

List of methods managed within the ESTI fixed and the flexible scope of accreditation

List N°: 2.9 Valid from: 04/08/2020	Replaces List N°: 2.8 Valid since: 17/01/2020	Prepared: L. Castellazzi Signature: e-signed	Approved: E. Dunlop Signature: e-signed
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CALIBRATION FIELD	CALIBRATION OBJECTS	QUANTITY	RANGE	REFERENCE to STANDARDS	CMC	INTERNAL METHOD	Version in Flex. Scope*	Validation
SOT-12 Solar irradiance	Primary PV reference cell	Current	Up to 1 A	IEC 60904-4:2009	0.52%	M44		
						M45	g	Updated standards: IEC 60904-4 Ed 2.0., IEC 60904-3 Ed 4.0. See H. Mullejans notes "Implementation of IEC 60904-4 ed.2" (26/11/2019) and "Implementation of IEC 60904-3 ed.4" (10/10/2019).
SOT-12 Solar irradiance	PV device (cell)	Current Voltage Power Efficiency	up to 40 A up to 400 V up to 1200W up to 100 %	IEC 60904-1:2006 IEC 60904-2:2015 IEC 61853-1:2011 IEC 60904-1-1:2017 IEC TS 60904-1-2:2019	0.48% 0.08% 0.85% 0.85%	M07		
						M41	d-amd1	Updated standard IEC 60904-3; See H. Mullejans notes "Implementation of IEC 60904-3 ed.4" (10/10/2019).
						M46		
						M51		
						M55	f	added paragraph 9.5 on noise during measurement
						M56	d	H. Mullejans notes: "validation of data acquisition sw for MPPT on Apollo M56" (02/10/2019), and "implementation of IEC 60904-3" (10/10/2019)
						M59		
						M63	b	Updated standard IEC 60904-3; See H. Mullejans notes "Implementation of IEC 60904-3 ed.4" (10/10/2019). Updated reference standards IEC 60904-3:2019 and 60904-7:2019; See H. Mullejans notes "implementation of IEC 60904-3" (10/10/2019) and "implementation of IEC 60904-7 ed. 4" (07/10/2019)
M64	Method not in Flexible Scope							
SOT-12 Solar irradiance	PV device (module)	Current Voltage Power	up to 40 A up to 400 V up to 1200W	IEC 60904-1:2006 IEC 60904-2:2015 IEC 61853-1:2011	0.52% 0.22% 1.0%	M07		
						M41		
						M46		

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		Efficiency	up to 100 %	IEC 60904-1-1:2017 IEC TS 60904-1-2:2019	1.0%	M51		
						M55	f	added paragraph 9.5 on noise during measurement
						M56	d	H. Mullejans notes: "validation of data acquisition sw for MPPT on Apollo M56" (02/10/2019), and "implementation of IEC 60904-3" (10/10/2019)
						M59		
						M63	b	Updated standard IEC 60904-3; See H. Mullejans notes "Implementation of IEC 60904-3 ed.4" (10/10/2019). Updated reference standards IEC 60904-3:2019 and 60904-7:2019; See H. Mullejans notes "implementation of IEC 60904-3" (10/10/2019) and "implementation of IEC 60904-7 ed. 4" (07/10/2019)
						M64	Method not in Flexible Scope	
SOT-12 Solar irradiance	PV device (cell, module)	Spectral responsivity and spectral mismatch factor	up to 2 A/W up to 1.5	IEC 60904-8:2014 IEC 60904-7:2008 IEC 60904-3:2016 IEC 60904-8-1:2017 ASTM E 2236-10 ASTM G173-03	2.50% 0.40%	M04	L	Updated reference standards IEC 60904-3:2019 and 60904-7:2019; See H. Mullejans notes "implementation of IEC 60904-3" (10/10/2019) and "implementation of IEC 60904-7 ed. 4" (07/10/2019)
						M42	f	Updated reference standards IEC 60904-3:2019 and 60904-7:2019 See H. Mullejans notes "implementation of IEC 60904-3" (10/10/2019) and "implementation of IEC 60904-7 e. 4" (07/10/2019)
						M50	d	updated normative references, in particular IEC 60904-8-1 included; inclusion of broad-band bias light for MJ; inclusion of dark measurement.

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SOT-12 Solar irradiance	PV device (cell, module)	Temperature coefficient of: - Current - Voltage - Power	up to $\pm 5\%/^{\circ}\text{C}$ up to $\pm 5\%/^{\circ}\text{C}$ up to $\pm 5\%/^{\circ}\text{C}$	IEC 60891:2009	0.0049%/ $^{\circ}\text{C}$ 0.0049%/ $^{\circ}\text{C}$ 0.0080%/ $^{\circ}\text{C}$	M21		
						M52	d	updated standards: IEC 60904-7:2019 [Ed 4.0]; see H. Mullejans note "implementation of IEC 60904-7 e. 4" (07/10/2019)
						M59		
						M61	c	updated standards IEC 60904-7:2019; see H. Mullejans note "implementation of IEC 60904-7 e. 4" (07/10/2019)
						M62	c	removal of UC56 and IEC 61853-1
SOT-12 Solar irradiance	PV device (cell, module)	Linearity of Current vs Irradiance	up to $\pm 100\%$	IEC 60904-10:2009	0.16%	M58	Method not in Flexible Scope	
SOT-12 Solar irradiance	Bifacial PV device (cell, module)	Bifaciality coefficient: - φ Isc - φ Voc - φ Pmax - BiFi _{rel} - P _{maxBiFi100} - P _{maxBiFi200}	up to $\pm 100\%$ up to $\pm 100\%$ up to $\pm 100\%$ up to $\pm 1\%/(\text{Wm}^{-2})$ up to 1200 W up to 1200 W	IEC TS 60904-1-2: 2019	0.88% 0.14% 1.36% 0.0077%/(Wm^{-2}) 1.25% 1.99%	M64	Method not in Flexible Scope	

(*) Flexible scope: The laboratory has flexibility to perform calibration including methods which are equivalent to those which are already covered by the fixed accreditation scope and to adopt new revisions and amendments of them, without varying measurand, measurement range and uncertainty.

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Table of changes:

V2.0 amd1	Internal Method (row 5): added M62
V2.1	Flexible scope (Row 4) added M42_e
V2.2	Flexible scope (Row 2 and 3) added M55_d
V2.3	Flexible scope (Row 2 and 3) added M56_b
V2.4	Flexible scope (Row 2 and 3) added M46_h
V2.5	Flexible scope removed M42_e, M46_h, M55_d, M56_b, UC04_i, UC42_h
V2.6	Flexible scope (Row1) added M44_d; (Row 2&3) added M14_d, M46_i, M55_e, M56_c; Fixed and Flexible scope (Row6) added Line for linearity vs Current and M58_a; Fixed and Flexible scope (Row 2&3) added M63_a and M64_a.
V.2.7	Flexible scope removed: M41_d, M46_i, M55_e, M58_a, M63_a, M64_a (Methods approved by Accredia during the reaccreditation audit on 24-25/07/2019); Flexible scope (Row 2 and 3) added M56_d (Updated reference for IEC 60904-3 ed.4; added alternative measurement of I-V curve).
v.2.8	Flexible scope added for M45_g, M41_d-amd1, M56_d, M04_L, M42_f, M50_d, M52_d, M61_c, M62_b
v.2.9	Flexible scope added for M55_f, M62_c, M63_b