

RVMATE

Washen

# FASTENING SYSTEM SOLUTIONS FOR SOLAR INDUSTRY



[www.worldrivet.com](http://www.worldrivet.com)

PLEASE CONTACT US UPON YOUR RIVETING REQUIREMENTS!

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RIVMATE RESERVE THE RIGHT TO EXPLAIN AND REVISE FOR BROCHURES

JIANGSU WASHEN FASTENER MANUFACTURE CO.,LTD

SUZHOU RIVMATE IMPORT & EXPORT CO.,LTD



## COMPANY PROFILE

Suzhou Rivmate Import&Export Co.,Ltd  
 Jiangsu Washen Fastener Manufacture Co.,Ltd

Jiangsu Washen Fastener Manufacture Co., Ltd is a High-Tech fastener factory that supplies rivets & solutions to Automobile, Mid/High Voltage Cabinets, Home Appliance industries, and Solar system.

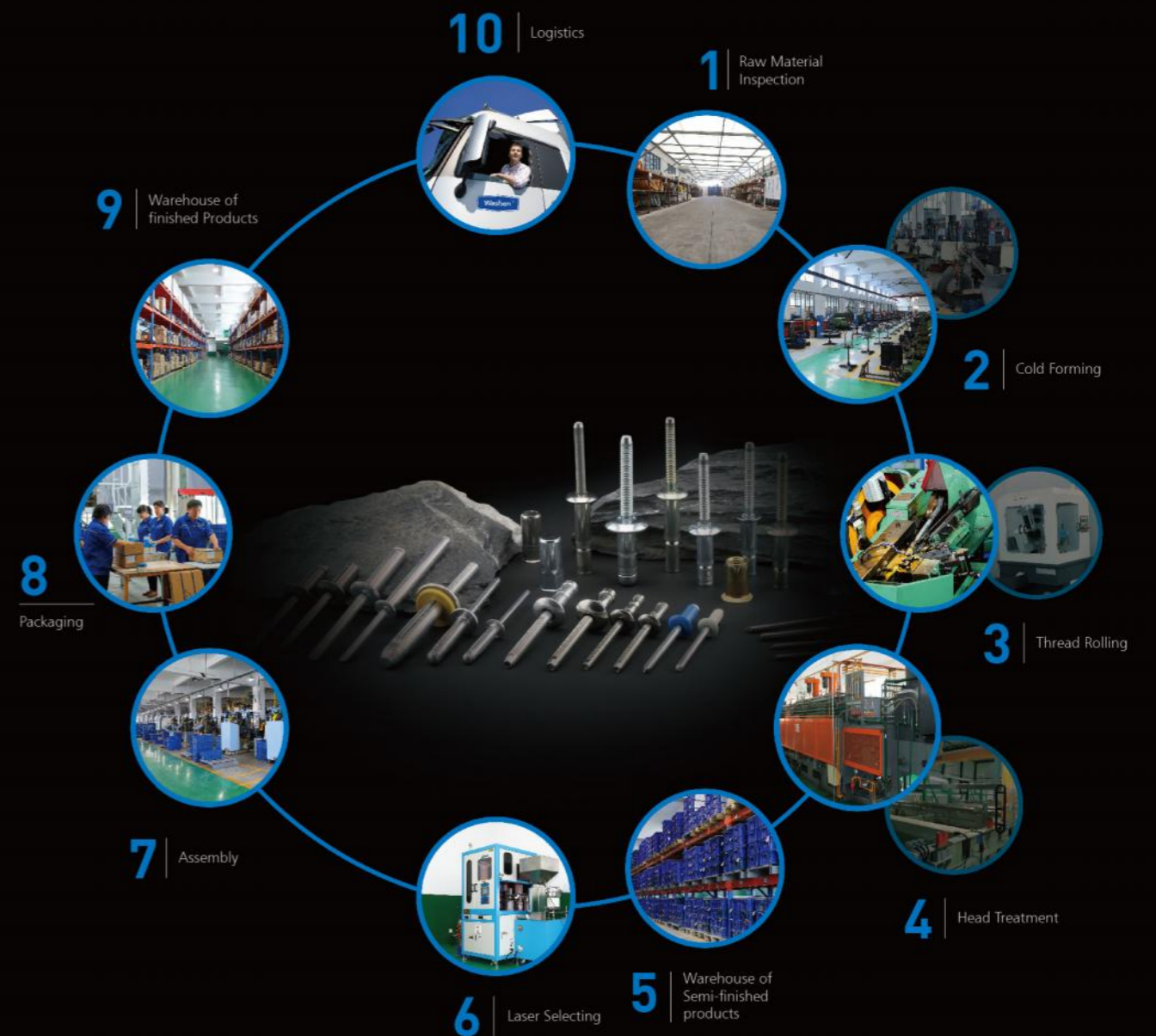
We have introduced 64 sets imported multi-station machines and 6 sets laser selecting machines. Our factory manufactures 400 million pieces of structural rivets and automobile blind rivets, 1 billion standard blind rivets annually now. Our Laboratory is equipped with Measuring Projector, Tensile & Shear Machines, Hardness Testing Set, Vision Measuring System, Destructive Testing Machine, Profilometer, Thickness Testing Machine and Salt Spray Testing Machine so that we can meet the automobile industry, electrical cabinet industry's strict requirement by providing fast & accurate testing data.

We choose top-ranking domestic suppliers as partners, from material selecting, manufacturing, till shipment are all strictly monitored and recorded according to ISO/TS16949 management system. We follow ISO, DIN7337, IFI114, HUCK and Avdel standard, and also we can design and produce according to customer requirement.



## 10 KEY MANUFACTURING PROCEDURES

Rivmate strictly follows the process of producing the fastener products. Each working process is scientifically planned and practiced; each product is tested for multiple times, and each production link is strictly monitored and managed to ensure that each Washen product will have no defect and that Washen can provide the clients with the high-quality fastener products.



# 13 KEY QUALITY CONTROL PROCESSES


Washen has established the laboratory basing on IATF 16949:2016 to provide the clients and the counterpart with the reliable test or calibration data and guarantee the product quality requirements.

The whole production process from the raw materials to the finished fasteners needs at least 13 key quality control tests. We set a lot of barriers for the inferior products to guarantee the quality of Washen fastener products.




# 13

workflows




**1** Direct-reading Spectrometer




**2** Image Mapping




**3** Measuring Projector




**4** Computer Tensile & Shearing Set




**5** Surface Profiler




**6** Film Thickness Measurement




**13** Riveting Test




**12** Rivets Spinning Sets




**11** Push-out Measurer




**10** Salt Spray Test Box



**9** Concentricity Detector



**8** Metallurgical Microscope



**7** Vickers Hardness Instrument

# MULTI-AXIS SOLAR TRACKING MOUNTING SYSTEM

## Gear Drive to Torque Tube BOOM-LOCK/FIXBULB

- $\phi 1\frac{1}{2}$ " / M12mm
- Material: Carbon Steel
- Finish: Zinc nickel/Dacromet
- /600hrs



## Column to Gear Drive BOLTAIL

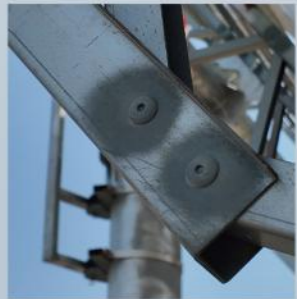
- $\phi 1\frac{1}{2}$ " / M12 / M14mm
- Material: Carbon Steel
- Finish: Zinc nickel/Dacromet
- /600hrs



## Purlin Connection

### HEM-FIRM/NOW-LOCK/MONO-LOCK

- $\phi 6.4$ mm / 7.8mm
- Material: Carbon Steel/Stainless steel
- Finish: Zinc nickel/Passivation
- /600hrs



# TRACKING BRACKET

## Synchronizing Shaft LOCKBOLT

- $\phi 8.0\text{mm}$
- Material: Carbon Steel
- Finish: Zinc nickel/Dacromet
- /600hrs



## Column to Gear Drive BOLTAIL

- $\phi 1/2''/M12/M14\text{mm}$
- Material: Carbon Steel
- Finish: Zinc nickel/Dacromet
- /600hrs



## Gear Drive to Torque Tube BOOM-LOCK/FIXBULB

- $\phi 1/2''/M12\text{mm}$
- Material: Carbon Steel
- Finish: Zinc nickel/Dacromet
- /600hrs



## Purlin to Panel HEM-FIRM

- $\phi 6.4\text{mm}$
- Material: Carbon Steel
- Finish: Zinc nickel/Passivation
- /600hrs



## Purlin to Panel BOLTAIL

- $\phi 1/4''\text{mm}$
- Material: Aluminum
- Finish: Passivation
- /600hrs

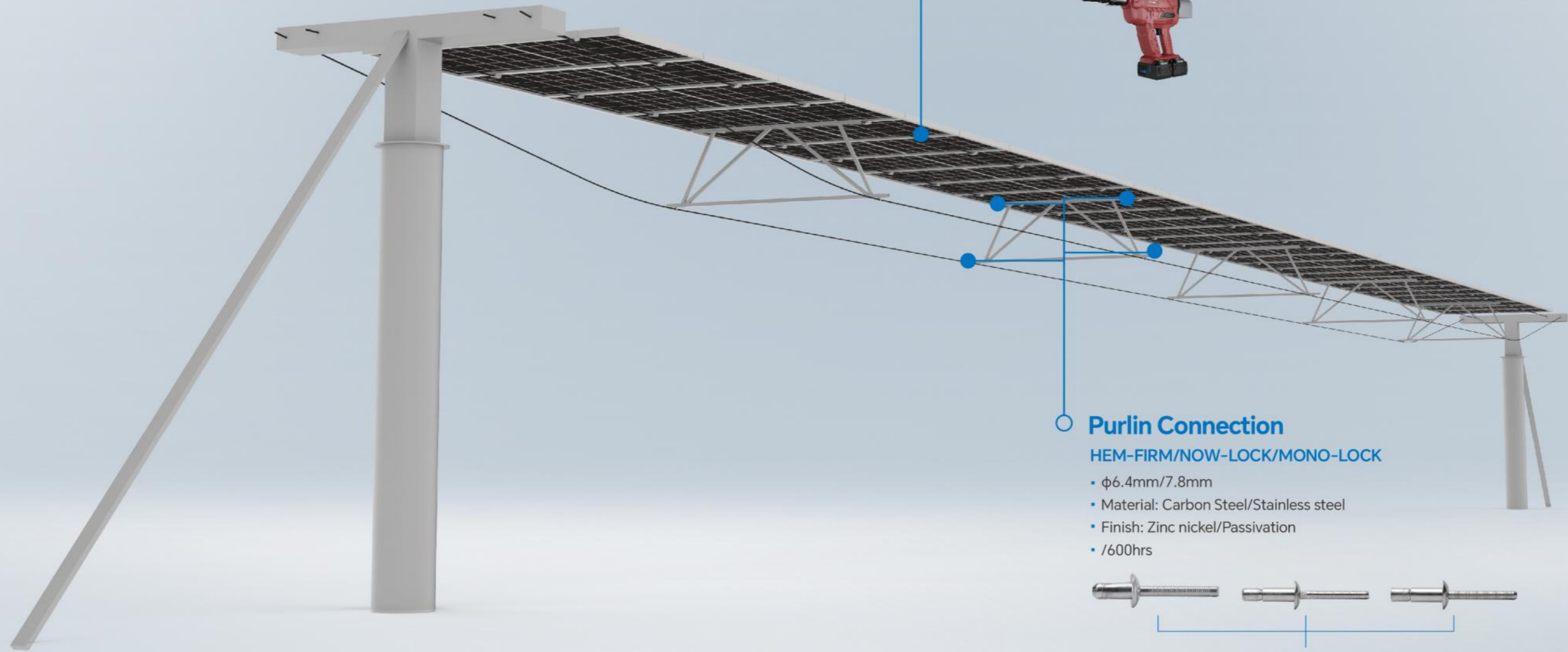


## Purlin to Panel MULTI-GRIP

- $\phi 6.4/8.0\text{mm}$
- Material: Aluminum/Stainless steel
- Finish: Passivation
- /600hrs



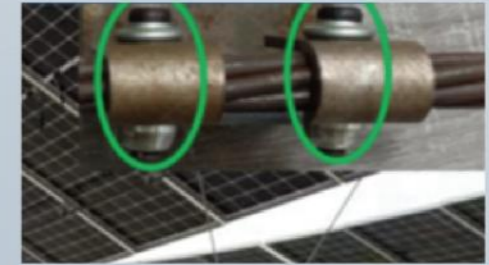
# FLEXIBLE BRACKET



## Steel Wire Rope Connection

### BOOM-LOCK

- $\phi 10.0\text{mm}$
- Material: Carbon Steel
- Finish: Zinc nickel
- /600hrs



## Purlin Connection

### HEM-FIRM/NOW-LOCK/MONO-LOCK

- $\phi 6.4\text{mm}/7.8\text{mm}$
- Material: Carbon Steel/Stainless steel
- Finish: Zinc nickel/Passivation
- /600hrs

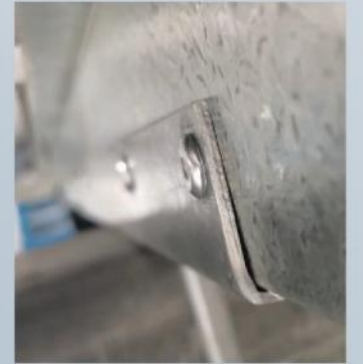


# FIXED BRACKET

## Purlin Connection

### HEM-FIRM/NOW-LOCK/MONO-LOCK

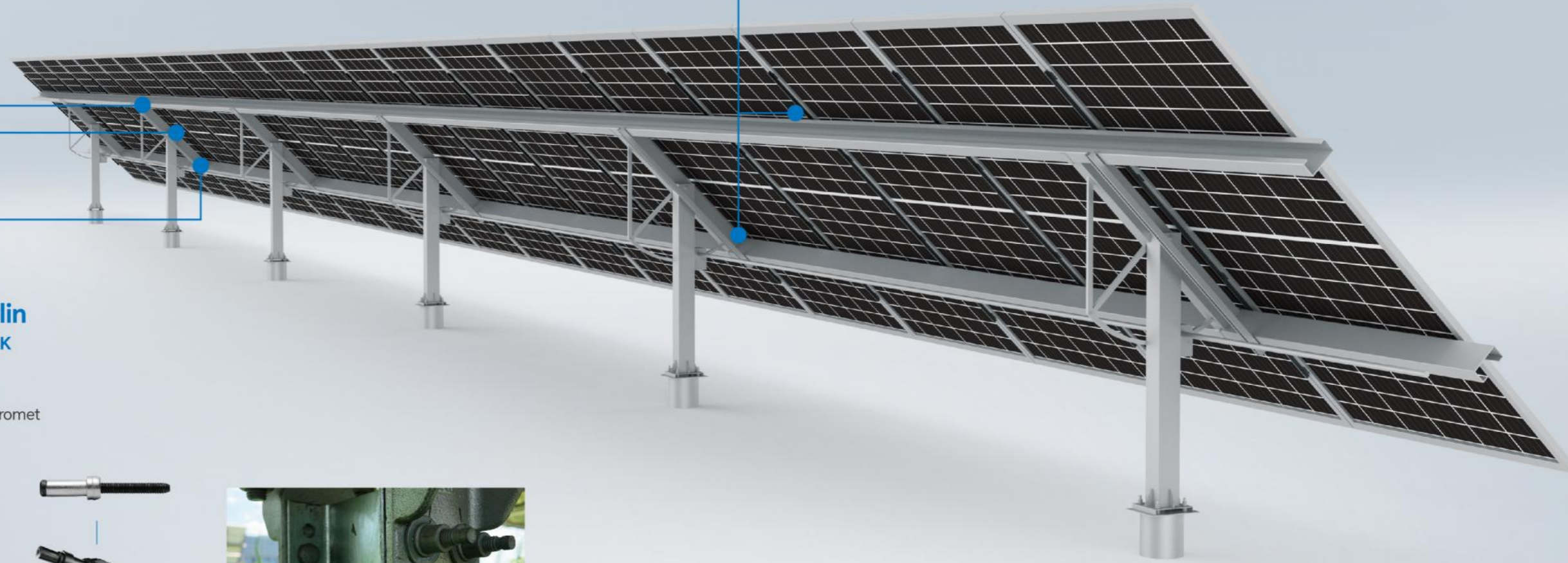
- $\phi 6.4\text{mm}/7.8\text{mm}$
- Material: Carbon Steel/Stainless steel
- Finish: Zinc nickel/Passivation
- /600hrs



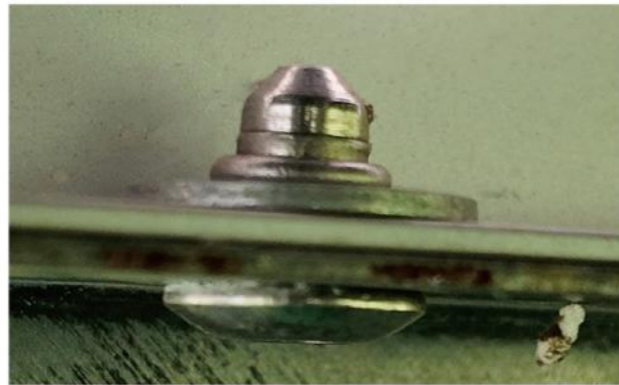
## Column to Purlin

### BOLTAIL/BOOMLOCK

- $\phi 1/2"$
- Material: Carbon Steel
- Finish: Zinc nickel/Dacromet
- /600hrs



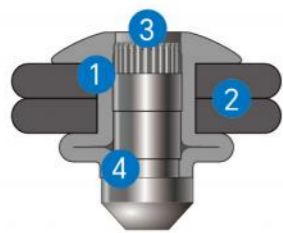
# 1. PANEL TO PURLIN APPLICATIONS



## OPTION 1: HEM-FIRM BLIND RIVET

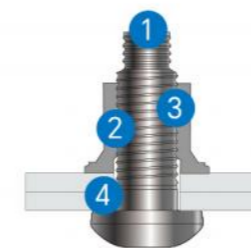


## OPTION 2: BOLT TAIL BLIND RIVET



Rivmate code	Size (mm)	Hole size (mm)	Grip range (mm)	Tensile(KN) min.	Shear(KN) min.	Retention load (KN) min.
SSH-B	6.4x14.5	6.60 - 6.80	5.50 - 8.50	7.92	10.80	1.80
	7.8x13.5	8.10 - 8.30	4.00 - 7.00	11.5	15.50	2.50

- 1 High tensile and shear strength
- 2 Large bearing area, resists joint-slippage
- 3 Grooved mandrel ensures a more secure, vibration-resistant joint after riveting
- 4 IPX7 waterproof, excellent sealing & gap-filling



Rivmate code	Size (mm)	Hole size (mm)	Grip range (mm)	Tensile(KN) min.	Shear(KN) min.	Retention load (KN) min.
ARBP	1/4"x23.8	6.60-7.13	2.00-6.40	5.10	5.20	/

- 1 Pintail-less design means reduced noise, no waste, and improved corrosion resistance.
- 2 Visual evidence of successful installation provided by installation indicator.
- 3 Collar material swaged into the lockgrooves forms a permanent, vibration-resistant connection.
- 4 Low-swage technology allows for faster, lighter, ergonomic tooling with parts that last longer.



TOOL Technical Data	
Pull Force	30kN (6800lbf)
Stroke	31mm (1.2")
Net Weight	2.9kg (6.4lbs) (with a battery)
Battery	18V / 4.0Ah
Charger	100 - 240V AC / 50 - 60Hz 21V / 2.3A
Charging Time	Approx. 100mins
Fastener Capacity	Now-Lock/Mono-Lock: 6.4mm (1/4") Hem-firm: 6.4mm (1/4"), 7.8mm (5/16")
Service Life	50,000 times Based on Hem-firm Rivet 7.8mm (5/16")

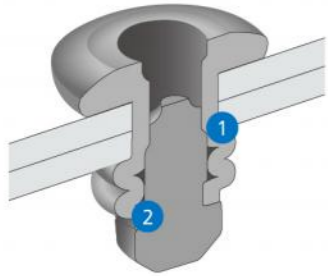


TOOL Technical Data	
Pull Force	20kN (4500lbf)
Stroke	30mm (1.2")
Net Weight	3.1kg (6.8lbs) (with a battery)
Battery	18V / 5.0Ah
Charger	100-240V AC / 50-60Hz 21V / 8A
Charging Time	Approx. 40mins
Fastener Capacity	POPTAIL 6.0 mm (7/32") (steel and aluminum material) POPTAIL 8.0 mm (5/16") (aluminum material)
Service Life	100,000 times Based on Steel POPTAIL Rivet 6.0mm (7/32")

# 1. PANEL TO PURLIN APPLICATIONS



## OPTION 3: MULTI-GRIP BLIND RIVET



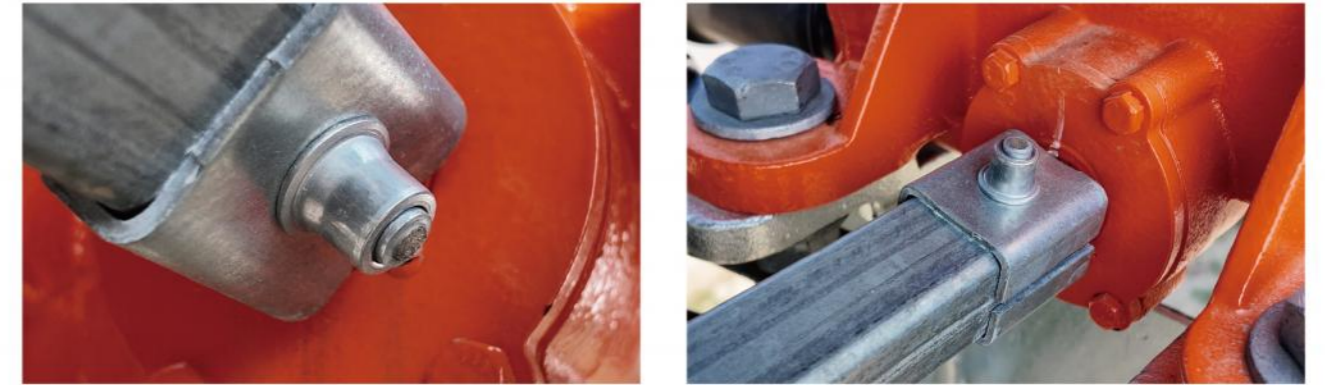
Rivmate code	Size (mm)	Hole size (mm)	Grip range (mm)	Tensile(KN) min.	Shear(KN) min.	Retention load (KN) min.
ABMG-B	6.4x14.5	6.50-6.60	1.50-7.50	4.0	3.8	/
	8.0x17.0	8.20 - 8.40	4.00 - 6.00	4.2	6.0	0.75

- 1 Riveting body clinches tightly with bearing area
- 2 Rivet mandrel locks with body firmly,vibration resistance

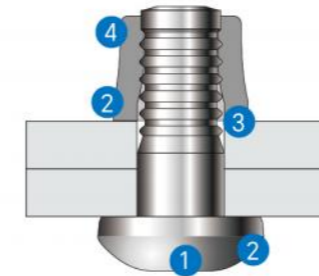


TOOL Technical Data	
Pull Force	30kN (6800lbf)
Stroke	31mm (1.2")
Net Weight	2.9kg (6.4lbs) (with a battery)
Battery	18V / 4.0Ah
Charger	100 - 240V AC / 50 - 60Hz 21V / 2.3A
Charging Time	Approx. 100mins
Fastener Capacity	Now-Lock/Mono-Lock: 6.4mm (1/4") Hem-firm:6.4mm (1/4"), 7.8mm (5/16")
Service Life	50,000 times Based on Hem-firm Rivet 7.8mm (5/16")

# 2. SYNCHRONIZING SHAFT APPLICATIONS



## LOCKBOLT



Rivmate code	Size (mm)	Hole size (mm)	Grip range (mm)	Tensile(KN) min.	Shear(KN) min.
SLBP	8.0x19.1	8.20	3.20-9.50	21.0	21.5

- 1 Wide bearing collar and head spread load to ensure structural integrity.
- 2 Initial long length of fastener enables pull-out of large gaps.
- 3 Excellent gap pull-out and high retained clamp.
- 4 High-fatigue, annular lock groove form extends the life of your structure.



TOOL Technical Data	
Pull Force	40kN (9000lbf)
Stroke	40mm (1.6")
Net Weight	5.7kg (12.6lbs) (with two batteries)
Battery	18V / 5.0Ah
Charger	100-240V AC / 50 - 60Hz 21V / 8A
Charging Time	Approx. 40mins
Fastener Capacity	BOOM 8.0mm (5/16") Lockbolt 8.0mm (5/16")/10.0mm (3/8")
Service Life	50,000 times Based on BOOM 8.0mm (5/16")

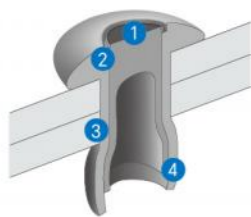
### 3. PURLIN CONNECTION APPLICATIONS



#### OPTION 1: MONO-LOCK



#### OPTION 2: NOW-LOCK



Rivmate code	Material	Size (mm)	Hole size (mm)	Grip range (mm)	Tensile(KN) min.	Shear(KN) min.	Retention load (KN) min.
SSM - AVD	Carbon steel	6.4x19.0	6.70 - 7.00	2.10 - 15.80	10.40	11.70	1.10
BBM	Stainless steel	6.4x19.0	6.70 - 7.00	2.10 - 15.80	9.0	11.00	1.10
AAM	Aluminum	6.4x14.0	6.70 - 7.00	2.10 - 9.50	4.2	6.0	0.55

- 1 Flush pin break leaves an even surface
- 2 Unique and solid-circle lock ensures maximum strength and vibration resistance. The potential risk for pin push-out is virtually eliminated.
- 3 Excellent gap between rivet body and workpiece and high retained damp.
- 4 Sleeve expands during installation to fill the hole and create a moisture-resistant joint.



Rivmate code	Material	Size (mm)	Hole size (mm)	Grip range (mm)	Tensile(KN) min.	Shear(KN) min.	Retention load (KN) min.
SSN - AVD	Carbon steel	6.4x20.0	6.70 - 6.90	2.10 - 15.80	8.30	11.10	1.80
BBN	Stainless steel	6.4x20.0	6.70 - 6.90	2.10 - 15.80	8.0	10.50	0.90
AAN	Aluminum	6.4x14.0	6.70 - 6.90	2.10 - 9.50	3.96	5.78	0.45

- 1 Flush pin break leaves an even surface
- 2 Unique and solid-circle lock ensures maximum strength and vibration resistance. The potential risk for pin push-out is virtually eliminated
- 3 Excellent gap between rivet body and workpiece and high retained damp
- 4 Sleeve expands during installation to fill the hole and create a moisture-resistant joint.

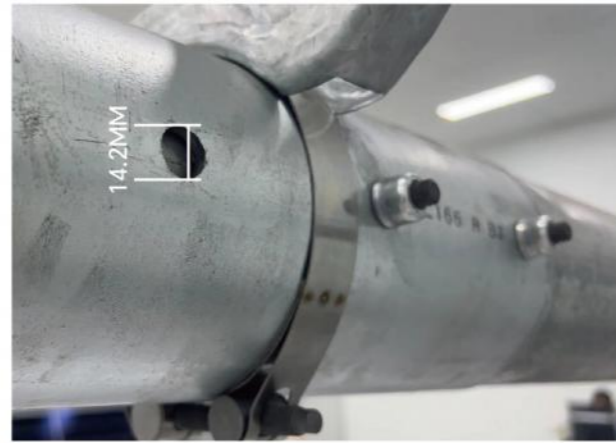
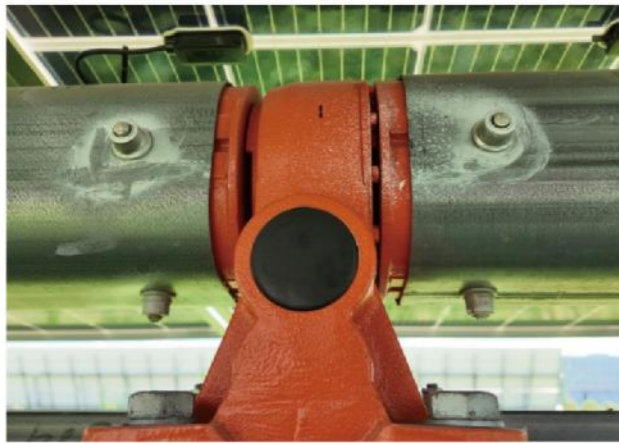


TOOL Technical Data	
Pull Force	30kN (6800lbf)
Stroke	31mm (1.2")
Net Weight	2.9kg (6.4lbs) (with a battery)
Battery	18V / 4.0Ah
Charger	100 - 240V AC / 50 - 60Hz 21V / 2.3A
Charging Time	Approx. 100mins
Fastener Capacity	Now-Lock/Mono-Lock: 6.4mm (1/4") Hem-firm: 6.4mm (1/4"), 7.8mm (5/16")
Service Life	50,000 times Based on Hem-firm Rivet 7.8mm (5/16")

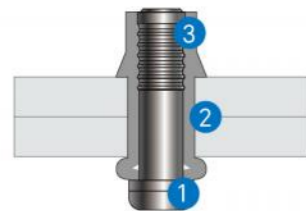


TOOL Technical Data	
Pull Force	30kN (6800lbf)
Stroke	31mm (1.2")
Net Weight	2.9kg (6.4lbs) (with a battery)
Battery	18V / 4.0Ah
Charger	100 - 240V AC / 50 - 60Hz 21V / 2.3A
Charging Time	Approx. 100mins
Fastener Capacity	Now-Lock/Mono-Lock: 6.4mm (1/4") Hem-firm: 6.4mm (1/4"), 7.8mm (5/16")
Service Life	50,000 times Based on Hem-firm Rivet 7.8mm (5/16")

## 4.TORQUE TUBE TO GEAR DRIVE APPLICATIONS



### OPTION 1: BOOM LOCK

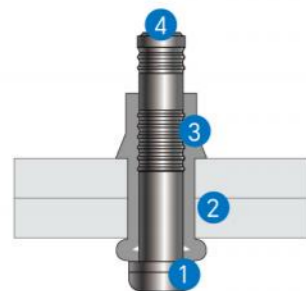


#### CARBON STEEL

Rivmate code	Size (mm)	Hole size (mm)	Grip range (mm)	Tensile(KN) min.	Shear(KN) min.
SSBOOM	01206	10.50-11.05	7.90-11.10	32.3	49.4
	01604	13.90-14.75	6.40 - 9.50	57.8	89.6

- 1 Applied in the heavy load application with higher tensile & shear force.
- 2 Large grip range based on different riveting thickness.
- 3 Intensified Locking system for vibrating

### OPTION 2: FIXBULB



#### CARBON STEEL

Rivmate code	Size (mm)	Hole size (mm)	Grip range (mm)	Tensile(KN) min.	Shear(KN) min.
FIXBULB	01604	14.00-14.80	6.40 - 9.50	57.8	71.2

- 1 Applied in the heavy load application with higher tensile & shear force.
- 2 Large grip range based on different riveting thickness.
- 3 Intensified Locking system for vibrating
- 4 No breaks; prevents corrosion.



### TOOL



#### Basic Kit

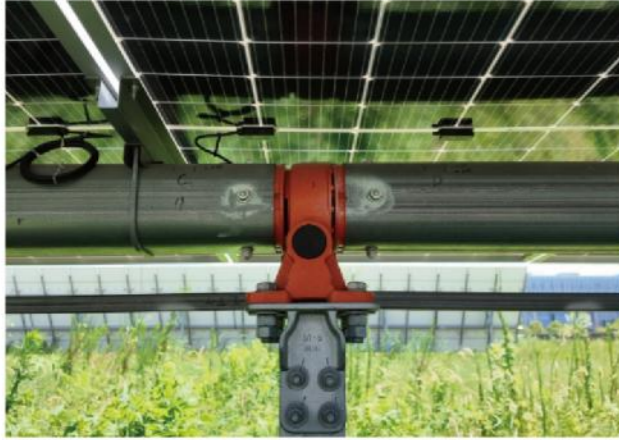
- E120B Rivet Gun Body
- BOOM 12.7mm(1/2")Nose Assembly
- 18V Battery\*4
- Charger\*1
- Single Shoulder Strap Assembly
- High Quality Tool Box

#### Riveting Data

- Based on 18V/5.0Ah battery\*2,Steel Rivets
- BOOM 12.7mm(1/2"):Approx.450 PCS

Pull Force	Stroke	Net Weight	Battery	Charger	Charging Time	Fastener Capacity	Service Life
100kN (22500lbf)	60mm (2.4")	8.5kg (18.7lbs) (with two batteries)	18V/5.0Ah	100-240V AC/ 50-60Hz 21V/8A	Approx. 40mins	BOOM: 12.7mm (1/2")	30,000 times Based on BOOM 12.7mm (1/2")

## 5. COLUMN CONNECTION



### BOLT TAIL (PERFECT BOLT REPLACEMENT)

### TOOL



#### CARBON STEEL

Size(mm)	Rivmate code	Tensile(KN) min.	Shear(KN) min.
M10	RIVBOLT	41.40	42.70
M12		75.80	62.30

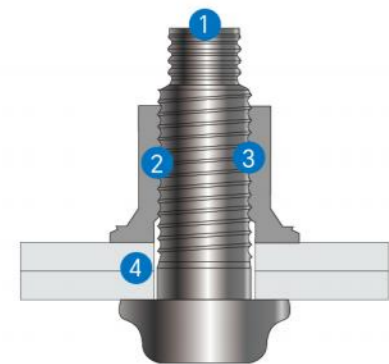


#### Basic Kit

- E810P Rivet Gun Body
- BOLT TAIL 8.0mm(5/16") or RIVBOLT 10.0mm(3/8") Nose Assembly
- 18V Battery\*4
- Charger\*1
- Special Wrench
- Single Shoulder Strap Assembly
- High Quality Tool Box

#### Riveting Data

Based on 18V/5.0Ah battery\*2, Steel Rivets  
 BOLT TAIL 8.0mm(5/16"): Approx. 1500 PCS  
 BOLT TAIL 10.0mm(3/8"): Approx. 1150 PCS



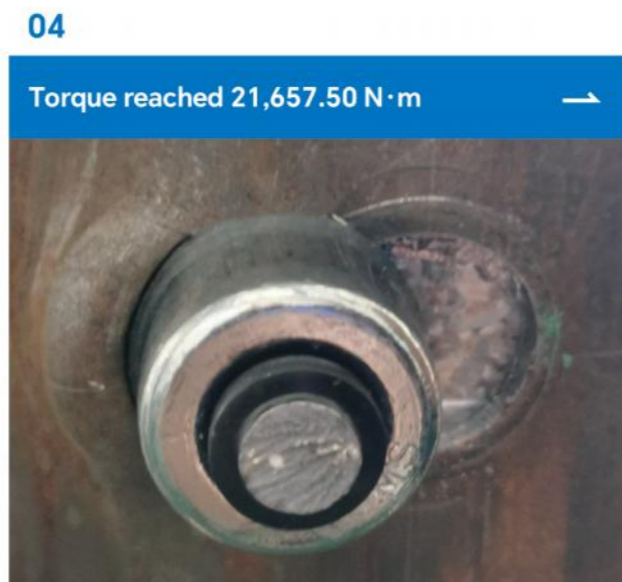
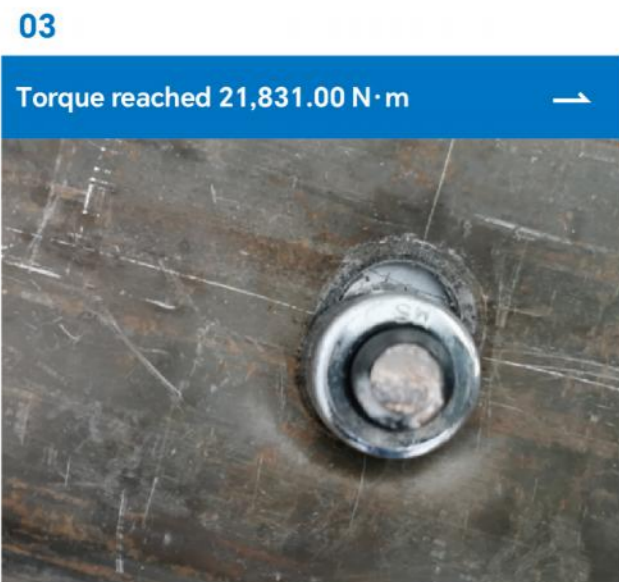
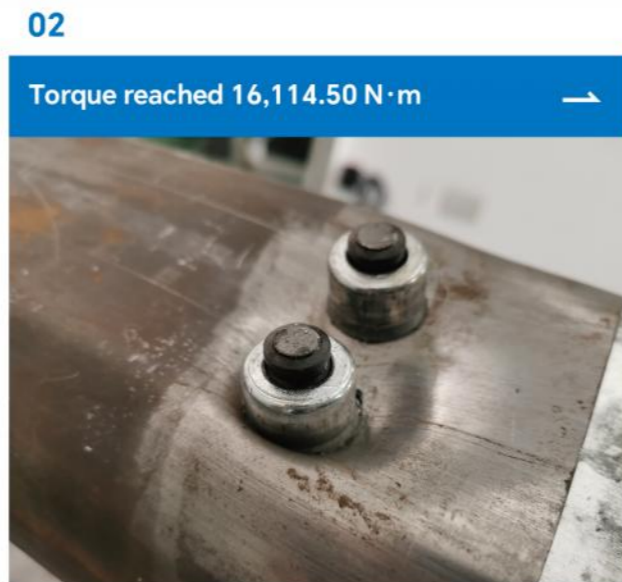
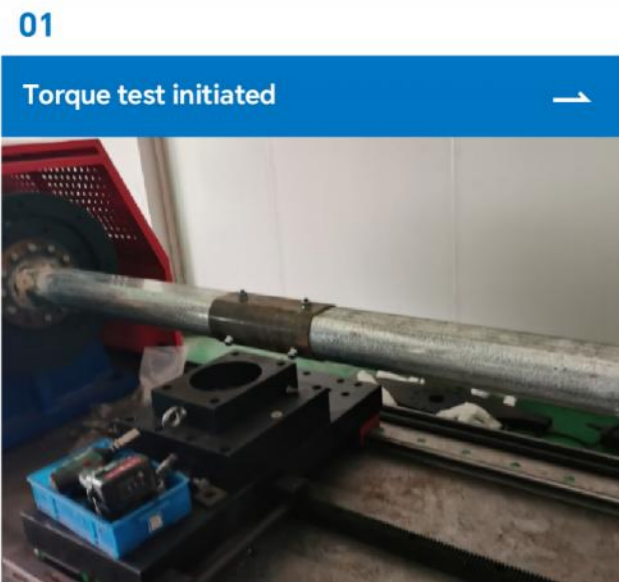
- 1 Pintail-less design means reduced noise, no waste, and improved corrosion resistance.
- 2 Visual evidence of successful installation provided by installation indicator.
- 3 Collar material swaged into the lockgrooves forms a permanent, vibration-resistant connection.
- 4 Low-swage technology allows for faster, lighter, ergonomic tooling with parts that last longer.

Pull Force	Stroke	Net Weight	Battery	Charger	Charging Time	Fastener Capacity	Service Life
50kN (11200lbf)	40mm (1.6")	5.3kg (11.7lbs) (with two batteries)	18V / 5.0Ah	100 - 240V AC / 50 - 60Hz 21V / 8A	Approx. 40mins	Steel POPTAIL Rivet: 8.0mm (5/16") 10.0mm (3/8")	100,000 times Based on Steel POPTAIL Rivet 10.0mm (3/8")

# LABORATORY TEST FOR TRACKERS' CONNECTION

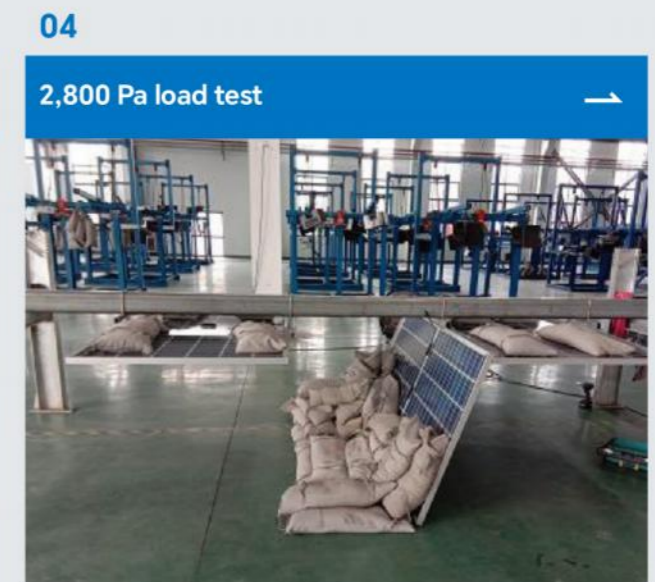
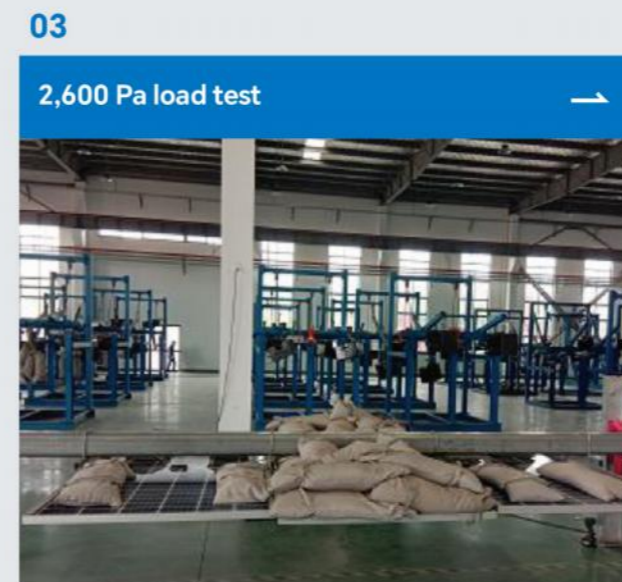
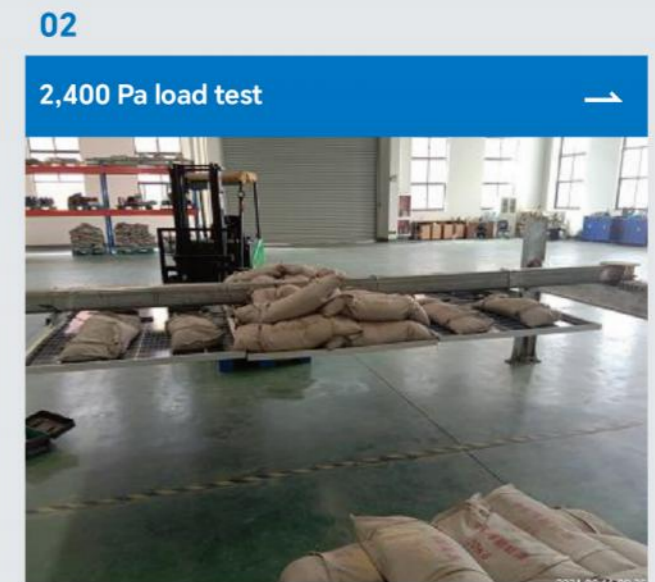
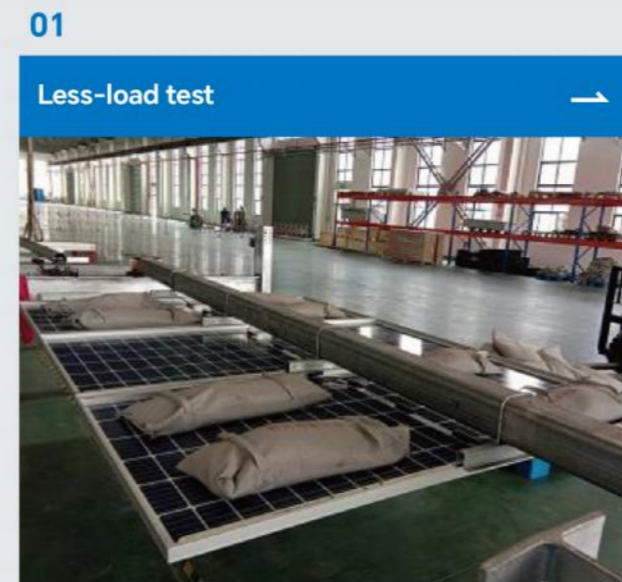
## 1. Torque Tube For Torque Test

After being subjected to a maximum torque of 21,657.50 N·m, the metal square tube was damaged, but the rivet maintained fastening integrity.



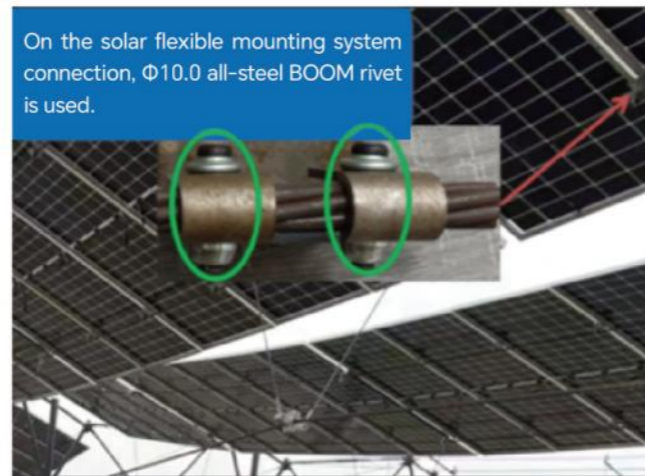
## 2. Panel To Purlin Bearing Test

Sandbags weighing 80 kg were placed on each side of the solar module, and a 2,400 Pa negative load was applied at the center. The module's condition was observed, then the load was increased in 200 Pa increments. At 2,800 Pa, damage occurred at the solar module connection point.



# ANHUI, CHINA — FLEXIBLE MOUNTING SYSTEM INSTALLATION SITE

Φ10.0mm Carbon Steel BOOM LOCK is used.



# GUIZHOU, CHINA — SOLAR TRACKING SYSTEM INSTALLATION SITE

Φ12.7mm Carbon Steel BOOM LOCK / Φ6.4mm Hem Firm is used.



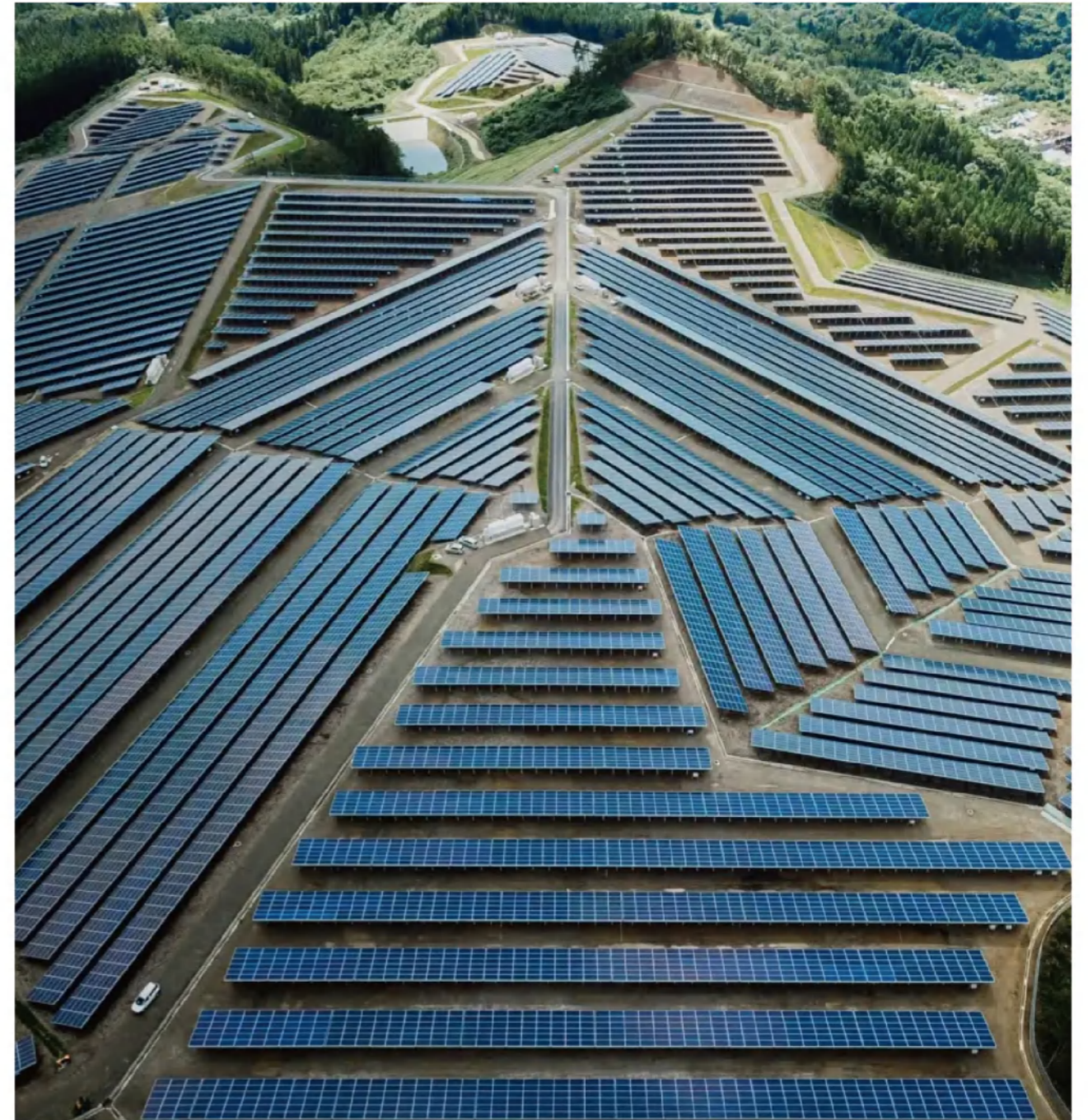
# MALDIVES – OFFSHORE SOLAR PV PLATFORM

A4 Stainless Steel Structural Rivets MONO-LOCK is used.



# SPAIN – FIXED MOUNTING SYSTEM PROJECT

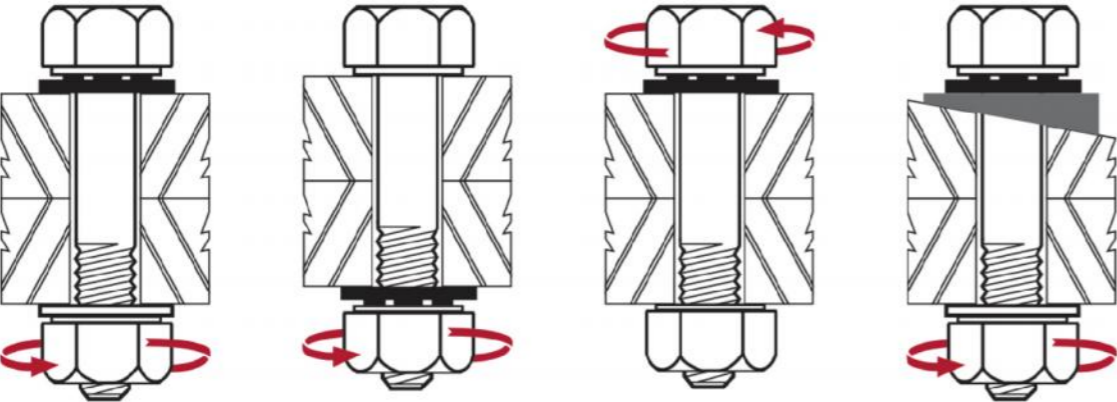
Carbon Steel Structural Rivets MONO-LOCK is used.



# WHY USE THE BLIND BOLT/RIVET INSTEAD OF BOLT IN THE TRACKERS?

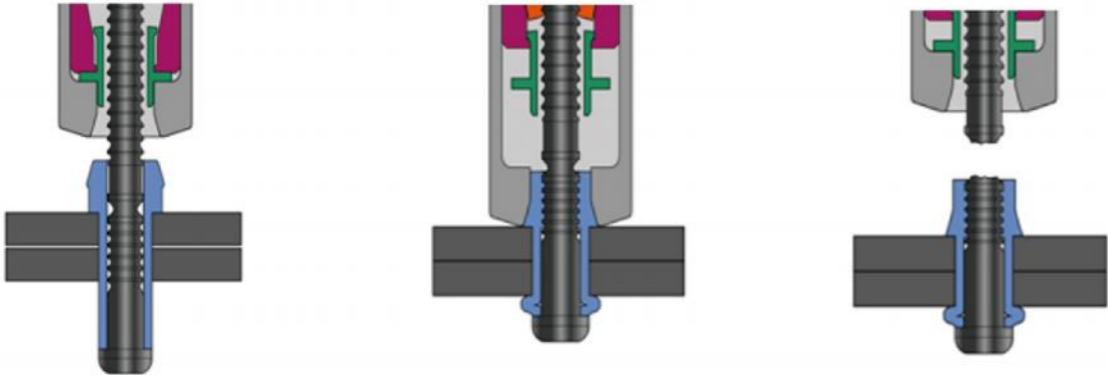
**BOLT :**

- 1 Bi-directional fastening requiring repeated wrench operation — low installation efficiency.
- 2 Requires scheduled periodic inspection for loosening within the service cycle.
- 3 During maintenance or replacement, wrench access is restricted by installation position — dismantling is cumbersome.



**RIVET :**

- 1 Single-sided fastening with quick installation — improves work efficiency by 20%+.
- 2 Designed for solar industry service life — no failure for 15 years.
- 3 Compatible with professional removal tools — easy maintenance and replacement.
- 4 Rivets provide consistent clamping force without the need to consider torque. The clamping effect can be visually inspected.



Continuous vibration during the operation of the solar tracking system can cause lock washers to loosen, leading to fastening failure and potentially resulting in bolt fatigue fracture.



# BOLT FAILURE CASES