Gamcorp (Melbourne) Pty Ltd
A.C.N 141 076 904 A.B.N 73 015 060 240
www.gamcorp.com.au solar@gamcorp.com.au
Tel: +61 3 9543 2211

PV Array Frame Engineering Certification

Nova Flush Mount Solar System on Tin & Tile Roof
Within Australia & New Zealand

For: Hopergy Australia Pty Ltd

7 Audsley St, Clayton South
VIC 3169

Job No.: 10101

Date: 13/05/2022

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Report Title		PV Array Frame Engineering Certification				
Document ID		10101 Rev2-NOVA4/HS		**Job No.**	10101	
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Client		Hopergy Australia Pty Ltd		**Client Contact**	Paul Chiu	
Rev	**Date**	**Revision Details**	**Prepared By**	**Author**	**Verifier**	**Approver**
0	18/11/2021	First Issue	HS	HS	AA	LvS
1	04/03/2022	New Wind Code	HS	HS	AA	LvS
2	13/05/2022	Limitation for <1.9mm Purlin/25mm Embedment	HS	HS	LvS	LvS
Current Revision		2				

Approval			
Author Signature		Approver Signature	
Name	Humam Sami	Name	L. Van Spaandonk
Title	Structural Engineer	Title	Principal Engineer

Our Ref:10101 Rev2-NOVA4/HS
13 May 2022

Hopergy Australia Pty Ltd
Unit 12, 25 HunTin & Tilegdale
Road Burwood VIC 3125

PV Array Frame Engineering Certification

Array Frame Engineering Certificate - Nova Flush Mount Solar System on Tin & Tile Roof

Gamcorp (Melbourne) Pty Ltd, being Structural Engineers within the meaning of Australian Building Regulations, have carried out a structural design check of Nova Flush Mounted System on Tin & Tile Roof within Australia & New Zealand. The design check is based on the array frame information provided by Hopergy Australia Pty Ltd.

Components of the system covered in this certificate shown in the table below:

Component	**Part No**
Rail	F55-0000.A101
End & Mid Clamps	PC-NEC40-NS6 NOVA End Clamp, PC-NIC40-NS6 NOVA Middle Clamp, PC-NPC40-NS6 NOV Universal Middle & End Clamp (30-40)
L-Feet	Nova L-Feet
Tile Hook	HOP-TRH-F01

This certificate is **only valid** for Nova Flush Mounted System on the Tin & Tile Roof itself. The roof structure or the building structure and PV panels shall be assessed separately and accordingly.

The interface spacings for tin roof are determined based on fixings into minimum **JD4 seasoned** timber with screw embedment of **35mm** and **1.9mm** thick steel purlins. Refer to notes section under spacing tables for **<1.9BMT** purlin and **25mm** screw embedment. If the fixing condition is different from those conditions, interface spacing shall be reviewed and validated.

This certificate is **only valid** for tile roof when fixing into minimum 1.9BMT steel rafters (topchord of the truss) or minimum JD4 seasoned timber rafters (topchord of the truss) with screw embedment of 35mm. If the fixing condition is different from those conditions, interface spacing shall be reviewed and validated

This certificate is **only valid** as a whole. Any information extracted from this certificate is not valid if standing alone.

We find the Installation of Nova Flush Mounted System on Tin & Tile Roof for Australian and New Zealand use to be structurally sufficient based on the following conditions:

- Wind loads to **AS/NZ1170.2:2021 Wind actions**
- Wind region **A (0-5), B1, B2, C, D, NZ (1-4)**
- Wind terrain category **2 & 3**
- Wind average recurrence interval of **200 years** for Australia & **250 years** for New Zealand
- Maximum building height **20m**
- The assessed PV panel dimensions are **1650mm x 1000mm & 2000mm x 1000mm**
- The PV panels length can be increased by **5%**, **10%**, **15%** & **20%**. However, the interface spacing must be reduced by a **certain percentage** consecutively. Note that if the reduced spacing is less than **350mm** then the installation of PV panels is not allowed within the correspondence roof zones
- Maximum wind pressure is limited to **5kPa**
- Weight of the PV panel and array frame to be **15 kg/m^2**
- Material of Rails to be **AL 6005-T5 UNO**
- Each PV panel to be installed using **2 rails** minimum in all circumstances

- No PV panel to be installed within **2xs** from edges and ridge. **"s"** is the maximum gap between the underside of the panel and the roof surface when installed on the roof **(50mm≤s≤300mm)**
- Tile hook (HOP-TRH-F01) must be connected to the steel/timber rafters (topchord of the truss) by **2 screws** minimum
- Installation of PV panels to be done in accordance with the PV panels installation manual
- The certification **excludes** assessment of roof structure and PV panels

Refer to attached summary table for interface spacing (Unit: mm)

NOTES:

- **This certificate supersedes all previous Nova Tilt mount solar system on concealed fix roof general certificates.**
- **The recommended spacing nominated in this certification is based on the capacity of the array frame and the fixing of array frames to the roof, not the roof structure and PV panels. It is the responsibility of the installer to adopt the most critical spacing.**
- **Tile hook interface is considered reaching its serviceability limit when then unloaded (residual) displacement reaches approx. 30% of loaded displacement.**
- **The capacity of tile hooks was determined based on the tensile test reports dated 30 August 2021 provided by Hopergy Australia Pty Ltd.**
- **The spacing shown in the interface tables shall be adjusted based on the assessment and requirement of the roof structures.**
- **If any of the above conditions cannot be met, the structural engineer must be notified immediately.**

Construction is to be carried out strictly in accordance with the manufacturers instructions. This work was designed by **Humam Sami** in accordance with the provisions of Australian Building Regulations and in accordance with sound, widely accepted engineering principles. This certificate is only valid till 13/05/2024. Gamcorp should be contacted for future validation. Contact Gamcorp for customised system or if the site conditions are not covered by this assessment.

Yours faithfully,
Gamcorp (Melbourne) Pty Ltd

L. Van Spaandonk

Principal Engineer
FIEAust CPEng NER 5038980
NT Registration: 244137ES
QLD Registration: 18703
VIC Registration: PE0001956
TAS Registration: CC7366

Attachments:
- Summary table for interface spacing, 10101 Rev2 - XIII - Tin & Tile Roof

Relationships built on trust

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Tel: +61 3 9543 2211

Structural Design Documentation

Flush Array Frame System Spacing Table For (Tin & Tile Roofs) According to AS/NZS 1170.2-2021 PV Panel Dimension 1.65mx1.00m & 2.00mx1.00m within Australia & New Zealand Terrain Category 2 & 3

For:	Hopergy Australia Pty Ltd 7 Audsley St, Clayton South VIC 3169
Job Number:	10101 Rev2 – XIII
Date:	13 May 2022

Relationships built on trust

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Job No: 10101 Rev2 – XIII
Client: Hopergy Australia Pty Ltd
Project: Flush Array Frame System Spacing Table For (Tin & Tile Roofs)
Address: within Australia & New Zealand
Wind Terrain Category: 2 & 3

Australian/New Zealand Standards

AS/NZS 1170.0:2002	Structural design actions Part 0: General principles
AS/NZS 1170.1:2002 (R2016)	Structural design actions Part 1: Permanent, imposed and other actions
AS/NZS 1170.2:2021	Structural design actions Part 2: Wind actions
AS/NZS 1664.1:1997 (R2020)	Aluminium structures Part 1: Limit state design
AS/NZS 4600:2018	Cold-formed steel structures
AS 4100:2020	Steel structures

Designed: HS
Checked: AA
Date: May-22

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Tel: +61 3 9543 2211

Client: **Hopergy Australia Pty Ltd**
Project: **Flush Array Frame System Spacing Table For (Tin & Tile Roofs)**
Address: **within Australia & New Zealand**

Job: **10101 Rev2 – XIII**
Date: **May-22**
Designed: **HS**
Checked: **AA**

Flush Array Frame System Spacing Table For (Tin Roofs)

Type of Rail — Nova Rail (F55-0000.A101)
Type of Interface — Nova L-Feet
Solar Panel Dimension — 1.65mx1m
Terrain category — **2**

h/d ≤ 0.5 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	1075	1585	1775	2000	880	1355	1650	1905	795	1215	1585	1845	750	1150	1555	1815
B1	800	1225	1675	2000	660	1005	1365	1900	595	905	1230	1845	560	855	1160	1795
B2	650	995	1350	1895	535	815	1105	1710	--	735	995	1540	--	695	935	1445
C	--	570	770	1185	--	465	630	965	--	420	570	870	--	--	535	820
D	--	--	545	830	--	--	445	680	--	--	--	615	--	--	--	580
NZ1&NZ2	1075	1525	1700	1955	880	1355	1585	1840	795	1215	1525	1785	750	1150	1495	1745
NZ3	750	1150	1500	1755	615	940	1275	1630	555	850	1150	1570	525	800	1085	1535
NZ4	850	1305	1525	1785	700	1070	1425	1655	630	965	1310	1595	595	910	1235	1565

h/d ≥ 1.0 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	730	1120	1520	1800	600	915	1240	1675	540	825	1115	1610	--	780	1055	1575
B1	545	830	1125	1745	--	685	925	1425	--	620	835	1280	--	585	785	1205
B2	--	675	915	1405	--	555	750	1150	--	--	680	1040	--	--	640	975
C	--	--	525	800	--	--	430	655	--	--	--	590	--	--	--	560
D	--	--	--	565	--	--	--	465	--	--	--	420	--	--	--	--
NZ1&NZ2	730	1120	1480	1730	600	915	1240	1605	540	825	1115	1545	--	780	1055	1515
NZ3	--	780	1055	1520	--	640	865	1330	--	580	780	1195	--	545	735	1130
NZ4	580	885	1200	1545	--	725	985	1445	--	655	885	1365	--	620	840	1285

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 11 for defination h and d.**

Flush Array Frame System Spacing Table For (Tin Roofs)

Type of Rail — Nova Rail (F55-0000.A101)
Type of Interface — Nova L-Feet
Solar Panel Dimension — 1.65mx1m
Terrain category — **3**

h/d ≤ 0.5 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	1305	1705	1885	2000	1305	1705	1885	2000	1125	1615	1805	2000	1005	1545	1730	1980
B1	975	1500	1880	2000	975	1500	1880	2000	840	1285	1760	2000	750	1150	1565	1980
B2	790	1210	1650	2000	790	1210	1650	2000	680	1040	1415	1925	610	930	1260	1855
C	450	690	935	1445	450	690	935	1445	--	595	805	1245	--	530	720	1105
D	--	490	660	1015	--	490	660	1015	--	420	570	870	--	--	510	775
NZ1&NZ2	1305	1635	1825	2000	1305	1635	1825	2000	1125	1550	1735	1985	1005	1490	1660	1915
NZ3	910	1400	1610	1865	910	1400	1610	1865	785	1205	1530	1790	700	1075	1460	1710
NZ4	1035	1465	1635	1890	1035	1465	1635	1890	895	1375	1550	1810	795	1220	1490	1740

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A.C.N 141 076 904 A.B.N 73 015 060 240
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Client: **Hopergy Australia Pty Ltd**
Project: **Flush Array Frame System Spacing Table For (Tin & Tile Roofs)**
Address: **within Australia & New Zealand**

Job: **10101 Rev2 – XIII**
Date: **May-22**
Designed: **HS**
Checked: **AA**

h/d ≥ 1.0 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	885	1360	1655	1905	885	1360	1655	1905	765	1170	1565	1825	685	1045	1420	1755
B1	660	1010	1375	1905	660	1010	1375	1905	570	870	1180	1825	--	780	1055	1630
B2	540	820	1110	1720	540	820	1110	1720	--	710	960	1475	--	635	855	1315
C	--	470	635	970	--	470	635	970	--	--	550	840	--	--	490	745
D	--	--	450	685	--	--	450	685	--	--	--	590	--	--	--	530
NZ1&NZ2	885	1360	1585	1845	885	1360	1585	1845	765	1170	1505	1760	685	1045	1420	1685
NZ3	620	950	1285	1635	620	950	1285	1635	535	815	1105	1550	--	730	985	1490
NZ4	705	1080	1425	1660	705	1080	1425	1660	610	930	1260	1575	545	830	1120	1510

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 11 for defination h and d.**

Flush Array Frame System Spacing Table For (Tin Roofs)

Type of Rail — Nova Rail (F55-0000.A101)
Type of Interface — Nova L-Feet
Solar Panel Dimension — 2mx1m
Terrain category — **2**

h/d ≤ 0.5 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	885	1370	1665	1925	725	1115	1525	1815	655	1005	1365	1745	620	950	1290	1705
B1	660	1010	1380	1925	545	830	1130	1755	490	750	1015	1575	460	705	955	1480
B2	535	820	1115	1735	440	675	910	1410	--	610	820	1270	--	570	775	1190
C	--	470	635	975	--	385	520	795	--	350	470	720	--	--	445	675
D	--	--	450	685	--	--	370	560	--	--	--	505	--	--	--	480
NZ1&NZ2	885	1370	1595	1860	725	1115	1485	1740	655	1005	1365	1675	620	950	1290	1640
NZ3	620	950	1290	1645	510	775	1055	1530	460	700	945	1470	435	660	895	1380
NZ4	700	1080	1430	1675	575	880	1200	1555	520	795	1080	1495	490	750	1020	1465

h/d ≥ 1.0 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	605	925	1255	1690	495	755	1025	1570	445	680	920	1425	--	645	870	1345
B1	450	685	930	1440	--	565	765	1175	--	510	690	1055	--	480	650	995
B2	--	560	755	1160	--	460	620	950	--	--	560	855	--	--	525	805
C	--	--	430	660	--	--	355	540	--	--	--	490	--	--	--	460
D	--	--	--	465	--	--	--	385	--	--	--	345	--	--	--	--
NZ1&NZ2	605	925	1255	1620	495	755	1025	1505	445	680	920	1425	--	645	870	1345
NZ3	--	645	870	1345	--	530	715	1095	--	475	645	985	--	450	605	930
NZ4	480	730	990	1450	--	600	810	1250	--	540	730	1125	--	510	690	1060

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 11 for defination h and d.**

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Client: **Hopergy Australia Pty Ltd**
Project: **Flush Array Frame System Spacing Table For (Tin & Tile Roofs)**
Address: **within Australia & New Zealand**

Job: **10101 Rev2 – XIII**
Date: **May-22**
Designed: **HS**
Checked: **AA**

Flush Array Frame System Spacing Table For (Tin Roofs)

Type of Rail	Nova Rail (F55-0000.A101)
Type of Interface	Nova L-Feet
Solar Panel Dimension	2mx1m
Terrain category	**3**

h/d ≤ 0.5 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	1075	1600	1795	2000	1075	1600	1795	2000	925	1435	1695	1955	825	1275	1620	1885
B1	800	1235	1695	2000	800	1235	1695	2000	690	1060	1450	1955	620	950	1290	1885
B2	650	1000	1360	1915	650	1000	1360	1915	560	860	1170	1825	500	765	1040	1615
C	370	570	770	1195	370	570	770	1195	--	490	665	1025	--	440	590	910
D	--	405	545	835	--	405	545	835	--	350	470	720	--	--	420	640
NZ1&NZ2	1075	1535	1720	1980	1075	1535	1720	1980	925	1435	1625	1890	825	1275	1555	1825
NZ3	750	1155	1510	1770	750	1155	1510	1770	645	995	1355	1675	580	885	1205	1605
NZ4	855	1320	1535	1800	855	1320	1535	1800	735	1135	1455	1705	655	1005	1375	1630

h/d ≥ 1.0 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	730	1120	1535	1815	730	1120	1535	1815	630	965	1315	1725	565	860	1170	1645
B1	545	835	1135	1765	545	835	1135	1765	470	720	975	1510	--	645	870	1345
B2	445	675	915	1415	445	675	915	1415	--	585	790	1215	--	520	705	1085
C	--	385	520	800	--	385	520	800	--	--	450	690	--	--	405	615
D	--	--	370	565	--	--	370	565	--	--	--	490	--	--	--	435
NZ1&NZ2	730	1120	1485	1745	730	1120	1485	1745	630	965	1315	1650	565	860	1170	1580
NZ3	510	780	1060	1530	510	780	1060	1530	440	675	910	1410	--	600	815	1255
NZ4	580	890	1210	1555	580	890	1210	1555	500	765	1040	1475	450	685	925	1415

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 11 for defination h and d.**

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Address: **within Australia & New Zealand**

Job: **10101 Rev2 – XIII**
Date: **May-22**
Designed: **HS**
Checked: **AA**

Flush Array Frame System Spacing Table For (Tile Roofs)

Type of Rail — Nova Rail (F55-0000.A101)
Type of Interface — HOP-TRH-F01
Solar Panel Dimension — 1.65mx1m
Terrain category — **2**

h/d ≤ 0.5 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	665	1040	1460	2000	540	845	1170	1905	485	755	1040	1685	460	710	980	1570
B1	665	1040	1460	2000	540	840	1165	1895	485	755	1040	1685	460	710	980	1570
B2	530	830	1150	1870	435	675	925	1480	--	605	830	1325	--	570	785	1240
C	--	555	755	1185	--	450	615	960	--	405	555	865	--	--	520	810
D	--	--	545	830	--	--	445	680	--	--	--	615	--	--	--	580
NZ1&NZ2	590	925	1290	1955	485	750	1035	1670	435	675	925	1480	410	635	870	1390
NZ3	415	640	880	1405	340	525	715	1130	--	470	645	1010	--	445	605	945
NZ4	435	675	925	1480	355	550	750	1190	--	495	675	1060	--	465	635	995

h/d ≥ 1.0 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	445	690	950	1525	365	565	770	1225	325	505	690	1090	--	475	650	1020
B1	445	690	950	1525	--	560	770	1215	--	505	690	1090	--	475	650	1020
B2	--	555	760	1200	--	455	615	965	--	--	555	870	--	--	525	815
C	--	--	505	790	--	--	415	640	--	--	--	575	--	--	--	540
D	--	--	--	565	--	--	--	465	--	--	--	420	--	--	--	--
NZ1&NZ2	400	615	845	1350	325	505	685	1085	--	455	615	965	--	430	580	910
NZ3	--	430	590	920	--	355	480	745	--	--	435	670	--	--	410	630
NZ4	--	455	615	965	--	370	505	785	--	335	455	705	--	--	430	660

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 11 for defination h and d.**

Flush Array Frame System Spacing Table For (Tile Roofs)

Type of Rail — Nova Rail (F55-0000.A101)
Type of Interface — HOP-TRH-F01
Solar Panel Dimension — 1.65mx1m
Terrain category — **3**

h/d ≤ 0.5 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	815	1295	1830	2000	815	1295	1830	2000	700	1100	1545	2000	620	970	1350	1980
B1	810	1280	1815	2000	810	1280	1815	2000	695	1095	1535	2000	620	970	1350	1980
B2	650	1020	1430	2000	650	1020	1430	2000	560	875	1215	1925	495	775	1070	1730
C	435	675	925	1445	435	675	925	1445	--	580	795	1245	--	515	705	1105
D	--	490	660	1015	--	490	660	1015	--	420	570	870	--	--	510	775
NZ1&NZ2	720	1140	1600	2000	720	1140	1600	2000	620	975	1360	1985	550	860	1195	1915
NZ3	505	785	1090	1760	505	785	1090	1760	435	675	930	1490	390	600	825	1310
NZ4	530	825	1140	1855	530	825	1140	1855	455	705	975	1565	405	630	865	1375

Gamcorp (Melbourne) Pty Ltd
A.C.N 141 076 904 A.B.N 73 015 060 240
www.gamcorp.com.au solar@gamcorp.com.au
Tel: +61 3 9543 2211

Client: **Hopergy Australia Pty Ltd**
Project: **Flush Array Frame System Spacing Table For (Tin & Tile Roofs)**
Address: **within Australia & New Zealand**

Job: **10101 Rev2 – XIII**
Date: **May-22**
Designed: **HS**
Checked: **AA**

h/d ≥ 1.0 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	545	850	1180	1905	545	850	1180	1905	470	730	1005	1615	415	645	885	1410
B1	540	845	1170	1900	540	845	1170	1900	465	725	1000	1605	--	645	885	1410
B2	440	680	935	1495	440	680	935	1495	--	585	800	1270	--	520	705	1115
C	--	455	615	965	--	455	615	965	--	--	530	830	--	--	475	735
D	--	--	450	685	--	--	450	685	--	--	--	590	--	--	--	530
NZ1&NZ2	485	755	1040	1680	485	755	1040	1680	420	650	890	1420	370	575	785	1245
NZ3	340	525	720	1135	340	525	720	1135	--	455	620	970	--	405	550	860
NZ4	360	550	755	1195	360	550	755	1195	--	475	645	1015	--	425	575	900

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 11 for defination h and d.**

Flush Array Frame System Spacing Table For (Tile Roofs)

Type of Rail — Nova Rail (F55-0000.A101)
Type of Interface — HOP-TRH-F01
Solar Panel Dimension — 2mx1m
Terrain category — **2**

h/d ≤ 0.5 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	545	860	1200	1925	445	695	965	1570	400	625	860	1390	380	585	805	1295
B1	545	860	1200	1925	445	690	960	1560	400	625	860	1390	380	585	805	1295
B2	440	685	945	1540	360	555	765	1220	--	500	685	1090	--	470	645	1025
C	--	455	625	975	--	370	505	790	--	335	455	710	--	--	430	670
D	--	--	450	685	--	--	370	560	--	--	--	505	--	--	--	480
NZ1&NZ2	490	765	1065	1745	400	620	855	1380	360	555	765	1220	340	525	720	1145
NZ3	340	530	725	1160	--	430	590	930	--	390	530	835	--	365	500	780
NZ4	360	555	765	1220	--	455	620	980	--	405	555	875	--	385	525	820

h/d ≥ 1.0 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	370	570	785	1260	--	465	635	1010	--	415	570	900	--	395	535	845
B1	370	570	785	1260	--	460	635	1000	--	415	570	900	--	395	535	845
B2	--	455	625	990	--	375	510	795	--	--	460	715	--	--	430	675
C	--	--	420	650	--	--	340	525	--	--	--	475	--	--	--	445
D	--	--	--	465	--	--	--	385	--	--	--	345	--	--	--	--
NZ1&NZ2	325	510	700	1110	--	415	565	895	--	375	510	795	--	355	480	750
NZ3	--	355	485	760	--	--	395	615	--	--	360	555	--	--	335	520
NZ4	--	375	510	795	--	--	415	645	--	--	375	580	--	--	355	545

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 11 for defination h and d.**

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Flush Array Frame System Spacing Table For (Tile Roofs)

Type of Rail	Nova Rail (F55-0000.A101)
Type of Interface	HOP-TRH-F01
Solar Panel Dimension	2mx1m
Terrain category	**3**

h/d ≤ 0.5 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	670	1065	1510	2000	670	1065	1510	2000	575	910	1275	1955	510	800	1115	1840
B1	665	1060	1500	2000	665	1060	1500	2000	575	900	1265	1955	510	800	1115	1840
B2	535	845	1180	1915	535	845	1180	1915	465	720	1005	1640	410	635	880	1425
C	360	555	765	1195	360	555	765	1195	--	480	655	1025	--	425	580	910
D	--	405	545	835	--	405	545	835	--	350	470	720	--	--	420	640
NZ1&NZ2	595	940	1325	1980	595	940	1325	1980	515	805	1120	1855	455	710	985	1605
NZ3	415	650	895	1450	415	650	895	1450	360	560	770	1230	--	495	680	1080
NZ4	435	680	940	1530	435	680	940	1530	375	580	805	1290	335	520	710	1135

h/d ≥ 1.0 *

Wind Region	Building Height – h (m)															
	h≤5				5<h≤10				10<h≤15				15<h≤20			
	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal	Corner	Edge	Intermediate	Internal
A	450	700	970	1585	450	700	970	1585	385	600	830	1335	345	530	730	1165
B1	445	695	965	1570	445	695	965	1570	385	595	825	1325	--	530	730	1165
B2	360	560	770	1230	360	560	770	1230	--	480	660	1050	--	425	585	920
C	--	375	510	795	--	375	510	795	--	--	440	685	--	--	390	605
D	--	--	370	565	--	--	370	565	--	--	--	490	--	--	--	435
NZ1&NZ2	400	620	860	1385	400	620	860	1385	345	535	735	1175	--	475	650	1025
NZ3	--	435	595	935	--	435	595	935	--	375	510	800	--	335	455	710
NZ4	--	455	620	985	--	455	620	985	--	390	535	840	--	350	475	740

*** For intermediate values of h/d ratios, linear interpolation shall be used. Refer Note 11 for defination h and d.**

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Designed: **HS**
Address: **within Australia & New Zealand** Checked: **AA**

General Notes

Note 1 Array frame components specified in the certificate are satisfied to use according to AS/NZS 1170.2-2021

Note 2 Tin Roof: Spacing calculated based on 1.9mm steel purlin or 35mm screw embedment length into timber (JD4 seasoned timber)
This spacing must be reduced by a certain percentage for purlins less than 1.9mm or 25mm screw embedment into timber as follows:

Purlins/Battens Thickness Screw Embedment	Reduction – WR* (A, B & NZ)	Reduction – WR* (C & D)
0.55mm Battens	26%	26%
0.75mm Battens	36%	36%
1.2mm Purlins	70%	70%
1.5mm Purlins	78%	78%
25mm Screw Embedment	78%	98%

***WR** stand for Wind Region

Example: if the base spacing is 1500mm and the reduction is 26% then final spacing will be 1500*0.26 = 390mm. Note that if the reduced interface spacing is less than 350mm then the installation of PV panels is not allowed within the correspondence roof zone

Note 3 Tile Roof: Spacing calculated based on 1.9mm steel rafters (topchord of the truss) or 35mm screw embedment length into rafters (topchord of the truss) (JD4 seasoned timber)

Note 4 Recommended screws

Metal Purlins/Battens/Rafters	14g-10 TPI Teks screws or approved equivalent
Timber Purlins/Battens/Rafters	14g-10 TPI T17 screws or approved equivalent

Note 5 Maximum uplift wind pressure is limited to 5kPa.

Note 6 Deflection is limited to Minimum of L/120 and 15mm.

Note 7 Panels to be installed parallel to roof surface.

Note 8 "--" states NOT SUITABLE FOR INSTALLATION.

Note 9 Refer to section 4.2.1 of AS/NZS 1170.2:2021 for terrain category definition.

Note 10 Wind regions are shown in Figure 3.1(A)&(B) of AS/NZS 1170.2:2021.

Note 11 Building height is average roof height of structure above ground. Refer to Figure 1 for definition of h, d and b.

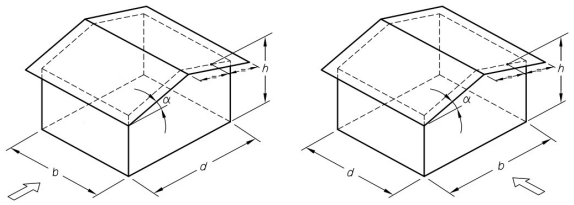
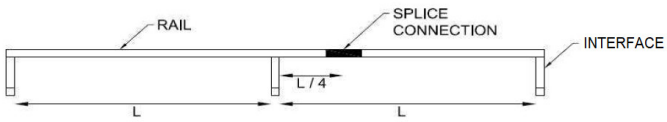


Figure 1 – h, d and b definition

Note 12 The optimised location of rail splice connection is at quarter length of the spacing of interface. No Splice connection should be placed at the centre of spacing or over the interface.



Note 13 Refer to Figure 2 for definition of roof zones.

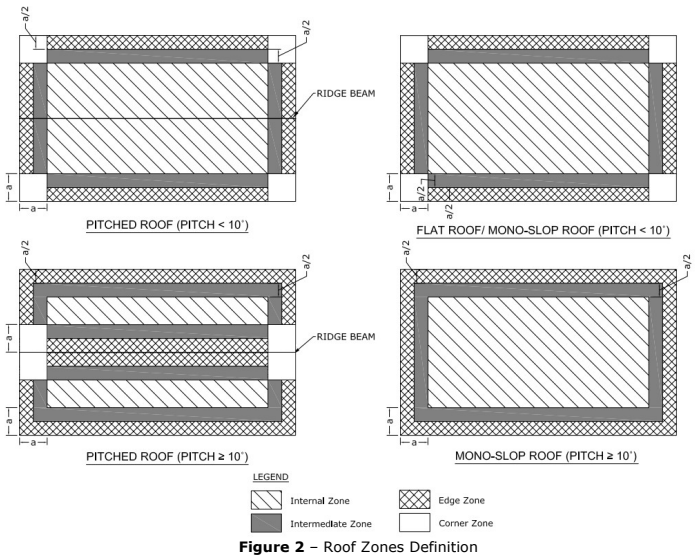


Figure 2 – Roof Zones Definition

In Figure 2, the value of dimension "a" is the minimum of 0.2b or 0.2d, if (h/b) or (h/d) ≥ 0.2; or 2h if both (h/b) and (h/d) < 0.2 (b & d are building dimensions and h is average roof height, see Figure 1)

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Note 14 The interface spacing must be reduced by a certain percentage if PV panels length increased as follow:

%Increase in PV Panels Length	%Decrease in Interface Spacing
5%	6%
10%	11%
15%	16%
20%	21%

NOTE: if the reduced interface spacing is less than 350mm then the installation of PV panels is not allowed within the correspondence roof zone

Note 15 Tile hooks (HOP-TRH-F01) must be connected to the steel/timber rafters (topchord of the truss) by 2 screws minimum