

**STANLEY®**  
Engineered Fastening



**Engineered Fastening Solutions  
For Solar Applications**

## Challenges In The Solar Industry

Solar industry manufacturers are under intense pressure to reduce installation costs, improve joining performance, and optimize assembly processes. At STANLEY, we work with you and your team to provide global engineering expertise to tackle these challenges.



### Reducing

- Complexity in the assembly process
- Installation cost



### Improving

- Joint performance
- Assembly time
- Robustness



### Managing

- Jobsite safety
- Easy of assembly
- Reduce workforce fatigue

## Through Global Engineering Expertise, Our Solutions Aim To:



Reduce environmental impact



Increase employee safety



Enhance customer experience



Optimize production output



Reduce total solution cost

## Holistic Solutions

### Complete Array Of Solutions

Fasteners and tools

### Early Involvement & Application Engineering

### Assembly Tools Supply

- Unique cordless systems
- Flexible modalities - tools-on-rent concept in select territories

### On-Site Training For Assembly Tools

### Design & Installation Support

Experienced team with international experience

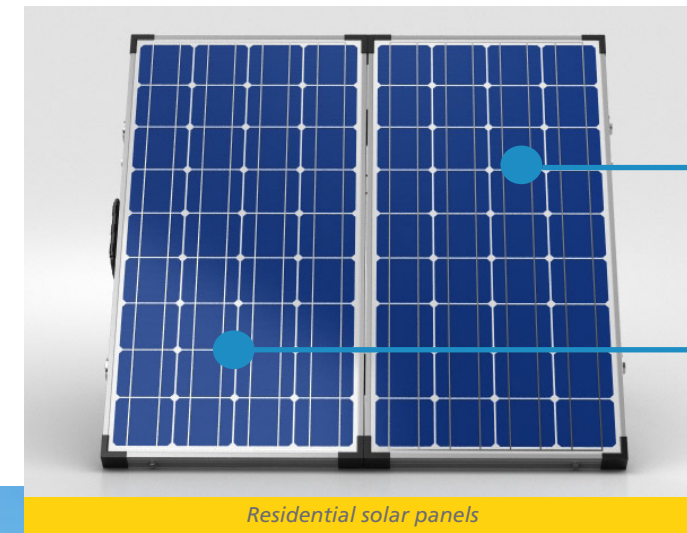
### After-Sales Service & Spares





## Residential & Commercial Applications

Solar panels have increasingly become part of the landscape in many cities around the world. From residential solar panels to commercial installations, STANLEY Engineered Fastening offers a wide range of fastening solutions that ensure optimal performance for solar applications.



Residential solar panels

- Avinox XT®**
- Permanent joining
  - Single-side access
  - Installs with POP® ProSet® PB3400



- Klump-Tite® Structural**
- Permanent joining
  - Structural blind rivets
  - Ideal for plastic assembly
  - Installs with POP® ProSet® PB3400



- NeoBolt® | NeoBolt® XT**

- Panel to cross bar assembly
- Permanent joining
- Structural lockbolts
- Double-side access
- Installs with PB2500N NeoBolt® Cordless Tool and AV Tool Series



- Avinox® XT | Avibulb® XT**

- Permanent joining
- Structural blind rivets
- Single-side access
- High-strength solution ideal for thin sheet metals
- Installs with POP® ProSet® PB3400



### Cable Ties, Electrical Coverings & Plastic Routing Clips

- Wire retention



### Nuts & Bolts

- Serviceable joining



### Spiralock®, WedgeLock® & Specialty Locknuts & Washers

- Serviceable joining
- Threaded Spiralock® for double-sided access
- WedgeLock® for vibration-resistant applications



### Cable Ties, Electrical Coverings & Plastic Routing Clips

- Wire retention



### Monobolt®

- Permanent joining
- Structural blind rivets
- Single-side access
- Multi-grip rivet for torque tube assembly
- Installs with ProSet® PB3400 and Avdel® 7287



Solar panels installed at an industrial site



## Utility Scale Applications - Thermosolar

At STANLEY, we understand that producing Concentrating Solar Power (CSP) from trackers or heliostat towers requires reliable fastening to meet specific challenges. Our range of fastening systems ensure the lowest total cost of ownership for utility scale applications.

### NeoBolt® XT

- Assembly of support bars
- Permanent joining
- Structural lockbolts
- Installs with AV Tool Series



### Monobolt® | NeoBolt® XT

- Assembly of mirror cross bars
- Permanent joining
- Structural lockbolts and blind rivets
- NeoBolt® XT installs with AV Tool Series
- Monobolt® installs with ProSet® PB3400 and Avdel® 7287



Thermosolar tracker - Concentrating Solar Power (CSP)

### Monobolt® | NeoBolt® XT

- Assembly of collector bars
- Permanent joining
- Structural lockbolts and blind rivets
- NeoBolt® XT installs with AV Tool Range
- Monobolt® installs with ProSet® PB3400 & Avdel® 7287



### Spiralock®

- Serviceable joining
- Threaded Spiralock® for double-sided access



### NeoBolt® XT

- Lattice girder assembly
- Permanent joining
- Structural lockbolts
- Installs with AV Tool Series



### NeoBolt® | NeoBolt® XT

- Assembly of support bars
- Double-side access
- Permanent joining
- Structural lockbolts
- Installs with PB2500N NeoBolt® Cordless Tool and AV Tool Series



Thermosolar tower heliostat (CSP)

### Hexsert®

- Facet assembly
- One-side access
- Blind rivet threaded insert with hexagonal body with improved torque-to-turn
- Installs with NB08PT-18



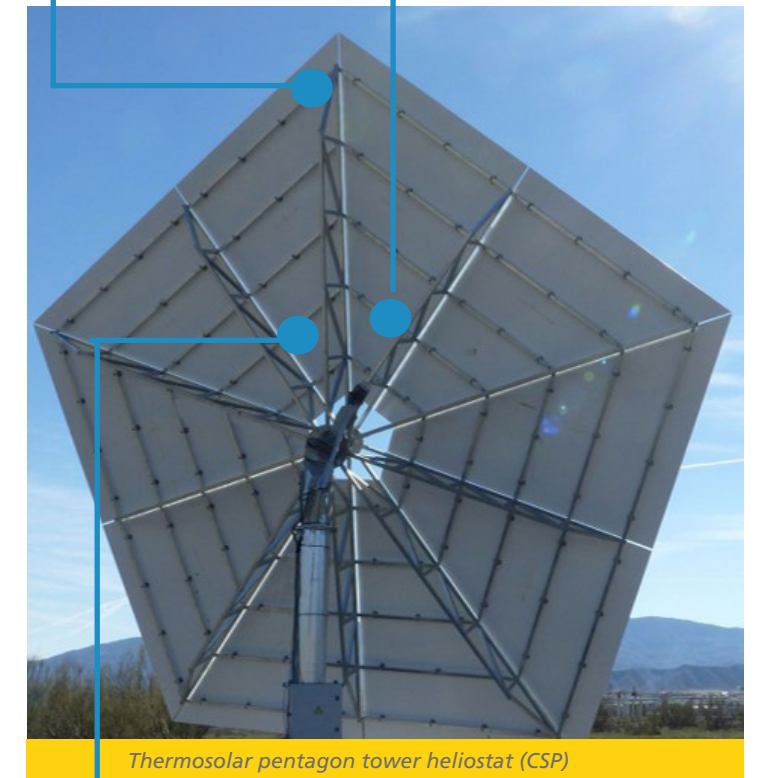
### Monobolt® | NeoBolt® | NeoBolt® XT | Hemlok® | Avinox® XT

- Lattice girder assembly
- Permanent joining
- Structural lockbolts and structural and non-structural rivets



### Monobolt® | Hemlok® | Avinox® XT

- Cross bar to radial lattice girder assembly
- Structural and non-structural rivets



Thermosolar pentagon tower heliostat (CSP)

### NeoBolt® | NeoBolt® XT

- Lattice girder support center
- Double-side access
- Permanent joining, structural lockbolts
- Installs with PB2500N NeoBolt® Cordless Lockbolt Tool and AV Tool Series





## Utility Scale Applications - Photovoltaic (PV)

Photovoltaic (PV) applications come with their own set of challenges. With several years of experience working with the biggest solar companies worldwide, STANLEY Engineered Fastening offers a wide range of solutions to suit your application.

### Avbolt®

- Torque tube assembly
- Permanent joining
- Heavy-duty structural blind fastener lockbolt with high strength and vibration- and tamper-resistance
- Installs with AV Tool Series and Avdel® 7287



### Hexsert®

- Tube assembly
- One-side access
- Blind rivet threaded insert with hexagonal body with improved torque-to-turn
- Installs with NB08PT-18



### NeoBolt® | Avinox® XT | Hemlok®

- Panel to cross bar assembly
- Permanent joining
- Structural lockbolts and structural and non-structural breakstem rivets



### Avbolt®

- Cross bars to torque tube assembly
- Permanent joining
- Heavy-duty structural blind fastener lockbolt with high strength and vibration- and tamper-resistance
- Installs with AV Tool Series and Avdel® 7287



### NeoBolt® XT

- Support assembly
- Double-side access
- Permanent joining
- Structural lockbolts
- Installs with AV Tool Series



### NELSON® Stud Welding

- Mounting solar panel structure on concrete
- Threaded weld studs and accessories
- Portable and battery-powered welding equipment for split-second fastening



### Spiralock®, WedgeLock® & Specialty Locknuts & Washers

- Serviceable joining
- Threaded Spiralock® for double-sided access
- WedgeLock® for vibration-resistant applications



### Cable Ties, Electrical Coverings & Plastic Routing Clips

- Wire retention



Photovoltaic (PV) tracker



## Photovoltaic (PV) Trackers - Torque Tube Assembly Solutions

Discover STANLEY Engineered Fastening lockbolt fastener solutions for torque tube assemblies. Avbolt® provides high-strength, tamper-resistant fastening for heavy-duty structural applications with high tensile and shear strength and quick installation speed with just single-sided access required. Neobolt® XT features a no pin-break and swage collar for high strength and unmatched vibration- and temperature-resistance in heavy duty applications such as torque tube assembly.



### Torque Tube Applications

Fasteners	
Fastener Choice	Finish
Avbolt®	Magni / 600 hrs.

#### Assembly Tools



AV Tool Series



7281



### Clamp & Cable Drive

Fasteners	
Fastener Choice	Finish
NeoBolt® XT + Flange Collar	Magni / 600 hrs.
Avbolt®	Magni / 600 hrs.

#### Assembly Tools



AV Tool Series



7281



### Gear Drive / Lateral Support Plate

Fasteners	
Fastener Choice	Finish
NeoBolt® XT + Flange Collar	Magni / 600 hrs.
Avbolt®	Magni / 600 hrs.

#### Assembly Tools



AV Tool Series



7281



### Driveline Pipe & Long Plate Clamp

Fasteners	
Fastener Choice	Finish
NeoBolt® XT + Flange Collar	Magni / 600 hrs.
Avbolt®	Magni / 600 hrs.

#### Assembly Tools



AV Tool Series



7281

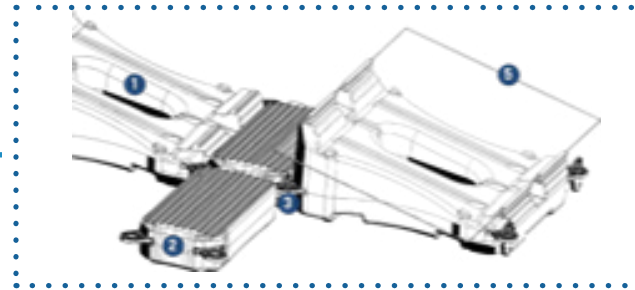


## Specialty Applications

Floating solar panels are increasingly becoming very popular in many markets around the world. This is just one example of the numerous specialty applications where STANLEY solutions provide advanced engineering and the most appropriate, reliable fastening solution. In floating solar applications, our specialized product range can also be used for bottom anchoring, bank anchoring, and hybrid anchoring.

### Klump-Tite® Structural

- Permanent joining
- Structural blind rivets
- Ideal for plastic assembly
- Installs with POP® ProSet® PB3400



### Monobolt®

- Permanent joining
- Structural blind rivets for single-side access
- Multi-grip rivet
- Installs with ProSet® PB3400 and Avdel® 7287



### Self-Drilling Screws and Lock Nuts



### Panel Connection Pins

- Connection of adjacent floats on which solar panels are mounted in a floating solar panel installation
- High-strength connection allowing flexibility of movement at the joint
- Easy to maintain and replace
- High durability and performance in highly corrosive environments (water, heat, salt)



Floating solar panels installation



## Blind Rivets & Lockbolts

### NEOBOLT® | NEOBOLT® XT

High-strength, vibration-resistant, and eco-friendly, the NeoBolt® non-breakstem lockbolt fastening system is designed for use in heavy-duty structural applications.

- High shear and tensile strength
- Unmatched vibration-resistance
- No pin-break
- High clamp force
- Fast assembly
- Sizes: 3/16" (4.8mm) - 1" (25.4mm)
- Material: steel or aluminum
- Head style: round
- Collar option: flanged



### AVBOLT®

Designed for use in heavy-duty fastening applications, the Avbolt® is a structural blind fastener with high strength and tamper-resistance ideal for installation in areas with restricted access.

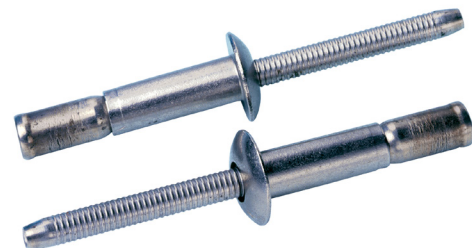
- Vibration-resistant
- One-side access assembly
- Heavy-duty structural applications
- High shear and tensile strength
- High clamp force
- Quick installation speed
- Sizes: 3/16" (4.8mm) - 3/4" (19mm)
- Material: steel



### MONOBOLT®

Monobolt® blind rivets are designed and developed for demanding applications where safety and performance are paramount.

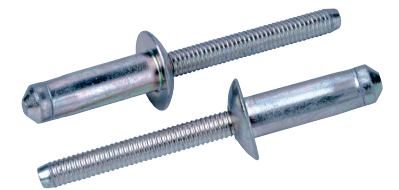
- Vibration-resistant
- Multi-grip capability
- High shear and tensile strength
- Stops sheet movement in non-standard holes
- Large gap-closing capability
- Visible mechanical lock for easy inspection
- Sizes: 3/16" (4.8mm) - 3/8" (10mm)
- Material: steel, aluminum, stainless steel
- Head style: protruding, countersunk



### HEMLOK®

This structural breakstem fastener has exceptional shear and tensile strength and a large blind side bearing area against the rear sheet. The large blind side bearing area spreads the load and prevents creep.

- Strong, vibration-resistant joints
- High residual clamp force
- Large bearing area ideal for thin sheet materials
- Exceptional shear and tensile strength
- Eliminates loose stem rattle and leaks
- Sizes: 1/4" (6.4mm)

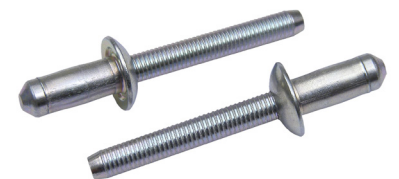


### AVIBULB® XT | AVINOX® XT

Avibulb® XT is a steel blind rivet with a wide grip range and is ideal for thin sheet applications and use with softer materials.

Avinox® XT combines high performance with excellent cosmetics and is ideal for thin sheet materials.

- High strength and wide hole tolerance
- Versatile multi-grip capability
- Resists vibration and joint-slippage
- High residual clamp load
- Spreads bearing load/clamp on the rear sheet
- Sizes: 1/4" (6.4mm)



### KLAMP-TITE® STRUCTURAL

Ideal for use in thin sheet or low-strength materials, the Klamp-Tite® structural rivet features a split-tail formation that spreads the tail bearing load/clamp load on the rear sheet.

- High strength and wide hole tolerance
- High resistance to pull-out loads
- Multi-grip capability accommodates wide variations in material thickness
- Visible lock for quick and easy inspection
- Sizes: 3/16" (4.8mm) to 1/4" (6.4mm)
- Material: aluminum
- Head style: protruding





## Threaded Fasteners

### SPIRALOCK®

**Spiralock® a technologically superior fastening system for threaded joint applications that are subjected to heavy vibration and challenging environments.**

- Improved joint integrity and more evenly distributed load
- Elimination of secondary locking devices
- Can be applied to a wide range of internally threaded fasteners and tapped holes



### WEDGELOCK®

**WedgeLock® is a highly engineered, vibration-resistant fastening solution tackling major solar application loosening issues by providing positive consistent mechanical lock.**

- Integrated design that wedges the fastener in place to resist loosening
- SEMS assembly - no lost washers
- No misoriented washers and SKU reduction - 2/3 to 1



### HEXSERT®

**Hexsert® provides a blind threaded insert with a hexagonal body for high torque-to-turn and pull-out performance, particularly in soft metals.**

- Can be used for very thin sheet materials from 0.50mm
- Can be installed in pre-coated applications without damaging the surface
- Sizes: M3 - M12, Materials: Steel, Stainless Steel
- Headforms: low profile and large flange



## NELSON® Stud Welding

### WELD STUDS

**Drawn-arc weld studs provide robust attachments for structural welding solar applications to save time and provide the highest return of investment.**

- CFL/CPL-MD/MP/MPF/MR threaded stud for general purpose attachments
- Other welding studs available include S3L-SD Shear Connectors and TBL-MI Internally Tapped Studs for construction, shipbuilding, and plate-mounting applications



### STUD WELDING EQUIPMENT

**Battery-powered stud welding equipment with superior performance to suit a wide range of solar applications.**

- N550c Arc Charger provides portable arc welding from a 120V wall outlet
- N900b Flexible Arc Control System is battery-powered and capable of delivering hundreds of welds on a single charge. Available in EMEA region in 2023



## Plastics

### PANEL CONNECTION PIN

- High-precision fastener with accurate thread profile
- Rust-free threaded plastic fasteners to withstand high salination water
- Reduced weight
- High-strength, glass-filled (up to 50%) + Polypropylene



### CABLE TIES

- Lightweight part capable of managing wide range of cable sizes
- Serviceable by incorporating a quick-releasing flex finger into the ratchet
- Affiliated products: cable straps, winder clips, cable retainers, cable channels



### ELECTRICAL COVERINGS

- Anti-rotation protection
- Easy manual assembly with wide range of size capabilities
- High cost-effectiveness
- Highly customizable for customer requirements



### PLASTIC ROUTING CLIPS

- Parts for all fastening points and assembly areas
- Avoids voltage peaks by using conductive materials
- Stable characteristics across a wide range of temperatures



### PLASTIC NUTS

- Lightweight
- Molded thread
- Low-torque, application-specific design
- Cost-effective production
- Optimized for installation space





## Installation Tools & Systems

### BATTERY TOOLS

#### PB2500N

- Installs rivets up to 3/16" (4.8mm)
- Fast and flexible installation
- Robust 20V Max battery powered by DEWALT

#### PB2500 Smart

- Installs 1,100 Steel 4.8mm Open End fasteners on a single charge
- Integrated process monitoring
- DEWALT lithium-ion battery

#### Proset® PB3400

- Installs rivets up to 1/4" (6.4mm)
- High-powered, long stroke
- Robust 20V Max battery powered by DEWALT

#### NB08PT-18

- Installs 900 (M6 steel) blind rivet nuts on a single charge
- Built-in touchscreen and pull-to-force and pull-to-stroke
- DEWALT lithium-ion battery



### HYDRO-PNEUMATIC TOOLS

#### AVDEL® 7287

- Quick and efficient installation of lockbolts
- Extremely robust design
- Pulls large rivets in a single stroke
- Long hose gives one-sided flexibility with single-trigger actuation

- Long-life components for reduced maintenance
- Smooth trigger actuation
- Vibration less than 2.5 ms2
- Less than 2.5 kg



### AV™ TOOL SERIES

- Install high-strength rivets and lockbolts up to 1-1/8" (28.6mm)
- High-performance range of Enerpac® pumps
- Robust and durable design
- Ergonomic and highly maneuverable
- **AV5** installs up to 3/8" (10mm) structural and NeoBolt® XT fasteners and 5/16" (8mm) Avbolt® fasteners
- **AV10** installs up to 3/8" (10mm) structural and Avbolt® fasteners

- **AV15** installs up to 1/2" (12.7mm) structural and Avbolt® fasteners
- **AV20** installs up to 1/2" (12.7mm) NeoBolt® XT and Avbolt®
- **AV25** installs up to 3/4" (19.1mm) NeoBolt® XT fasteners and 5/8" (16mm) Avbolt® fasteners
- **AV30** installs up to 3/4" (19mm) structural fasteners and 5/8" Avbolt® fasteners
- **AV50** installs up to 1-1/8" (28.6mm) NeoBolt® XT fasteners



## Our Global Presence



More than 50 locations around the world provide the most extensive range of fastening solutions and local support for our global customers.



STANLEY Engineered Fastening provides engineering expertise to the world's leading solar companies.



**STANLEY**  
Engineered Fastening



## Product Portfolio

**AVDEL**

Structural Blind  
Fasteners

**INTEGRA**

Plastic  
Components

**NELSON**

Stud  
Welding

**OPTIA**

Threaded  
Fasteners

**POP**

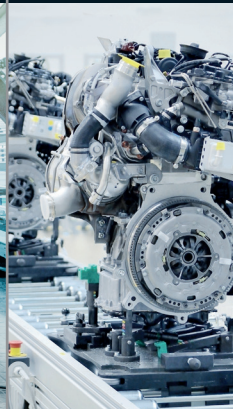
Non-structural  
Blind Fasteners

**STANLEY**  
Assembly Technologies

Specialist  
Assembly

**TUCKER**

Automated  
Fastener Systems



**STANLEY**  
Engineered Fastening

Stanley Engineered Fastening — a division of Stanley Black and Decker — is the global leader in precision fastening and assembly solutions. Our industry-leading brands, Avdel®, Integra™, Nelson®, Optia™, POP®, STANLEY® Assembly Technologies, and Tucker®, elevate what our customers create. Backed by a team of passionate and responsive problem-solvers, we empower engineers who are changing the world.

### STANLEY ENGINEERED FASTENING FAMILY OF BRANDS

**AVDEL** **INTEGRA** **NELSON** **OPTIA** **POP** **STANLEY** **TUCKER**  
Assembly Technologies



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