Annex to declaration of accreditation (scope of accreditation)
Normative document: EN ISO/IEC 17025:2005
Registration number: **K 006**

of **KEMA B.V.**
Calibration & Metering

This annex is valid from: **18-12-2018** to **30-11-2020** Replaces annex dated: **19-09-2018**

Location(s) where activities are performed under accreditation

Head Office

Utrechtseweg 310, Building no. R42
6812 AR
Arnhem
The Netherlands

Location	Abbreviation/ location code
Utrechtseweg 310, Building no. R42 6812 AR Arnhem The Netherlands	ARN

HCS code	Measured quantity, Range	Frequency	CMC[1]	Remarks	Location
LF 0 0	DC/LF Quantities				ARN
LF 1 0	DC Voltage				ARN
	Up to 3 mV		0,8 μV		
	3 mV – 10 mV		$3 \cdot 10^{-4} \cdot U$		
	10 mV – 100 mV		$8{,}5 \cdot 10^{-5} \cdot U$		
	100 mV – 1100 V		$2{,}0 \cdot 10^{-5} \cdot U$		
	Zener Reference Standards				
	1 V and 1,018 V		3 μV		
	10 V		20 μV		
LF 1 3	High Voltage				ARN

This annex has been approved by the Board of the Dutch Accreditation Council, on its behalf,

J.A.W.M. de Haas
Director of Operations

[1] Calibration and Measurement Capability (CMC): Demonstrated measurement uncertainty, with coverage probability of 95%, in a given measurement point or measurement range. Measurement uncertainty, *U*, is calculated according to EA-4/02 "*Evaluation* of the Uncertainty of Measurement in Calibration".

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HCS code	Measured quantity, Range	Frequency	CMC[1]	Remarks	Location
	1 kV – 6 kV		$2 \cdot 10^{-3} \cdot U$	Measuring	
LF 2 0	DC Current			On location with reduced accuracy	
LF 2 1	10 µA – 3 A		$3{,}0 \cdot 10^{-5} \cdot I$		ARN
	3 A – 10 A		$8{,}0 \cdot 10^{-5} \cdot I$		
	10 A – 20 A		$2{,}5 \cdot 10^{-4} \cdot I$		
	10 A – 100 A		$1{,}1 \cdot 10^{-4} \cdot I$		
LF 2 4	Charge				ARN
	5 pC – 1000 pC		1%	Charge measurement by means of voltage measurement at a capacitor	
LF 3 0	AC Voltage			On location with reduced accuracy	
LF 3 1	60 mV – 1000 V	20 Hz – 20 kHz	$2 \cdot 10^{-4} \cdot U$		ARN
	60 mV – 1000 V	20 kHz – 50 kHz	$3 \cdot 10^{-4} \cdot U$		
	60 mV – 220 V	50 kHz – 100 kHz	$4 \cdot 10^{-4} \cdot U$		
	220 V – 1000 V	50 kHz – 100 kHz	$2 \cdot 10^{-3} \cdot U$		
	High Voltage			Measuring	
	1 kV – 6 kV	50 Hz	$2 \cdot 10^{-3} \cdot U$		
LF 3 2	AC Voltage Ratio				ARN
	(instrument transformers)				
	Primary: (10 – 600) V Secondary: (0.1 – 240) V	50 Hz and 60 Hz	$3 \cdot 10^{-5} \cdot U_{out}/U_{in}$ and 90 µrad		
LF 3 3	AC High Voltage			Measuring	ARN
	1 kV – 6 kV	50Hz	$2 \cdot 10^{-3} \cdot U$		

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HCS code	Measured quantity, Range	Frequency	CMC[1]	Remarks	Location
LF 4 0	AC Current			On location with reduced accuracy	
LF 4 1	0,1 mA – 3 A	40 Hz – 5 kHz	$3 \cdot 10^{-4} \cdot I$		ARN
	3 A – 20 A	40 Hz – 1 kHz	$3 \cdot 10^{-4} \cdot I$		
	30 A – 50 A	40 Hz – 1 kHz	$6 \cdot 10^{-4} \cdot I$		
LF 4 2	AC Current Ratio			ambient temp. (23 ± 2) °C	ARN
	(instrument transformers) Primary: 5 A – 6,000 A Secondary: 1 A or 5 A	50 Hz and 60 Hz	$3 \cdot 10^{-5} \cdot I_{out} / I_{in}$ and 90 μrad	Measuring	
LF 4 3	High Current				ARN
	10 A – 6000 A	50 Hz, 60 Hz	$3 \cdot 10^{-4} \cdot I$		
LF 5 0	Power and Energy			10 mV to 1,100 V,	ARN
	Power			10 μA to 100 A	
	3 W – 57.6 kW	50 Hz and 60 Hz	$\frac{3 \cdot 10^{-4}}{\cos(\varphi)} \cdot P$	on site to be performed at ambient temperature; (23,0 ± 3,0) °C	
	3 W – 2.9 MW	50 Hz and 60 Hz	$\frac{2 \cdot 10^{-4}}{\cos\varphi} \cdot P$	measuring 20 V to 1,100 V 100 mA to 6,000A cos φ = 0 to 1	
	Reactive Power (Pr) 6 VAr – 1.8 MVAr	50 Hz and 60 Hz	$\frac{5 \cdot 10^{-4}}{\sin\varphi} \cdot P_r$	60 V to 300 V 100 mA to 6,000 A	
	Electrical (reactive-) energy			see (reactive-) power and time	
LF 6 0	Impedance (DC/LF)				
LF 6 2	DC Resistance			On location with reduced accuracy Non-decadic values	ARN
	20 μΩ – 50 μΩ		$16 \cdot 10^{-4} \cdot R$		

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HCS code	Measured quantity, Range	Frequency	CMC[1]	Remarks	Location
	50 μΩ – 100 μΩ		$8{,}0\cdot10^{-4}\cdot R$		
	100 μΩ – 0,3 mΩ		$6{,}0\cdot10^{-4}\cdot R$		
	0,3 mΩ – 10 mΩ		$4{,}0\cdot10^{-4}\cdot R$		
	10 mΩ – 100 mΩ		$3{,}0\cdot10^{-4}\cdot R$		
	100 mΩ – 1 Ω		$7{,}0\cdot10^{-5}\cdot R$		
	1 Ω – 2 Ω		$25\cdot10^{-6}\cdot R$	Decadic Values	
	2 Ω – 2 MΩ		$20\cdot10^{-6}\cdot R$		
	2 MΩ – 20 MΩ		$10\cdot10^{-5}\cdot R$		
	20 MΩ – 100 MΩ		$75\cdot10^{-5}\cdot R$		
	10 kΩ – 1 MΩ		$1\cdot10^{-5}\cdot R$		
	1 MΩ – 10 MΩ		$1.2\cdot10^{-5}\cdot R$		
	10 MΩ – 100 MΩ		$3\cdot10^{-5}.R$		
	100 μΩ – 10 kΩ		$3\cdot10^{-6}\cdot R$ to $6\cdot10^{-6}\cdot R$	Decadic Values	
LF 6 3	AC Resistance				ARN
	20 μΩ – 1 Ω	50 Hz and 60 Hz	$2\cdot10^{-3}\cdot Z$	Impedance only	
LF 6 4	Capacitance				ARN
LF 6 5	LF Capacitance			accuracy depends on dissipation factor at 1 kHz	ARN
	10 pF – 100 nF	100 Hz, 1 kHz, 10 kHz	$1\cdot10^{-3}\cdot C$		
	1 μF	50 Hz, 200 Hz, 1 kHz	$1\cdot10^{-3}\cdot C$		
	330 pF – 1 μF	50 Hz to 1 kHz	$3.5\cdot10^{-3}\cdot C$ – $3.5\cdot10^{-2}\cdot C$	On location and generating only	
LF 6 7	Inductance				ARN
	1 mH – 10 mH	1 kHz	$1\cdot10^{-3}\cdot L$		

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	100 mH	400 Hz, 1 kHz, 1.592 kHz	$1 \cdot 10^{-3} \cdot L$		
	1 H	100 Hz, 200 Hz, 400 Hz and 1 kHz	$1 \cdot 10^{-3} \cdot L$		
TF 0 0	Time and frequency				
TF 2 0	Relative time				
TF 2 1	Frequency	1 Hz – 1.2 GHz	$5 \cdot 10^{-10} \cdot f$		ARN
TF 2 2	Time interval	1 μs – 4 h	$5 \cdot 10^{-10} \cdot t$ + 100 ns		ARN
TF 3 0	Timeinterval and amplitude				
TF 3 2	Harmonic Distortion				ARN
	< 0.1 %	20 Hz – 2.5 kHz	$3 \cdot 10^{-4}$	(1)	
	0.1 % – 1 %	20 Hz – 2.5 kHz	$1 \cdot 10^{-3}$	(1)	
	1 % – 10 %	20 Hz – 2.5 kHz	$3 \cdot 10^{-3}$	(1)	
	10 % – 30 %	20 Hz – 2.5 kHz	$1 \cdot 10^{-2}$	(1)	
	30 % – 100 %	20 Hz – 2.5 kHz	$3 \cdot 10^{-2}$	(1)	
TE 0 0	Temperature				
TE 9 0	Simulators / Indicators	-100 °C to t_{max} -200 °C to -100 °C	0.2 K 0.35 K	Base-metal couples (also on location)	ARN
		0 °C to t_{max}	0.5 tp 0.8 K	Noble-metal couples (also on location)	
		-165 °C to 200 °C 200 °C to 600 °C	0.1 K 0.2 K	Resistance thermometers (also on location)	

Remarks:
The ambient temperature during calibration is, unless specified otherwise, for:
For al measurements @ (23,0 ± 2,0) °C

(1) The stated best measurement capabilities are based on the fundamental frequency of the input signal.
If desired the distortion can be specified as a rang number of the harmonics.

Calibrations are performed inside the laboratory, unless specified otherwise.