iii. The deputed personnel shall be in a position to check and test all the equipments regularly, so that preventive actions, if any, could be taken well in advance to save any equipment from damage.

iv. Normal and preventive maintenance of the Solar Photovoltaic Water pumping systems such as cleaning of module surface, tightening of all electrical connections, changing of tilt angle of module mounting structure, cleaning & greasing of motor pump sets, changing filters etc. are also the duties of the deputed personnel during maintenance visits.

v. During operation and maintenance period of the Solar Photovoltaic Water Pumping Systems, if there is any loss or damage of any component due to miss management or miss handling or due to any other reasons pertaining to the deputed personnel by empaneled vendor, what-so-ever, the supplier shall be responsible for immediate replacement or rectification. The damaged component may be repaired or replaced by new component.

vi. The maintenance shall include replacement of any component irrespective of whether the defect was a manufacturing defect or due to wear and tear.

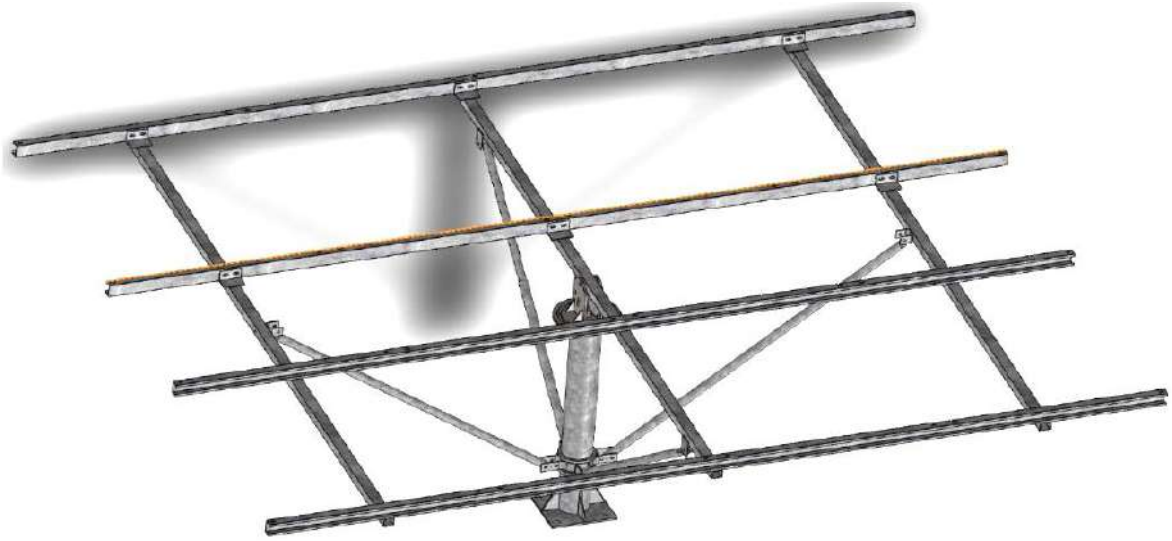
LIST OF REFERRED INDIAN STANDARDS

456:2000	Plain and reinforced concrete - Code of practice (Fourth Revision)
811:1987	Specification for cold formed light gauge structural steel sections (Second Revision)
822:1970	Code of procedure for inspection of welds
IS 875 : Part 1 : 1987	Code of practice for design loads (Other Than Earthquake) for buildings and structures: Part 1 dead loads - Unit weights of building materials and stored materials (Second Revision)
694:2010	Polyvinyl Chloride Insulated Unsheathed--And Sheathed Cables/cords With Rigid And-Flexible Conductor For Rated Voltages-Up To And Including 450/750 V
1079:2017	Hot rolled carbon steel sheet, plate and strip - Specification (Seventh Revision)
1161:2014	Steel tubes for structural purposes - Specification (Fifth Revision)
1239 (Part 1):2004	Steel tubes, tubulars and other wrought steel fittings - Specification: Part 1 steel tubes (Sixth Revision)
2062:2011	Hot rolled medium and high tensile structural steel - Specification (Seventh Revision)
2629:1985	Recommended practice for hot-dip galvanizing of iron and steel (First Revision)
2633:1986	Method for testing uniformity of coating on zinc coated articles (Second Revision)
3043:1987	Code of Practice for Earthing
4091:1979	Code of practice for design and construction of foundations for transmission line towers and poles (First Revision)
4759:1996	Hot - Dip zinc coatings on structural steel and other allied products - Specification (Third Revision)
5120:1977	Technical requirements for rotodynamic special purpose pumps (First revision)
5624:1993	Foundation bolts - Specification (First Revision)
6403:1981	Code of practice for determination of bearing capacity of shallow foundations
6745:1972	Methods for determination of mass of zinc coating on zinc coated iron and steel articles
7215:1974	Tolerances for fabrication of steel structures
8034:2018	Submersible pump sets - Specification (third revision)
9079:2018	Monoset pumps for clear, cold water for agricultural and water supply purposes - Specification (third revision)
9283:2013	Motors for submersible pump sets
9968 (Part 1):1988	Specification for elastomer insulated cables: Part 1 for working voltages up to and including 1100 volts (First Revision)
14220:2018	Open well submersible pump sets - Specification (first revision)
14536:2018	Selection, installation, operation and maintenance of submersible pumpset - Code of practice (First Revision)
IS/IEC 61701 : 2011	Salt mist corrosion testing of photovoltaic (PV) modules First Revision
IS 17210 (Part 1) : 2019 IEC TS 62804-1 : 2015	Photovoltaic (PV) Modules — Test Methods for the Detection of Potential-Induced Degradation Part 1 Crystalline Silicon
IS/IEC 60034-1:2004	Rotating Electrical Machines ─ Part 1 Rating and Performance
IS/IEC 61683:1999	Photovoltaic System-Power Conditioners — Procedure for Measuring Efficiency
IEC 62253:2011	Photovoltaic Pumping Systems – Design qualification and performance measurements
IS 14286 : 2010 /IEC 61215 : 2005	Crystalline Silicon Terrestrial Photovoltaic (Photo Voltaic (PV)) modules - Design Qualification And Type Approval (First Revision)

IS/IEC 61730-1 : 2004	Photovoltaic (Photo Voltaic (PV)) Module Safety Qualification Part 1 Requirements for Construction
IS/IEC 61730-2 : 2004	Photovoltaic (Photo Voltaic (PV)) Module Safety Qualification Part 2 Requirements for Testing
IEC 60068-2-6:2007	Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)
IEC 60068-2-30:2005	Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 + 12h cycle)
IS/IEC 60947 : PART 1 : 2007	Low - Voltage switchgear and controlgear: Part 1 general rules (First Revision)
IS xxxxxx (Doc No MED/20/13071)	Solar Photovoltaic Water Pumping Systems — Testing Procedure Guidelines

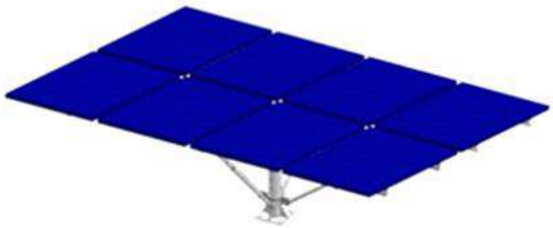
Annexure-I

Specifications for Dual Axis Manual Tracking Type
Module Mounting Structure (MMS) for Solar Water Pumping System



4 Module MMS

6 Module MMS



8 Module MMS

10 Module MMS

A-1 Standard MMS for 4, 6, 8 and 10 solar modules have been specified. These standard MMS may be used in combinations for different capacities of solar water pumping systems as follows:

1. Standard MMS of 4 Modules for 1 HP

2. Standard MMS of 6 Modules for 2 HP

3. Standard MMS of 10 Modules or Combination of standard MMS of 4 Modules and standard MMS 6 Modules for 3 HP

4.Combination of two standard MMS of 8 Modules or combination of standard MMS of 10 Modules and standard MMS 6 Modules for 5 HP

5. Combination of three standard MMS of 8 Modules or combination of two standard MMS of 10 Modules and one standard MMS 6 Modules for 7.5 HP

and so on….

A- 2 Specifications of main parts used in MMS are given below:

A-2.1 Centre Shaft

Centre shaft used in structure shall be of :

a) For 4, 6 and 8 Modules structure - minimum 139 OD with minimum thickness of 4 mm with base plate minimum 10 mm thickness if used and foundation hardware shall be as per IS 5624.
b) For 10 Modules structure - minimum 165 OD with minimum thickness of 4 mm with base plate minimum 20 mm thickness if used and foundation hardware shall be as per IS 5624.

For system without base plate i.e., direct pilling is shall be as per the site condition based on the properties of Soil and refer (IS 6403 / 456 / 4091 / 875) for foundation design.

A-2.2Rafters

The Main and secondary rafter used in structure shall be of either SHS & RHS pipe sections.

A-2.3Purlin

Mounting Purlins used in the structure shall be made of Cold form steel section as per IS 1079 with minimum thickness of 2 mm.

A-2.4 Provision for Seasonal Tilt

In one structure at least four telescopic supports (three may be used in MMS for 4 modules) either round hollow sections or square hollow section to be provided to support the mounting structure.

A-2.5 Provision for Daily Tracking

Provision for Daily tracking shall be provided by the way of providing min. 8 mm thick metal sheet with precision cut grooves.

A-2.6 Module Locking System

Modules shall be locked with antitheft bolts of SS 304 Grade.

A-2.7General Hardware for Structure Fitment

Either SS 304 or 8.8 grade hardware shall be used for fitment.

A-2.8Hot Dip Galvanizing

All structure parts shall be hot dip galvanized according to IS 4759.

A-2.9Tolerance for Fabrication

Tolerance for fabrication of steel structure shall as per IS 7215.

A-2.10Welding

Welding shall be done as per IS: - 822 & grade of welding wire shall be (ER70S-6).

A-2.11 Raw Material Test Certificates (MTC)

MTC of all types of raw material used in dual axis manual tracking type MMS as per appropriate Indian Standard shall be submitted along with dispatch documents.

A-2.12 Tests to be performed on Dual Axis Manual Tracking Type MMS for Solar Water Pumping System.

A-2.12.1 For ascertaining proper welding of structure part following shall be referred.

a) Weld wire grade shall be of grade **(ER 70 S - 6);** and

b) D.P. Test (Pin Hole / Crack) **(IS 822)**

A-2.12.2 For ascertaining hot dip galvanizing of fabricated structure following shall be referred: -

a)Min coating required shall be as per IS 4759.

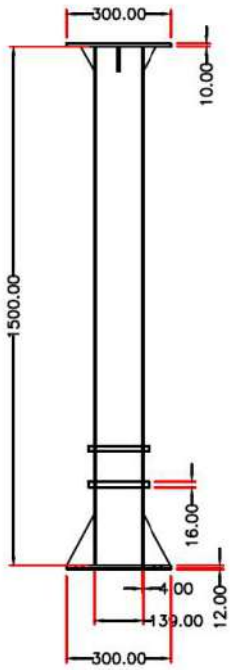
b) Testing of galvanized material.

c) PREECE Test (CuSO4 Dip Test) **(IS 2633)**

d) Mass of Zinc **(IS 6745 or IS 4759)**

e) Adhesion Test **(IS 2629)**

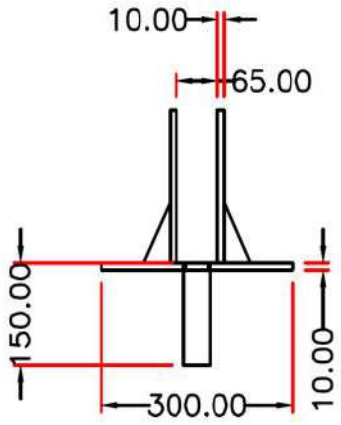
Part1 – Mail Column

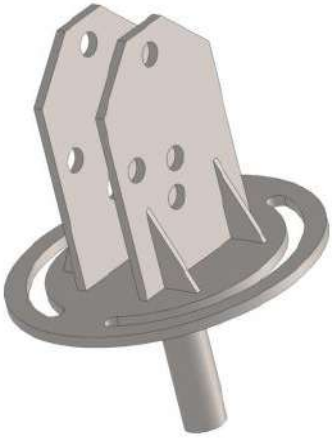


Notes: -

1. All Dimensions are in mm.
2. Main Column material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

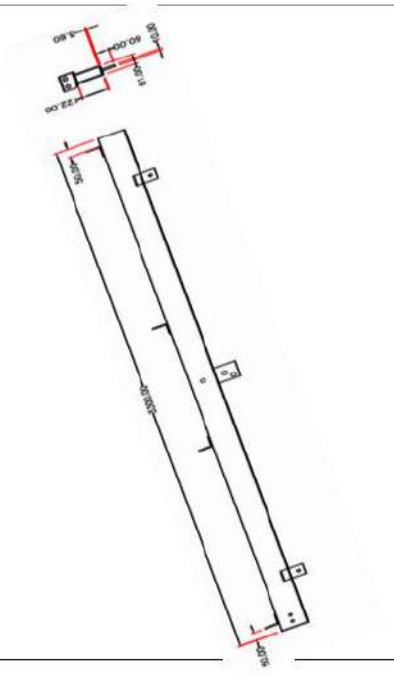
Part 2 – Top Plate





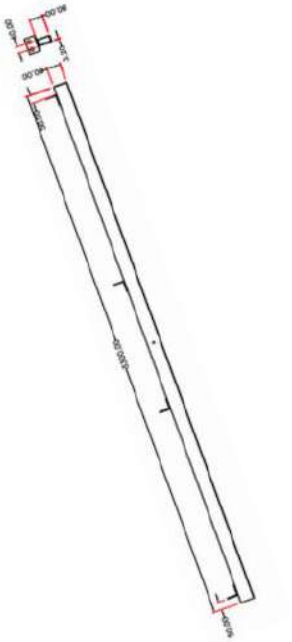
Notes: -

1. All Dimensions are in mm.
2. Top Plate material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

Part 3 – Main Tube	
	

Notes: -

1. All Dimensions are in mm.
2. Main Tube material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

Part 4 – Side Tube	
	

Notes: -

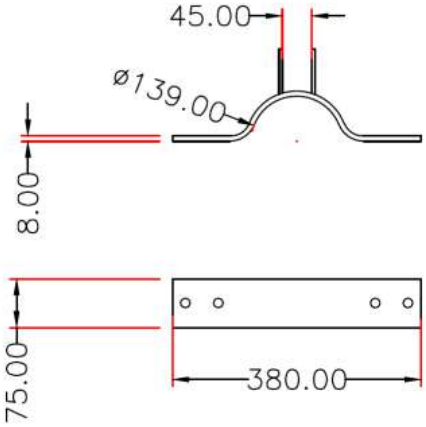
1. All Dimensions are in mm.
2. Side Tube material grade should be YST - 240 as per: -IS: 1161 / 1239 & E250 as per: - IS: 1079 / 2062.

Part 5 – Purlin

Notes: -

1. All Dimensions are in mm.
2. Mounting Purlin material grade should be E250 as per: - IS: 1079 / 2062 & IS: 811.

Part 6 – Clamp with Blade



Notes: -

1. All Dimensions are in mm.
2. Clamp with Blade material grade should be as per: - IS: 1079 & E250 as per: - IS: 2062.