

19th March 2015

Energy Matters Pty Ltd
359-361 City Road
Southbank VIC 3006



Attention: Mr Jeremy Lawrence

STRUCTURAL DESIGN CERTIFICATE

Project Description: Sunlock Commercial Framing Calculator v3.0

We, Partridge Structural Pty Limited, being professional Structural Engineers within the meaning of the Building Code of Australia, hereby certify that we have carried out a review of the source code used by the 'Sunlock Commercial Framing Calculator v3.0', dated 13th March 2015, and that this work is in accordance with the relevant provisions of the Standard Building Codes and in accordance with accepted engineering practice and principles.

The review has been carried out based on the assumptions listed below, the standard Sunlock documentation appended, concealed/flush mounted fixing details appended and the calculator source code appended.

Assumptions:

- $M_t = 1.0$ (Flat terrain)
- $M_s = 1.0$ (No shielding)
- $M_d = 1.0$ (Any wind direction)
- 25 year design life (250 year wind return period)
- Maximum solar panel size 2000 mm x 1200 mm
- Sunlock Channel V2 Foot Capacity = 3.59 kN
- Sunlock 5° and 15° Bracket Capacity = 1.28 kN
- Sunlock 10° Bracket Capacity = 1.70 kN
- Lysaght Longline 305 Concealed Fixing = 2.80 kN (10G screw minimum)
- Lysaght Kliplok 406 Concealed Fixing = 1.60 kN (12G screw minimum)
- Lysaght Kliplok 700 HS Concealed Fixing = 1.60 kN (12G screw minimum)
- Stramit Speed Deck Ultra Concealed Fixing = 1.90 kN (12G screw minimum)
- Metroll Metlok 700 Concealed Fixing = 2.00 kN (12G screw minimum)
- Timber screw fixings with 14G screws, min. 35mm embedment into:
 - Pine/Oregon with minimum joint group of J4, or,
 - Hardwood with minimum joint group of JD2

Relevant Australian Standards:

- AS/NZS 1170.0:2011- Structural design actions, Part 0: General principles
- AS/NZS 1170.1:2011- Structural design actions, Part 1: Permanent, imposed and other actions
- AS/NZS 1170.2:2011- Structural design actions, Part 2: Wind Actions
- AS/NZS 1664.1:1997- Aluminium Structures, Part 1: Limit State Design
- AS 1720.1:2010- Timber Structures, Part 1: Design Methods
- AS/NZS 4600:2005- Cold-formed steel structures

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Relevant Documentation:

- Partridge Drawing: 2013S0075 / S6.1A: 'Sunlock Commerical Roof Bracket Framing System for a Sheeted Roof- MAX 10° pitch', dated 27/06/2013, attached.
- Partridge Sketches 2013S0075 SK01/02: 'Configurations' and 'Flush Mounted Details', dated 22/11/2013, attached.
- Calculator source code, 'Sunlock Commercial Framing Calculator v3.0', dated 13/03/2015, attached.

This certification extends to the design of the mounting system ONLY. The structural adequacy of the roof to support the additional loading from the solar array should be determined and certified by a suitably qualified structural engineer.

This certificate shall not be construed as relieving any other party of their responsibilities, liabilities or contractual obligations.

Prepared by:



Robbie van Leeuwen

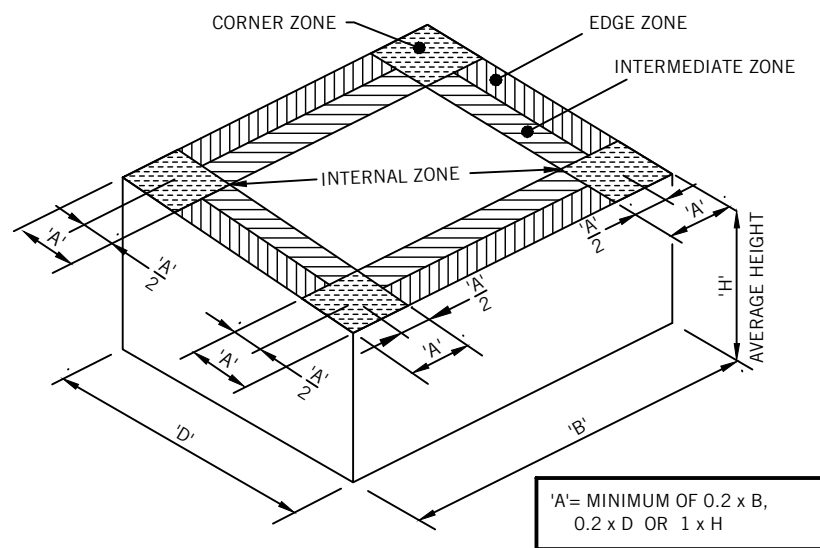
BE (Structures) (Hons.1) GradIEAust
Design Engineer

Reviewed by:



Rob O'Reilly

BE(Hons) MIEAust CPEng NPER(Structural) RPEQ
Group Director



METAL SHEETED ROOF - INSTALLATION ZONE
NOT TO SCALE

MINIMUM NUMBER OF CHANNELS AND BRACKETS PER SOLAR PANEL					
WIND REGION	PURLIN SPACING IN mm	SUNLOCK CHANNEL V2 NUMBERS PER PANEL			
		INTERNAL ZONE	INTERMEDIATE ZONE	EDGE ZONE	CORNER ZONE
A	900	REFER TO CALCULATOR RESULTS			
	1200				
	1500				
B	900				
	1200				
	1500				
C	900				
	1200				
	1500				

1 PAIR OF BRACKETS PER CHANNEL FOR EACH PANEL

PRODUCT NAME

SUNLOCK COMMERCIAL BRACKET SOLAR PANEL MOUNTING SYSTEM

PRODUCT DESCRIPTION

- BRACKETS FOR LANDSCAPE MOUNTED SOLAR PANELS
- FOR METAL SHEETED ROOFS AT 0°-10° PITCH

MANUFACTURER'S NAME

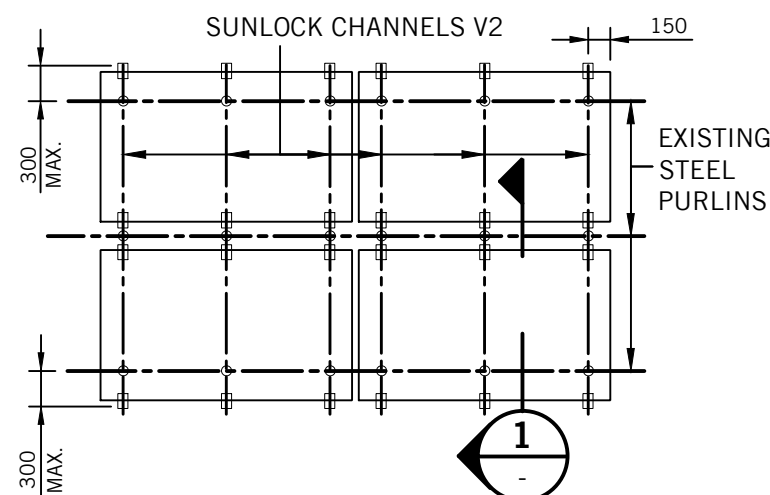
ENERGY MATTERS PTY LTD

DESIGN CRITERIA

- WIND SPEEDS AND PRESSURES ARE CALCULATED IN ACCORDANCE WITH AS/NZS 1170.2: 2011
- IMPORTANCE LEVEL 2
- TOPOGRAPHIC MULTIPLIER M = 1.0 (FLAT)

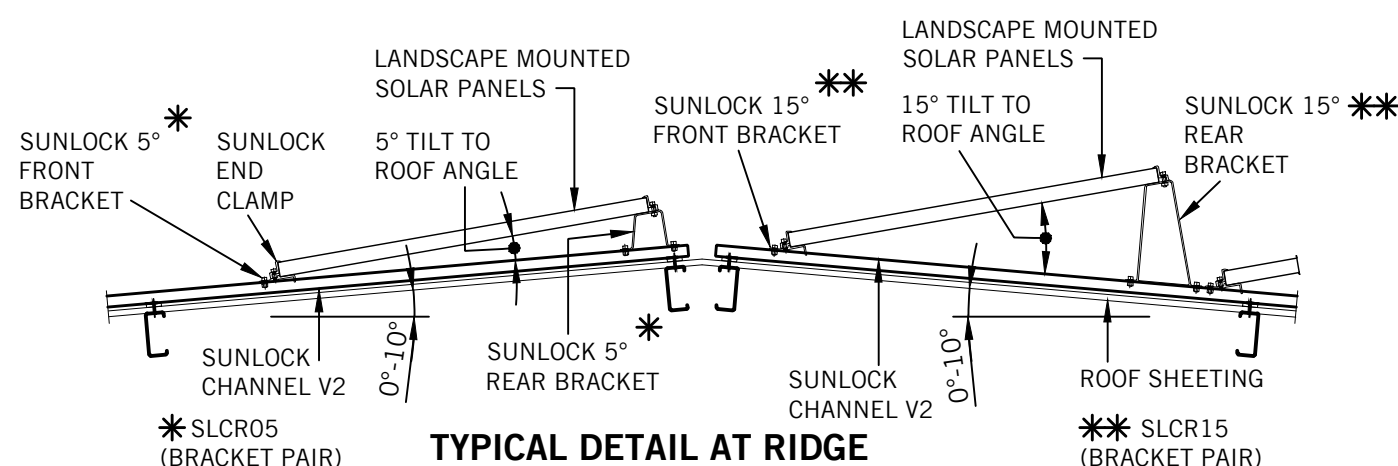
LIMITATIONS

- THE EXISTING ROOF CONSTRUCTION SHALL BE VERIFIED TO ENSURE ITS SUITABILITY FOR THIS PRODUCT AND THAT IT IS CAPABLE OF SUPPORTING THE ADDITIONAL LOADS.
- IF THE BUILDING IS SITUATED ANYWHERE OTHER THAN ON A FLAT AREA (IE. A SLOPE, A HILL ETC) DO NOT USE THIS DRAWING. CONTACT A STRUCTURAL ENGINEER FOR A CUSTOM DESIGN.
- MINIMUM 0° ROOF PITCH
- MAXIMUM 10° ROOF PITCH
- SOLAR PANELS TO BE CERTIFIED SEPARATELY

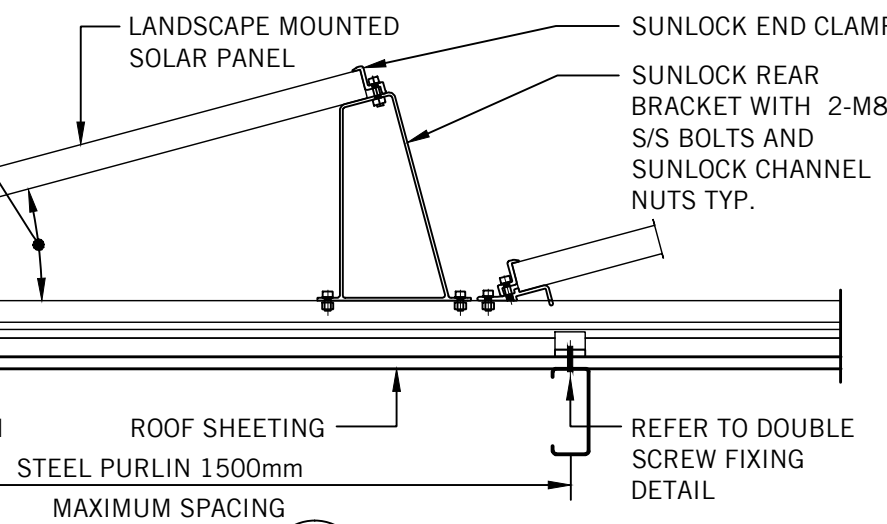


- REFER SUNLOCK CHANNEL TO PURLIN FIXING
- SUNLOCK FRONT/REAR BRACKET & END CLAMP

LANDSCAPE PANEL FIXING LAYOUT PLAN

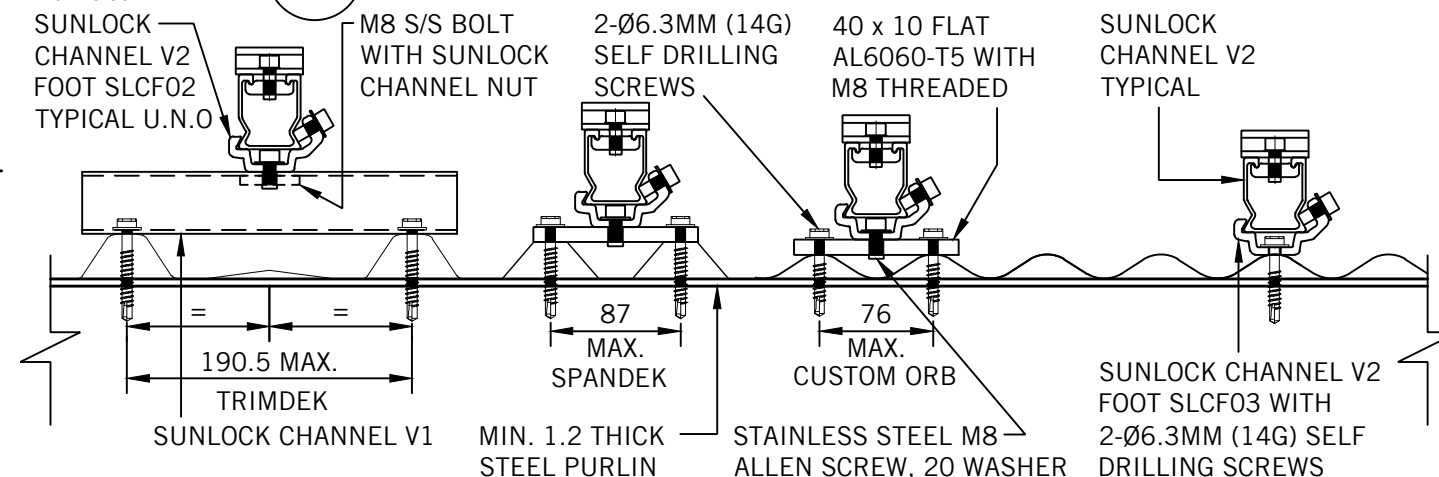


TYPICAL DETAIL AT RIDGE



SECTION 1

NOT TO SCALE



SUNLOCK CHANNEL V2 TO PURLIN DOUBLE SCREW FIXING DETAIL

ELECTRONIC SIGNATURE:
THIS DRAWING HAS BEEN ASSIGNED AN ELECTRONIC SIGNATURE CODE. THE PRESENCE OF THIS CODE SIGNIFIES THAT THIS IS THE CERTIFIED DRAWING ISSUED FOR CONSTRUCTION.

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Rev.	Issue / Amendment	App.	Date
P1	PRELIMINARY ISSUE	R.H	25.06.13
A	ISSUED FOR CONSTRUCTION	R.H	27.06.13
B	ISSUED FOR CALCULATOR CERTIFICATION	RVL	19.03.15

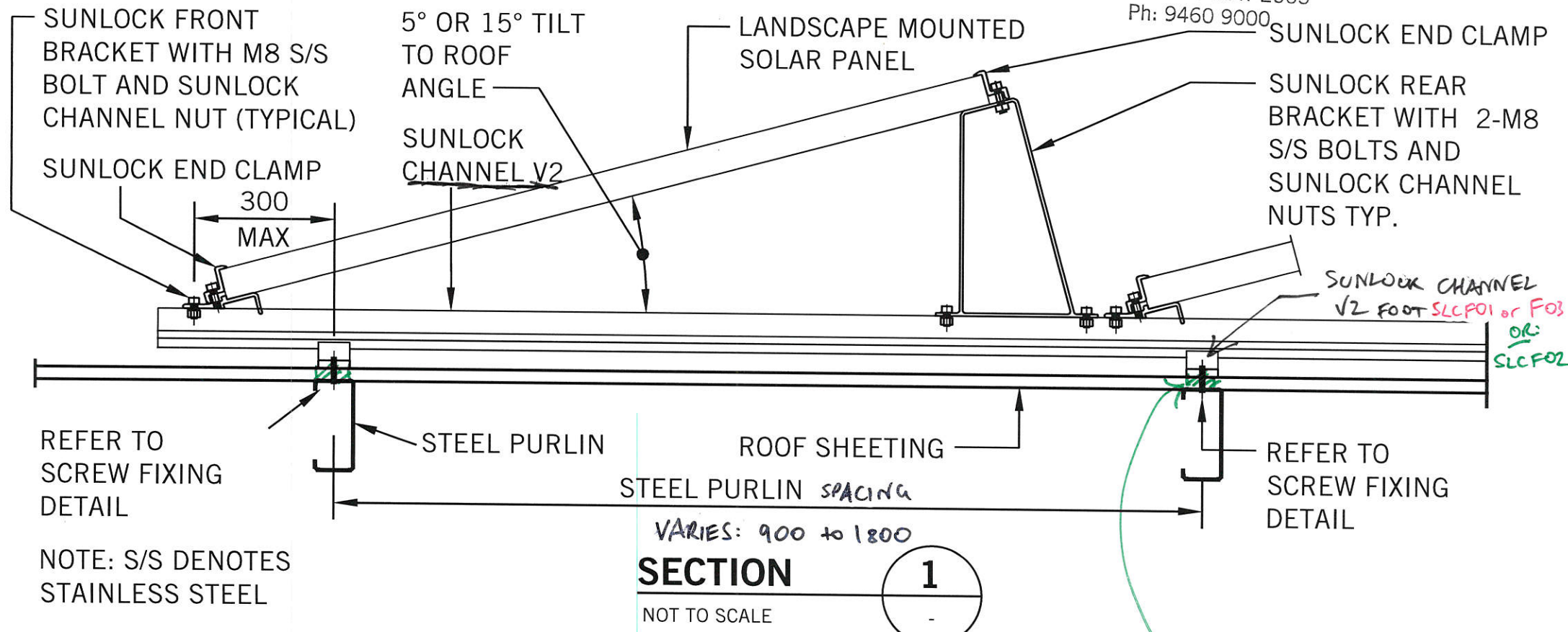


Client
ENERGY MATTERS PTY LTD

SUNLOCK MOUNTING SYSTEM AND FIXINGS COMMERCIAL ROOF BRACKET FRAMING SYSTEM
SHEETED ROOF AT MAX 10° PITCH
COMMERCIAL STEEL ROOF STRUCTURE

Electronic Code	Signature Date
Design RH	Drawn JR
Scale at A3 N/A	Date JUN 2013
Job No. 2013S0075	Drg. Rev. S6.1 B

Level 5, 1 Chandos Street
St. Leonards NSW 2065
Ph: 9460 9000



CONFIGURATION:

① TILTED PANEL WITH EXPOSED FIXING

② TILTED PANEL WITH CONCEALED FIXING

FOR CONFIGURATION ②:

* ADDITIONAL SUNLOCK ROOF CLAMP.

* M8 BOLT FROM SUNLOCK ROOF CLAMP TO SUNLOCK CHANNEL V2 FOOT.

Project ENERGY MATTERS.

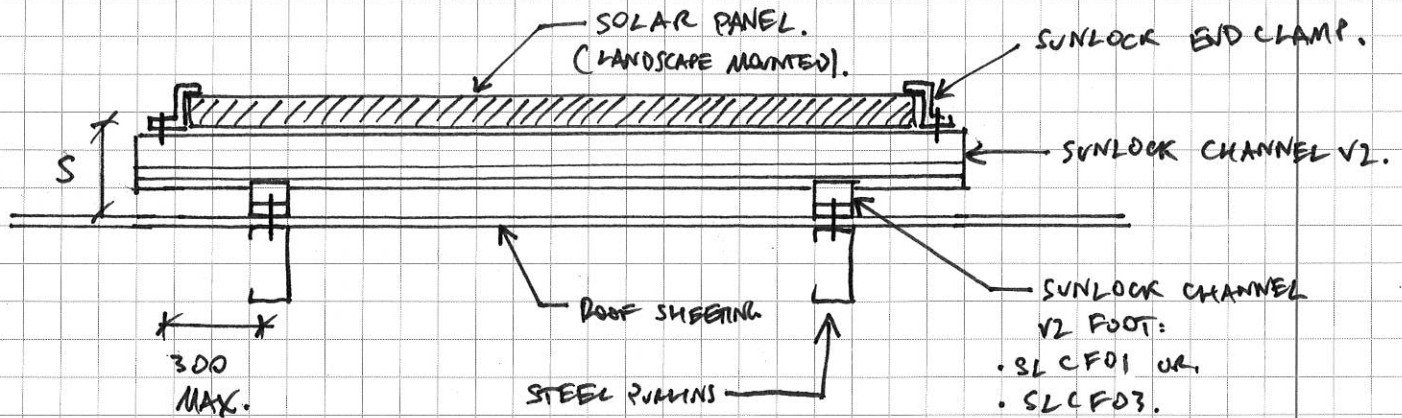
Job No. 201350075 Date 22/11/2013 Page 1

Subject FLUSH MOUNTED DETAILS.

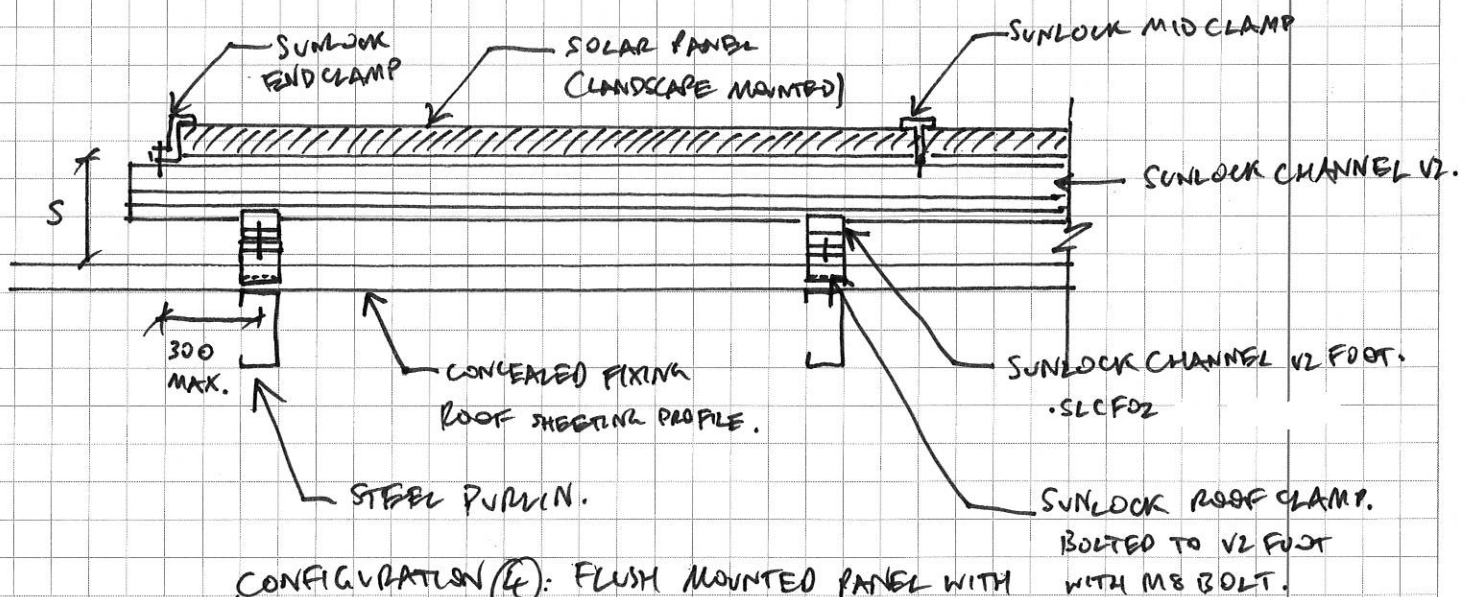


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DWG NO: 201350075 SK02.



CONFIGURATION (3): FLUSH MOUNTED PANEL WITH EXPOSED FIXINGS.



CONFIGURATION (4): FLUSH MOUNTED PANEL WITH CONCEALED FIXINGS.

N.B. THE FOLLOWING RESTRICTIONS APPLY:

- ① $\frac{h}{d} \leq 0.5$; $\frac{h}{b} \leq 0.5$
- ② $50 \leq S \leq 300$
- ③ MIN. EDGE DISTANCE FROM PANEL TO EDGE OF ROOF = $2S$.

↳ THESE RESTRICTIONS APPLY TO FLUSH MOUNTED PANELS ONLY

<?php

```

//var_dump($_POST);

//user variable inputs from form
$wind_region = $_POST['wind_region'];
$roof_zone = $_POST['roof_zone'];
$terrain = $_POST['terrain'];
//$screws_per_foot = $_POST['screws_per_foot'];
$purlin_thickness = $_POST['purlin_thickness'];
$purlin_spacing = $_POST['purlin_spacing'];
$purlin_material = $_POST['purlin_material'];
$height = $_POST['height'];
$width = $_POST['width'];
$length = $_POST['length'];
$module_length = $_POST['module_length'];
$module_width = $_POST['module_width'];
//$panels_per_column = $_POST['panels_per_column'];
//$panels_per_row = $_POST['panels_per_row'];
//$panels_spacing = $_POST['panels_spacing'];
//$panel_tilt_angle = $_POST['panel_tilt_angle'];
$module_inclination = $_POST['module_inclination'];
$fixing_type = $_POST['fixing_type'];
//if($fixing_type == "tek-screw")$concealed = false;
//else $concealed = true;

//fixed or calculated variables
//$panel_length = '1680';
//$panel_width = '1000';
$panel_cantilever = '150';
/*
if($concealed){
    $screw_diameter = '5.5';
}else{
    $screw_diameter= '6';
}
*/
$channel_V2_capacity = '1';
$channel_V2_foot_capacity = '3.59';

// Number of screws per fixing
if($fixing_type == "2screw") {
    $screws_per_foot = "2";
} else {
    $screws_per_foot = "1";
}

// Screw diameter (mm)
if($fixing_type == "1screw" || $fixing_type == "2screw") {
    $screw_diameter = "6";
    $roof_capacity = "false";
} elseif($fixing_type == "lysaght305") {
    $screw_diameter = "4.88";
} else {
    $screw_diameter = "5.5";
}

```

```

//Roof Clamp Capacity
//if($fixing_type == "lysaght" || $fixing_type == "lysaght406"){
if($fixing_type == "lysaght700" || $fixing_type == "lysaght406"){
    $roof_capacity = "1.6";
}
if($fixing_type == "stramit") {
    $roof_capacity = "1.9";
}
if($fixing_type == "metro11700"){
    $roof_capacity = "2";
}
if($fixing_type == "lysaght305") {
    $roof_capacity = "2.8";
}

//Cp
/*
if($module_inclination != '0'){
    $Cp = 1.3;
}else{
    if($roof_zone == 'central') $Cp = 1.4;
    if($roof_zone == 'end') $Cp = 1.7;
}
*/
//Roof Zone
//if($roof_zone == 'central' || $roof_zone == 'end') $roof_zone = 1;

// Pressure coefficients and factors
if($roof_zone == "central") {
    $pressure_coefficient = "1.4";
} elseif($roof_zone == "end") {
    $pressure_coefficient = "1.7";
} else {
    $pressure_coefficient = "1.3";
}

if($roof_zone == "central" || $roof_zone == "end") {
    $local_pressure_factor = "1";
} elseif($roof_zone == "internal") {
    $local_pressure_factor = "1";
} elseif($roof_zone == "intermediate") {
    $local_pressure_factor = "1.5";
} elseif($roof_zone == "edge") {
    $local_pressure_factor = "2";
} elseif($roof_zone == "corner") {
    $local_pressure_factor = "3";
}

//Component capacity
/*
if ($panel_tilt_angle=='5') {
    $bracket_capacity = 1.28;
}

```

```

}
if ($panel_tilt_angle=='10') {
    $bracket_capacity = 1.7;
}
if ($panel_tilt_angle=='15') {
    $bracket_capacity = 1.28;
}
*/

// Tilt Bracket (kN)
if($module_inclination == "5") {
    $bracket_capacity = "1.28";
} elseif($module_inclination == "10") {
    $bracket_capacity = "1.7";
} elseif($module_inclination == "15") {
    $bracket_capacity = "1.28";
} else {
    $bracket_capacity = "false";
}

//Screw pull out capacity
//purlin_grade
/*
if ($purlin_thickness <= '1') {
    $purlin_grade = '550';
} elseif ($purlin_thickness > '1' && $purlin_thickness <= '1.2') {
    $purlin_grade = '500';
} elseif ($purlin_thickness > '1.2') {
    $purlin_grade = '450';
}

$screw_capactiy_1 = (0.5 * 0.85 * $purlin_thickness * $screw_diameter * $purlin_grade *
$screws_per_foot) / 1000;
$screw_capactiy_2 = (0.3 * 0.85 * $purlin_thickness * $screw_diameter * $purlin_grade *
$screws_per_foot) / 1000;
*/

//Screw capacity (kN)
if($purlin_material == "pine") {
    if($screw_diameter == "4.88") {
        $char_capacity = "42";
    } elseif($screw_diameter == "5.5") {
        $char_capacity = "48";
    } else {
        $char_capacity = "54";
    }

    $pull_out_capacity = 0.85 * 35 * $char_capacity * $screws_per_foot / 1000;
} else if($purlin_material == "hardwood") {
    if($screw_diameter == "4.88") {
        $char_capacity = "112";
    } elseif($screw_diameter == "5.5") {
        $char_capacity = "127";
    } else {
        $char_capacity = "145";
    }

    $pull_out_capacity = 0.85 * 35 * $char_capacity * $screws_per_foot / 1000;
}

```



```

} else if($purlin_material == "steel") {
    if($wind_region == "A" || $wind_region == "B") {
        $cyclonic_factor = "0.5";
    } elseif($wind_region == "C" || $wind_region == "D") {
        $cyclonic_factor = "0.3";
    }

    if($purlin_thickness <= "1") {
        $purlin_grade = "550";
    } elseif($purlin_thickness > "1" && $purlin_thickness <= "1.2") {
        $purlin_grade = "500";
    } elseif($purlin_thickness > "1.2") {
        $purlin_grade = "450";
    }

    $pull_out_capacity = 0.85 * $cyclonic_factor * $purlin_thickness * $screw_diameter *
    $purlin_grade * $screws_per_foot / 1000;
}

//Wind loading

//V
/*
if ($wind_region == 'A') {
    $V = '45';
} elseif ($wind_region == 'B') {
    $V = '57';
} elseif ($wind_region == 'C') {
    $V = '69.3';
} elseif ($wind_region == 'D') {
    $V = '88';
}
*/

// Wind speed
if($wind_region == "A") {
    $site_wind_speed = "43";
} elseif($wind_region == "B") {
    $site_wind_speed = "53";
} elseif($wind_region == "C") {
    $site_wind_speed = "65.1";
} elseif($wind_region == "D") {
    $site_wind_speed = "81.4";
}

if ($height <= '5') {
    $L = 3;
    $H = 5;
    $LTC1 = 0.99;
    $LTC1_5 = 0.95;
    $LTC2 = 0.91;
    $LTC2_5 = 0.87;
    $LTC3 = 0.83;
    $LTC4 = 0.75;
    $HTC1 = 1.05;

```

```
$HTC1_5 = 0.98;  
$HTC2 = 0.91;  
$HTC2_5 = 0.87;  
$HTC3 = 0.83;  
$HTC4 = 0.75;  
} elseif ($height > '5' && $height <= '10') {  
    $L = 5;  
    $H = 10;  
    $LTC1 = 1.05;  
    $LTC1_5 = 0.98;  
    $LTC2 = 0.91;  
    $LTC2_5 = 0.87;  
    $LTC3 = 0.83;  
    $LTC4 = 0.75;  
    $HTC1 = 1.12;  
    $HTC1_5 = 1.06;  
    $HTC2 = 1;  
    $HTC2_5 = 0.915;  
    $HTC3 = 0.83;  
    $HTC4 = 0.75;  
} elseif ($height > '10' && $height <= '15') {  
    $L = 10;  
    $H = 15;  
    $LTC1 = 1.12;  
    $LTC1_5 = 1.06;  
    $LTC2 = 1;  
    $LTC2_5 = 0.915;  
    $LTC3 = 0.83;  
    $LTC4 = 0.75;  
    $HTC1 = 1.16;  
    $HTC1_5 = 1.105;  
    $HTC2 = 1.05;  
    $HTC2_5 = 0.97;  
    $HTC3 = 0.89;  
    $HTC4 = 0.75;  
} elseif ($height > '15' && $height <= '20') {  
    $L = 15;  
    $H = 20;  
    $LTC1 = 1.16;  
    $LTC1_5 = 1.105;  
    $LTC2 = 1.05;  
    $LTC2_5 = 0.97;  
    $LTC3 = 0.89;  
    $LTC4 = 0.75;  
    $HTC1 = 1.19;  
    $HTC1_5 = 1.135;  
    $HTC2 = 1.08;  
    $HTC2_5 = 1.01;  
    $HTC3 = 0.94;  
    $HTC4 = 0.75;  
} elseif ($height > '20' && $height <= '30') {  
    $L = 20;  
    $H = 30;  
    $LTC1 = 1.19;  
    $LTC1_5 = 1.135;  
    $LTC2 = 1.08;  
    $LTC2_5 = 1.01;
```

```
$LTC3 = 0.94;  
$LTC4 = 0.75;  
$HTC1 = 1.22;  
$HTC1_5 = 1.17;  
$HTC2 = 1.12;  
$HTC2_5 = 1.06;  
$HTC3 = 1;  
$HTC4 = 0.8;  
} elseif ($height > '30' && $height <= '40') {  
    $L = 30;  
    $H = 40;  
    $LTC1 = 1.22;  
    $LTC1_5 = 1.17;  
    $LTC2 = 1.12;  
    $LTC2_5 = 1.06;  
    $LTC3 = 1;  
    $LTC4 = 0.8;  
    $HTC1 = 1.24;  
    $HTC1_5 = 1.2;  
    $HTC2 = 1.16;  
    $HTC2_5 = 1.10;  
    $HTC3 = 1.04;  
    $HTC4 = 0.85;  
  
} elseif ($height > '40' && $height <= '50') {  
    $L = 40;  
    $H = 50;  
    $LTC1 = 1.24;  
    $LTC1_5 = 1.2;  
    $LTC2 = 1.16;  
    $LTC2_5 = 1.10;  
    $LTC3 = 1.04;  
    $LTC4 = 0.85;  
    $HTC1 = 1.25;  
    $HTC1_5 = 1.215;  
    $HTC2 = 1.18;  
    $HTC2_5 = 1.125;  
    $HTC3 = 1.07;  
    $HTC4 = 0.9;  
  
} elseif ($height > '50' && $height <= '75') {  
    $L = 50;  
    $H = 75;  
    $LTC1 = 1.25;  
    $LTC1_5 = 1.215;  
    $LTC2 = 1.18;  
    $LTC2_5 = 1.125;  
    $LTC3 = 1.07;  
    $LTC4 = 0.9;  
    $HTC1 = 1.27;  
    $HTC1_5 = 1.245;  
    $HTC2 = 1.22;  
    $HTC2_5 = 1.17;  
    $HTC3 = 1.12;  
    $HTC4 = 0.98;  
  
} elseif ($height > '75' && $height <= '100') {  
    $L = 75;  
    $H = 100;
```

```
$LTC1 = 1.27;  
$LTC1_5 = 1.245;  
$LTC2 = 1.22;  
$LTC2_5 = 1.17;  
$LTC3 = 1.12;  
$LTC4 = 0.98;  
$HTC1 = 1.29;  
$HTC1_5 = 1.265;  
$HTC2 = 1.24;  
$HTC2_5 = 1.2;  
$HTC3 = 1.16;  
$HTC4 = 1.03;  
} elseif ($height > '100' && $height <= '150') {  
    $L = 100;  
    $H = 150;  
    $LTC1 = 1.29;  
    $LTC1_5 = 1.265;  
    $LTC2 = 1.24;  
    $LTC2_5 = 1.2;  
    $LTC3 = 1.16;  
    $LTC4 = 1.03;  
    $HTC1 = 1.31;  
    $HTC1_5 = 1.29;  
    $HTC2 = 1.27;  
    $HTC2_5 = 1.24;  
    $HTC3 = 1.21;  
    $HTC4 = 1.11;  
} elseif ($height > '150' && $height <= '200') {  
    $L = 150;  
    $H = 200;  
    $LTC1 = 1.31;  
    $LTC1_5 = 1.29;  
    $LTC2 = 1.27;  
    $LTC2_5 = 1.24;  
    $LTC3 = 1.21;  
    $LTC4 = 1.11;  
    $HTC1 = 1.32;  
    $HTC1_5 = 1.305;  
    $HTC2 = 1.29;  
    $HTC2_5 = 1.265;  
    $HTC3 = 1.24;  
    $HTC4 = 1.16;  
}  
  
if ($terrain == '1') {  
    $M1 = $LTC1;  
    $M2 = $HTC1;  
} elseif ($terrain == '1.5') {  
    $M1 = $LTC1_5;  
    $M2 = $HTC1_5;  
} elseif ($terrain == '2') {  
    $M1 = $LTC2;  
    $M2 = $HTC2;  
} elseif ($terrain == '2.5') {  
    $M1 = $LTC2_5;  
    $M2 = $HTC2_5;  
} elseif ($terrain == '3') {
```

```

    $M1 = $LTC3;
    $M2 = $HTC3;
} elseif ($terrain == '4') {
    $M1 = $LTC4;
    $M2 = $HTC4;
}
$gradient = ($M2 - $M1)/($H-$L);
$y_intersect = $M1 - ($gradient*$L);
$M = $gradient * $height + $y_intersect;
//$V2 = $V * $M;
$design_wind_speed = $site_wind_speed * $M;

//$wind_loading = (0.5 * 1.2 * pow($V2,2) * $Cp * $roof_zone) / 1000;
$wind_loading = 0.5 * 1.2 * pow($design_wind_speed,2) * $pressure_coefficient *
$local_pressure_factor / 1000;

//-----Final Calcs-----

//$uplift_brackets = ($wind_loading * $panel_width * 0.5) / 1000;
$uplift_brackets = ($wind_loading * $module_width * 0.5) / 1000;

/*
if ($purlin_spacing < '1000' || $panel_tilt_angle == 0) {
    $uplift_rail_supports = ($wind_loading * $purlin_spacing / 1000);
} else {
    $uplift_rail_supports = ($wind_loading / 1000) * max(1000,($purlin_spacing - 200));
}
*/

// Channel Feet / Fixing Screws / Roof Clamps (kN/m)
if($purlin_spacing < "1000" || $module_inclination == "0") {
    $uplift_supports = $wind_loading * $purlin_spacing / 1000;
} else {
    $uplift_supports = $wind_loading / 1000 * max(1000, ($purlin_spacing - 200));
}

//$moment_rails = ($wind_loading * pow(($purlin_spacing / 1000),2)) / 4;
//Channel (kN/m/m)
if($module_width < (0.5 * $purlin_spacing)) {
    $moment_rails = $wind_loading * pow(($purlin_spacing / 1000),2) / 8;
} else {
    $moment_rails = $wind_loading * ($purlin_spacing / 1000) * ($module_width / 1000) / 4;
}

if($bracket_capacity) {
    $bracket_spacing = ($bracket_capacity / $uplift_brackets) * 1000;
}

/*
if ($wind_region == 'A' || $wind_region == 'B') {
    $screw_spacing = ($screw_capactiy_1 / $uplift_rail_supports) * 1000;
    $pull_out_capacity = (.5 * .85 * $purlin_thickness * $screw_diameter
    *$purlin_grade)/1000 * $screws_per_foot;
} else {
    $screw_spacing = ($screw_capactiy_2 / $uplift_rail_supports) * 1000;
    $pull_out_capacity = (.3 * .85 * $purlin_thickness * $screw_diameter

```



```

*$purlin_grade)/1000 * $screws_per_foot;
}
*/
// Roof screws (m)
$screw_spacing = $pull_out_capacity / $uplift_supports * 1000;

$rail_spacing = ($channel_V2_capacity / $moment_rails) * 1000;

/*
if($concealed){
    $foot_spacing = (min($channel_V2_foot_capacity, $pull_out_capacity, $roof_capacity) /
    $uplift_rail_supports) * 1000;
}else{
    $foot_spacing = (min($channel_V2_foot_capacity,$pull_out_capacity) /
    $uplift_rail_supports) * 1000;
}
*/

// Channel Feet (m)
$channel_feet_spacing = $channel_V2_foot_capacity / $uplift_supports * 1000;
// Roof Clamp (m)
if($roof_capacity) {
    $roof_spacing = $roof_capacity / $uplift_supports * 1000;
}

/*
if($bracket_spacing){
    $critical_spacing = min($bracket_spacing,$rail_spacing,$foot_spacing,$screw_spacing);
}
else{
    $critical_spacing = min($rail_spacing,$foot_spacing,$screw_spacing);
}
*/

// Critical Spacing
if($bracket_spacing && $roof_spacing) {
    $critical_spacing = min($bracket_spacing, $screw_spacing, $rail_spacing,
    $channel_feet_spacing, $roof_spacing);
} elseif($bracket_spacing) {
    $critical_spacing = min($bracket_spacing, $screw_spacing, $rail_spacing,
    $channel_feet_spacing);
} elseif($roof_spacing) {
    $critical_spacing = min($screw_spacing, $rail_spacing, $channel_feet_spacing,
    $roof_spacing);
} else {
    $critical_spacing = min($screw_spacing, $rail_spacing, $channel_feet_spacing);
}

/*
if ($critical_spacing >= 840) {
    $no_channels = 2;
} elseif ($critical_spacing >= 690 && $critical_spacing < 840) {
    $no_channels = 3;
} elseif ($critical_spacing >= 460 && $critical_spacing < 690) {
    $no_channels = 4;
} elseif ($critical_spacing >= 345 && $critical_spacing < 460) {
    $no_channels = 5;
}

```

```

} elseif ($critical_spacing < 345) {
    //echo $critical_spacing;
    $no_channels = 'n/a';
}
*/

// Number of Channels
if($critical_spacing >= ($module_length / 2)) {
    $channels_per_row = 2;
} elseif($critical_spacing > max($panel_cantilever + ($module_length - 2 * $panel_cantilever)
/ 4, ($module_length - 2 * $panel_cantilever) / 2)) {
    $channels_per_row = 3;
} elseif($critical_spacing > max($panel_cantilever + ($module_length - 2 * $panel_cantilever)
/ 6, ($module_length - 2 * $panel_cantilever) / 3)) {
    $channels_per_row = 4;
} elseif($critical_spacing > max($panel_cantilever + ($module_length - 2 * $panel_cantilever)
/ 8, ($module_length - 2 * $panel_cantilever) / 4)) {
    $channels_per_row = 5;
} else {
    $channels_per_row = "n/a";
}

// Limiting factor
if($channels_per_row > 2) {
    if($critical_spacing == $screw_spacing) {
        $limiting_factor = "Screw Pullout Capacity";
    } elseif($critical_spacing == $channel_feet_spacing) {
        $limiting_factor = "Channel Foot Capacity";
    } elseif($critical_spacing == $rail_spacing) {
        $limiting_factor = "Channel Capacity";
    } elseif($roof_spacing) {
        if($critical_spacing == $roof_spacing) {
            $limiting_factor = "Roof Clamp Capacity";
        }
    } elseif($bracket_spacing) {
        if($critical_spacing == $bracket_spacing) {
            $limiting_factor = "Tilt Bracket Capacity";
        }
    }
} else {
    $l1 = "n/a";
}
/*
echo '<div class="left">';

echo '<table class="result">';
//echo '<tr><td width="166px">Number of modules</td><td class="result_yellow"
width="130px">'. $total_panels. '</td></tr>';
//echo '<tr><td>Channel lengths per row</td><td
class="result_yellow">'. $no_channels. '</td></tr>';
echo '<tr><td>Channel lengths per row</td><td
class="result_yellow">'. $channels_per_row. '</td></tr>';
echo '<tr><td>Limiting factor</td><td class="result_yellow">'. $limiting_factor. '</td></tr>';
//echo '<tr><td>Internal zone</td><td class="result_yellow">'. $internal_zone. '</td></tr>';
//echo '<tr><td>Intermediate zone</td><td
class="result_yellow">'. $intermediate_zone. '</td></tr>';
//echo '<tr><td>Edge zone</td><td class="result_yellow">'. $edge_zone. '</td></tr>';

```

```
//echo '<tr><td>Corner zone</td><td class="result_yellow">'.$corner_zone.'</td></tr>';
echo '</table>';

echo '</div>';
echo '<div class="right">';
/*
echo "screws_per_foot=" . $screws_per_foot . "<br>";
echo "screw_diameter=" . $screw_diameter . "<br>";
echo "roof_capacity=" . $roof_capacity . "<br>";
echo "pressure_coefficient=" . $pressure_coefficient . "<br>";
echo "local_pressure_factor=" . $local_pressure_factor . "<br>";
echo "bracket_capacity=" . $bracket_capacity . "<br>";
echo "char_capacity=" . $char_capacity . "<br>";
echo "pull_out_capacity=" . $pull_out_capacity . "<br>";
echo "cyclonic_factor=" . $cyclonic_factor . "<br>";
echo "purlin_grade=" . $purlin_grade . "<br>";
echo "site_wind_speed=" . $site_wind_speed . "<br>";
echo "gradient=" . $gradient . "<br>";
echo "y_intersect=" . $y_intersect . "<br>";
echo "M=" . $M . "<br>";
echo "design_wind_speed=" . $design_wind_speed . "<br>";
echo "wind_loading=" . $wind_loading . "<br>";
echo "uplift_brackets=" . $uplift_brackets . "<br>";
echo "uplift_supports=" . $uplift_supports . "<br>";
echo "moment_rails=" . $moment_rails . "<br>";
echo "bracket_spacing=" . $bracket_spacing . "<br>";
echo "screw_spacing=" . $screw_spacing . "<br>";
echo "rail_spacing=" . $rail_spacing . "<br>";
echo "channel_feet_spacing=" . $channel_feet_spacing . "<br>";
echo "roof_spacing=" . $roof_spacing . "<br>";
echo "critical_spacing=" . $critical_spacing . "<br>";
echo "channels_per_row=" . $channels_per_row . "<br>";
*/
/*
echo '<tr><td colspan="2" style="font-size: 1.2em">Bill of materials</td></tr>';
echo '<tr><td width="160px">Part</td><td width="140px">Qty</td></tr>';
echo '<tr><td>SL2C6.0</td><td>'.$SL2C6_0.'</td></tr>';
echo '<tr><td>SLCR515-38</td><td>'.$SLCR515_38.'</td></tr>';
echo '<tr><td>SLCR505-38</td><td>'.$SLCR505_38.'</td></tr>';
echo '<tr><td>SLCF01</td><td>'.$SLCF01.'</td></tr>';
echo '<tr><td>SLCF02</td><td>'.$SLCF02.'</td></tr>';
echo '<tr><td>SLCJ</td><td>'.$SLCJ.'</td></tr>';
echo '</table>';
*/

echo '</div>';
echo '<div style="clear: both"></div>';

//echo '<div><br /><i>Disclaimer</i>:<br />The Bill of materials is an indicative
calculation only. For non-standard installations, please <a
href="http://www.sunlock.com.au/contact.php" class="white">contact</a> SunLock for more
information.<br />&nbsp;</div>';
```

?>