to monitor and manage water consumption system on cooling towers, irrigation, kitchen area, etc.

b) Set Water Saving Index (WSI) based on factors as follows:
   - Water fittings flow rate
   - Usage rate
   - Number of occupants

Reporting requirements

Prepare a list of water efficiency equipment including catalogue, certifications, and real image references.

WATER SAVING INDEX	Residential	Non- Residential
Total water saving index (minimum 30%)	1A	1A

Water Saving Index calculation example

Normal installation (From Table 5.3 and 5.4) = 17,960 m^3

Rainwater Harvesting System (From Table 5.5) = 1,751 m^3

Savings from Rainwater Harvesting System = 1,751/17,960 = 9.75%

Total Water Saving Index = 9.75%

Normal installation (From Table 5.3 and 5.4) = 17,960 m^3

Rainwater Harvesting System (From Table 5.5) = 1,751 m^3

Water efficiency equipment (From Table 5.6 and 5.7) = 7,864 m^3

Savings from Rainwater Harvesting System and Water Efficiency Equipment = (1,751 + 7,864) / 17,960 = 53.54%

Total Water Saving Index = 53.54%

MARKS & MAXIMUM POINTS ALLOCATION

MARKS & MAXIMUM POINTS ALLOCATION

CRITERIA	RESIDENTIAL BUILDINGS	NON- RESIDENTIAL BUILDINGS
Energy Efficiency	2C 7A	7C 9A
Indoor Environment Quality	3C 3A	4C 2A
Sustainability Planning & Management	3C 7A	4C 6A
Materials & Resources	2C 0A	3C 1A
Water Efficiency	1C 4A	1C 4A
Melaka Green Seal certification marks	**11 compulsory points + 9 alternative points**	**19 compulsory points + 6 alternative points**

Requirement for Melaka Green Seal certification are by achieving **20 points** for **Residential Buildings** and **25 points** for **Non-Residential Buildings**. Acronym **(C)** is defined as **Compulsory** and Acronym **(A)** is defined as **Alternative**.

APPENDICES

INFORMATION EXTRACTED FROM GBI WEBPAGE RELATED TO BEI FOR REFERENCE ONLY

NREB	General	to achieve					demonstrate energy saving from baseline (last 3 years) improvement			
Jan-2011	V1.1	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point	Or	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point
		≤ 150	2	≤ 90	15		≥ 20% & with result ≤ 200	2	≥ 70% & with result ≤ 110	15

NRNC	Data center	to achieve				And	Power Usage Effectiveness (PUE) = Ratio of Total Faciities Power to IT Equipment Power
Jan-2012	V1.0	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		PUE
		≤ 150	2	≤ 90	15		≤ 1.9

NREB	Data center	to achieve				And	Power Usage Effectiveness (PUE) = Ratio of Total Faciities Power to IT Equipment Power			
Jan-2013	V1.0	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		PUE	GBI Point	PUE	GBI Point
		≤ 150	2	≤ 90	15		≤ 1.9	2	≤ 1.3	15
		Or								
		demonstrate energy saving from baseline (last 3 years) improvement				And	Power Usage Effectiveness (PUE) = Ratio of Total Faciities Power to IT Equipment Power			
		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		PUE	GBI Point	PUE	GBI Point
		≥ 20% & with result ≤ 200	2	≥ 70% & with result ≤ 110	15		≤ 2.1	2	≤ 1.5	15

NRNC	Retail	to achieve (Normal Hours)				And	to achieve (After Hours)			
Jan-2013	V1.0	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point
		≤ 240	2	≤ 145	15		≤ 350	2	≤ 210	15

NREB	Retail	to achieve (Normal Hours)				And	to achieve (After Hours)			
May-2013	V1.0	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point
		≤ 240	2	≤ 145	15		≤ 350	2	≤ 210	15
		Or								
		demonstrate energy saving from baseline (last 3 years) improvement : (Normal Hours)				And	demonstrate energy saving from baseline (last 3 years) improvement : (After Hours)			
		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point

		≥ 20% & with result ≤ 320	2	≥ 70% & with result ≤ 175	15		≥ 20% & with result ≤ 465	2	≥ 70% & with result ≤ 225	15

NRNC	Hotel	to achieve (3 Start and below)				And	to achieve (4 Start and above)			
41671	V1.0	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point
		≤ 200	2	≤ 120	15		≤ 290	2	≤ 175	15

NREB	Hotel	to achieve (3 Start and below)				And	to achieve (4 Start and above)			
Feb-2014	V1.0	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point
		≤ 200	2	≤ 120	15		≤ 290	2	≤ 175	15
		Or								
		demonstrate energy saving from baseline (last 3 years) improvement : (3 Start and below)					demonstrate energy saving from baseline (last 3 years) improvement : (4 Start and above)			
		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point	And	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point
		≥ 20% & with result ≤ 267	2	≥ 70% & with result ≤ 150	15		≥ 20% & with result ≤ 387	2	≥ 70% & with result ≤ 212	15

NREB	Resort	to achieve				Or	demonstrate energy saving from baseline (last 3 years) improvement			
Feb-2014	V1.0	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point
		≤ 245	2	≤ 148	15		≥ 20% & with result ≤ 327	2	≥ 70% & with result ≤ 181	15

NRNC	Hotel	to achieve (limited clinical services)				Or	to achieve (major clinical services)			
Jul-2015	V1.0	kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point		kWh/sqm.yrs	GBI Point	kWh/sqm.yrs	GBI Point
		≤ 200	2	≤ 120	15		≤ 290	2	≤ 175	15

FORMS

PERBADANAN TEKNOLOGI HIJAU MELAKA
ARAS 3 WISMA NEGERI BANDAR MITC
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BORANG MHM-A

No. Fail :
MHM-_____-_____

BORANG AKUAN PELAKSANAAN

TAJUK PEMOHONAN	
JENIS PEMBANGUNAN	☐ Bangunan Bukan Kediaman Baru ☐ Bangunan Kediaman Baru ☐ Bangunan Bukan Kediaman Sedia Ada ☐ Bangunan Kediaman Sedia Ada
PIHAK BERKUASA TEMPATAN	☐ MBMB ☐ MPHTJ ☐ MPAG ☐ MPJ ☐ Seksyen 20A

**Tandakan (√) pada ruang yang berkaitan*

Butiran Tuan Tanah	Nama : Alamat :	No. Tel : No. Fax :
Butiran Pemaju	Nama : Alamat :	No. Tel : No. Fax :
Butiran Perunding (Perancang)	Nama : Alamat :	No. Tel : No. Fax :

SENARAI SEMAK PERMOHONAN

Bil.	Perkara	Jumlah Salinan	Semakan Pemohon	Semakan PTHM
1	Surat Permohonan Rasmi (perunding perancang) **Akuan Melaksanakan MHM*	1	☐	☐
2	Surat lantikan perunding perancang	1	☐	☐
3	Borang MHM-A yang lengkap diisi	2	☐	☐
4	Pelan susun atur	1	☐	☐
5	Bayaran Fi - RM 100.00	1	☐	☐

Pembayaran boleh dilakukan dengan cara berikut :

Jenis Bayaran : ☐ Pesanan Kerajaan ☐ Electronic Fund Transfer (EFT) ☐ Cek ☐ Tunai

Nama Jabatan : PERBADANAN TEKNOLOGI HIJAU MELAKA No Akaun Bank : 554138011558 (Maybank)

Akuan Pemohon	Status Permohonan	Pengesahan Penerima
Tandatangan Pemohon & Cop Rasmi : Tarikh :	☐ Lengkap ☐ Tidak Lengkap	Tandatangan Penerima & Cop Penerimaan : Tarikh :

**Hanya permohonan yang lengkap sahaja yang akan diproses*

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BORANG MHM-01

No. Fail :
MHM-____-____

BORANG PERMOHONAN

TAJUK PEMOHONAN	
JENIS PEMBANGUNAN	☐ Bangunan Bukan Kediaman Baru ☐ Bangunan Kediaman Baru ☐ Bangunan Bukan Kediaman Sedia Ada ☐ Bangunan Kediaman Sedia Ada
PIHAK BERKUASA TEMPATAN	☐ MBMB ☐ MPHTJ ☐ MPAG ☐ MPJ ☐ Seksyen 20A

**Tandakan (v) pada ruang yang berkaitan*

Butiran Pemaju	Nama : Alamat :	No. Tel : No. Fax :
Butiran Perunding (Arkitek)	Nama : Alamat :	No. Tel : No. Fax :
Butiran Perunding (Awam & Struktur)	Nama : Alamat :	No. Tel : No. Fax :
Butiran Perunding (Mekanikal &Elektrikal)	Nama : Alamat :	No. Tel : No. Fax :

SENARAI SEMAK PERMOHONAN

Bil.	Perkara	Jumlah Salinan	Semakan Pemohon	Semakan PTHM
1	Surat Permohonan Rasmi (Perunding Arkitek)	1	☐	☐
2	Surat lantikan perunding arkitek	1	☐	☐
3	Borang MHM-01 yang lengkap diisi	2	☐	☐
4	Surat Kelulusan Kebenaran Merancang (KM)	1	☐	☐
5	Laporan Meterai Hijau Melaka (*Rujuk Garis Panduan MHM)	3	☐	☐
6	Borang Markah	3	☐	☐
7	Borang MHM-Fi	1	☐	☐
8	Bayaran Fi	1	☐	☐

Akuan Pemohon	Status Permohonan	Pengesahan Penerima
Tandatangan Pemohon & Cop Rasmi : Tarikh :	☐ Lengkap ☐ Tidak Lengkap	Tandatangan Penerima & Cop Penerimaan : Tarikh :

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BORANG MHM-02

No. Fail :
MHM-_____-_____

BORANG PENGESAHAN SIAP KERJA

TAJUK PEMOHONAN	
JENIS PEMBANGUNAN	☐ Bangunan Bukan Kediaman Baru ☐ Bangunan Kediaman Baru ☐ Bangunan Bukan Kediaman Sedia Ada ☐ Bangunan Kediaman Sedia Ada
PIHAK BERKUASA TEMPATAN	☐ MBMB ☐ MPHTJ ☐ MPAG ☐ MPJ ☐ Seksyen 20A

**Tandakan (v) pada ruang yang berkaitan*

Butiran Pemaju	Nama : Alamat :	No. Tel : No. Fax :
Butiran Perunding (Arkitek)	Nama : Alamat :	No. Tel : No. Fax :
Butiran Perunding (Awam & Struktur)	Nama : Alamat :	No. Tel : No. Fax :
Butiran Perunding (Mekanikal &Elektrikal)	Nama : Alamat :	No. Tel : No. Fax :

SENARAI SEMAK PERMOHONAN

Bil.	Perkara	Jumlah Salinan	Semakan Pemohon	Semakan PTHM
1	Surat Permohonan Rasmi (Perunding Arkitek)	1	☐	☐
2	Surat lantikan perunding arkitek	1	☐	☐
3	Borang MHM-02 yang lengkap diisi	2	☐	☐
4	Borang Pemeriksaan Tapak yang disahkan oleh PTHM	1	☐	☐
5	Laporan Meterai Hijau Melaka (*Rujuk Garis Panduan MHM)	3	☐	☐

Akuan Pemohon	Status Permohonan	Pengesahan Penerima
Tandatangan Pemohon & Cop Rasmi : Tarikh :	☐ Lengkap ☐ Tidak Lengkap	Tandatangan Penerima & Cop Penerimaan : Tarikh :

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BORANG MHM-FI

No. Fail :
MHM-_____-_____

BORANG PEMBAYARAN FI

TAJUK PEMOHONAN	

Adalah dengan ini disahkan bahawa jumlah keseluruhan pelan lantai bangunan ini adalah : ..... m².
Bayaran pemprosesan adalah seperti berikut:

≤ 2,000	:	_____	m²	x	RM 2.00	=	RM	_____
2,001 - 4,000	:	_____	m²	x	RM 1.75	=	RM	_____
4,001 - 10,000	:	_____	m²	x	RM 1.20	=	RM	_____
10,001 - 30,000	:	_____	m²	x	RM 0.75	=	RM	_____
30,001 - 50,000	:	_____	m²	x	RM 0.60	=	RM	_____
50,001 - 100,000	:	_____	m²	x	RM 0.45	=	RM	_____
≥ 100,001	:	_____	m²	x	RM 0.20	=	RM	_____

KAEDAH PEMBAYARAN	Pembayaran boleh dilakukan dengan cara berikut : Jenis Bayaran : ☐ Pesanan Kerajaan ☐ Cek ☐ Electronic Fund Transfer (EFT) Nama Jabatan : PERBADANAN TEKNOLOGI HIJAU MELAKA No Akaun Bank : 554138011558 (Maybank)

**Tandakan (v) pada ruang yang berkaitan*

**Sila lampirkan bukti bayaran bersama-sama borang ini*

PERBADANAN TEKNOLOGI HIJAU MELAKA
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HANG TUAH JAYA 75450 AYER KEROH MELAKA
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MHM-BM-BK

No. Fail :
MHM-_____-_____

BORANG MARKAH - BANGUNAN KEDIAMAN

TAJUK PEMOHONAN	

GARIS PANDUAN METERAI HIJAU MELAKA		Markah		Catatan
		Wajib	Pilihan	
KECEKAPAN TENAGA				
1.1	**LIPUTAN TERMAL LUARAN BANGUNAN**			
	a) OTTV < 50 W/m^2 dan Nilai U bumbung : • ≤ 0.4 W/m²K bagi atap ringan (binaan bumbung bukan dari konkrit) • ≤ 0.6 W/m²K bagi atap berat (binaan bumbung dari konkrit) b) RTTV ≤ 25 W/m^2 (Wajib sekiranya bumbung bangunan mempunyai skylight)	1W	-	
1.2	**SISTEM PENGURUSAN TENAGA**			
	a) Memasang EMS	-	-	
	b) Memasang EMS bagi memantau penggunaan tenaga	-	-	
1.3	**ZON PENCAHAYAAN**			
	a) Zon Pencahayaan	1W	-	
	b) Tahap Pencahayaan	-	-	
	c) Ketumpatan Kuasa	-	-	
	d) Sensor Pencahayaan	-	1P	
	e) Sensor Pergerakan	-	1P	
1.4	**SUBMETER**			
	a) Submeter lampu dan kuasa pada setiap tingkat bagi beban yang melebihi 100kVA	-	-	
	b) Menyambungkan submeter kepada EMS	-	-	
1.5	**TENAGA BOLEH BAHARU**			
	a) 1kWp (Kediaman) / 5 kWp (Bukan Kediaman)	-	1P	
1.6	**INTENSITI TENAGA BANGUNAN (BEI)**			
	a) BEI ≤ 200 kWh/m².yr (Bangunan Pejabat) b) BEI ≤ 300 kWh/m².yr (Hotel 4 Bintang) c) BEI ≤ 250 kWh/m².yr (Hotel 3 Bintang) d) BEI ≤ 150 kWh/m².yr (Bangunan Komersial)	-	-	
1.7	**PENTAULIAHAN DITINGKATKAN DAN PENTAULIAHAN SEMULA**			
	a) Peringkat Reka Bentuk - Menyediakan dokumen keperluan pentauliahan - Menyediakan pelan pelaksanaan pentaulihan	-	1P	
	b) Peringkat Penghunian - Menyediakan latihan kepada kakitangan teknikal - Mengemaskini Manual Operasi Bangunan	-	1P	
1.8	**PENYELENGGARAAN LESTARI**			
	a) Menyediakan Manual Penyelenggaraan Bangunan	-	1P	
	b) Menyediakan dokumen perancangan penyelenggaraan fasiliti dan perbelanjaan penyelenggaraan untuk tempoh tiga tahun	-	1P	

GARIS PANDUAN METERAI HIJAU MELAKA		Markah		Catatan
		Wajib	Pilihan	
KUALITI PERSEKITARAN DALAMAN				
2.1	**KADAR PENGALIHUDARAAN**			
	a) Mematuhi kod bangunan tempatan / MS1525 / ASHRAE 62.1 & 62.2	1W	-	
2.2	**PENEBAT BUNYI**			
	a) Mengurangkan pencemaran bunyi antara dan dalaman ruang dengan menyediakan bahan / barangan yang bersifat menyerap bunyi	1W	-	
2.3	**KUALITI CAHAYA SIANG**			
	a) Menunjukkan tidak kurang daripada 30% ruang yang boleh diduduki mempunyai faktor pencahayaan (*Daylight Factor*) 1.0 % hingga 3.5 %	-	1P	
2.4	**CAT & BAHAN RENDAH EMISI**			
	a) Menggunakan cat dan bahan rendah emisi dalam bangunan	-	1P	
2.5	**KAWALAN PERSEKITARAN ASAP TEMBAKAU**			
	a) Memasang papan tanda 'Dilarang Merokok' di dalam bangunan dan tempat awam dan / atau sediakan kawasan khas merokok	-	1P	
2.6	**PENYAHUDARAAN PRA KEMASUKAN**			
	a) Melakukan penyahudaraan bangunan	1W	-	
PERANCANGAN & PENGURUSAN TAPAK LESTARI				
3.1	**PERANCANGAN TAPAK**			
	a) Mematuhi Rancangan Tempatan pada kawasan pembangunan tersebut dan Kelulusan Kebenaran Merancang.	1W	-	
3.2	**PENGURUSAN LUARAN BANGUNAN**			
	a) Mengurangkan pencemaran alam sekitar semasa menjalankan aktiviti penyelenggaraan luar bangunan	-	1P	
3.3	**KEUTAMAAN KENDERAAN HIJAU**			
	a) Menyediakan parkir khusus bagi perkongsian kenderaan dan kenderaan hijau	-	1P	
3.4	**TUMBUHAN HIJAU & BUMBUNG**			
	a) Lanskap	1W	-	
	b) Elemen Keras *(Hardscape)*			
	-Teduhan (5 tahun penghunian)	-	1P	
	-Bahan Turapan (sekurang-kurangnya SRI 29)	-	1P	
	-Sistem Turapan Terbuka	-	1P	
	c) Kawasan Bumbung - Bumbung SRI Tinggi	-	1P	
	d) Permukaan Bumbung - Albedo Tinggi & Bumbung Hijau	-	1P	
3.5	**MANUAL PENGGUNA BANGUNAN**			
	a) Mendokumenkan ciri-ciri reka bentuk dan tujuan bangunan bagi maklumat dan panduan pengguna untuk mengekalkan prestasi semasa bangunan digunakan	1W	-	
BAHAN & SUMBER				
4.1	**POLISI MAMPAN**			
	a) Membangunkan Polisi bagi: -Mematuhi peraturan-peraturan berkaitan semasa pengoperasian bagi memastikan kepatuhan terhadap alam sekitar. -Perolehan hijau bagi pembelian barangan, peralatan dan perkhidmatan. -Sebarang penggantian bagi penyelenggaraan perlu menepati spesifikasi awal rekabentuk atau lebih baik dalam memenuhi kriteria MHM.	1W	-	
4.2	**BAHAN TEMPATAN**			
	a) Menggalakkan penggunaan bahan tempatan bagi mengurangkan impak kepada alam sekitar kesan daripada pengangkutan	1W	-	

GARIS PANDUAN METERAI HIJAU MELAKA		Markah		Catatan
		Wajib	Pilihan	
4.3	**BAHAN PENYEJUK & AGEN SISTEM KAWALAN KEBAKARAN**			
	a) Menggunakan bahan penyejuk sintetik (sifar ODP) bagi sistem pendingin hawa dan agen sistem kawalan kebakaran yang mesra alam	-	-	
	b) Menggunakan bahan penyejuk semulajadi bagi sistem pendingin hawa dan agen sistem kawalan kebakaran yang mesra alam	-	-	
	KECEKAPAN AIR			
5.1	**SISTEM PENUAIAN AIR HUJAN (SPAH)**			
	a) Mengurangkan penggunaan air dari bekalan air utama dengan mengumpul dan menggunakan air hujan	-	1P	
5.2	**PEPASANGAN PERALATAN, PENGAIRAN DAN LANSKAP CEKAP AIR**			
	a) Pepasangan peralatan cekap air	1W	-	
	b) Lanskap cekap air	-	1P	
	c) Pengairan cekap air			
5.3	**INDEKS PENJIMATAN AIR**			
	a) Jumlah Indeks penjimatan air (minimum 30%)	-	1P	
	JUMLAH			

ULASAN PEMERIKSA	
KEPUTUSAN : ☐ SOKONG ☐ TIDAK SOKONG **ULASAN :**	
DISEMAK	**DISAHKAN**
Cop & Tandatangan : Nama : Tarikh :	Cop & Tandatangan : Nama : Tarikh :

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MHM-BM-BBK

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MHM-_____-_____

BORANG MARKAH - BANGUNAN BUKAN KEDIAMAN

TAJUK PEMOHONAN	

GARIS PANDUAN METERAI HIJAU MELAKA	Markah		Catatan
	Wajib	Pilihan	
KECEKAPAN TENAGA			
1.1 **LIPUTAN TERMAL LUARAN BANGUNAN**			
a) OTTV < 50 W/m^2 dan Nilai U bumbung : • ≤ 0.4 W/m²K bagi atap ringan (binaan bumbung bukan dari konkrit) • ≤ 0.6 W/m²K bagi atap berat (binaan bumbung dari konkrit) b) RTTV ≤ 25 W/m^2 (Wajib sekiranya bumbung bangunan mempunyai skylight)	1W	-	
1.2 **SISTEM PENGURUSAN TENAGA**			
a) Memasang EMS	-	1P	
b) Memasang EMS bagi memantau penggunaan tenaga	-	1P	
1.3 **ZON PENCAHAYAAN**			
a) Zon Pencahayaan	1W	-	
b) Tahap Pencahayaan	1W	-	
c) Ketumpatan Kuasa	1W	-	
d) Sensor Pencahayaan	-	1P	
e) Sensor Pergerakan	-	1P	
1.4 **SUBMETER**			
a) Submeter lampu dan kuasa pada setiap tingkat bagi beban yang melebihi 100kVA	-	1P	
Menyambungkan submeter kepada EMS	-	1P	
1.5 **TENAGA BOLEH BAHARU**			
a) 1kWp (Kediaman) / 5 kWp (Bukan Kediaman)	-	1P	
1.6 **INTENSITI TENAGA BANGUNAN (BEI)**			
a) BEI ≤ 200 kWh/m².yr (Bangunan Pejabat) b) BEI ≤ 300 kWh/m².yr (Hotel 4 Bintang) c) BEI ≤ 250 kWh/m².yr (Hotel 3 Bintang) d) BEI ≤ 150 kWh/m².yr (Bangunan Komersial)	1W	-	
1.7 **PENTAULIAHAN DITINGKATKAN DAN PENTAULIAHAN SEMULA**			
a) Peringkat Reka Bentuk - Menyediakan dokumen keperluan pentauliahan - Menyediakan pelan pelaksanaan pentaulihan	1W	-	
b) Peringkat Penghunian - Menyediakan latihan kepada kakitangan teknikal - Mengemaskini Manual Operasi Bangunan	1W	-	
1.8 **PENYELENGGARAAN LESTARI**			
a) Menyediakan Manual Penyelenggaraan Bangunan	-	1P	
b) Menyediakan dokumen perancangan penyelenggaraan fasiliti dan perbelanjaan penyelenggaraan untuk tempoh tiga tahun	-	1P	

	GARIS PANDUAN METERAI HIJAU MELAKA	Markah		Catatan
		Wajib	Pilihan	
	KUALITI PERSEKITARAN DALAMAN			
2.1	**KADAR PENGALIHUDARAAN**			
	a) Mematuhi kod bangunan tempatan / MS1525 / ASHRAE 62.1 & 62.2	1W	-	
2.2	**PENEBAT BUNYI**			
	a) Mengurangkan pencemaran bunyi antara dan dalaman ruang dengan menyediakan bahan / barangan yang bersifat menyerap bunyi	1W	-	
2.3	**KUALITI CAHAYA SIANG**			
	a) Menunjukkan tidak kurang daripada 30% ruang yang boleh diduduki mempunyai faktor pencahayaan (*Daylight Factor*) 1.0 % hingga 3.5 %	-	1P	
2.4	**CAT & BAHAN RENDAH EMISI**			
	a) Menggunakan cat dan bahan rendah emisi dalam bangunan	-	1P	
2.5	**KAWALAN PERSEKITARAN ASAP TEMBAKAU**			
	a) Memasang papan tanda 'Dilarang Merokok' di dalam bangunan dan tempat awam dan / atau sediakan kawasan khas merokok	1W	-	
2.6	**PENYAHUDARAAN PRA KEMASUKAN**			
	a) Melakukan penyahudaraan bangunan	1W	-	
	PERANCANGAN & PENGURUSAN TAPAK LESTARI			
3.1	**PERANCANGAN TAPAK**			
	a) Mematuhi Rancangan Tempatan pada kawasan pembangunan tersebut dan Kelulusan Kebenaran Merancang.	1W	-	
3.2	**PENGURUSAN LUARAN BANGUNAN**			
	a) Mengurangkan pencemaran alam sekitar semasa menjalankan aktiviti penyelenggaraan luar bangunan	-	1P	
3.3	**KEUTAMAAN KENDERAAN HIJAU**			
	a) Menyediakan parkir khusus bagi kenderaan hibrid dan elektrik serta perkongsian kenderaan	1W	-	
3.4	**TUMBUHAN HIJAU & BUMBUNG**			
	a) Lanskap	1W	-	
	b) Elemen Keras *(Hardscape)*			
	-Teduhan (5 tahun penghunian)	-	1P	
	-Bahan Turapan (sekurang-kurangnya SRI 29)	-	1P	
	-Sistem Turapan Terbuka	-	1P	
	c) Kawasan Bumbung - Bumbung SRI Tinggi	-	1P	
	d) Permukaan Bumbung - Albedo Tinggi & Bumbung Hijau	-	1P	
3.5	**MANUAL PENGGUNA BANGUNAN**			
	a) Mendokumenkan ciri-ciri reka bentuk dan tujuan bangunan bagi maklumat dan panduan pengguna untuk mengekalkan prestasi semasa bangunan digunakan	1W	-	
	BAHAN & SUMBER			
4.1	**POLISI MAMPAN**			
	a) Membangunkan Polisi bagi: -Mematuhi peraturan-peraturan berkaitan semasa pengoperasian bagi memastikan kepatuhan terhadap alam sekitar. -Perolehan hijau bagi pembelian barangan, peralatan dan perkhidmatan. -Sebarang penggantian bagi penyelenggaraan perlu menepati spesifikasi awal rekabentuk atau lebih baik dalam memenuhi kriteria MHM.	1W	-	
4.2	**BAHAN TEMPATAN**			
	a) Menggalakkan penggunaan bahan tempatan bagi mengurangkan impak kepada alam sekitar kesan daripada pengangkutan	1W	-	

GARIS PANDUAN METERAI HIJAU MELAKA		Markah		Catatan
		Wajib	Pilihan	
4.3	**BAHAN PENYEJUK & AGEN SISTEM KAWALAN KEBAKARAN**			
	a) Menggunakan bahan penyejuk sintetik (sifar ODP) bagi sistem pendingin hawa dan agen sistem kawalan kebakaran yang mesra alam	1W	-	
	b) Menggunakan bahan penyejuk semulajadi bagi sistem pendingin hawa dan agen sistem kawalan kebakaran yang mesra alam	-	1P	
	KECEKAPAN AIR			
5.1	**SISTEM PENUAIAN AIR HUJAN (SPAH)**			
	a) Mengurangkan penggunaan air dari bekalan air utama dengan mengumpul dan menggunakan air hujan	-	1P	
5.2	**PEPASANGAN PERALATAN, PENGAIRAN DAN LANSKAP CEKAP AIR**			
	a) Pepasangan peralatan cekap air	1W	-	
	b) Lanskap cekap air c) Pengairan cekap air	-	1P	
5.3	**INDEKS PENJIMATAN AIR**			
	a) Jumlah Indeks penjimatan air (minimum 30%)	-	1P	
	JUMLAH			

ULASAN PEMERIKSA
KEPUTUSAN : ☐ SOKONG ☐ TIDAK SOKONG **ULASAN :**

DISEMAK	**DISAHKAN**
Cop & Tandatangan : Nama : Tarikh :	Cop & Tandatangan : Nama : Tarikh :