



COMPANY PROFILE
TTP ENERGY
2021

นํ้ากําลังอุปกรณ์ฮาร์ดแวร์ นํ้ากําลังเรา ตระกูลไทย

TTP Energy Co., Ltd.,

This subsidiary is a leader in the design, engineering, and construction of solar farms and solar roofs. It also provides maintenance and operation for solar farms and solar roofs. Both domestically and internationally, it is a leader in business development for installing solar energy systems on building roofs for small, medium, large, industrial and other businesses, it is the first such company in Thailand and other Asean countries. It is also a leader and investment business in solar farms and solar roofs systems, and energy conservation in various ways to support efficient use of energy and renewable in the country and the surrounding region.

TTP Energy Objectives

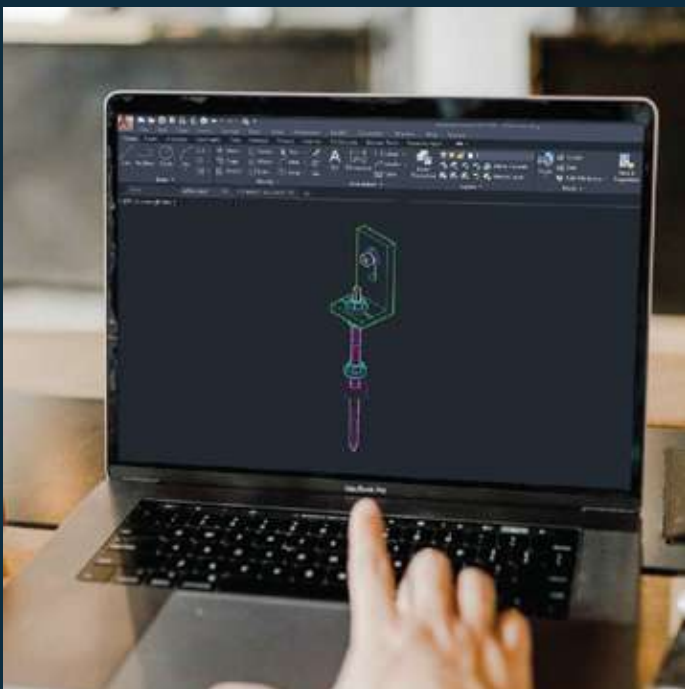
TTP Energy aims to be a leading company in the manufacture of imported goods and the distribution of Solar panels, Solar lamps, Cables, batteries, and solar-related equipment with modern equipment and good-quality products at fair prices as well as services. TTP also endeavours to provide good after-sale service to ensure the satisfaction of customers, and it is also a leader in Domestic online marketing and treatment of business partners with justice.

Quality policy

We are growing company in the Asean region, aiming to provide the distribution of modern and high-quality equipment along with good after-sales service and on-time delivery to the satisfaction of customers. The company has implemented a proper Personnel and Process development Human Resource Policy at present, and thus the company has trained employees to provide good services to customers. The company workers have a wide knowledge of products, and the company management encourages employees to develop themselves and learn throughout with effective safety measures in the company and progress in work.

Products and services

1. Mounting and Panel washers.
2. Solar Panel Heckert (Germany) Brand
3. Solar Panel Risen (China) Brand
4. Solar Panel Longi (China) Brand
5. Repair Service.
6. Installation of solar system.



INSTALL & DESIGN SOLAR CELL SYSTEMS

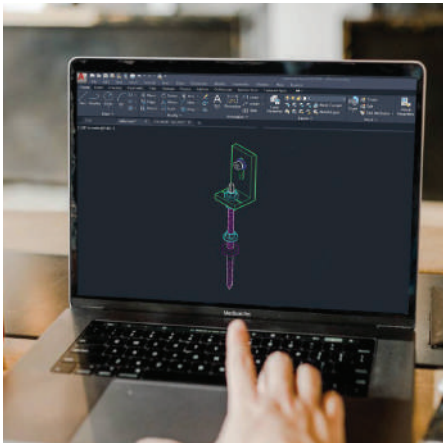


We design and install a whole solar cell system. And with years of experience we make sure we can They can be installed in accordance with mounting standards, bringing us at the forefront of the photovoltaic installation industry.

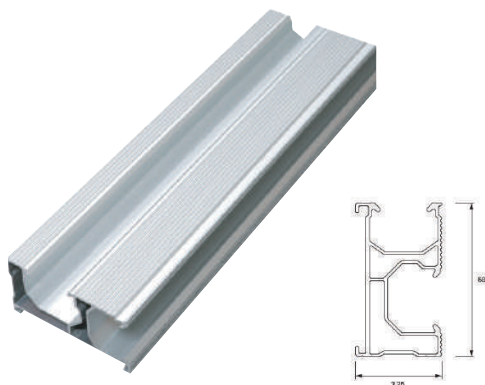


MISSION & GOAL

Our company aims to be one of the most important solar cell manufacturers in terms of both installation and sales of equipment to meet the market demand. It also persists and insists on developing equipment and installation skills to always meet or exceed the required standards.



MOUNTING ○○○



○○○ SOLAR ALU RAIL 4200 MM

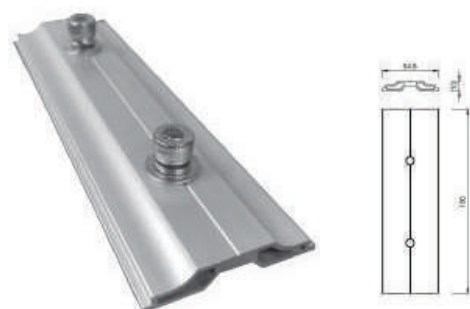
Standard Materials : Aluminium

Finishing : Hot-dip Galvanized

Application :

Houses runs of control and power cable

Used for cable and wire junction, distribution and termination

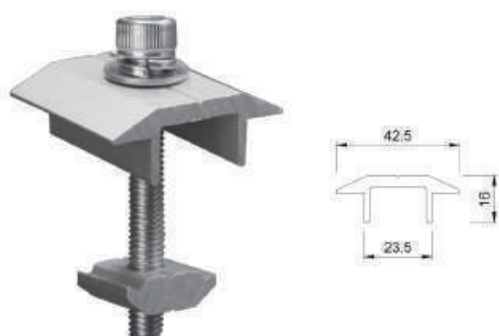


○○○ RAIL JOINER KIT

Standard Materials : Aluminium / SUS304

Finishing : Hot-dip Galvanized

Application : Used for connecting Alu Rail



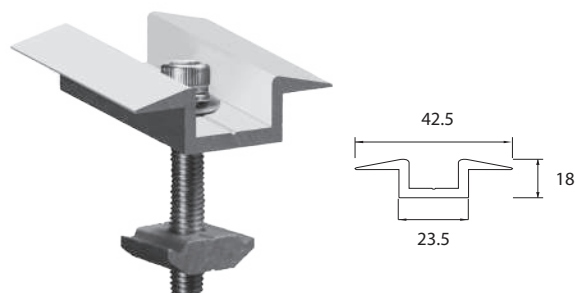
○○○ MID CLAMP Adjusting 55,60,65 MM

Standard Materials : Aluminium / SUS304

Finishing : Hot-dip Anodized AL6005-TS (Aluminium)

Application : The mid-clamp can make the connection between the panels firmly.

Aluminum framed panel clamps for fixing panel on the rail.



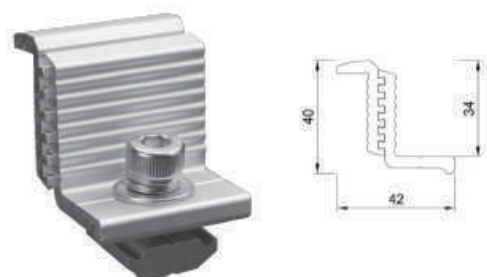
○○○ MID CLAMP HN Adjusting 35,40,50 MM

Standard Materials : Aluminium / SUS304

Finishing : Hot-dip Anodized AL6005-TS (Aluminium)

Application : The mid-clamp can make the connection between the panels firmly.

Aluminum framed panel clamps for fixing panel on the rail.



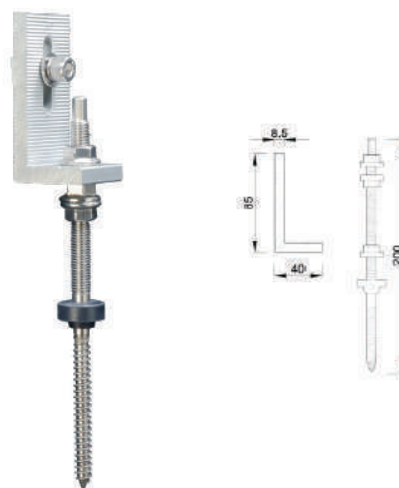
○○○ END CLAMP Adjusting 35-55 MM

Standard Materials : Aluminium / SUS304

Finishing : Hot-dip Anodized AL6005-TS (Aluminium)

Application : End clamps can be connected to the solar panel in the last part of the row.

For mounting panels on the rail



○○○ HOOK M10-200

Standard Materials : Aluminium / SUS304 / Rubber

Finishing : Hot-dip Anodized AL6005-TS (Aluminium)

Application : Attach the rail to the Roman Roof Tiles structure.

MOUNTING ○○○

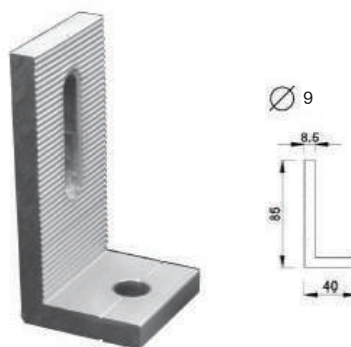


○○● HOOK METAL SHEET

Standard Materials : Aluminium / SUS304 / Steel

Finishing : Hot-dip Anodized AL6005-TS (Aluminium) Hot-dip Zinc (Steel)

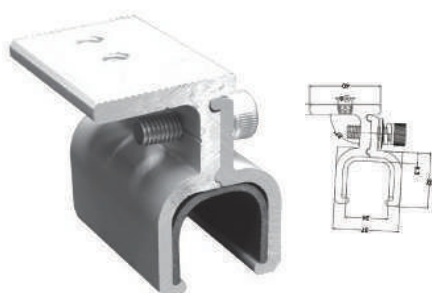
Application : Attach the rail to the metal sheet structure.



○○● L-BACKING 9 MM

Standard Materials : Aluminium

Finishing : Hot-dip Anodized AL6005-TS

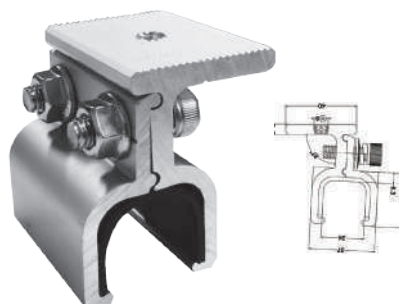


○○● HOOK KLIP LOK 1

Standard Materials : Aluminium / SUS304 / Rubber

Finishing : Hot-dip Anodized AL6005-TS (Aluminium)

Application : Attach the rail to the metal sheet structure.

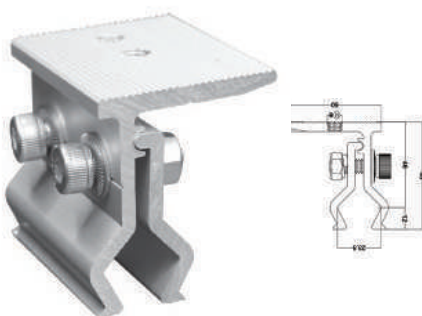


○○● HOOK KLIP LOK 1 Slim

Standard Materials : Aluminium / SUS304 / Rubber

Finishing : Hot-dip Anodized AL6005-TS (Aluminium)

Application : Attach the rail to the metal sheet structure.

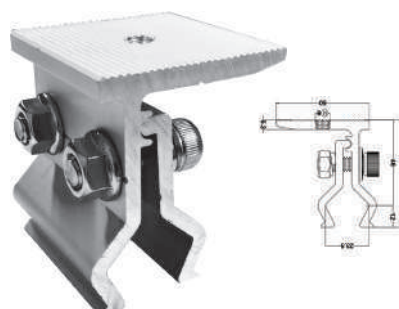


○○● HOOK KLIP LOK 2

Standard Materials : Aluminium / SUS304

Finishing : Hot-dip Anodized AL6005-TS (Aluminium)

Application : Attach the rail to the metal sheet structure.



○○● HOOK KLIP LOK 2 Slim

Standard Materials : Aluminium / SUS304

Finishing : Hot-dip Anodized AL6005-TS (Aluminium)

Application : Attach the rail to the metal sheet structure.

MOUNTING ○○○



○○○ ROOF HOOK

Standard Materials : SUS304

Finishing : Hot-dip Galvanized

Application : Attach the rail to the Concrete Tile structure.

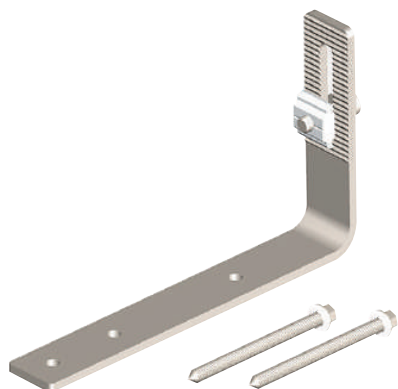


○○○ ROOF HOOK

Standard Materials : SUS304

Finishing : -

Application : -



○○○ ROOF HOOK

Standard Materials : SUS304

Finishing : -

Application : -



○○○ ROOF HOOK

Standard Materials : SUS304

Finishing : -

Application : -



○○○ ROOF HOOK

Standard Materials : SUS304

Finishing : -

Application : -



○○○ ROOF HOOK

Standard Materials : SUS304

Finishing : -

Application : -

MOUNTING ○○○



○○○ 60X1500 / 60X2000
FRONT & BACK FEET POLE

Standard Materials : Steel
Finishing : Hot-dip Galvanized
Application :



○○○ 25X1300 / 25X1390
PIPING SUPPORT

Standard Materials : Steel
Finishing : Hot-dip Galvanized
Application :



○○○
SOLAR U-CLAMP Solar Triangle

Standard Materials : Steel
Finishing : Hot-dip Galvanized
Application : Used for connecting Alu Rail



○○○
SOLAR TRIANGLE

Standard Materials : Steel
Finishing : Hot-dip Galvanized
Application : Used for connecting Alu Rail



○○○
SOLAR P-CLAMP

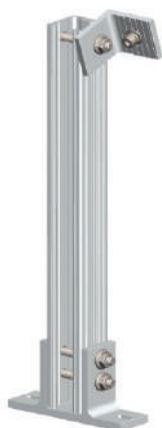
Standard Materials : Steel
Finishing : Hot-dip Galvanized
Application : Used for connecting Alu Rail



○○○
ADJUSTABLE TRIANGLE KIT 15/30

Standard Materials : Steel
Finishing : Hot-dip Galvanized
Application : Used for connecting Alu Rail

MOUNTING ○○○



○○○ ADJUSTED BACK FEET A

Standard Materials : Aluminium / SUS304 / Rubber

Finishing : Hot-dip Galvanized

Application :



○○○ ADJUSTED BACK FEET B

Standard Materials : Aluminium / SUS304 / Rubber

Finishing : Hot-dip Galvanized

Application :



○○○ ADJUSTED BACK FEET A 10 -15

Standard Materials : Aluminium / SUS304 / Rubber

Finishing : Hot-dip Galvanized

Application :



○○○ ADJUSTED BACK FEET B 10 -15

Standard Materials : Aluminium / SUS304 / Rubber

Finishing : Hot-dip Galvanized

Application :

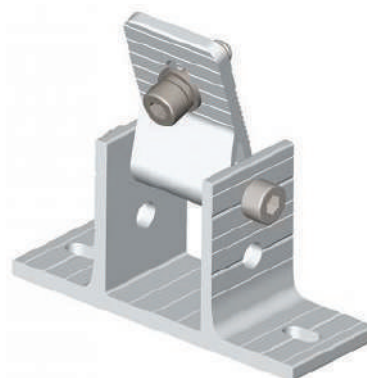


○○○ ADJUSTED FRONT FEET A

Standard Materials : Aluminium / SUS304 / Rubber

Finishing : Hot-dip Galvanized

Application :



○○○ ADJUSTED FRONT FEET B

Standard Materials : Aluminium / SUS304

Finishing : Hot-dip Galvanized

Application :

MOUNTING ○○○



○○○ EARTHING KIT

Standard Materials : Aluminium / SUS304
Finishing : Hot-dip Anodized AL6005-TS (Aluminium)
Application : -



○○○ CABLE CLIP

Standard Materials : SUS304



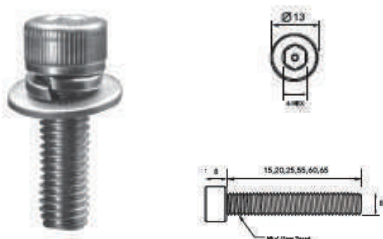
○○○ GROUND STAINLESS PLATE

Standard Materials : SUS304
Finishing : -
Application : -



○○○ GROUND STAINLESS PLATE

Standard Materials : SUS304
Finishing : -
Application : -



○○○ T-NUT 15,20,25,55,60,65

Standard Materials : SUS304



○○○ T-NUT

Standard Materials : Aluminium
Finishing : Hot-dip Anodized AL6005-TS (Aluminium)

CABLE LADDER ○○○



○○● CABLE LADDER

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● LADDER HORIZONTAL BEND 90HB

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● LADDER VERTICAL INSIDE 90VI

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● LADDER VERTICAL OUTSIDE 90VO

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● LADDER HORIZONTAL TEE HT

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● LADDER SPLICE PLATE OUT

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :

CABLE LADDER ○○○



○○● PERFORATED TRAY

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● HORIZONTAL BEND 90HB-LVH

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● VERTICAL INSIDE 90VI-LVH

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● VERTICAL OUTSIDE 90VO-LVH

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● HORIZONTAL TEE HT-LVH

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :



○○● SPLICE PLATE OUT

Standard Materials : Steel Sheet 2.0 mm.
Finishing : Hot-dip Galvanized
Application :

ARMY CAMP SOLAR POWER PLANT : 1MW SOUTH OF THAILAND





Nomsangsupan



S.Mongkol ushakam Ltd.



Inpawin



N.S.S Ltd.



Partnership J.R Quality



Huahin Hospital



Pitoon



Partnership Boom Autopart



Tong garden Ltd.



Chaiponfram



CP All



Trakul Thai Factory



Trakul thai Factory 2



Trakul thai Factory 6



Kalasin



Prachinburi 1 Mk

Maintenance



Lopburi 5 Mw



Samutsakorn 1 Mw

Maintenance



Suphanburi 5 Mw



Ratchaburi 500 Kw

Maintenance



Kimhang Ltd. 500 Kw



CP All Patthanakan 10 Kw

การทดสอบกำลังการต้านทานแรงดึงของอุปกรณ์จับยึดหลังคา (ตัวจีบ)

TENSION TEST OF ROOF HOOK KLIP LOCK (2)

บริษัท คอสมอส บรีวเวอรี่ (ประเทศไทย) จำกัด

บริษัท ไทยเบฟเวอเรจ เอ็นเนอร์ยี่ จำกัด

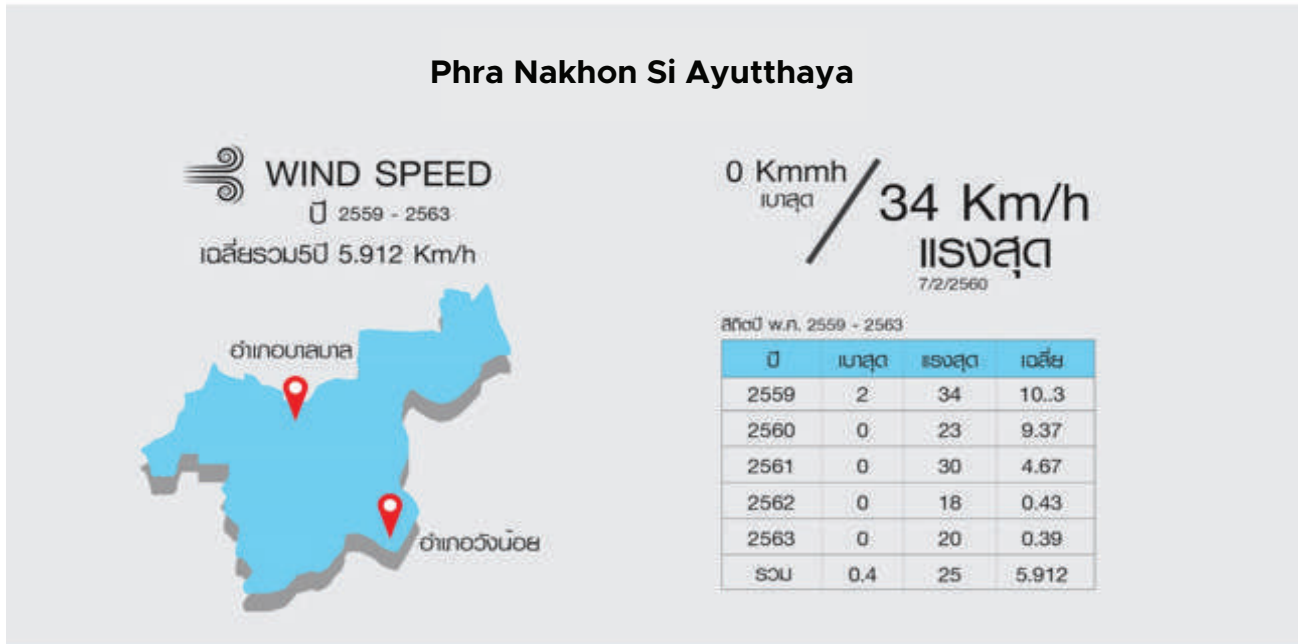
บริษัท โซลาริส ไซแอม จำกัด



พิกัด : 77 พหลโยธิน ถ.พหลโยธิน ตำบล ลำไทร อำเภอวังน้อย จังหวัดพระนครศรีอยุธยา 13170

บริษัท ทีทีพี เอนเนอร์จี จำกัด

WIND LOAD TEST



Example of Mounting Test of Phra Nakhon Si Ayutthaya Province 2015-2020 (5 Years)
 The average wind load is 5.912 Km/h.
 Strongest winds at 34 Km/h (2015) - Lightest at 0 Km/h (2019)
 Standardized High-rise building control Which has the following levels

Building Height	Unit of wind load at least	The specified value (greater than)
Height restriction laws	10 meters	50 Kg/m ²
Height restriction laws	10 meters but not more than 20 meters	80 Kg/m ²
Height restriction laws	20 meters but not more than 40 meters	120 Kg/m ²
Height restriction laws	Upper 40 meter	160 Kg/m ²

ข้อกำหนดที่ใช้ในการคำนวณออกแบบอาคารต้นแบบของกรมโยธาธิการและผังเมือง พ.ศ. 2550

กฎกระทรวง ว่าด้วย หน่วยงานวิศวกรรมที่ใช้ในการออกแบบ ออกโดย พระราชบัญญัติควบคุมอาคาร พ.ศ. 2522

HEIGHT OF THE BUILDING
15M
TENSILE TEST STANDARD
60 KG

TEST RESULTS
100.27KG



Phra Nakhon Si Ayutthaya



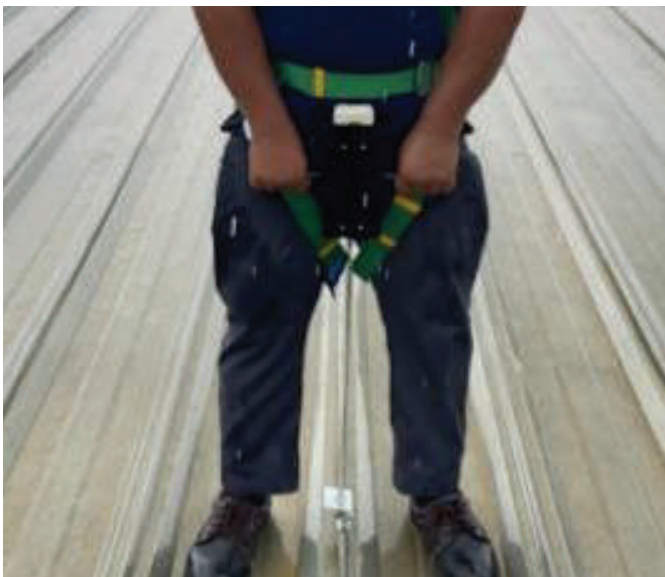
Phra Nakhon Si Ayutthaya



Phra Nakhon Si Ayutthaya



Phra Nakhon Si Ayutthaya



Phra Nakhon Si Ayutthaya



Phra Nakhon Si Ayutthaya

การทดสอบกำลังการต้านทานแรงดึงของอุปกรณ์จับยึดหลังคา (โค้ง)

TENSION TEST OF ROOF HOOK KLIP LOCK (1)

บริษัท โออิชิ ฟู้ด เซอร์วิส จำกัด

บริษัท ไทยเบฟเวอเรจ เอ็นเนอร์ยี่ จำกัด

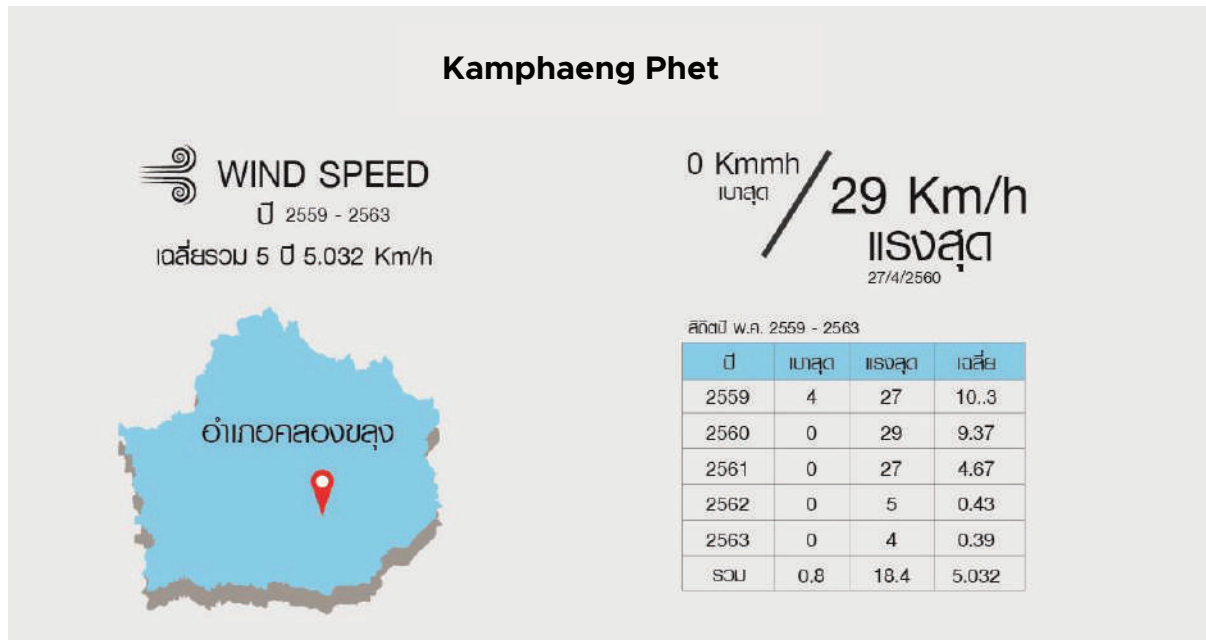
บริษัท โซลาริส โซลแอม จำกัด



พิกัด : 283/2 หมู่ที่ 3 ตำบล หนองซาก อำเภอบ้านบึง ชลบุรี 20170

บริษัท ทีทีพี เอนเนอร์จี จำกัด

WIND LOAD TEST



Example of Mounting Test of Kamphaeng Phet Province 2015-2020 (5 Years)
 The average wind load is 5.032 Km/h.
 Strongest winds at 29 Km/h (2016) - Lightest at 0 Km/h (2020)
 Standardized High-rise building control Which has the following levels

Building Height	Unit of wind load at least	The specified value (greater than)
Height restriction laws	10 meters	50 Kg/m ²
Height restriction laws	10 meters but not more than 20 meters	80 Kg/m ²
Height restriction laws	20 meters but not more than 40 meters	120 Kg/m ²
Height restriction laws	Upper 40 meter	160 Kg/m ²

ข้อกำหนดที่ใช้ในการคำนวณออกแบบอาคารต้นแบบของกรมโยธาธิการและผังเมือง พ.ศ. 2550
 กฎกระทรวง ว่าด้วย หน่วยงานความรับผิดชอบในการออกแบบ ออกโดย พระราชบัญญัติควบคุมอาคาร พ.ศ. 2522

HEIGHT OF THE BUILDING
15M
TENSILE TEST STANDARD
60 KG

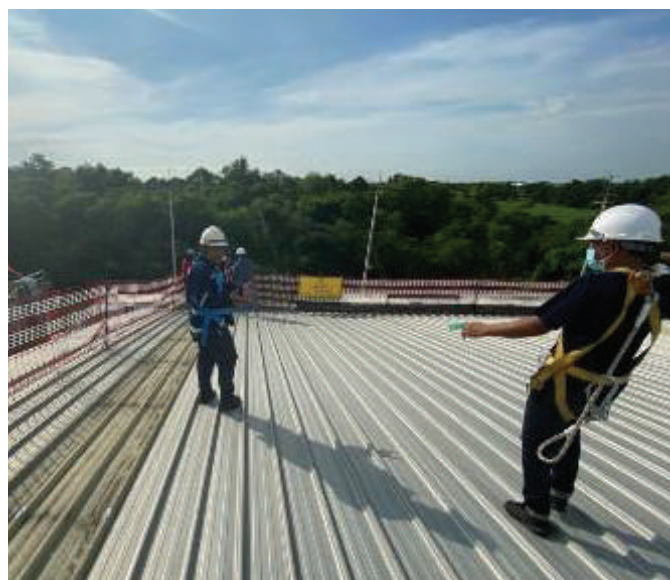
TEST RESULTS
100.94 KG



Chonburi



Chonburi



Chonburi



Chonburi



Chonburi



Chonburi

การทดสอบกำลังการต้านทานแรงดึงของอุปกรณ์จับยึดหลังคา (ตัวจีบ)

TENSION TEST OF ROOF HOOK KLIP LOCK (2)

บริษัท เปียร์ไทย (1991) จำกัด (มหาชน)

บริษัท ไทยเบฟเวอเรจ เอ็นเนอร์ยี่ จำกัด

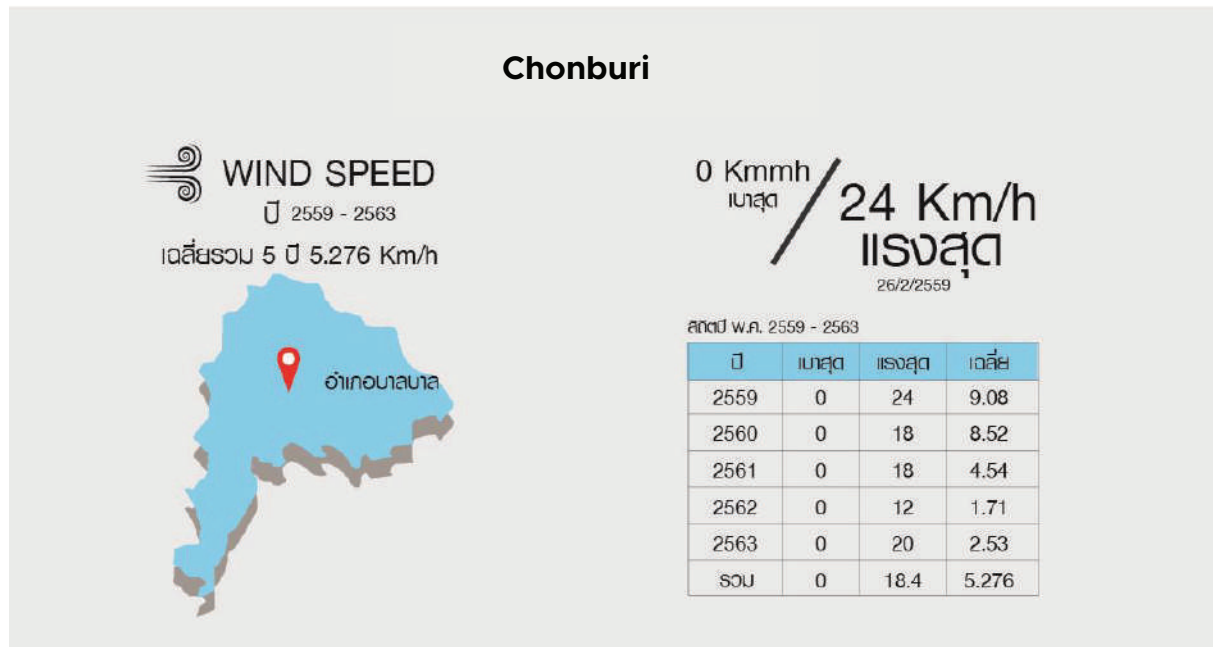
บริษัท โซลาริส โซแอม จำกัด



พิกัด : 349 หมู่ 2 ตำบลแม่ลาด อำเภอลองขลุง จังหวัดกำแพงเพชร 62120

บริษัท ทีทีพี เอนเนอร์ยี่ จำกัด

WIND LOAD TEST



Example of Mounting Test of Chonburi Province 2015-2020 (5 Years)

The average wind load is 5.276 Km/h.

Strongest winds at 24 Km/h (2010) - Lightest at 0 Km/h (2016)

Standardized High-rise building control Which has the following levels

Building Height	Unit of wind load at least	The specified value (greater than)
Height restriction laws	10 meters	50 Kg/m ²
Height restriction laws	10 meters but not more than 20 meters	80 Kg/m ²
Height restriction laws	20 meters but not more than 40 meters	120 Kg/m ²
Height restriction laws	Upper 40 meter	160 Kg/m ²

ข้อกำหนดที่ใช้ในการคำนวณออกแบบอาคารต้านลมของกรมโยธาธิการและผังเมือง พ.ศ. 2550

กฎกระทรวง ว่าด้วย หน่วยงานวิศวกรรมที่ใช้ในการออกแบบ ออกโดย พระราชบัญญัติควบคุมอาคาร พ.ศ. 2522

HEIGHT OF THE BUILDING
15M
TENSILE TEST STANDARD
60 KG

TEST RESULTS
100.18 KG



Kamphaeng Phet



Kamphaeng Phet



Kamphaeng Phet



Kamphaeng Phet



Kamphaeng Phet



Kamphaeng Phet

การทดสอบกำลังการต้านทานแรงดึงของอุปกรณ์จับยึดหลังคา (โค้ง)

TENSION TEST OF ROOF HOOK KLIP LOCK (1)

บริษัท โออิชิ เทรตติ้ง จำกัด

บริษัท ไทยเบฟเวอเรจ เอ็นเนอร์ยี่ จำกัด

บริษัท โซลาริส โซแอม จำกัด

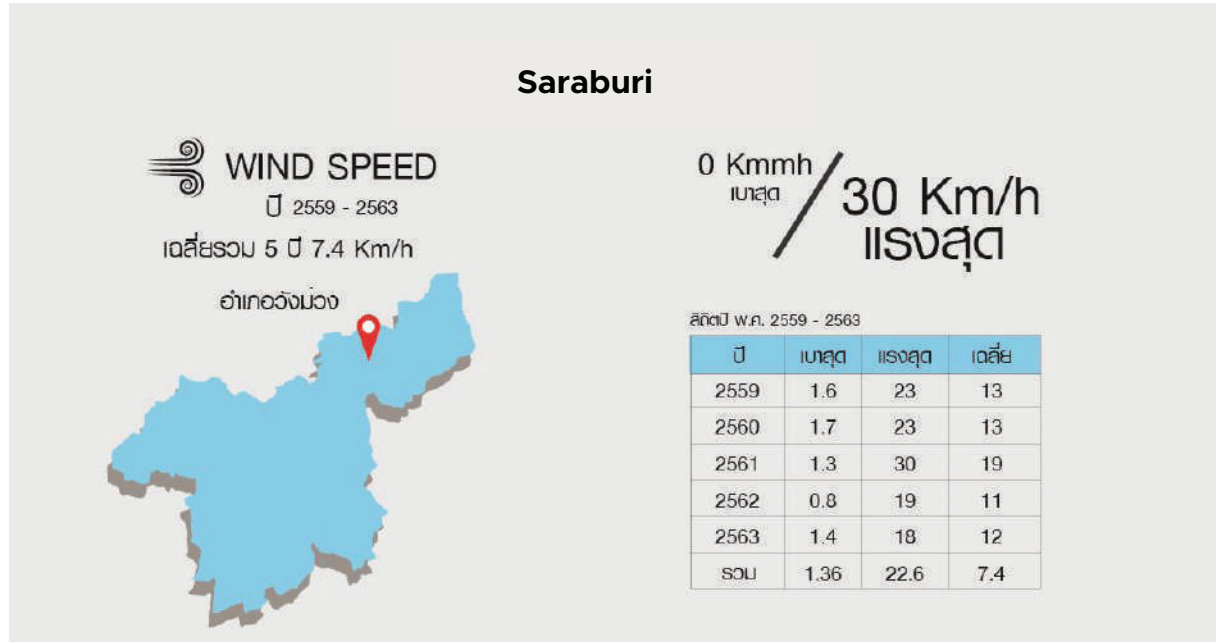


พิกัด : 333 หมู่ 1 ตำบลแสงพัน อำเภอวังม่วง จังหวัดสระบุรี 18220

บริษัท ทีทีพี เอนเนอร์จี จำกัด

22/154 เพชรเกษม 69 แขวงหนองค้างพลู เขตหนองแขม กรุงเทพมหานคร 10160 ประเทศไทย

WIND LOAD TEST



Example of Mounting Test of Kamphaeng Phet Province 2015-2020 (5 Years)
 The average wind load is 7.4 Km/h.
 Strongest winds at 30 Km/h (2016) - Lightest at 0 Km/h (2020)
 Standardized High-rise building control Which has the following levels

Building Height	Unit of wind load at least	The specified value (greater than)
Height restriction laws	10 meters	50 Kg/m ²
Height restriction laws	10 meters but not more than 20 meters	80 Kg/m ²
Height restriction laws	20 meters but not more than 40 meters	120 Kg/m ²
Height restriction laws	Upper 40 meter	160 Kg/m ²

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 กฎกระทรวง ว่าด้วย หน่วยงานความถี่ลมที่ใช้ในการออกแบบ ออกโดย พระราชบัญญัติควบคุมอาคาร พ.ศ. 2522

HEIGHT OF THE BUIDING
 15M
 TENSILE TEST STANDARD
 60 KG

TEST RESULTS
102.71 KG



Saraburi



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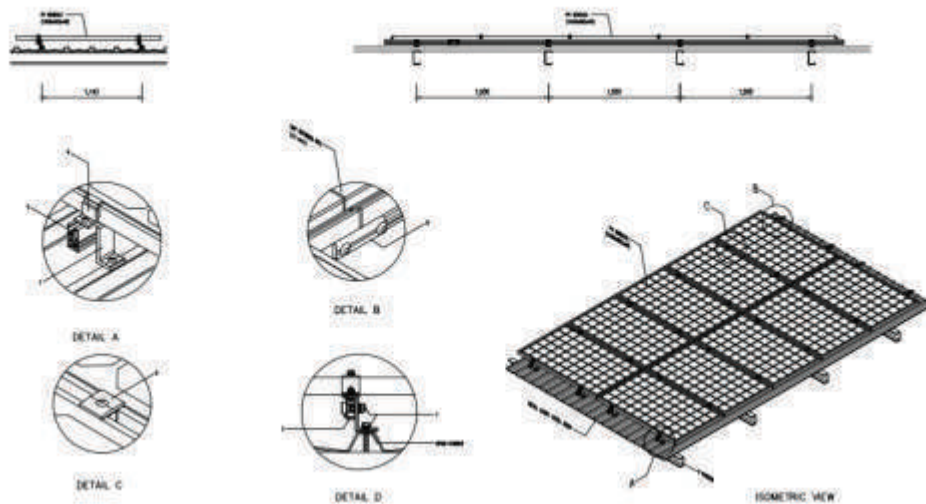
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TORQUE TEST

Reference Safety Torque List

รายการ	Torque Value (N*m)
SOLAR MID CLAMP ADJUSTING	8-14
SOLAR END CLAMP ADJUSTING 35-55 mm.	8-14
SOLAR L-BACKING 9 mm.	8-14
ROOF HOOK KLIP LOK 1	8-16
ROOF HOOK KLIP LOK 2	8-16
SOLAR ALU SD RAIL JOINER SPLICE KIT 180 mm.	8-16
SOLAR ALU STANDARD RAIL 4200 MM	-

(Note) รายการนี้แสดงค่าแรงบิดที่แนะนำให้ใช้สำหรับระบบรางโซลาร์เซลล์เท่านั้น และค่าแรงบิดนี้ไม่ได้รวมค่าแรงบิดที่จำเป็นในการขันน็อตหรือสกรูที่ใช้ในการติดตั้งระบบรางโซลาร์เซลล์



เครื่องมือที่ใช้ในการทดสอบ

1. เครื่องทดสอบแรงดึง 1000N Digital Push Pull Gauge

รุ่น HF-1000 JEDTO หมายเลขเครื่อง 381022315

CHECK CERTIFICATE

HOLDER : Protronics Co., Ltd.
PRODUCT : DIGITAL FORCE GAUGE
MODEL : HF-1000
ACCURACY : + 1%
TESTER : Q1
CERTIFIER
DATE : 03/10/2019

Standard (N)	Compression (N)		Stretching (N)	
	Loading	Unload	Loading	Unload
200.0	201.0	200.0	201.0	200.0
400.0	399.0	399.0	401.0	400.0
600.0	597.0	601.0	598.0	597.0
800.0	800.0	799.0	798.0	802.0
1000.0	1005.0	998.0	1004.0	1005.0



DIGITAL FORCE GAUGE
MODEL : HF-1000

Specifications and Parameters Maximum load:1000N

Effective stroke:150 mm

Length x width x height:230x150x490 mm

Effective area of the test area:105x100 mm

Net weight: 9kg

2. ประแจปอนด์ รุ่น YC-617-2ST (Taiwan)



BIKE HAND



CERTIFICATE OF CALIBRATION

Model : 1/4" Serial No: YC-617-2S / BHS1090400101
Wrench Capacity : 2-24NM Inspector : Bryan
Date of Calibration : 2020/4/8 Unit: NM

Set Point :	(CW) +/- 4%		Actual Readings		
	Min	Max			
4	3.84	4.16	4.15	4.14	4.10
10	9.60	10.40	10.34	10.29	10.30
12	11.52	12.48	12.43	12.34	12.40

Testing Standard No: DIN-ISO-6789

Testing is in compliance with international standards with test equipment and reference standards calibrated by a laboratory traceable to international standards

tester Model : ETT-30N
The uncertainty of the equipment at 20°C is < +/- 1%
Inspector Approval: *Bryan Ho*

TENSILE TEST

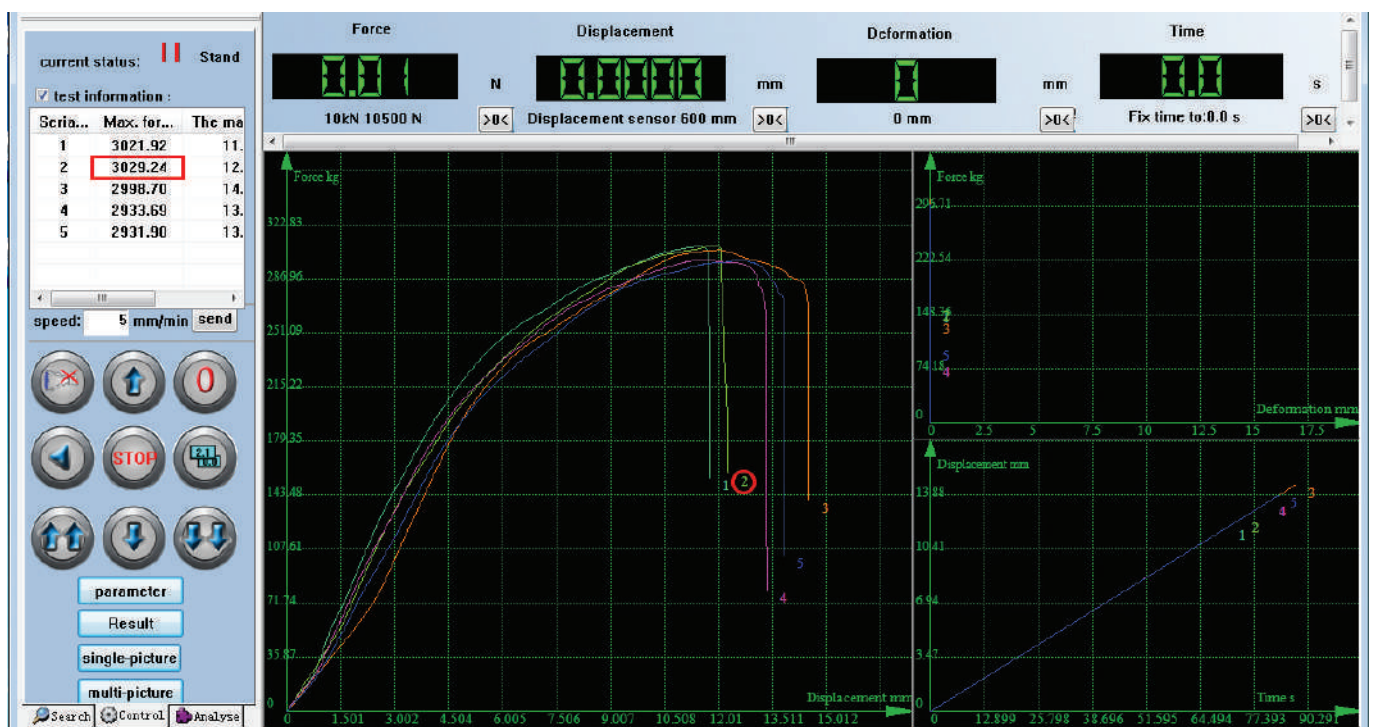
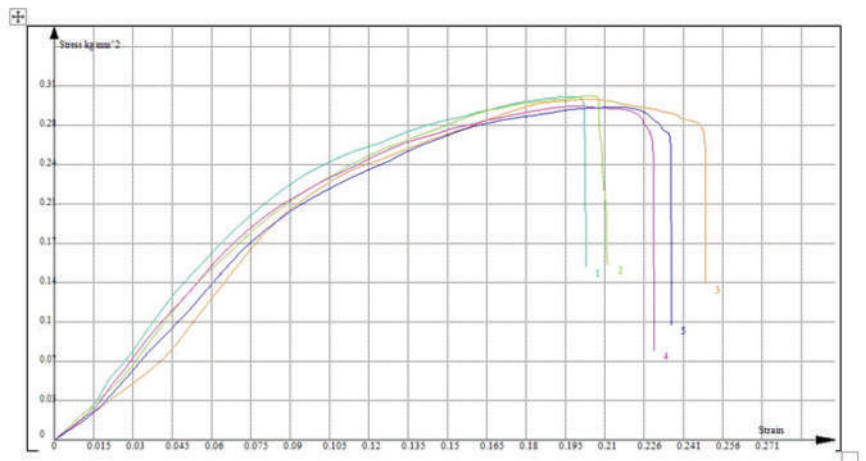
Generic Metal Tensile for Roof Hook Klip Lock

Product Klip Lock Date 2020-09-09 15:02:19 Speed: 5mm/mm

Remarks:



	Diameter	Gage Length	Area	Modulus	Ultimate Force	Tensile strength	Offset @0.2% Force	Elongation manual cal	Elongation Auto Cal
Unit	mm	mm	mm ²	kg/mm ²	kg	kg/mm ²	kg	%	%
Specimen1	36	57.92	1017.88	5.27	308.36	0.30	164.25	1.59	20.33
Specimen2	36	57.97	1017.88	5.14	309.11	0.30	155.58	2.95	21.20
Specimen3	36	58.26	1017.88	4.86	305.99	0.30	203.53	13.15	24.91
Specimen4	36	58.19	1017.88	4.71	299.36	0.29	184.81	12.82	22.94
Specimen5	36	58.67	1017.88	4.29	299.17	0.29	190.42	11.97	23.60
Maximum value	36.00	58.67	1017.88	5.27	309.11	0.30	203.53	13.15	24.91
Minimum value	36.00	57.92	1017.88	4.29	299.17	0.29	155.58	1.59	20.33
Mid-value	36.00	58.19	1017.88	4.71	299.36	0.29	184.81	12.82	22.94
Average value	36.00	58.20	1017.88	4.85	304.40	0.30	179.72	8.50	22.60



TENSILE TEST

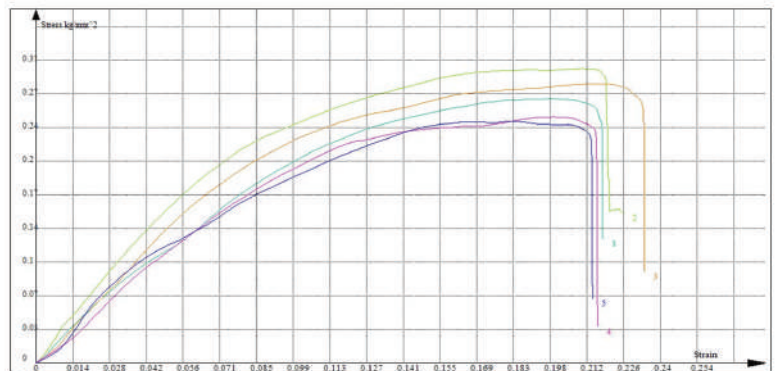
Generic Metal Tensile for Roof Hook Klip Lock

Product Klip Lock 02 Date 2020-09-09 15:02:19 Speed: 5mm/mm



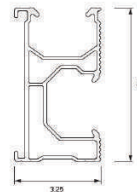
Remarks:

	Diameter	Gage Length	Area	Modulus	Ultimate Force	Tensile strength	Offset @0.2% Force	Elongation manual cal	Elongation Auto Cal
Unit	mm	mm	mm ²	kg/mm ²	kg	kg/mm ²	kg	%	%
Specimen1	36	58.17	1017.88	3.35	272.82	0.27	202.69	12.34	21.78
Specimen2	36	59.63	1017.88	5.10	304.04	0.30	173.73	9.74	22.58
Specimen3	36	59.16	1017.88	4.77	288.61	0.28	166.69	11.87	23.39
Specimen4	36	59.31	1017.88	3.70	254.04	0.25	162.27	9.66	21.58
Specimen5	36	59.86	1017.88	5.54	249.51	0.25	93.30	8.04	21.39
Maximum value	36.00	59.86	1017.88	5.54	304.04	0.30	202.69	12.34	23.39
Minimum value	36.00	58.17	1017.88	3.35	249.51	0.25	93.30	8.04	21.39
Mid-value	36.00	59.31	1017.88	3.70	254.04	0.25	162.27	9.66	21.58
Average value	36.00	59.23	1017.88	4.49	273.80	0.27	159.74	10.33	22.14



Certificate

King Mongkut's University of Technology Thonburi



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SOLAR ALU RAIL 4200 MM

Standard Materials : Aluminium

Finishing : Hot-dip Galvanized

Application :

Houses runs of control and power cable

Used for cable and wire junction, distribution and termination



KING MONGKUT'S UNIVERSITY OF TECHNOLOGY THONBURI
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OUR REF: ISTRS /63277/02

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REPORT OF TEST

SPECIMEN : SOLAR RAIL
CLIENT : TTP ENERGY CO., LTD.
DATE OF INSPECTION : SEPTEMBER 17, 2020

WE REPORT AS FOLLOW:

1. TENSILE TEST

BY SIGNING THIS CERTIFICATE THE TEST CENTER MAKES NO WARRANTY OF ANY KIND AND NEITHER SHALL THE TEST CENTER BE LIABLE FOR ANY PERSONAL INJURY OR PROPERTY DAMAGE ARISING FROM OR CONNECTED WITH THIS INSPECTION.

VERY TRULY YOURS,

TEST BY Nattarat Kerkla
(Ms. Nattarat Kerkla)

CERTIFIED BY Assoc. Prof. Anek Siripanchorn
(Assoc. Prof. Anek Siripanchorn)
Director Institute for Scientific and
Technological Research and service

OUR REF: ISTRS /63277/02

PAGE 2/2

REPORT OF TENSILE TEST

SPECIMEN : SOLAR RAIL
PLACE OF INSPECTION : TOOL AND MATERIAL ENGINEERING SECTION, KMUTT.
DATE OF INSPECTION : SEPTEMBER 17, 2020
DATE OF REPORT : SEPTEMBER 17, 2020
TESTING MACHINE : 1. UNIVERSAL TESTING MACHINE (LLOYD, LR50K)
2. DIGITAL VERNIER CALIPER (MITUTOYO, 150 mm / 0.01)
CONDITIONS : SPEED 5 mm/min, GAUGE LENGTH 50 mm, WIDE 12.5 mm.

RESULTS :

SPECIMENS	TENSILE STRENGTH (MPa)	EXTENSION AT BREAK (%)
1	236.00	16.88
2	192.91	16.55
3	209.78	16.71
4	223.64	15.46
5	222.69	13.51
AVERAGES	217.00	15.82



FIG.1 TENSILE TESTING

***** END OF TEST REPORT *****

Certificate

King Mongkut's University of Technology Thonburi



RAIL JOINER KIT

Standard Materials : Aluminium / SUS304
Finishing : Hot-dip Galvanized
Application : Used for connecting Alu Rail

OUR REF: ISTRS /63277/01

PAGE 2/2

REPORT OF TENSILE TEST

SPECIMEN : SPLICE (JOINER)
PLACE OF INSPECTION : TOOL AND MATERIAL ENGINEERING SECTION, KMUTT.
DATE OF INSPECTION : SEPTEMBER 17, 2020
DATE OF REPORT : SEPTEMBER 17, 2020
TESTING MACHINE : 1. UNIVERSAL TESTING MACHINE (LLOYD, LR50K)
2. DIGITAL VERNIER CALIPER (MITUTOYO, 150 mm / 0.01)
CONDITIONS : SPEED 5 mm/min AND LENGTH 103 mm.
RESULTS :

SPECIMENS	TENSILE MAXIMUM LOAD (N)	TENSILE MAXIMUM LOAD (kg)	EXTENSION AT BREAK (mm)
1	632.07	63.21	0.59
2	610.75	61.08	0.98
3	689.30	68.93	0.60
4	658.74	65.87	1.09
5	605.03	60.50	2.21
AVERAGES	639.18	63.92	1.09



FIG.1 TENSILE TESTING

***** END OF TEST REPORT *****



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OUR REF: ISTRS /63277/01

PAGE 1/2

REPORT OF TEST

SPECIMEN : SPLICE (JOINER)
CLIENT : TTP ENERGY CO., LTD.
DATE OF INSPECTION : SEPTEMBER 17, 2020

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VERY TRULY YOURS,

TEST BY Nattarat Kengkla
(Ms. Nattarat Kengkla)

CERTIFIED BY Anek Siripanichgorn
(Assoc. Prof. Anek Siripanichgorn)
Director Institute for Scientific and
Technological Research and service



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