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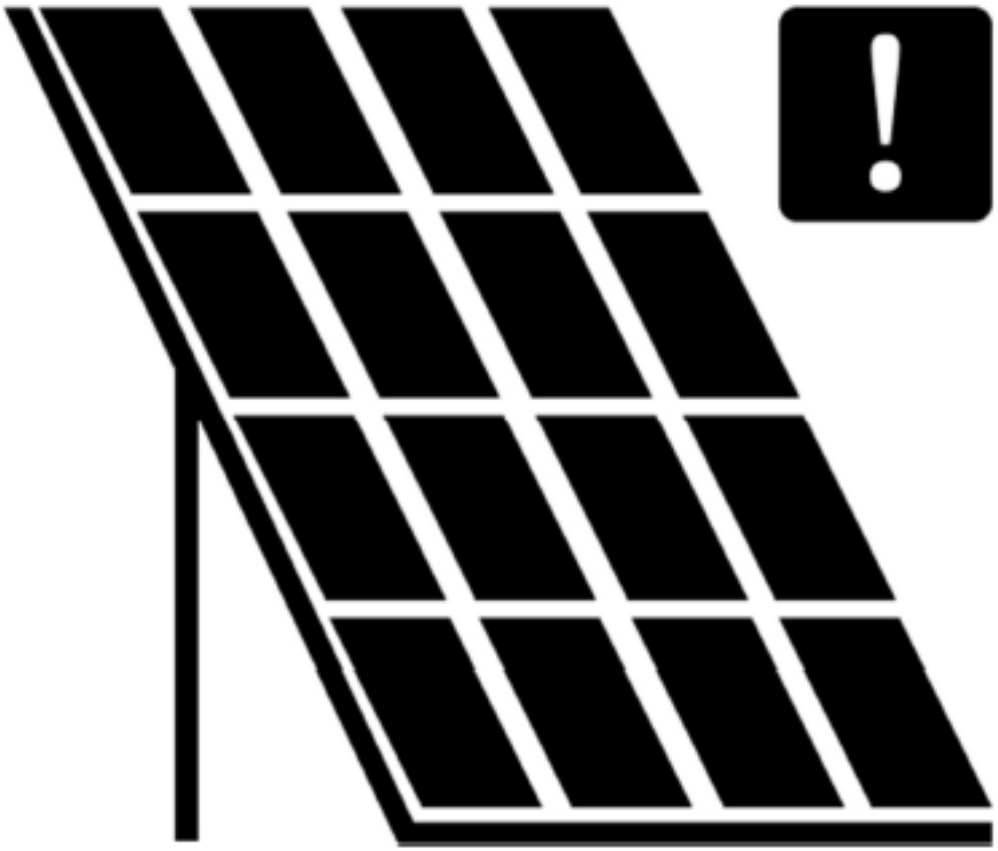
COMPLAINT PROCEDURE

PHOTOVOLTAIC MODULES



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KENO sp. z o. o., based on the provisions of General Terms of Sales §10, declares the possibility of intermediating in warranty complaint processes for its contractors. The validity of the complaint and the final decision lie with the manufacturer of a given PV module based on the provisions contained in the warranty document.

1. AIM AND PURPOSE

The document aims to provide our contractors with clear, step-by-step guidelines of the complaint process. This manual only covers defects in photovoltaic modules that have been installed in accordance with the installation and operating instructions, and are therefore covered by the manufacturer's warranty.

2. GENERAL INFORMATION

In order to efficiently carry out the complaint process, the necessary data presented in this manual must be provided. The guidelines are set by the manufacturers. The claim will be rejected if the applicant refuses to provide the required documents, measurements, photographs, and other information that the manufacturer? may require.

Further in this document you can find basic information on documenting the issues with a photovoltaic module and a division into common defect criteria. Firstly, the installer should perform an inspection in accordance with the basic information immediately after discovering the defect.

Complaints should be submitted via the B2B sales platform at:

https://b2b.keno-energy.com/#

Or by e-mail :

claims@keno-energy.com

Please include the number of one of the proofs of purchase (invoice or order number) in the subject of the message.

Afterwards, based on the manufacturer’s decision, KENO will replace or refund the module.

The duration of complaint handling and processing depends on the contents of individual warranty documents. Manufacturers reserve the right to request additional information, documents or measurements. This is tantamount to prolonging the complaint process by the time needed to provide the necessary documents.

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3. PHOTOVOLTAIC MODULE – BASIC INFORMATION

a) Location of serial numbers and nameplate:

- Fig. 1 – full view of the front of the module,
- Fig. 2 – full view of the back of the module,
- Fig. 3 – serial number on the front of the module glass,
- Fig. 4 – nameplate on the back of the module,
- Fig. 5 – serial number on the back of the module.


fig.1


fig.2

fig.3

fig.4

fig.5

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b) Goods marking on the shipment data sheet

The shipment data sheet is a document attached to the short side of the original unpacked pallet.

A data sheet includes:

1. Pallet number
2. Product index
3. Serial numbers
4. Module dimensions
5. Color/shade marking

最大功率 Pmax	365W		电流分档 Current Class	H	
托盘号 Pallet No.	LRA903038210623424				
组件型号 Module Type	LR4-60HPB-365M				
接线盒型号(线长/连接器) J-box Type (Cable Length/connector)	隆基-PV-LR03C(1.2m)/LONGI-PV-LR03C(1.2m)				
电池片颜色 Cell color	深深蓝/dark blue		边框颜色 Frame color	黑色/Black	
整托包装外尺寸 Total Size	1795*1125*1185		总净重 Total N. W.	585KG	

序号 No.	条形码 BarCode	序号 No.	条形码 BarCode	序号 No.	条形码 BarCode
1	LRP903038210602015906	2	LRP903038210602015967	3	LRP903038210602015977
4	LRP903038210602015970	5	LRP903038210602015974	6	LRP903038210602015901
7	LRP903038210602015909	8	LRP903038210602015912	9	LRP903038210602015907
10	LRP903038210602015910	11	LRP903038210602015908	12	LRP903038210602015905
13	LRP903038210602015904	14	LRP903038210602015913	15	LRP903038210602015911
16	LRP903038210602015918	17	LRP903038210602015915	18	LRP903038210602015928
19	LRP903038210602015920	20	LRP903038210602015923	21	LRP903038210602015931
22	LRP903038210602015895	23	LRP903038210602015897	24	LRP903038210602015949
25	LRP903038210602015950	26	LRP903038210602015894	27	LRP903038210602015937
28	LRP903038210602015935	29	LRP903038210602015926	30	LRP903038210602015927

备注 Remark:

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4. DEFECT CRITERIA

I. INCORRECT MARKINGS

Description of the problem:

The delivered module has markings inconsistent with the manufacturer's assurance. The inconsistency mainly concerns errors in the nameplate and serial numbers and the partial or complete absence of these labels.

Fig.1 Missing nameplate

Fig.2 Duplicate and incorrectly attached serial number

If the presented defect is detected, in order to receive support, please provide the following documentation and information for each PV module that may be affected:

1. Photograph of the back and front of the module,
2. In the case of modules in the manufacturer's packaging from bulk orders, a scan or photograph of the transport document,
3. Detailed photos of any inconsistencies,
4. Video recording of serial number differences on a single module.

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II. HOT SPOT

Description of the problem:

A Hot Spot is an area of a module that tends to be much higher in temperature than the rest of it. There are several reasons for a hot spot to occur, notably:

- cracking of the module surface,
- point pressure applied to the glass surface,
- partial shading (reverse current begins to flow in the solar cell that remains shaded),
- improper handling of the module,
- excessive tightening force of the elements (lack of appropriate tools and failure to follow the manufacturer's recommendations).

Overheating of the module in the previously mentioned hot spots may reach up to 250°C , which may result in a loss of module efficiency or reduction of its proper operation time.

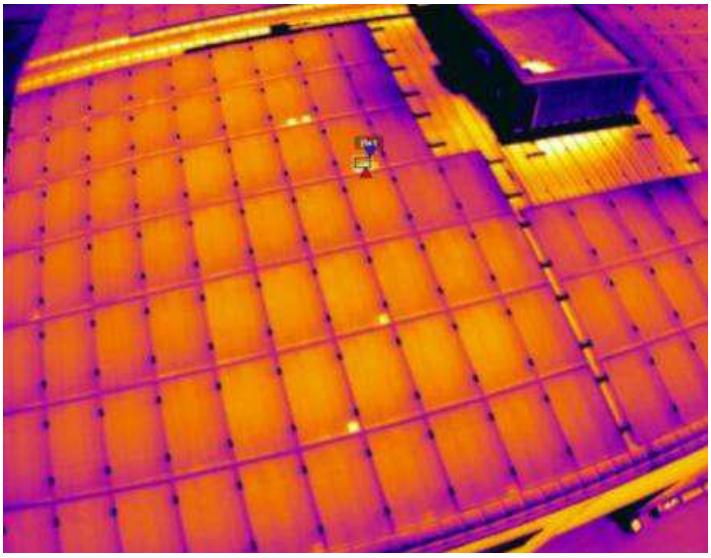

Fig.1 Hot spot visible during thermal imaging

Fig.2 Visible spot burns

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If a photovoltaic module defect is discovered, the following information must be provided immediately in order to receive support:

1. An image taken by a thermal imaging camera with visible temperature data,
2. Photos of the front and back of the module with the nameplate,
3. Serial number of the module,
4. Photos of the installation environment,
5. Clear photos of any inconsistencies.

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III. STAINS AND DIRT

Description of the problem:

Another easily noticeable defect is the contamination found on/under the surface of the photovoltaic panel. They may come from production processes. Stains on the surface/frame should be properly documented in order to start the complaint process (dirt caused during and after installation is not subject to complaint).

Fig.1 Smeared silicone

Fig.2 Moisture under the glass

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Fig.3 Defect under the glass

Fig.4 Delamination of EVA foil

Fig.5 Silicone residues from the production process

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In the event of a defect in the PV modules, please provide the following documentation and information for each PV module that may be affected for assistance.

1. Photo of the nameplate and serial number of the module,
2. Full view of the problematic side of the module,
3. The problem area from a viewing angle that will highlight the defect,
4. In the case of dirt under the glass: a video of an attempt to remove the dirt, e.g. by using a cleaning agent

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IV. CRACKED GLASS

Description of the problem:

Damage to the glass surface is a serious failure that is the first step to corrosion of cells and electrical circuits. The undesirable consequence is a decrease in efficiency and a potential life hazard. Damage to the glass surface occurs both during transport and during and after installation. An installed module with a detected defect must be immediately disconnected.

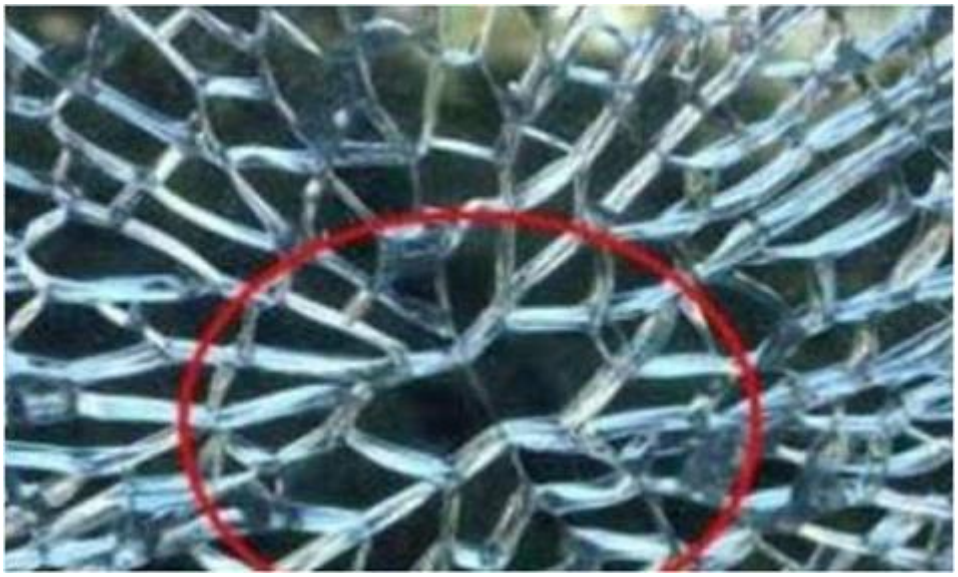

Fig.1 Spontaneous cracking - a "butterfly-shaped" point

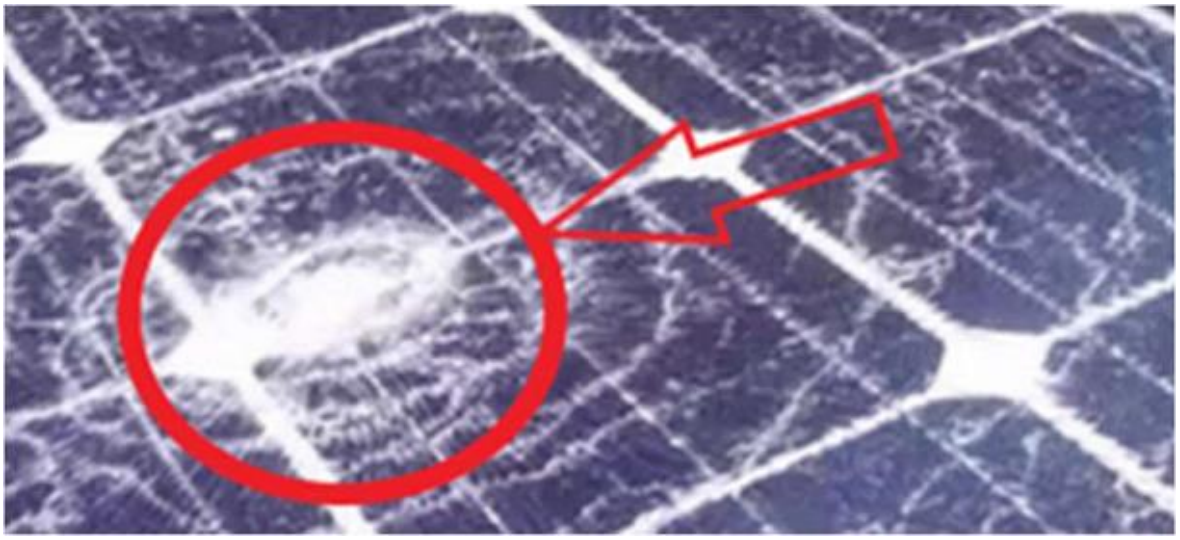

Fig. 2 Fracture caused by an external factor

If the presented defect of the photovoltaic module is detected, in order to obtain assistance, you need to take high resolution photos:

1. The nameplate and serial number of the module,
2. Full view of the problematic side of the module,
3. Back and front of the entire module,
4. In the case of modules in the manufacturer's packaging from bulk orders, a scan or photo of the transport document,
5. Close-up photos according to the diagram below.

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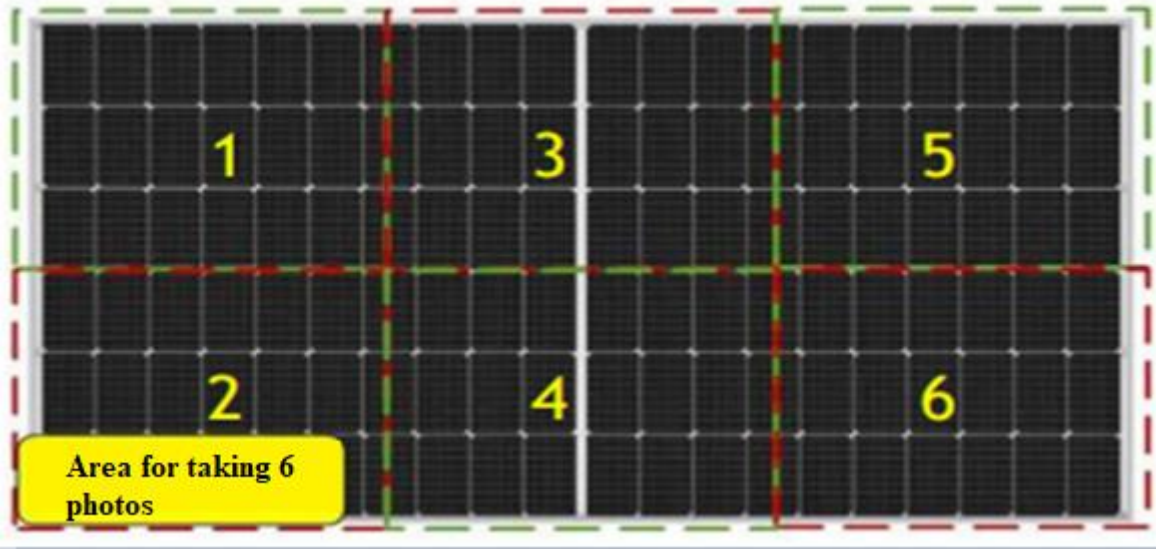

Fig. 3 Diagram - take 6 photos according to the indicated division into areas

If cracks are found in the glass surface of bifacial /dual glass modules, in order to file a complaint with the manufacturer, in addition to the previously mentioned photos of the module and any damage found, photographic documentation regarding the mounting structure used should be sent:

1. Photos of measurements of the distance between the mounting clamps and the edges of the modules (Fig. 4),
2. Photos of the dimensions of the mounting clamp used (fig. 5),
3. Photos of the entire installation with visible locations of the mounting clamps.

Fig.4 Measuring the distance of the mounting clamp from the edge of the module

Fig.5 Dimensions of the mounting clamp

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V. MALFUNCTION OF THE BYPASS DIODE

Description of the problem:

Damage to the bypass diode is associated with a significant drop in module performance (minimum 1/3 drop in performance). If any irregularities in the operation of the installation are noticed, it can be speculated that the bypass diodes is damaged. However, when diagnosing possible sources of irregularities, other factors affecting the efficiency of the installation must also be excluded. If optimizers are used, first check their condition and rule out their failure.

fig.1 Screenshot from the Solar Edge monitoring application

Fig.2 Sample measurement

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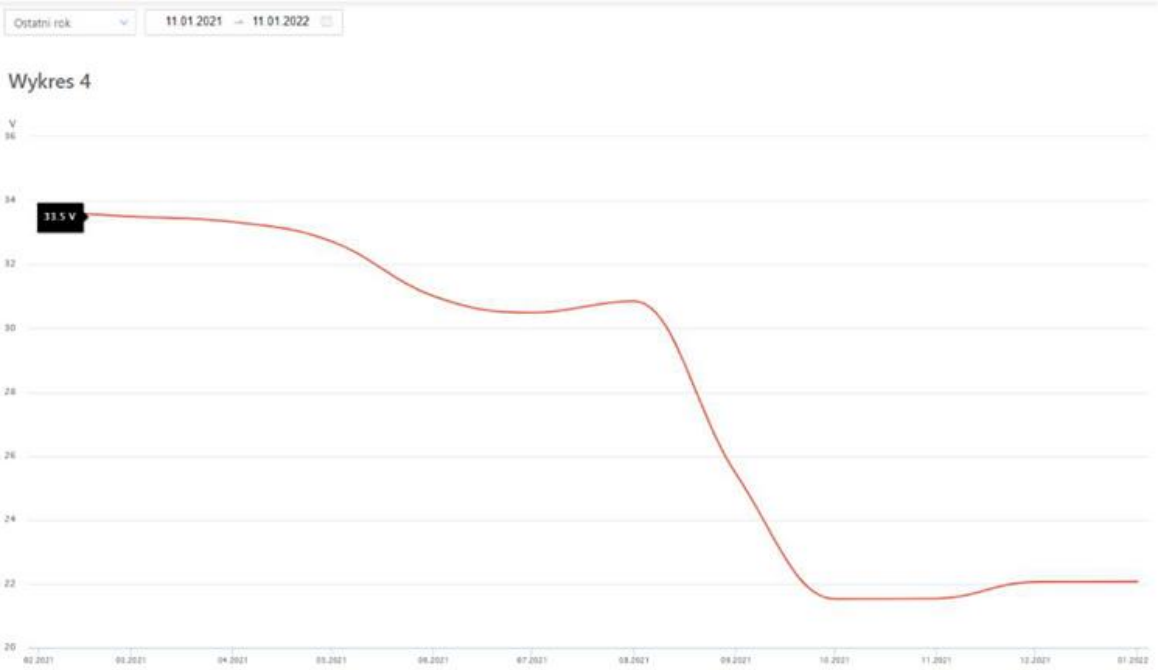

Fig.3 Screenshot from the Solar Edge monitoring application with a visible drop in power

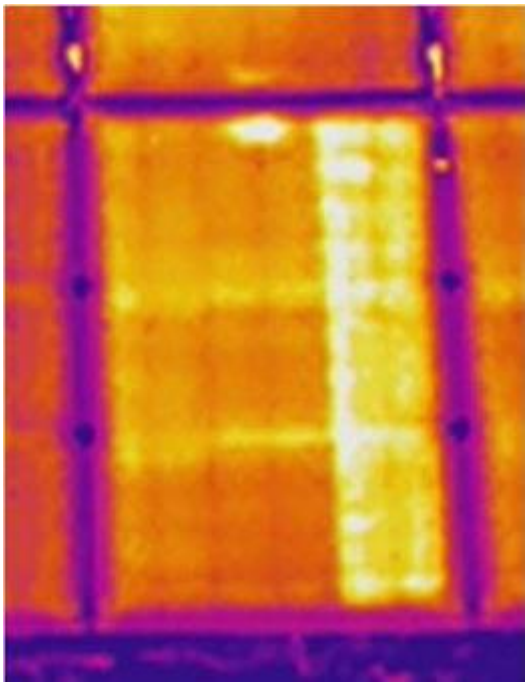

Fig.4 Photo taken with a thermal imaging camera

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Fig. 5 Installation environment – Ground structure

Fig. 6 Installation environment – Pitched roof

If a defect is detected in the PV modules, for assistance, please provide the following documentation and information for each PV module that may be affected:

1) A screenshot from the monitoring application with a precise indication of the faulty module and its operating characteristics,
2) Photos of the installation environment indicating the faulty module ,
3) Photographic documentation of Voc measurements ,
4) Photo of the faulty module taken with a thermal imaging camera (with visible temperature),
5) Photo of the back and front of the entire module,
6) Photo of the nameplate and serial number,
7) Full access to monitoring the installation in which the faulty panel operates.

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VI. MECHANICAL DEFECTS

Description of the problem:

Originally packaged pallets may contain modules with manufacturing defects caused during production. These may include, for example: a broken or misaligned busbar, a foreign body in the solar cell, air bubbles under the glass or laminate, etc. Although these are often poorly visible and seemingly harmless defects, they may have a significant impact on the module's performance and the safety of its use.
Therefore, any such defects should be reported immediately and the modules should not be installed until the manufacturer issues a decision.

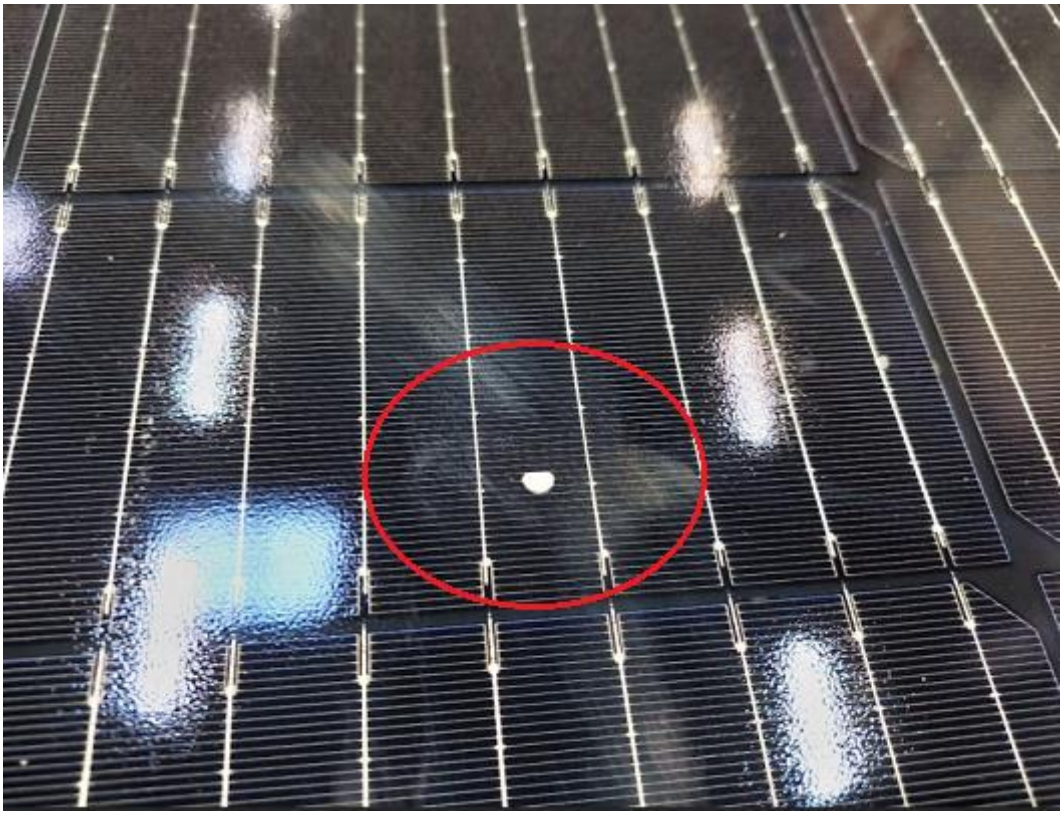

Fig.1 Foreign body under the glass

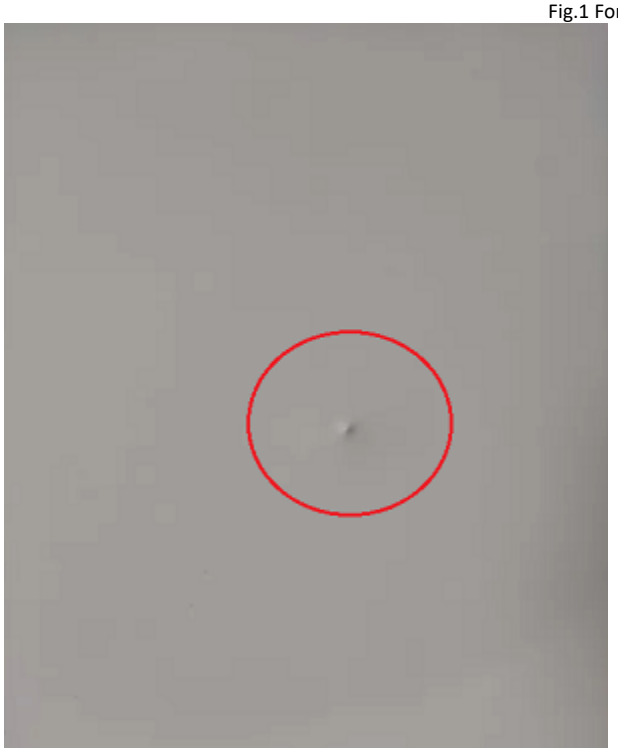

Fig.2 Foreign body under the laminate

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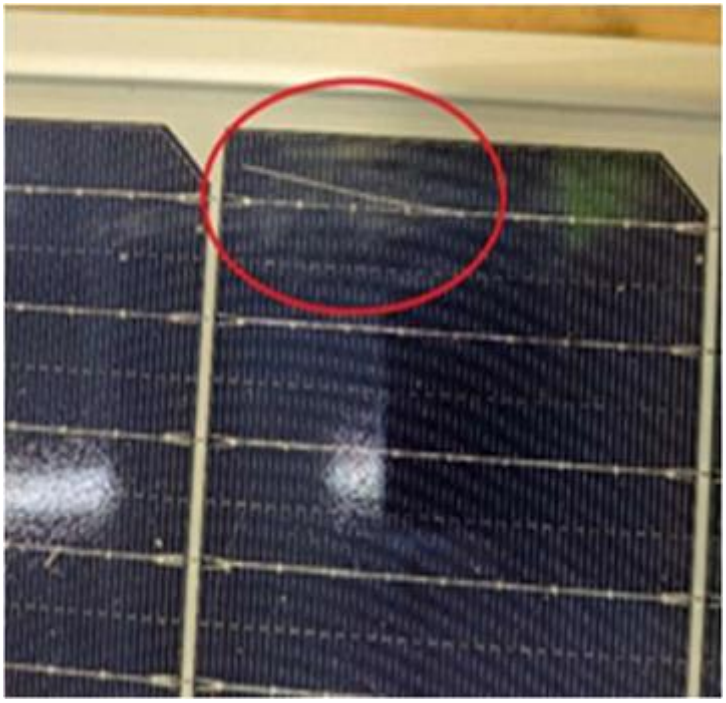

Fig.3 Damaged busbar

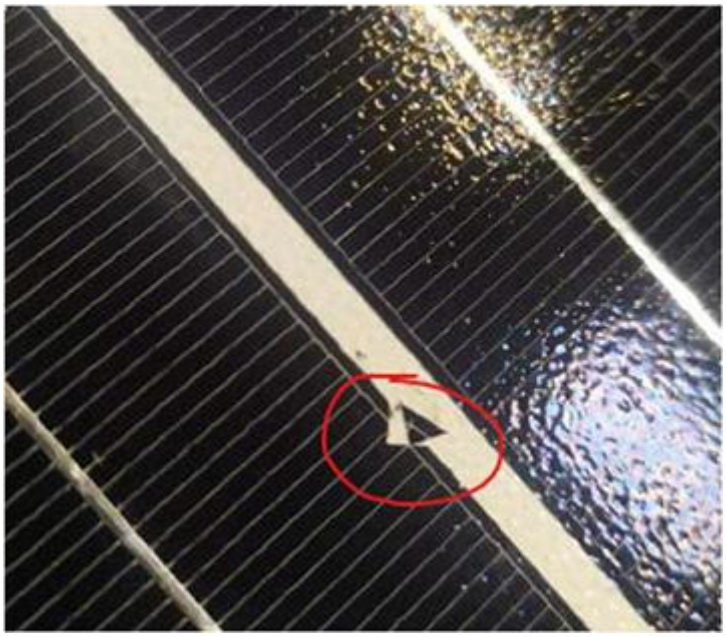

Fig.4 Damaged cell

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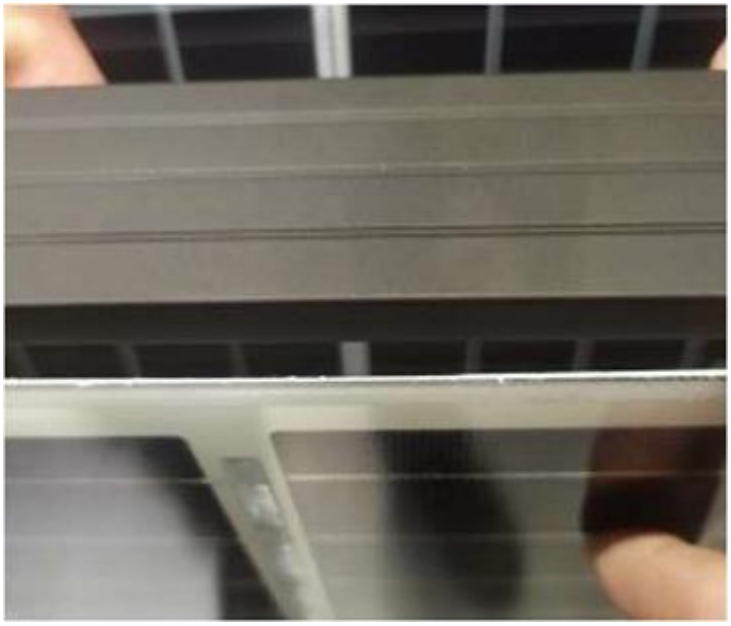

Fig.5 Air bubble under the glass

Fig.6 Lack of silicone or glue connecting the frame with the internal elements

If a defect is detected in the PV modules, for assistance, please provide the following documentation and information for each PV module that may be affected:

1. Photo of the nameplate and serial number,
2. Photos with a full view of the front and back of the module,
3. In the case of bulk orders of PV modules, a scan or photo of the transport document,
4. Close-up photos of the defect from different perspectives.

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VII. LRF EFFECT

Description of the problem:

LRF (light redirecting film) is a foil that increases the power of photovoltaic modules used by some manufacturers. Its operating principle is to direct sunlight reflected from the module surface onto adjacent cells, which significantly increases the overall efficiency. However, the reflection angle will not be uniform over the entire surface of the module, which may result in non-uniform reflection patterns visible from a distance.

Fig.1 LRF effect on a sunny day

Fig. 2 The LRF effect up close

The LRF effect is not classified as a quality defect.

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VIII. COLOR DIFFERENCES

Description of the problem:

Color differences in photovoltaic cells result from the production processes used and the availability of raw materials. It is impossible to obtain the same color in a photovoltaic module. In order to retain the aesthetic value and the visually pleasing aspect, manufacturers ensure the use of cells of the same color class in a single module.

The visual sensations associated with the finished installation of photovoltaic modules depend on several factors:

- angle of refraction of light,
- cloudiness,
- cell used,
- natural degradation process of module components.

Manufacturers try to ensure that modules from the same pallet and pallets from the same container have the same color class.

Color differences between modules do not negatively affect operation and performance of the module in any way and are not classified as a product defect.

Examples of differences excluded from warranty by manufacturers:

Fig.1 Mixed modules from 3 pallets of different color categories

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Fig.2 Differences resulting from the light refraction effect

Fig. 3 Photos taken on a cloudy day. Visual differences caused by dirt and moisture.

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Fig.4 Example of photo documentation of a photovoltaic installation - REQUIRED BY THE MANUFACTURER

Fig.5 JINKO sheet marking

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Fig.6 LONGi sheet marking

If there are significant, abnormal differences between modules from the same pallet, follow the steps below:

1. Prepare a list with serial numbers of all installed modules,
2. Take high-resolution photos (on a sunny day, without clouds):
   - Showing the full view of the roof - 3 photos taken from the front and the left and right sides of the installation (example Fig. 4, photos can also be taken from the ground from a distance of at least 10 meters);
   - Nameplates and serial numbers of adjacent modules showing significant differences;
3. Record a video (if possible).

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IX. EXCESS SILICONE

Description of the problem:

Leaking silicone is a rare defect resulting from problems related to maintaining the quality of the production process. Manufacturers make every effort to ensure that any irregularities are detected and corrected immediately. Please note that errors may occur.

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If silicone leakage is detected, you can receive support by sending the following high resolution photos for each affected PV module:

1. Close-up photo of the leak area,
2. Photo of the nameplate and serial number,
3. Photo of the back and front of the entire module .