# SOLARTESTER TEST REPORT

## Project Details

| | | | |
|---|---|---|---|
| Client | **R&H Solartechnik Dresden GmbH** | Test Date | woensdag 9 december 2020 |
| Test Location | Kaiserslautern | Operator | Rogier Vugts |
| Address | Denisstraße 12-14 | | |
| | 67663 Kaiserslautern | | |
| | Germany | | |

## Module Details

| | | | |
|---|---|---|---|
| Module Brand | Talesun | Number of modules tested | 7 |
| Module Type | TP660P-260 | Number of Modules in project | |
| Nominal power STC (nameplate) | 260 | Percentage of batch/Container | |
| Number of cells per module | 60 | | |
| Calibration module | C52908191230110389232362 | | |

| Average power at STC | Lowest STC power | Highest STC power | Module classification |
|---|---|---|---|
| 246,87 Watt | 246,07 Watt | 248,35 Watt | 100% Class A |
| 95,0% of nom | 94,6% of nom | 95,5% of nom | 0,00% Class B |
| ⬇ -5,05% deviation | ⬇ -5,36% deviation | ⬇ -4,48% deviation | 0,00% Class C |
| | | | 0,00% Class D |

## Power measurement distribution



nominal value 260 Watt
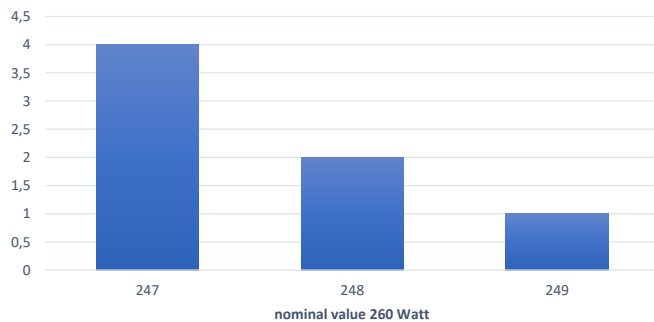
## MPP versus Nameplate value



0%

100%

■ Above nameplate value    ■ Below nameplate value
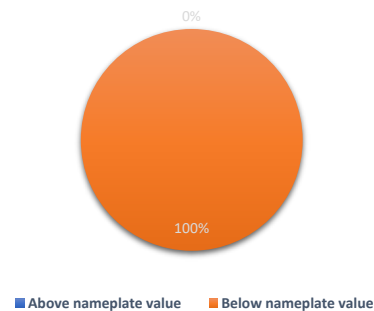
## Conclusion

| | |
|---|---|
| Power Measurement | The test shows average module power is 5.05% lower than nameplate value. Average output of 95% aligns with about 3 years of linear degradation according to the datasheet for this type of module. |
| Electroluminescence imaging | Modules have been classified as Class A no B, C or D modules have been found. |

## Detailed test results Electroluminescence imaging

**Evaluation protocol:** Standard MBJ / TÜV version 3.4 - www.solartester.nl/downloads

| Cell classification | | # cells found | percentage |
|---|---|---|---|
| **Unmarked** | No abnormalities | 410 | 97,62% |
| **EL green** | Uncritical cracks; do not lead directly to a degradation of the module. Other cracks and cell breaks are acceptable if they are not able to disconnect cell areas larger than 1 %. | 6 | 1,43% |
| **EL yellow** | Critical: All cell areas that can potentially disconnect cell areas larger 1 % and smaller 20 % from power supply or which already do so. | 0 | 0,00% |
| **El red** | Very critical: Cell breaks that can potentially disconnect more than 20% of the cell area from the power supply are classified in the 'very critical' category and marked red. This category includes above all comminuted or fan-like breaks. Red cells lead directly to the classification of a PV module in the class C | 0 | 0,00% |
| **El blue** | Other EL abnormalities (shunts, dark cells, printing failures, edge contamination, ...). This category includes all defects which have occurred in the module manufacturing process and which have no negative impact on performance within the lifetime of the photovoltaic module. Such defects are normally uncritical and marked blue, since the power loss of the cell is already entered in the performance specified by the manufacturer. Consequential damages are not expected. | 0 | 0,00% |

## Module Classification

| | | # of modules | percentage |
|---|---|---|---|
| **A** | less than 10% green marked cells, no yellow or red | 3 | 57,14% |
| **B** | less than 20% green marked cells, less than 10% yellow, no red, total # marked cells less than 20% | 0 | 0,00% |
| **C** | more than 20% green marked, more than 10% yellow marked, less than 10% red marked, total # marked cells less than 30% | 0 | 0,00% |
| **D** | more than 10% red marked, total # marked cells more than 30% | 0 | 0,00% |

## Flash / EL Data summary

| ModuleID | ParameterSetName | Judgement | MPP@STC | ELRed | ELYellow | ELGreen | ELBlue | CommentJudgment |
|---|---|---|---|---|---|---|---|---|
| 1024342017 | Talesun / TP660P-260 | CLASSA | 246,33 | 0 | 0 | 1 | 0 | |
| 1005853917 | Talesun / TP660P-260 | CLASSA | 246,16 | 0 | 0 | 3 | 0 | |
| 10058593917 | Talesun / TP660P-260 | CLASSA | 246,07 | 0 | 0 | 0 | 0 | |
| 1005233917 | Talesun / TP660P-260 | CLASSA | 246,24 | 0 | 0 | 2 | 0 | |
| 1005263917 | Talesun / TP660P-260 | CLASSA | 247,07 | 0 | 0 | 0 | 0 | |
| 1005243917 | Talesun / TP660P-260 | CLASSA | 248,35 | 0 | 0 | 0 | 0 | |
| 1005203917 | Talesun / TP660P-260 | CLASSA | 247,88 | 0 | 0 | 0 | 0 | |