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GP 12-90

Solar Photovoltaic (PV) Energy Systems

Group Practice

**BP GROUP
ENGINEERING TECHNICAL PRACTICES**

Foreword

This is the first issue of Engineering Technical Practice (ETP) GP 12-90. This Group Practice (GP) is based on parts of heritage documents from BP Solar.

DRAFT FOR REVIEW

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Introduction

BP Solar intends to provide the best quality products and services. Correct design, installation, operations and maintenance (O&M), and decommissioning are essential to achieve this mission. BP Solar growth is enormous. Therefore, a basis of design is needed for new engineers around the globe to meet best in class designs and integrity management expectations.

BP itself is one of the largest commercial users of solar energy in the world. BP uses solar products at many service stations, plants, and offices. It is expected that solar designs are going to be increasingly in demand in the BP engineering community, as alternative energy sources are going to be more common in all aspects of the industry.

Photovoltaic (PV) systems can be hazardous, due to the nature of electricity generators. The main hazard risks are:

- a. Personnel exposure to electrical shock.
- b. Fire caused by DC arcing and arc flash events.
- c. Personnel exposure to mechanical shock (falling objects or roof collapse).
- d. Exposure of installers to working at heights.
- e. Blast due to explosive atmosphere associated with batteries.

1. Scope

- a. This GP provides requirements for design, installation, operation, maintenance, and decommissioning of solar generators suitable for operation on grid connected or standalone systems.
- b. This GP covers the entire system, from light input to a solar cell, up to and including the interface with the electrical system(s) to which energy is supplied.
- c. This GP provides generic recommendations for PV systems. For further details, please refer to Site Technical Practices (STPs) placed in the BP Solar three digit category (SOL 660).
- d. This GP applies to systems up to 1000 VDC, with no limitation to system power.
- e. Concentration and thermal solar systems are not within the scope of this GP.

2. Normative references

Institute of Electrical and Electronic Engineers (IEEE)

IEEE 142	Recommended Practice for Grounding of Industrial and Commercial Power Systems - Green Book.
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International Electrotechnical Commission (IEC)

IEC 60364	Electrical installation of buildings.
IEC 61215	Crystalline silicon terrestrial photovoltaic (PV) modules - Design qualification and type approval.
IEC 61427	Secondary cells and batteries for photovoltaic energy systems (PVES) - General requirements and methods of test.
IEC 61727	Photovoltaic (PV) systems - Characteristics of the utility interface.
IEC 61730	Photovoltaic (PV) module safety qualification.

3. Terms and definitions

Earthing (grounding) system

One or more earth (ground) electrodes, with their earth (ground) conductors, capable of being connected to a main earthing (grounding) terminal.

Fault

Circuit condition in which current flows through an abnormal or unintended path.

Inverter

Device for converting direct current (DC) from the PV generator into alternating current (AC) that is used by most normal household devices and especially for feeding energy into an existing supply grid.

Levelised cost of energy (LCOE)

Economic assessment of the cost of the energy generating system, including all the costs over its lifetime (e.g., initial investment, operations and maintenance, cost of fuel, cost of capital). A net present value calculation is performed and solved such that, for the value of the LCOE chosen, the net present value of the project becomes zero.