

Comparision of Various PV Technologies

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Abstract- This paper presents far reaching study on execution correlation of various photovoltaic advances, at the point when exposed to five unmistakable extents of temperature and dampness in a controlled situation under biasing conditions. The examination considers five distinctive PV (Photovoltaic) advancements (Mono, Multi, a-Si, CdTe, CIGS) in light of their electrical parameters. It is seen that CIGS (Cadmium Indium Gallium Selenide) performs with best proficiency at 60 °C, 60% RH (relative mugginess) while CdTe performs with best productivity at 85 °C, 85% RH.

The enlightening insights demonstrates that the biggest conceivable Variance in Maximum Power of a-Si out of every accessible innovation is about 20.85 though the least noted in Mono C-Si is 0.917. The fluctuation of information is additionally checked utilizing Analysis of Variance device. At long last the investigation sets up the execution predominance of C-Si (Mono) innovation over all the slight film advances dependent on stress tests and assessment through the rehashed estimation of most extreme Power, module proficiency and cell effectiveness.

Keywords- Photovoltaic technologies, Accelerated aging Environmental testing ,Degradation

I. INTRODUCTION

Vitality security is a standout amongst the most talked about subjects today among the perusers. For created countries, the development of vitality consumption is 1% every year, while for creating countries it is around 5% every year. Presently so as to keep up the developing vitality need there is a need to move from regular wellspring of vitality to sustainable power source, which are feasible and condition cordial. In this content sun based vitality has progressed toward becoming fuel of things to come and has extensive potential. Be that as it may, the test survives from catching the accessible sunlight based vitality and changing over it efficiently to electrical vitality. The present issue is particularly pervasive while producing power everywhere scale. Studies uncover that control yield can be expanded from 25% to 30% by following the sun in both the bearings, therefore they require guaranteed, certified quality of PV modules. The certification/qualification of CrCost effectiveness of PV (Photovoltaic) systems is increasingly

gaining importance with the ongoing growth of PV market. 70% of capital investment for PV systems is related to the technologies are generally done according to the International standard IEC (International Electrotechnical Commission) 61215 and IEC 61646. A qualification test indicates that whether a PV module is suitable or not for long term operation when kept under normal environmental condition. In other words the purpose of qualification testing is to do characterization of the module while exposing it before and after the diff Qualification test is accomplished for quick location of disappointments of PV modules in the controlled condition. It likewise gives the moment rating of relative qualities and acknowledges capacities of plan alternatives amid item improvement. The quantitative examination of PV module while holding it under continuous pressure is regularly entangled and testing. There are specific test regimens wanted by the PV business to give a reenacted an incentive to the lifetime of a PV module, which would guarantee a base endorsed lifetime for the PV module. One of the restrictions of qualification test is that it is performed on a set number of modules (under 10) when contrasted with 1000 of PV modules that are delivered a year. Likewise it doesn't confirm that all generation modules will pass. Some specific quickened tests are additionally being utilized as screening tests alongside the standard tests to examine disappointments or potential issues one of a kind to specific module plans..

Wohlgemuth revealed that qualification tests are vital, with restrictions connected to it. The feelings of anxiety are structure dependent and the objective is to have all financially accessible items prepared to do finishing the test succession, as a rule qualification test portrays the PV module with specific benchmarks yet does not give assurance for its long haul execution. In most accelerated indoor testing, PV modules are exposed to extreme ranges of temperature and humidity whereas in normal outdoor analysis of PV modules, they are exposed to temperature, humidity and light simultaneously. So, in order to investigate possible effects, it is necessary to perform a combined exposure test. The execution of PV modules is additionally influenced when dampness enters the back sheet of PV modules through the EVA (ethyl vinyl acetic acid derivation) sheets, as it can debilitate the interfacial cement bonds while infiltrating the polymer and achieving the sun based cell. This outcomes in delamination, loss of passivation, expanded no of entrance

ways and erosion of bond joints. To have long haul dependability of PV framework and profitable information for assessing efficiency, it is vital to realize the PV module's corruption conduct alongside its open air field condition and blame diagnostics. The quickened maturing tests done gives a performance expectation that the PV module is sturdy and dependable for as long as 25 years, which generally is trying in the genuine situation. So quickened maturing tests give a long haul expectation while applying a lot of worry for a brief span on PV modules. There are different methods additionally to distinguish and diagnosing abandons in PV modules including checking techniques like flow evoltage estimations and infrared thermography, however there is a requirement for further research to anticipate long haul unwavering quality of modules .

AAT (Accelerated maturing test), is utilized to examine the debasement and disappointment instruments in PV modules,. One of the quickened life tests for PV module is consistent light-drenching (Such life test can be specifically corresponded with genuine condition utilizing the normal day by day irradiance profiles from the objective site, contingent upon the land area. As the information for outside is accessible, however writing information for the increasing speed variables of crys-talline silicon are very scanty. As concentrates done by Osterwald expressed that endeavors have been made to correspond the quantity of hours at 85 °C, 85% RH (relative humidity)Damp Heat with long periods of musical drama tion in a damp atmosphere

The regular quality criteria utilized in the standard qualification test are type endorsement testing of earthly PV modules for both crystalline and slim film modules. Numerous productions have talked about the imperfections and disappointment rates related with the testing of business PV modules .. As indicated by IEC (International

Electrotechnical Commission) 61215, numerous investigations were endeavored in the past to find out the unwavering quality of PV modules utilizing Damp Heat test to decide the impact of long haul infiltration of dampness on materials.. Laronde et al. nitty gritty that modules are debased in light of disintegration while using DH (Damp Heat) testing Peike et al. reported that the effect of damp warmth test on PV modules is network disintegration or decreased conductivity. It likewise detailed that higher temperatures quicken water vapor saturation into the module and the resulting debasement r Examination of indoor test information with open air disappointment instruments relating to PV establishments has not been endeavored till now. This will require information from PV establishments till now about the disappointment type and recurrence. A few investigations have announced that

IEC 61215 certified PV module ensures somewhere in the range of 15 and 20 years of life in a genuinely moderate atmosphere.responses. There is a colossal refinement in results saw from the indoor and outside examination. The flaws that appear in these IEC 61215 tests are one of a kind in connection to those that appear in the field. For instance e in warm cycles and soaked warmth tests for the most part watched blemish is tedlar delamination however in real working conditions typically watched deformation is tedlar partitions. Module lifetime can't be extrapolated from the eventual outcomes of C-Si and p-Si PV modules, concerning crystalline and polycrystalline silicon PV modules, there is a yearly power abatement of 2%, while love phous and CIS sun situated modules demonstrate a significantly higher power decline. Defilement and influence incident in PV modules is similarly watched coming about as a result of the weight connected by system voltage inclination. The qualification tests and checks don't adequately survey the quality of the modules to the whole deal effects of high voltage tendency experienced in field exhibits.Degradation brought about by voltage inclination is specifically associated with the spillage current or coulombs go from the silicon dynamic layer through the encapsulant and glass to the grounded module outline. It must be viewed as that contending forms make the impact nonlinear

Laboratories like NREL (National Renewable Energy Laboratory) performed indoor and outside testing to portray the long haul impacts of framework voltage connected to the dynamic layers of sun oriented cell.

II. DEGRADATION ANALYSIS METHODOLOGY

Preceding the sending at the trial proving ground office in natural loads at NISE (National Institute of sun powered En-ergy), the constructional information of the considerable number of modules of every innovation with item specification were noted and their I-V attributes were estimated inside, utilizing a class A sun test system at NISE, so as to create a gauge information for further correlation.

The execution examination of every individual PV innovation has been explored through a far reaching test battle as pursues

- Visual Inspection of the PV modules.
- Insulation Test
- Initial I-V Curve measurement of five technologies is noted .
- The Temperature and Humidity Ranges are selected according to the chart and procedure which is followed for performing this experiment is presented in timeline

form as shown in along with accelerated ranges of temperature and humidity with time in hours.

- STC and Insulation test is carried out at an interval of every 200 h after subjecting each range of temperature and humidity, their experimental setup is shown in a and d respectively.

III. RESULT and CONCLUSION

A nitty gritty examination of various PV innovations is exhibited w.r.t parameters like most extreme power, module efficiency and cell efficiency, when modules are presented to various scopes of temperature and stickiness in natural chambers connected for a definite timeframe. Their graphical investigation delineated identified with the diverse advances and further examination is finished portraying gatherings of same numerical information for module efficiency, most extreme power and cell efficiency through their quartiles by box and hair plot . All advances delineate a variable conduct. While concentrating enlightening insights, obviously mono C-Si has indicated best execution as far as little variety in most extreme power and a-Si innovation has demonstrated least fortunate execution regarding vast variety in greatest power. While thinking about module efficiency and cell efficiency, a significant distinction in the execution for all advancements isn't watched. Further to reconfirming the outcomes, another factual instrument ANOVA (examination of change without replication) is utilized to think about the execution.

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