

PROJECT : Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories

OTTV CALCULATION

Introduction
For simplicity, the structural beams and columns are neglected and replaced by wall panels in the OTTV calculation. i.e., the building envelop is built up by concrete wall panels and windows only. Based on this assumption, the calculated OTTV value should be greater than the actual value of the building. Thus as the calculated values are not greater than 50W/m² for building tower, and so as the actual values.

Breakdown of Wall, Glass & Roof Area

Ref. : BD 2/9048/18
Building Address: Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Glass, Wall, & Roof Area (sq. meter)									
Facing Orientation/Direction	N	NE	E	SE	S	SW	W	NW	Roof
W1 External Concrete Wall Area	1.2	0.7	1.1	5.0	24.8	87.0	3.7	4.4	0.0
R1 Concrete Roof Area	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	501.8
F1 Glass Wall Area	74.1	119.7	51.3	11.4	0.0	0.0	11.4	29.8	0.0

Assumed Construction Details

W1 Concrete Wall: -

10mm light grey oil paint on mosaic tile cladding
(External Finish Material)
+ 25mm cement/sand plaster/render (1st Intermediate Material) + 90mm normal weight aggregate concrete (2nd Intermediate Component)
+ 25mm white semi gloss paint on gypsum plaster/render
(Internal Finish Material)

R1 Roof Panel: -

20mm light grey oil paint on concrete flat roof tiles or slabs (External Finish Material) + 40mm plaster/render cement/sand (1st Intermediate Component)
+ 50mm polystyrene expanded insulation (2nd Intermediate Component) + 20mm asphalt, mastic with 20% grit (3rd Intermediate Component)
+ 20mm plaster/render cement/sand (4th Intermediate Component)
+ 150mm white semi-gloss paint on normal weight aggregate concrete
(Internal Finish Material)

Notes:

- Shading Coefficient (SC) of fenestration are listed as follows: -- (Glass Information refers to Appendix A1)

<u>Shading Coefficient (SC)</u>	<u>Window Type</u>
0.93	F1
0.97	F2
- External Shading Multiplier (ESM) is assumed to be 1 for all directions.
- Façade Orientation markup refers to Appendix A2

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

1

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data of Opaque:

*Wall/Roof

Facade Orientation Facing:

N

Solar Factor (SF) is

104

*Wall/Roof Code No.		*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof		Concrete wall			
External Surface Film R_o		0.044			
External Finish Material		Mosaic tile cladding			
Conductivity W/m^2C		1.5			
Density kg/m^3		2500			
Thickness m		0.005			
Material/Paint		White mosaic tiles			
Absorptivity (α)		0.58			
Intermediate Component		Plaster/render - cement/sand			
Conductivity W/m^2C		0.72			
Density kg/m^3		1860			
Thickness m		0.01			
Air Space Resistance R_a					
Intermediate Component		Concrete - normal weight aggregate			
Conductivity W/m^2C		2.16			
Density kg/m^3		2400			
Thickness m		0.125			
Intermediate Component					
Conductivity W/m^2C					
Density kg/m^3					
Thickness m					
Internal Finish Material		Plaster/render - cement/sand			
Conductivity W/m^2C		0.72			
Density kg/m^3		1860			
Thickness m		0.01			
Material/Paint		White gloss paint			
Absorptivity (α)		0.25			
Internal Surface Film R_i		0.299			
U' Value of Composite *Wall/Roof		2.31			
Area of *Wall/Roof m^2		1.17			
Density of Composite *Wall/Roof kg/m^2		349.70			
Equivalent Temperature Difference (TD_{eq})		2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

2

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data of Opaque:

~~*Wall/Roof~~

Facade Orientation Facing:

NE

Solar Factor (SF) is

138

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity W/m^2C	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity W/m^2C				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite *Wall/Roof	2.31			
Area of *Wall/Roof m^2	0.69			
Density of Composite *Wall/Roof kg/m^2	349.70			
Equivalent Temperature Difference (TD_{eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

3

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data of Opaque:

*Wall/Roof

Facade Orientation Facing:

E

Solar Factor (SF) is

168

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity W/m^2C	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity W/m^2C				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite				
*Wall/Roof	2.31			
Area of *Wall/Roof m^2	1.08			
Density of Composite				
*Wall/Roof kg/m^2	349.70			
Equivalent Temperature Difference (TD_{eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

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Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data of Opaque:

*Wall/Roof

Facade Orientation Facing:

SE

Solar Factor (SF) is

197

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity W/m^2C	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity W/m^2C				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite				
*Wall/Roof	2.31			
Area of *Wall/Roof m^2	5.03			
Density of Composite				
*Wall/Roof kg/m^2	349.70			
Equivalent Temperature Difference (TD_{eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A 5 Ref. : BD 2/9048/18
 Building Address: Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)
 Physical data of Opaque: *Wall/Roof
 Facade Orientation Facing: S Solar Factor (SF) is 191

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity $W/m^{\circ}C$	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity $W/m^{\circ}C$	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity $W/m^{\circ}C$	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity $W/m^{\circ}C$				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity $W/m^{\circ}C$	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite <u>*Wall/Roof</u>	2.31			
Area of <u>*Wall/Roof</u> m^2	24.83			
Density of Composite <u>*Wall/Roof</u> kg/m^2	349.70			
Equivalent Temperature Difference (TD_{eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

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Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data of Opaque:

~~*Wall/Roof~~

Facade Orientation Facing:

SW

Solar Factor (SF) is

202

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3
Location of Wall/Roof	Concrete wall		
External Surface Film R_o	0.044		
External Finish Material	Mosaic tile cladding		
Conductivity W/m^2C	1.5		
Density kg/m^3	2500		
Thickness m	0.005		
Material/Paint	White mosaic tiles		
Absorptivity (α)	0.58		
Intermediate Component	Plaster/render - cement/sand		
Conductivity W/m^2C	0.72		
Density kg/m^3	1860		
Thickness m	0.01		
Air Space Resistance R_a			
Intermediate Component	Concrete - normal weight aggregate		
Conductivity W/m^2C	2.16		
Density kg/m^3	2400		
Thickness m	0.125		
Intermediate Component			
Conductivity W/m^2C			
Density kg/m^3			
Thickness m			
Internal Finish Material	Plaster/render - cement/sand		
Conductivity W/m^2C	0.72		
Density kg/m^3	1860		
Thickness m	0.01		
Material/Paint	White gloss paint		
Absorptivity (α)	0.25		
Internal Surface Film R_i	0.299		
U' Value of Composite			
*Wall/Roof	2.31		
Area of *Wall/Roof m^2	87.00		
Density of Composite *Wall/Roof kg/m^2	349.70		
Equivalent Temperature Difference (TD_{Eq})	2.72		

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

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Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data of Opaque:

*Wall/Roof

Facade Orientation Facing:

W

Solar Factor (SF) is

175

*Wall/Roof Code No.		*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof		Concrete wall			
External Surface Film	R_o	0.044			
External Finish Material		Mosaic tile cladding			
Conductivity	$W/m^{\circ}C$	1.5			
Density	kg/m^3	2500			
Thickness	m	0.005			
Material/Paint		White mosaic tiles			
Absorptivity	(α)	0.58			
Intermediate Component		Plaster/render - cement/sand			
Conductivity	$W/m^{\circ}C$	0.72			
Density	kg/m^3	1860			
Thickness	m	0.01			
Air Space Resistance	R_a				
Intermediate Component		Concrete - normal weight aggregate			
Conductivity	$W/m^{\circ}C$	2.16			
Density	kg/m^3	2400			
Thickness	m	0.125			
Intermediate Component					
Conductivity	$W/m^{\circ}C$				
Density	kg/m^3				
Thickness	m				
Internal Finish Material		Plaster/render - cement/sand			
Conductivity	$W/m^{\circ}C$	0.72			
Density	kg/m^3	1860			
Thickness	m	0.01			
Material/Paint		White gloss paint			
Absorptivity	(α)	0.25			
Internal Surface Film	R_i	0.299			
U' Value of Composite		2.31			
*Wall/Roof					
Area of *Wall/Roof	m^2	3.69			
Density of Composite	kg/m^2	349.70			
*Wall/Roof					
Equivalent Temperature Difference	(TD_{eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

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Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data of Opaque:

*Wall/~~Roof~~

Facade Orientation Facing:

NW

Solar Factor (SF) is

138

*Wall/Roof Code No.	*W1/ R1	*W2/ R2	*W3/ R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity W/m^2C	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity W/m^2C				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite *Wall/ Roof	2.31			
Area of *Wall/ Roof m^2	4.38			
Density of Composite *Wall/ Roof kg/m^2	349.70			
Equivalent Temperature Difference (TD_{eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

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Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data of Opaque:

*Wall/Roof

Facade Orientation Facing:

Roof

Solar Factor (SF) is

264

*Wall/Roof Code No.	*W1/R1	*W2/R2		
Location of Wall/Roof	Roof			
External Surface Film R_o	0.055			
External Finish Material	Concrete - flat roof tiles or slabs			
Conductivity W/m^2C	1.1			
Density kg/m^3	2100			
Thickness m	0.01			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Concrete - lightweight aggregate			
Conductivity W/m^2C	0.44			
Density kg/m^3	1300			
Thickness m	0.075			
Intermediate Component	Insulating materials - polyurethane foam			
Conductivity W/m^2C	0.026			
Density kg/m^3	30			
Thickness m	0.05			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.025			
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.15			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite *Wall/Roof	0.39			
Area of *Wall/Roof m^2	501.79			
Density of Composite *Wall/Roof kg/m^2	526.50			
Equivalent Temperature Difference (TD_{EQ})	9.75			

Building (Energy Efficiency) Regulation
Form OTTV2

Window / Rooflight Schedule

Sheet No. B Ref. : BD 2/9048/18
Building Address: 1
Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data on *window/~~rooflight~~
Facade Orientation Facing: N Solar Factor (SF) is 104

*Wall/Roof Code No.	*F1/ RL1	*F2/ RL2	*F3/ RL3	*F4/ RL4
Location of *Window/ Rooflight	Ground Level	Ground Level		
Glazing Type	Tinted	Tinted		
Thickness m	0.016	0.016		
Shading Coefficient (SC)	0.93	0.97		
Type of Shading Device	N/A	N/A		
External Shading Multiplier (ESM)	1	1		
Area of Glazing m ²	53.37	20.76		

Physical data on *window/~~rooflight~~
Facade Orientation Facing: NE Solar Factor (SF) is 138

*Wall/Roof Code No.	*F1/ RL1	*F2/ RL2	*F3/ RL3	*F4/ RL4
Location of *Window/ Rooflight	Ground Level	Ground Level		
Glazing Type	Tinted	Tinted		
Thickness m	0.016	0.016		
Shading Coefficient (SC)	0.93	0.97		
Type of Shading Device	N/A	N/A		
External Shading Multiplier (ESM)	1	1		
Area of Glazing m ²	86.21	33.53		

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV2

Window / Rooflight Schedule

Sheet No. B

2

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data on *window/~~Rooflight~~

Facade Orientation Facing:

E

Solar Factor (SF) is

168

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level	Ground Level		
Glazing Type	Tinted	Tinted		
Thickness m	0.016	0.016		
Shading Coefficient (SC)	0.93	0.97		
Type of Shading Device	N/A	N/A		
External Shading Multiplier (ESM)	1	1		
Area of Glazing m ²	36.95	14.37		

Physical data on *window/~~Rooflight~~

Facade Orientation Facing:

SE

Solar Factor (SF) is

197

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level	Ground Level		
Glazing Type	Tinted	Tinted		
Thickness m	0.016	0.016		
Shading Coefficient (SC)	0.93	0.97		
Type of Shading Device	N/A	N/A		
External Shading Multiplier (ESM)	1	1		
Area of Glazing m ²	8.21	3.19		

*Delete as appropriate

Building (Energy Efficiency) Regulation

Form OTTV2

Window / Rooflight Schedule

Sheet No. B

3

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data on *window/~~rooflight~~

Facade Orientation Facing:

S

Solar Factor (SF) is

191

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	1			
Area of Glazing m ²	0.00			

Physical data on *window/~~rooflight~~

Facade Orientation Facing:

SW

Solar Factor (SF) is

202

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	1			
Area of Glazing m ²	0.00			

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV2

Window / Rooflight Schedule

Sheet No. B

4

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Physical data on *window/~~rooflight~~

Facade Orientation Facing:

W

Solar Factor (SF) is

175

*Wall/Roof Code No.	*F1/ RL1	*F2/ RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level	Ground Level		
Glazing Type	Tinted	Tinted		
Thickness m	0.016	0.016		
Shading Coefficient (SC)	0.93	0.97		
Type of Shading Device	N/A	N/A		
External Shading Multiplier (ESM)	1	1		
Area of Glazing m ²	8.21	3.19		

Physical data on *window/~~rooflight~~

Facade Orientation Facing:

NW

Solar Factor (SF) is

138

*Wall/Roof Code No.	*F1/ RL1	*F2/ RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level	Ground Level		
Glazing Type	Tinted	Tinted		
Thickness m	0.016	0.016		
Shading Coefficient (SC)	0.93	0.97		
Type of Shading Device	N/A	N/A		
External Shading Multiplier (ESM)	1	1		
Area of Glazing m ²	25.02	4.79		

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

1

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Façade Orientation Facing

N (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _f	U	a	TDeq	SUM
W1	Concrete wall	1.17	2.31	0.58	2.72	4.3
Subtotals		1.17	(A)		Heat Gain	4.3 (C)

Fenestration

Code No.	Description	*A _f w/A _f	SC	ESM	SF	SUM
F1	Tinted	53.37	0.93	1	104	5162.0
F2	Tinted	20.76	0.97	1	104	2093.8
Subtotals		74.13	(B)		Heat Gain	7255.8 (D)

Gross Heat Gain (C + D) 7260.08 (E)
 Gross Area (A + B) 75.30 (F)
 OTTV = (E / F) = 96.42 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

2

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Façade Orientation Facing

NE (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _r	U	a	TDeq	SUM
W1	Concrete wall	0.69	2.31	0.58	2.72	2.5
Subtotals		0.69	(A)		Heat Gain	2.5 (C)

Fenestration

Code No.	Description	*A _{fw} /A _f	SC	ESM	SF	SUM
F1	Tinted	86.21	0.93	1	138	11064.7
F2	Tinted	33.53	0.97	1	138	4488.0
Subtotals		119.74	(B)		Heat Gain	15552.8 (D)

Gross Heat Gain (C + D) 15555.29 (E)
 Gross Area (A + B) 120.44 (F)
 OTTV = (E / F) = 129.16 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

3

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Façade Orientation Facing

E (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _f	U	a	TDeq	SUM
W1	Concrete wall	1.08	2.31	0.58	2.72	3.9
Subtotals		1.077	(A)		Heat Gain	3.9 (C)

Fenestration

Code No.	Description	*A _{fw} /A _f	SC	ESM	SF	SUM
F1	Tinted	36.95	0.93	1	168	5772.9
F2	Tinted	14.37	0.97	1	168	2341.6
Subtotals		51.32	(B)		Heat Gain	8114.5 (D)

Gross Heat Gain (C + D) 8118.42 (E)
 Gross Area (A + B) 52.40 (F)
 OTTV = (E / F) = 154.95 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

4

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Façade Orientation Facing

SE (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _f	U	a	TDeq	SUM
W1	Concrete wall	5.03	2.31	0.58	2.72	18.4
Subtotals		5.03375	(A)		Heat Gain	18.4 (C)

Fenestration

Code No.	Description	*A _f w/A _f	SC	ESM	SF	SUM
F1	Tinted	8.21	0.93	1	197	1504.3
F2	Tinted	3.19	0.97	1	197	610.2
Subtotals		11.40	(B)		Heat Gain	2114.5 (D)

Gross Heat Gain (C + D) 2132.87 (E)
 Gross Area (A + B) 16.44 (F)
 OTTV = (E / F) = 129.75 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

5

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Façade Orientation Facing

S (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _f	U	a	TDeq	SUM
W1	Concrete wall	24.83	2.31	0.58	2.72	90.7
Subtotals		24.8325	(A)		Heat Gain	90.7 (C)

Fenestration

Code No.	Description	*A _f w/A _f	SC	ESM	SF	SUM
F1	Tinted	0.00	0.93	1	191	0.0
Subtotals		0	(B)		Heat Gain	0.0 (D)

Gross Heat Gain (C + D)

90.69 (E)

Gross Area (A + B)

24.83 (F)

OTTV = (E / F)=

3.65 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

6

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Façade Orientation Facing

SW (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _r	U	a	TDeq	SUM
W1	Concrete wall	87.00	2.31	0.58	2.72	317.7
Subtotals		87.003	(A)		Heat Gain	317.7 (C)

Fenestration

Code No.	Description	*A _{fw} /A _{fr}	SC	ESM	SF	SUM
F1	Tinted	0.00	0.93	1	202	0.0
Subtotals		0	(B)		Heat Gain	0.0 (D)

Gross Heat Gain (C + D)

317.74 (E)

Gross Area (A + B)

87.00 (F)

OTTV = (E / F)=

3.65 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

7

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Façade Orientation Facing

W (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _r	U	a	TDeq	SUM
W1	Concrete wall	3.69	2.31	0.58	2.72	13.5
Subtotals		3.68975	(A)		Heat Gain	13.5 (C)

Fenestration

Code No.	Description	*A _f w/A _f	SC	ESM	SF	SUM
F1	Tinted	8.21	0.93	1	175	1336.3
F2	Tinted	3.19	0.97	1	175	542.0
Subtotals		11.404	(B)		Heat Gain	1878.4 (D)

Gross Heat Gain (C + D) 1891.83 (E)
 Gross Area (A + B) 15.09 (F)
 OTTV = (E / F) = 125.34 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

8

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Façade Orientation Facing

NW (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _r	U	a	TDeq	SUM
W1	Concrete wall	4.38	2.31	0.58	2.72	16.0
Subtotals		4.37675	(A)		Heat Gain	16.0 (C)

Fenestration

Code No.	Description	*A _f w/A _f	SC	ESM	SF	SUM
F1	Tinted	25.02	0.93	1	138	3210.6
F2	Tinted	4.79	0.97	1	138	641.1
Subtotals		29.806	(B)		Heat Gain	3851.7 (D)

Gross Heat Gain (C + D)

3867.73 (E)

Gross Area (A + B)

34.18 (F)

OTTV = (E / F) =

113.15 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

9

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Façade Orientation Facing

Roof (Including Curved Face)

Opaque Walls/Roofs

Code No.	Description	*Aw/Ar	U	a	TDeq	SUM
R1	Roof	501.79	0.39	0.58	9.75	1106.67
Subtotals		501.79	(A)		Heat Gain	1106.7 (C)

Fenestration

Code No.	Description	*Afw/Afr	SC	ESM	SF	SUM
R1	Roof	0.00	0.34	1	0	0.00
Subtotals		0	(B)		Heat Gain	0.00 (D)

Gross Heat Gain (C + D)

1106.7 (E)

Gross Area (A + B)

501.79 (F)

OTTV = (E / F)=

2.21 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 4

Summary of OTTV of Building Envelope

Sheet No. D

1

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T5)

Total Envelope Heat Gain

*(Tower/Podium)

Façade Orientation	Gross Area from Form OTTV3	Gross Heat Gain from Form OTTV3
Walls		
N	75.30	7260.08
NE	120.44	15555.29
E	52.40	8118.42
SE	16.44	2132.87
S	24.83	90.69
SW	87.00	317.74
W	15.09	1891.83
NW	34.18	3867.73
Subtotal	425.68 (G)	39234.64 (H)
Roof		
a.	501.79	1106.67
b.		
c.		
Subtotal	501.79 (I)	1106.67 (J)

*Tower/Podium Walls OTTV = $H/G = \frac{7260.08}{75.30} = 92.17$ W/sq meter

*Tower/Podium Roof OTTV = $J/I = \frac{1106.67}{501.79} = 2.21$ W/sq meter

*Tower/Podium OTTV = $J+H/G+I = \frac{39234.64}{425.68} = 43.50$ W/sq meter (<50W/sq meter, comply)

*Delete as appropriate



AMENDED
25 MAR 2022

2/9048/18
2641

PROJECT : Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories

OTTV CALCULATION

Introduction
For simplicity, the structural beams and columns are neglected and replaced by wall panels in the OTTV calculation. i.e., the building envelop is built up by concrete wall panels and windows only. Based on this assumption, the calculated OTTV value should be greater than the actual value of the building. Thus as the calculated values are not greater than 50W/m² for building tower, and so as the actual values.

Breakdown of Wall, Glass & Roof Area

Ref. : BD 2/9048/18
Building Address: Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Glass, Wall, & Roof Area (sq. meter)									
Facing Orientation/Direction	N	NE	E	SE	S	SW	W	NW	Roof
W1 External Concrete Wall Area	0.3	28.6	0.0	0.0	0.0	5.3	2.6	0.0	0.0
R1 Concrete Roof Area	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9
F1 Glass Wall Area	7.3	0.0	0.0	0.0	0.0	17.1	9.8	0.0	0.0

Assumed Construction Details

W1 Concrete Wall: -

10mm light grey oil paint on mosaic tile cladding
(External Finish Material)
+ 25mm cement/sand plaster/render (1st Intermediate Material) + 90mm normal weight aggregate concrete (2nd Intermediate Component)
+ 25mm white semi gloss paint on gypsum plaster/render (Internal Finish Material)

R1 Roof Panel: -

20mm light grey oil paint on concrete flat roof tiles or slabs (External Finish Material) + 40mm plaster/render cement/sand (1st Intermediate Component)
+ 50mm polystyrene expanded insulation (2nd Intermediate Component) + 20mm asphalt, mastic with 20% grit (3rd Intermediate Component)
+ 20mm plaster/render cement/sand (4th Intermediate Component)
+ 150mm white semi-gloss paint on normal weight aggregate concrete (Internal Finish Material)

Notes:

- Shading Coefficient (SC) of fenestration are listed as follows: -- (Glass Information refers to Appendix A1)

<u>Shading Coefficient (SC)</u>	<u>Window Type</u>
0.93	F1
- External Shading Multiplier (ESM) is assumed to be 1 for all directions.
- Façade Orientation markup refers to Appendix A2

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A 1 Ref. : BD 2/9048/18
 Building Address: Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)
 Physical data of Opaque: *Wall/Roof
 Facade Orientation Facing: N Solar Factor (SF) is 104

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity $W/m^{\circ}C$	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity $W/m^{\circ}C$	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity $W/m^{\circ}C$	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity $W/m^{\circ}C$				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity $W/m^{\circ}C$	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite *Wall/Roof	2.31			
Area of *Wall/Roof m^2	0.62			
Density of Composite *Wall/Roof kg/m^2	349.70			
Equivalent Temperature Difference (TD_{Eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof and Details of Other Values

Sheet No. A

2

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Physical data of Opaque:

*Wall/Reef

Facade Orientation Facing:

NE

Solar Factor (SF) is

138

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity $W/m^{\circ}C$	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity $W/m^{\circ}C$	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity $W/m^{\circ}C$	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity $W/m^{\circ}C$				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity $W/m^{\circ}C$	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite *Wall/Roof	2.31			
Area of *Wall/Roof m^2	21.78			
Density of Composite *Wall/Roof kg/m^2	349.70			
Equivalent Temperature Difference (TD_{eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

3

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Physical data of Opaque:

*Wall/Roof

Facade Orientation Facing:

E

Solar Factor (SF) is

168

*Wall/Roof Code No.		*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof		Concrete wall			
External Surface Film R_o		0.044			
External Finish Material		Mosaic tile cladding			
Conductivity W/m^2C		1.5			
Density kg/m^3		2500			
Thickness m		0.005			
Material/Paint		White mosaic tiles			
Absorptivity (α)		0.58			
Intermediate Component		Plaster/render - cement/sand			
Conductivity W/m^2C		0.72			
Density kg/m^3		1860			
Thickness m		0.01			
Air Space Resistance R_a					
Intermediate Component		Concrete - normal weight aggregate			
Conductivity W/m^2C		2.16			
Density kg/m^3		2400			
Thickness m		0.125			
Intermediate Component					
Conductivity W/m^2C					
Density kg/m^3					
Thickness m					
Internal Finish Material		Plaster/render - cement/sand			
Conductivity W/m^2C		0.72			
Density kg/m^3		1860			
Thickness m		0.01			
Material/Paint		White gloss paint			
Absorptivity (α)		0.25			
Internal Surface Film R_i		0.299			
U' Value of Composite *Wall/Roof		2.31			
Area of *Wall/Roof m^2		0.00			
Density of Composite *Wall/Roof kg/m^2		349.70			
Equivalent Temperature Difference (TD_{eq})		2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A 4 Ref. : BD 2/9048/18
 Building Address: Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)
 Physical data of Opaque: *Wall/Roof
 Facade Orientation Facing: SE Solar Factor (SF) is 197

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity W/m^2C	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity W/m^2C				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite *Wall/Roof	2.31			
Area of *Wall/Roof m^2	0.00			
Density of Composite *Wall/Roof kg/m^2	349.70			
Equivalent Temperature Difference (TD_{eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A 5 Ref. : BD 2/9048/18
 Building Address: Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)
 Physical data of Opaque: *Wall/Roof
 Facade Orientation Facing: S Solar Factor (SF) is 191

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity W/m^2C	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity W/m^2C				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite *Wall/Roof	2.31			
Area of *Wall/Roof m^2	0.00			
Density of Composite *Wall/Roof kg/m^2	349.70			
Equivalent Temperature Difference (TD_{EQ})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A 6 Ref. : BD 2/9048/18
 Building Address: Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)
 Physical data of Opaque: *Wall/Roof
 Facade Orientation Facing: SW Solar Factor (SF) is 202

*Wall/Roof Code No.		*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof		Concrete wall			
External Surface Film R_o		0.044			
External Finish Material		Mosaic tile cladding			
Conductivity W/m^2C		1.5			
Density kg/m^3		2500			
Thickness m		0.005			
Material/Paint		White mosaic tiles			
Absorptivity (α)		0.58			
Intermediate Component		Plaster/render - cement/sand			
Conductivity W/m^2C		0.72			
Density kg/m^3		1860			
Thickness m		0.01			
Air Space Resistance R_a					
Intermediate Component		Concrete - normal weight aggregate			
Conductivity W/m^2C		2.16			
Density kg/m^3		2400			
Thickness m		0.125			
Intermediate Component					
Conductivity W/m^2C					
Density kg/m^3					
Thickness m					
Internal Finish Material		Plaster/render - cement/sand			
Conductivity W/m^2C		0.72			
Density kg/m^3		1860			
Thickness m		0.01			
Material/Paint		White gloss paint			
Absorptivity (α)		0.25			
Internal Surface Film R_i		0.299			
U' Value of Composite <u>*Wall/Roof</u>		2.31			
Area of <u>*Wall/Roof</u> m^2		1.42			
Density of Composite <u>*Wall/Roof</u> kg/m^2		349.70			
Equivalent Temperature Difference (TD_{eq})		2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

7

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Physical data of Opaque:

*Wall/Reef

Facade Orientation Facing:

W

Solar Factor (SF) is

175

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity W/m^2C	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity W/m^2C				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite				
*Wall/Reef	2.31			
Area of *Wall/Reef m^2	0.80			
Density of Composite				
*Wall/Reef kg/m^2	349.70			
Equivalent Temperature Difference (TD_{EQ})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A

8

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Physical data of Opaque:

*Wall/Roof

Facade Orientation Facing:

NW

Solar Factor (SF) is

138

*Wall/Roof Code No.	*W1/R1	*W2/R2	*W3/R3	
Location of Wall/Roof	Concrete wall			
External Surface Film R_o	0.044			
External Finish Material	Mosaic tile cladding			
Conductivity W/m^2C	1.5			
Density kg/m^3	2500			
Thickness m	0.005			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Air Space Resistance R_a				
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.125			
Intermediate Component				
Conductivity W/m^2C				
Density kg/m^3				
Thickness m				
Internal Finish Material	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.01			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
U' Value of Composite *Wall/Roof	2.31			
Area of *Wall/Roof m^2	0.00			
Density of Composite *Wall/Roof kg/m^2	349.70			
Equivalent Temperature Difference (TD_{eq})	2.72			

Building (Energy Efficiency) Regulation
Form OTTV 1

Calculation of 'U' Value of Composite Wall/Roof
and Details of Other Values

Sheet No. A 9 Ref. : BD 2/9048/18
 Building Address: Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)
 Physical data of Opaque: *Wall/Roof
 Facade Orientation Facing: Roof Solar Factor (SF) is 264

*Wall/Roof Code No.	*W1/R1	*W2/R2		
Location of Wall/Roof	Roof			
External Surface Film R_o	0.055			
External Finish Material	Concrete - flat roof tiles or slabs			
Conductivity W/m^2C	1.1			
Density kg/m^3	2100			
Thickness m	0.01			
Material/Paint	White mosaic tiles			
Absorptivity (α)	0.58			
Intermediate Component	Concrete - lightweight aggregate			
Conductivity W/m^2C	0.44			
Density kg/m^3	1300			
Thickness m	0.075			
Intermediate Component	Insulating materials - polyurethane foam			
Conductivity W/m^2C	0.026			
Density kg/m^3	30			
Thickness m	0.05			
Intermediate Component	Plaster/render - cement/sand			
Conductivity W/m^2C	0.72			
Density kg/m^3	1860			
Thickness m	0.025			
Intermediate Component	Concrete - normal weight aggregate			
Conductivity W/m^2C	2.16			
Density kg/m^3	2400			
Thickness m	0.15			
Material/Paint	White gloss paint			
Absorptivity (α)	0.25			
Internal Surface Film R_i	0.299			
'U' Value of Composite <u>*Wall/Roof</u>	0.39			
Area of <u>*Wall/Roof</u> m^2	4.87			
Density of Composite <u>*Wall/Roof</u> kg/m^2	526.50			
Equivalent Temperature Difference (TD_{eq})	9.75			

Building (Energy Efficiency) Regulation
Form OTTV2

Window / Rooflight Schedule

Sheet No. B

1

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Physical data on *window/~~Rooflight~~

Facade Orientation Facing:

N

Solar Factor (SF) is

104

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	0.621			
Area of Glazing m ²	5.97			

Physical data on *window/~~Rooflight~~

Facade Orientation Facing:

NE

Solar Factor (SF) is

138

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	0.537			
Area of Glazing m ²	8.17			

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV2

Window / Rooflight Schedule

Sheet No. B

2

Ref.: BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Physical data on *window/~~Rooflight~~

Facade Orientation Facing:

E

Solar Factor (SF) is

168

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	1			
Area of Glazing m ²	0.00			

Physical data on *window/~~Rooflight~~

Facade Orientation Facing:

SE

Solar Factor (SF) is

197

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	1			
Area of Glazing m ²	0.00			

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV2
Window / Rooflight Schedule

Sheet No. B

3

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Physical data on *window/~~rooflight~~

Facade Orientation Facing:

S

Solar Factor (SF) is

191

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	1			
Area of Glazing m ²	0.00			

Physical data on *window/~~rooflight~~

Facade Orientation Facing:

SW

Solar Factor (SF) is

202

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	0.453			
Area of Glazing m ²	17.01			

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV2

Window / Rooflight Schedule

Sheet No. B

4

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Physical data on *window/~~rooflight~~

Facade Orientation Facing:

W

Solar Factor (SF) is

175

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	0.62			
Area of Glazing m ²	9.43			

Physical data on *window/~~rooflight~~

Facade Orientation Facing:

NW

Solar Factor (SF) is

138

*Wall/Roof Code No.	*F1/RL1	*F2/RL2	*F3/RL3	*F4/RL4
Location of *Window/ Rooflight	Ground Level			
Glazing Type	Tinted			
Thickness m	0.016			
Shading Coefficient (SC)	0.93			
Type of Shading Device	N/A			
External Shading Multiplier (ESM)	1			
Area of Glazing m ²	0.00			

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

1

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Façade Orientation Facing

N (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _r	U	a	TDeq	SUM
W1	Concrete wall	0.62	2.31	0.58	2.72	2.3
Subtotals		0.62	(A)	Heat Gain		2.3 (C)

Fenestration

Code No.	Description	*A _{fw} /A _{fr}	SC	ESM	SF	SUM
F1	Clear Glass	5.97	0.93	0.621	104	358.6
Subtotals		5.97	(B)	Heat Gain		358.6 (D)

Gross Heat Gain (C + D)

360.84 (E)

Gross Area (A + B)

6.59 (F)

OTTV = (E / F)=

54.76 W / sq. meter

*Delete as appropriate

**Building (Energy Efficiency) Regulation
Form OTTV 3**

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

2

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Façade Orientation Facing

NE (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _f	U	a	TDeq	SUM
W1	Concrete wall	21.78	2.31	0.58	2.72	79.5
Subtotals		21.78	(A)		Heat Gain	79.5 (C)

Fenestration

Code No.	Description	*A _{fw} /A _f	SC	ESM	SF	SUM
F1	Clear Glass	8.17	0.93	0.537	104	424.3
Subtotals		8.17	(B)		Heat Gain	424.3 (D)

Gross Heat Gain (C + D)

503.88 (E)

Gross Area (A + B)

29.95 (F)

OTTV = (E / F)=

16.82 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

3

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Façade Orientation Facing

E (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _r	U	a	TDeq	SUM
W1	Concrete wall	0.00	2.31	0.58	2.72	0.0
Subtotals		0	(A)	Heat Gain		0.0 (C)

Fenestration

Code No.	Description	*A _{fw} /A _{fr}	SC	ESM	SF	SUM
F1	Tinted	0.00	0.93	1	197	0.0
Subtotals		0.00	(B)	Heat Gain		0.0 (D)

Gross Heat Gain (C + D)

0.00 (E)

Gross Area (A + B)

0.00 (F)

OTTV = (E / F) =

0.00 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

4

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Façade Orientation Facing

SE (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _g	U	a	TDeq	SUM
W1	Concrete wall	0.00	2.31	0.58	2.72	0.0
Subtotals		0 (A)			Heat Gain	0.0 (C)

Fenestration

Code No.	Description	*A _{fw} /A _{fg}	SC	ESM	SF	SUM
F1	Tinted	0.00	0.93	1	197	0.0
Subtotals		0.00 (B)			Heat Gain	0.0 (D)

Gross Heat Gain (C + D)

0.00 (E)

Gross Area (A + B)

0.00 (F)

OTTV = (E / F) =

0.00 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

5

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Façade Orientation Facing

S (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _f	U	a	TDeq	SUM
W1	Concrete wall	0.00	2.31	0.58	2.72	0.0
Subtotals		0	(A)		Heat Gain	0.0 (C)

Fenestration

Code No.	Description	*A _f w/A _f	SC	ESM	SF	SUM
F1	Clear Glass	0.00	0.93	1	191	0.0
Subtotals		0	(B)		Heat Gain	0.0 (D)

Gross Heat Gain (C + D)

0.00 (E)

Gross Area (A + B)

0.00 (F)

OTTV = (E / F) =

0.00 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

6

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Façade Orientation Facing

SW (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _f	U	a	TDeq	SUM
W1	Concrete wall	1.42	2.31	0.58	2.72	5.2
Subtotals		1.42	(A)		Heat Gain	5.2 (C)

Fenestration

Code No.	Description	*A _{fw} /A _f	SC	ESM	SF	SUM
F1	Clear Glass	17.01	0.93	0.453	191	1368.7
Subtotals		17.01	(B)		Heat Gain	1368.7 (D)

Gross Heat Gain (C + D)

1373.92 (E)

Gross Area (A + B)

18.43 (F)

OTTV = (E / F) =

74.55 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

7

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Façade Orientation Facing

W (Including Curved Face)

Opaque *Walls/Reefs

Code No.	Description	*Aw/A _r	U	a	TDeq	SUM
W1	Concrete wall	0.80	2.31	0.58	2.72	2.9
Subtotals		0.8	(A)	Heat Gain		2.9 (C)

Fenestration

Code No.	Description	*A _{fw} /A _{fr}	SC	ESM	SF	SUM
F1	Clear Glass	9.43	0.93	0.62	202	1098.3
Subtotals		9.43	(B)	Heat Gain		1098.3 (D)

Gross Heat Gain (C + D)

1101.26 (E)

Gross Area (A + B)

10.23 (F)

OTTV = (E / F)=

107.65 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

8

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Façade Orientation Facing

NW (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/A _f	U	a	TDeq	SUM
W1	Concrete wall	0.00	2.31	0.58	2.72	0.0
Subtotals		0	(A)	Heat Gain		0.0 (C)

Fenestration

Code No.	Description	*A _{fw} /A _f	SC	ESM	SF	SUM
F1	Clear Glass	0.00	0.93	1	138	0.0
Subtotals		0	(B)	Heat Gain		0.0 (D)

Gross Heat Gain (C + D)

0.00 (E)

Gross Area (A + B)

0.00 (F)

OTTV = (E / F) =

0.00 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 3

Calculation of OTTV of Individual Façade in Building Envelope

Sheet No. C

9

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Façade Orientation Facing

Roof (Including Curved Face)

Opaque *Walls/Roofs

Code No.	Description	*Aw/Ar	U	a	TDeq	SUM
R1	Roof	4.87	0.39	0.58	9.75	10.75
Subtotals		4.874	(A)	Heat Gain		10.7 (C)

Fenestration

Code No.	Description	*Afw/Afr	SC	ESM	SF	SUM
R1	Roof	0.00	0.34	1	0	0.00
Subtotals		0	(B)	Heat Gain		0.00 (D)

Gross Heat Gain (C + D)

10.7 (E)

Gross Area (A + B)

4.874 (F)

OTTV = (E / F)=

2.21 W / sq. meter

*Delete as appropriate

Building (Energy Efficiency) Regulation
Form OTTV 4

Summary of OTTV of Building Envelope

Sheet No. D

1

Ref. : BD 2/9048/18

Building Address:

Proposed Residential Development at 23 On Hei Street, Sai Kung, New Territories (T1)

Total Envelope Heat Gain

~~*(Tower/Podium)~~

Façade Orientation	Gross Area from Form OTTV3	Gross Heat Gain from Form OTTV3
Walls		
N	6.59	360.84
NE	29.95	503.88
E	0.00	0.00
SE	0.00	0.00
S	0.00	0.00
SW	18.43	1373.92
W	10.23	1101.26
NW	0.00	0.00
Subtotal	65.20 (G)	3339.90 (H)
Roof		
a.	4.87	10.75
b.		
c.		
Subtotal	4.87 (I)	10.75 (J)

*~~Tower~~/Podium Walls OTTV = $H/G =$ 51.23 W/sq meter

*~~Tower~~/Podium Roof OTTV = $J/I =$ 2.21 W/sq meter

*~~Tower~~/Podium OTTV = $J+H/G+I =$ 47.82 W/sq meter (<50W/sq meter, comply)

*Delete as appropriate