TEST

DESCRIPTION

:To detect any visual defects in module

.Broken, cracked, or torn external surfaces Bent or misaligned external surfaces, including superstrates, substrates, frames and junction boxes to the extent that the operation of the PV module would be .impaired Bubbles or delamination's forming a continuous path between electric circuit and .the edge of the module If the mechanical integrity depends on lamination or other means of adhesion, the sum of the area of all bubbles shall not .exceed 1% of the total module area Evidence of any molten or burned encapsulant, back sheet, front sheet, diode or .active PV component Loss of mechanical integrity to the extent that the installation and operation of the module .would be impaired Cracked/broken cells which can remove more than 10% of the cell's photovoltaic active area from the electrical circuit of the PV .module Voids in, or visible corrosion of any of the layers of the active (live circuitry of the module extending over more than 10% of any .cell .Broken interconnections, joints or terminals Any short-circuited live parts or exposed live .electrical parts Module markings (label) are no longer .attached, or the information is unreadable

MQT 01 Visual Inspection

MQT 02 Maximum Power Determination	Checking the functionality of module and maximum .power by checking the I-V curve
MQT 03 Insulation Test	HiPot test with voltage of 3000V for PV modules with voltage system of 1000V for 1 min. again another HiPot test for 2 min with 1000V (system .(voltage
MQT 04 Measurement of Temperature Coefficients	Determining temperature coefficients of current, .voltage and peak power from module measurement
MQT 05 Measurement of Nominal Module Operating Temperature ((NMOT	Determining the solar module characteristics (Voc, Isc and Pmax) in 800 W/m2, 20 degree and wind .speed of 1m/s

MQT 06 Performance at STC and NMOT	Checking the short circuit current (Isc) and open circuit voltage (Voc) and IV-curve and comparing with the rating with tolerances for both STC (1000 W/m2 , 25 degree and AM = 1.5) and NMOT (800 W/m2, 20 degree and wind speed of 1 m/s) .conditions
MQT 07 Performance at Low Irradiance	Determining the current-voltage characteristics of module at 25 degree and low irradiance of 200 .W/m2 and having IV curve result
MQT 08 Outdoor Exposure Test	Installing the module outdoor with load around its maximum power for at least 60 kWh/m2. No defect .should be found
MQT 09 Hot-Spot Endurance Test	Determining ability of module against hot-spot effects like solder melting or deterioration caused by faulty cells, mismatched cells, shadowing, or soiling. Using I-V curve tracer and IR scan to check the .hot-spot by making shadow for every single cell

MQT 10 UV Preconditioning Test	Install the module in a chamber with only UV light (between 280nm to 320 wavelength and 320 to 400nm) with maximum 250W/m2 and short-circuited module (or with load in maximum power) at the 60 degree temperature. Subject the module to total UV irradiance of at least 15kWh/m2 in the wavelength .range between 280 to 400nm
MQT 11 Thermal Cycling Test	Testing the module by changing the temperature repeatedly. Module to be installed in the chamber with a temperature sensor attached to its middle. The temperature should change with no more than 100 degree per hour and stay at -40 and 85 for at least 10 min. during the test, module will carry the current when the temperature increases from -40 to 80 degree only. Below process will be taken 50 or .200 times

MQT 12 Humidity Freeze Test

Testing the module in high temperature and humidity followed by sub-zero temperature. Temperature will arise to 85 degree at maximum 100 degree per hour and keep the module for 20h in humidity of RH 85%. Then cool down to zero and then -40 degree by the speed of max 100 and 200 degree per hour. And .keep for 30 min. do this process for 10 cycles





MQT 14 Robustness of Terminations

Checking capability of withstanding of cables and termination attachments against stresses. Force of 40N for 10s in different direction will be applied to junction box to test its retention on module surface. Cable will be pulled 50 times for 1s in the direction or the axis and then torque test will be applied for 1 .min





Putting module in the tank of required solution to a depth sufficient to cover all surfaces (except junction box not designed for immersion). Then doing HiPot .(test for 2 min at system voltage (1000V

MQT 15 Wet Leakage Current test Testing ability of withstanding with minimum static load. During the test electrical continuity of internal circuit should be monitored. Fixing the module on mounting base and applying 1 hour of 1.5 times of design load (per manufacturer) in front and back of .the module respectively for three cycles

MQT 16 Static Mechanical Load Test Testing the effect of hitting hail on the module surface (different location). Module will be installed on 90 degree tilt and room temperature. 11 hail ball at the diameter of minimum 25mm and speed of minimum 23 m/s will be fired through launcher. No .major defect should be found





MQT 17 Hail Test

MQT 18 Bypass Diode Testing	Checking the forward voltage of diode with short circuit current in 30, 50, 70 and 90 degree Celsius, then keep the current 100% and 125% of short circuit current for one hour and check the forward voltage at 75 degree. Then checking the functionality of diode after test. It could be done by successive IV-Curve tracer at maximum power by having shaded the strings to turn the diode ON or connecting the IV-Curve tracer in reverse polarity to .turn the diode ON

MQT 19 Stabilization	Checking the power of module to make sure it is stabilized electrically. The power testing on three consecutive should follow below relation: (Pmax – Pmin) / Paverage < x
	Stabilization will be done in the beginning to check the label of each module and at the end of test to make sure degradation did not effect on the .modules
	IEC classified the tests in few categories just to have better view on all tests as follow:
	Environmental stress tests (MST 51, MST 52, (MST 53, MST 54, MST 55, MST 56 General inspection tests (MST 01, MST 02, (MST 03, MST 04, MST 05, MST 06, MST 07 Electrical shock hazard tests (MST 11, MST 12, MST 13, MST 14, MST 16, MST 17, MST (42 Fire hazard tests (MST 21, MST 22, MST 23, (MST 24, MST 25, MST 26 Mechanical stress tests (MST 32, MST 33, (MST 34, MST 35, MST 36, MST 37, MST 42