

CONTENTS

FOREWORD	5
INTRODUCTION	7
1 Scope	8
2 Normative references	8
3 Terms and definitions	8
4 System documentation requirements	10
4.1 General	10
4.2 System data	10
4.2.1 Basic system information	10
4.2.2 System designer information	11
4.2.3 System installer information	11
4.3 Wiring diagram	11
4.3.1 General	11
4.3.2 Array – General specifications	11
4.3.3 PV string information	11
4.3.4 Array electrical details	12
4.3.5 AC system	12
4.3.6 Earthing and overvoltage protection	12
4.4 String layout	12
4.5 Datasheets	12
4.6 Mechanical design information	12
4.7 Emergency systems	12
4.8 Operation and maintenance information	13
4.9 Test results and commissioning data	13
5 Verification	13
5.1 General	13
5.2 Inspection	14
5.2.1 General	14
5.2.2 DC system – General	14
5.2.3 DC system – Protection against electric shock	14
5.2.4 DC system – Protection against the effects of insulation faults	14
5.2.5 DC system – Protection against overcurrent	15
5.2.6 DC system – Earthing and bonding arrangements	15
5.2.7 DC system – Protection against the effects of lightning and overvoltage	15
5.2.8 DC system – Selection and erection of electrical equipment	15
5.2.9 AC system	16
5.2.10 Labelling and identification	16
5.3 Testing	16
5.3.1 General	16
5.3.2 Test regimes and additional tests	17
5.3.3 Test regimes for systems with module level electronics	17
5.3.4 Category 1 test regime – All systems	18
5.3.5 Category 2 test regime	18
5.3.6 Additional tests	19
6 Test procedures – Category 1	19
6.1 Continuity of protective earthing and equipotential bonding conductors	19

6.2	Polarity test	19
6.3	PV string combiner box test	20
6.4	PV string – Open circuit voltage measurement	20
6.5	PV string – Current measurement	21
6.5.1	General	21
6.5.2	PV string – Short circuit test	21
6.5.3	PV string – Operational test	22
6.6	Functional tests	22
6.7	PV array insulation resistance test	22
6.7.1	General	22
6.7.2	PV array insulation resistance test – Test method	23
6.7.3	PV array insulation resistance – Test procedure	23
7	Test procedures – Category 2	25
7.1	General	25
7.2	String I-V curve measurement	25
7.2.1	General	25
7.2.2	I-V curve measurement of V_{OC} and I_{SC}	25
7.2.3	I-V curve measurement – Array performance	25
7.2.4	I-V curve measurement – Identification of module / array defects or shading issues	26
7.3	PV array infrared camera inspection procedure	27
7.3.1	General	27
7.3.2	IR test procedure	27
7.3.3	Interpreting IR test results	27
8	Test procedures – Additional tests	28
8.1	Voltage to ground – Resistive ground systems	28
8.2	Blocking diode test	28
8.3	PV array – Wet insulation resistance test	29
8.3.1	General	29
8.3.2	Wet insulation test procedure	29
8.4	Shade evaluation	29
9	Verification reports	30
9.1	General	30
9.2	Initial verification	31
9.3	Periodic verification	31
Annex A (informative)	Model verification certificate	32
Annex B (informative)	Model inspection report	33
Annex C (informative)	Model PV array test report	36
Annex D (informative)	Interpreting I-V curve shapes	37
D.1	General	37
D.2	Variation 1 – Steps or notches in curve	38
D.3	Variation 2 – Low current	38
D.4	Variation 3 – Low voltage	38
D.5	Variation 4 – Rounder knee	39
D.6	Variation 5 – Shallower slope in vertical leg	39
D.7	Variation 6 – Steeper slope in horizontal leg	40

Figure D.1 – I-V curve shapes.....37

Table 1 – Modifications to the test regime for systems with module level electronics17

Table 2 – Minimum values of insulation resistance – PV arrays up to 10 kWp24