Infinite Possibilities...

Definite Solutions.
Nuevosol’s solar module mounting solutions are designed and engineered to cater to specific site conditions. We, at Nuevosol, believe that every project is unique. Our design philosophy is to ensure that the solutions we put forth are economical to procure, practical to install, and diligently conform to all requisite design codes and methodologies.

Nuevosol’s in-house design team comprises of professionals with deep core competencies and a keen focus on ensuring practicality of design. Auto CAD, STAAD Pro and SolidWorks – globally accepted designing tools, are employed in tandem during the design process to churn out the required solution.

A typical mounting structure solution passes through the following stages during the in-house design analysis.

- Structural Analysis – Analysis of wind loads and dead loads using STAAD Pro. Data from on-site pull-out tests is utilized to finalize foundation depths.
- 2D drafts of General Arrangement and Structural Members, using AutoCAD
- 3D checks of 2D components, using SolidWorks
- Review, Final Checks and Final Approval.
- Finite Element Analysis of individual structural members or specific connections is performed to further corroborate the stability of the structural design.*

*executed on specific client request, on case-to-case basis
The following codes are strictly adhered to during the design procedure

Design of Steel
- Design of steel structures as per IS 800, 801
- Design of Loads as per IS 875

Foundation Design
- IS 456 – Plain and Reinforced Concrete
- IS 2911 – Design of Pile Foundation
- SP 16 – Design aids for reinforced concrete

Fabrication of Steel
- IS 2062 - Specification of structural steel for fabrication
- ASTM 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
- ASTM 792 - Standard Specification for Steel Sheet, 55 % Aluminium-Zinc Alloy-Coated by the Hot-Dip Process
- General tolerances will be in accordance with IS 2768
- Dimensions of structural steel as per IS 811

Nuevosol recognizes that actual conditions and loads are known to differ from design simulation conditions. Each and every mounting solution offered by Nuevosol is subjected to mandatory destructive testing prior to being introduced into the market. Nuevosol’s ground mount systems can be installed on any terrain and soil, irrespective of undulations within the land area. Nuevosol’s rooftop mounting structures, which offer both penetrative and non-penetrative solutions successfully cater to all types of roofs including RCC and sheet metal. Structural integrity and safety is afforded the topmost priority during the design process. The expected life of a solar power plant is 25 years and Nuevosol ensures that structures are designed in a manner to ensure achieving of said milestone.
On-Site Analysis

Site characteristics are analyzed with specific attention to detail to ensure that a structure solution is in line with all operative design code requirements. The following data is of paramount importance to ensure flawless design of a module mounting structure.

For Ground Mount Solutions:
- Endemic soil conditions at installation site, established via a soil test report conforming to IS 2720
- A contour survey of the site recorded prior to 2 months of project inception.
- Site pull-out tests conducted in line with IS 2911 (Part 4, 2013)
- Prototype Analysis

For Roof Top Solutions:
- For RCC roofs, detailed rooftop layouts identifying obstacles.
- For sheet-metal roofs – roofing type, roofing configuration, condition of roofing, and design details of supporting structure.
- For penetrative rooftop solutions, pull out tests to test the strength of anchoring to support structure.

Foundation Analysis for Ground Mount Solutions

Foundations are the most critical element of solar module mounting structures. Nuevosol provides complete foundation design that varies with varying soil conditions.

Some of the foundation designs offered based on empirical soil data are:
- Concreting Foundation: for sandy and gravel soils, with hard rock
- Ramming: Clayey soil
- Under-Reamed: For soils with a high percentage of sand
- Isolated footing - Rebars
- Anchor-rod foundation
OUR PRODUCT PORTFOLIO

GROUND MOUNTED PRODUCTS
- NUEVO ULTIMA
- NUEVO TILT
- NUEVO TRAC

ROOF MOUNTED PRODUCTS
- NUEVO FIX
- NUEVO CLAMP
- NUEVO KLIP
NUEVO ULTIMA
**NUEVO ULTIMA** is a fixed-tilt ground mount solution that is designed to cater to a singular tilt angle. NUEVO ULTIMA is specifically designed for installation in vast spaces and can be arranged in various configurations by iterating the structural components and their operative section types. Based on the type of design, Nuevo ULTIMA can be further categorized into

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**Single Pole structures**

For smaller array sizes with a maximum span of 4 meters in NS direction.

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**Dual Pole structures**

For larger array sizes with a maximum span of 8 meters in NS direction. Owing to lower moments of operative structural loads, dual pole structures are ideal for steeper angles.
Structure Description:

Single pole and Dual pole structures are erected using the following components

- Column post, Vertical Rafter and Bracings form a triangular support for the structure at the required tilt angle.
- Horizontal Rafters run in E-W direction if the required module orientation is landscape.
- Purlins run over the Vertical Rafter/Horizontal Rafter. Solar modules are installed on the purlins.
- Gusset Plates and Bracing pieces are used as auxiliary components and contribute to the triangular support.
- Splice plates and purlin plates are structural components that enable effective connectivity of all major structural members.
- L-Brackets connect the Vertical Rafter to the Horizontal Rafter or the Purlin, as per the design. L-Brackets are used specifically when the interacting components possess C-sections.
- In addition, for C-section purlins or Horizontal Rafters, Tie Rods are utilized to provide necessary support and avoid buckling.
Technical Data

- Design wind speeds: 120 - 200 kmph
- Orientation: Portrait / Landscape
- Tilt Angle: Depends on the latitude
- Ground Clearance: 500 - 800 mm
- PV Modules: Crystalline / Thin film
- Approximate Mass of structure excluding the module weight: 5 – 8 kg/m² (Typical)
- Concrete consumption: 80 – 100 m³/ MWp (Typical)
**NUEVO TILT** is a ground mount structure solution that is designed to accommodate various tilt angles. Optimum generation output can be achieved by changing the structural tilt angle at least twice during the year. On the basis of the design and operative components, NUEVO TILT can be classified into

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**Curved Slot**

In-built machining of curved slots into vital components permits the tilting of the structure for various angles.

**Hinge Mechanism**

Composed of welded assemblies, the hinge mechanism is built for robustness, ready to weather the most extreme conditions.
NuevoTILT structures are composed of the following components:

- Column Post, Vertical Rafter and Bracing form a triangular support for the structure at the required tilt angle.
- Bracings have the provision of multiple holes, each hole corresponding to a specific tilt angle.
- Horizontal Rafters run in E-W direction if the required module orientation is landscape.
- Specifically for a hinge requirement, the hinge mechanism consists of adopter plates and hinges welded in a manner permitting mating of the hinges and free rotational movement along a single axis.
- Purlins run over the Vertical Rafter/Horizontal Rafter on which solar modules are installed.
- With purlins of C cross-sections, L-brackets will be utilized to connect the purlin to the Vertical Rafter, or to the Horizontal Rafters, as permitted by the design.
- In addition, for C-section purlins, Tie rods are utilized to provide necessary support and avoid buckling.
Technical Data

- Design wind speeds: 120-200 kmph
- Orientation: Portrait / Landscape
- Tilt Angle: Optimal tilt angles determined via PVsyst.
- Ground Clearance: 500 - 800 mm
- PV Modules: Crystalline / Thin film
- Approximate Mass of structure excluding the module weight: 5 – 8 kg/m² (Typical)
- Concrete consumption: 80 – 100 m³/ MWp (Typical)
NUEVO TRAC
NUEVO TRAC is an innovative and cost effective single axis tracking solution. Equipped with a robust design and reliable drive components, NUEVO TRAC is built for longevity, assures a 25% increase in real time yield with near-zero maintenance costs, and in the long run fosters increased grid stability. The NUEVO TRAC solution can broadly be divided into Mounting Structure & Tracker Driving Components.
 mounting Structure Components

- Column Post, typically a tube section, serves as the main load bearing member.
- Bearing system consisting of nylon bushes that form the crux of the rotating mechanism.
- Rafters, of tubular sections, are integrated with the bearing system.
- Purlins, preferably hat sections, are mounted on top of Rafters.
- Purlin Plates fixed to the Purlins serve as the Module mounting components.
- Horizontal Transmission Tube runs beneath the Rafters and their corresponding Bearing assemblies. The linear actuator, controlled by the PLC, is connected to the Horizontal Transmission Rod thus providing for the requisite movement of the entire tracking superstructure.
- Vertical Transmission Tubes connect the Rafters and the Horizontal Transmission Tube, thus serving as the critical component transmitting the linear motion of the Horizontal Transmission onto the eventual rotary motion of the Rafters.
- Splice plates and U-bolts are used as the connecting elements for the structural members. Base plates are anchored to the foundations via J-Bolts.
Tracker Driving Components

- Linear Actuator, incorporated with a worm gear mechanism converts the rotational motion of a 3ph Ac motor to linear motion and drives the tracking system.
- PLC Control Panel determines the sun’s position and controls the actuator to align the modules facing sun.
- Inclinometer serves as the feedback system to the PLC Control Panel, and provides continuous information of the module inclination angle.
- Anemometer, a wind speed sensor, relays information to the PLC Control Panel and allows for emergency reset to Stow Position of the modules in High Wind conditions.
- Limit Switches are integrated to the mounting structure to prevent the mechanism from swinging beyond the range.
- Remote Monitoring and Control (SCADA) provides remote access to the tracking system and facilitates proactive monitoring of data.

* Mentioned for illustrative purposes only, actual components might vary based on project requirements.
NUEVO FIX
**NUEVO FIX** solutions are premium rooftop mounting solutions designed for flat RCC roofs. The non-penetrative nature of the solution facilitates easy installation on both residential and commercial spaces, and provides for rapid expansion from kilowatt to megawatt scales.

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**Low Elevation Ballast**

Modular structure with minimal connections, the perfect Do-It-Yourself rooftop solutions.

**Elevated Ballast**

Robust rooftop solutions guaranteeing longevity. Perfect for captive power and net metering.
Low Elevation Ballast

Structure Description:

The Low Elevation Ballast system is built up of the following major components:

- Base Post, Module Post and Wind Shield Post form a triangular support for the rooftop structure that is installed at a singular tilt angle.
- L-Angle connects adjacent base posts to ensure perfect and proper alignment.
- Hat Link interconnects the rows for even distribution of loads on the roof.
- Wind Shield is designed to reduce the wind impacts on the solar module.
- EPDM sheet separates the array from the roof which helps during water stagnations. In addition, the EPDM strip acts as a frictional layer between the roof and the structure.
Technical Data

- Design wind speeds: 140-200 kmph
- Orientation: Landscape
- Tilt Angle: 10 degrees

Advantages

- Non-penetrative.
- Can be relocated
- Customized as per module dimensions.
- Ideal Do-It-Yourself rooftop solution for both residential and commercial spaces.

Module Mid Clamp Connection

L-Angle
Pre Galvanized MS (550 GSM)
Yield Strength = 250 MPa

Wind Shield
Galvalume (150 GSM)
Yield Strength = 550 MPa

Concrete Blocks
Grade = M20 / M25

Mid & End Clamps with Hex-nuts
Anodized Aluminium (15 µ)
Yield Strength = 210 MPa
**Elevated Ballast**

**Structure Description:**

*Typical elevated ballast structure is built up with the following components,*

- Column Post, Vertical Rafter, Bracings that form a triangular support for the structure at the required tilt angle.
- Horizontal Rafters run in E-W direction if the required module orientation is landscape.
- Purlins run over the Vertical Rafter/Horizontal Rafter. The solar modules are installed on purlins.
- Gusset Plates and Bracing pieces are used as auxiliary components and contribute to the triangular support.
- Splice Plates and Purlin Plates are structural components that enable effective connectivity of all major structural members.
- L-Brackets connect the vertical rafter to the horizontal rafter or the purlin, as per the design. L-Brackets are used specifically when the interacting components possess C-sections.
- In addition, for C-section purlins or Horizontal Rafters, Tie Rods are utilized to provide necessary support and avoid buckling.

**Column Post**
- Post Galvanized MS (80-120 µ)
- Yield Strength = 250 - 350 MPa

**Vertical Rafter**
- Pre Galvanized MS (550 GSM) (or), Post Galvanized MS (80-120 µ)
- Yield Strength = 250 - 350 MPa

**Concrete Block**
- Grade = M20 / M25

**L Brackets**
- Post Galvanized MS (80-120 µ)
- Yield Strength = 250 - 350 MPa

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Technical Data

- Design wind speeds: 120 - 200 kmph
- Orientation: Portrait / Landscape
- Tilt Angle: Typically 10 to 20 degrees
- Ground Clearance: 300 – 1500 mm
- PV Modules: Crystalline / Thin film
- Approximate Mass of structure excluding the module weight: 6 – 8 kg/m² (Typical)

Technical Specifications:

- Purlin
  - Galvalume (150 GSM) (or)
  - Pre Galvanized MS (550 GSM) (or)
  - Post Galvanized MS (80-120 µ)
  - Yield Strength = 250 - 350 MPa (MS); 550 MPa (Galvalume)

- Tie Rod
  - Pre Galvanized MS (550 GSM) (or)
  - Post Galvanized MS (80-120 µ)
  - Yield Strength = 250 - 350 MPa

- Bracing
  - Pre Galvanized MS (550 GSM) (or)
  - Post Galvanized MS (80-120 µ)
  - Yield Strength = 250 - 350 MPa

- Side Bracing
  - Pre Galvanized MS (550 GSM) (or)
  - Post Galvanized MS (80-120 µ)
  - Yield Strength = 250 - 350 MPa
NUEVO CLAMP
NUEVO CLAMP solutions are engineered to provide maximum flexibility in both design and installation for various trapezoidal-profile metal roofs. Requiring very few components for installation, they are both economical and efficient to install at a rapid pace. NUEVO CLAMPS are broadly classified into 3 types:

**Omega Clamp**
Directly connected to the roof using ergonomically efficient omega clamps.

**Steel Rails**
Utilise the substructure arrangement of roofing to form support base for modules. Extremely robust and resilient.

**Aluminium Rails**
Preferred mode of installation for curved roofings. Aluminium’s durability and flexibility serves as a major game changer.
Omega Clamp

**Structure Description:**

*Omega clamp solution is the simplest of the clamp solutions and consists of the following components*

- Omega Clamp is the critical member which is fastened to the sheet metal using the pop rivets. EPDM strip beneath the L-Bracket serves both as a frictional agent as well as primary waterproofing layer.
- Omega clamps are installed at 3 locations on the longer side of the module.
- Sikasil© sealant is applied on the edges of the omega clamp for additional protection.
- This is connected at the crest to the roof thereby eliminating the water logging.

**Technical Data**

- Design to wind speed: 140-200 kmph
- Orientation: Landscape
- Tilt Angle: Parallel to the roof
- Module Connecting Elements: Pop Nuts with a washer
- Material: Post galvanized steel, Aluminium, Stainless Steel.
- Sealant : Sikasil©

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**Technical Data**

- **Post-galvanized MS (80 µ)**
  - Yield Strength of 250-350 MPa

- **Anodized Aluminium (15 µ)**
  - Yield Strength = 210 MPa

- **EPDM**
  - Excellent ozone, chemical, and aging resistance.
Structure Description:
Steel or Aluminium railings are proposed, either when sheet roofing is deteriorated, or when the roofing possesses a curved profile. The solution’s consisting components are

- L-brackets, the critical load bearing members, fastened directly to the sheet metal roof in the trough of the trapezoidal profile.
- Self-tapping screws to fasten the L-Bracket to the roof via EPDM.
- EPDM strip beneath the L-Bracket serves both as a frictional agent as well as primary waterproofing layer.
- Steel or Aluminium purlins anchored to the free end of the L-bracket. Modules are placed on the purlin.
- Sikasil® sealant applied as an additional waterproofing layer.

Technical Data

- L-Brackets and Purlins Connecting elements:
  - Aluminium: T-bolts
  - Steel: Hex bolts
- Module Connecting Elements:
  - For Aluminium Rails = T-bolts
  - For Steel Rails = Hex bolts
- Material: Post galvanized steel, Aluminium, Stainless Steel.
- Max adoptable curvature roof: 5 deg – 30 deg

End Clamp With Hex Nuts
Anodized Aluminium (15 µ)
Yield Strength = 210 MPa

L-Bracket
Post Galvanized MS
Yield Strength = 250 - 350 MPa

Steel Railings
Pre Galvanized MS (550 GSM) Or,
Post Galvanized MS (80-120 µ)
Yield Strength = 250 - 350 MPa

Aluminium Rails with T- Bolts
Anodized Aluminium (15 µ)
NUEVO KLIP
**NUEVO KLIP** solutions are non-penetrative solution for concealed roofs. For different rooftop profiles, different clips are designed that utilize the unique profile of the rooftop as an anchoring base.

**KlipLoc**

KlipLoc solution is a customized solution designed specifically for KlipLoc© roof sheetings. Modules can either be directly mounted onto the Klip or via a Purlin arrangement.

**Standing Seam**

Standing Seam solutions are specific for concealed roofs with standing seam profile.
**Kliploc / Standing Seam**

**Structure Description:**

For NuevoKLIP solutions, a clip serves as the major load bearing member, transmitting the load directly onto the roofing.

**Technical Data**

- Module Connecting Elements:
  - With purlins = T-bolts
  - Without purlins = Hex bolts
- Material: Aluminium, Stainless Steel.

**Technical Specifications**

- **End Clamp With Hex Nuts**
  - Anodized Aluminium (15 µ)
  - Yield Strength = 210 MPa
- **Kliploc**
  - Anodized Aluminium (15 µ)
  - Yield Strength = 210 MPa
- **Purlin**
  - Pre Galvanized MS (550 GSM) (or)
  - Post Galvanized MS (80-120 µ)
  - Yield Strength = 250 - 350 MPa
- **Standing Seam**
  - Anodized Aluminium (15 µ)
  - Yield Strength = 210 MPa
For the past 4 years, Nuevosol has been able to continuously reset paradigms, aspire to and achieve new heights, and actively explore and expand the frontiers of the global solar sector. This can be solely attributed to the sector’s willingness to invest in: TRUST. The industry has continued to trust our innovative solutions, design expertise and ability to deliver. Nuevosol will continue to live up to this TRUST. Nuevosol will continue to INNOVATE with unflappable vigor.

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