

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 006**

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

This annex is valid from: **30-03-2010** to **01-03-2014**

Replaces annex dated: **30-06-2009**

Premises: **n.a.**

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities ($k=2$)	Remarks
LF 0 0	DC/LF Quantities			
LF 1 0	DC Voltage			
	Standard cells		3 μ V	
	Up to 1 mV		0,4 μ V	
	1 mV to 10 mV		$3 \cdot 10^{-4} \cdot U$	
	10 mV to 100 mV		$3 \cdot 10^{-5} \cdot U$	
	100 mV to 10 V		$5 \cdot 10^{-6} \cdot U$	
	10 V to 100 V		$1 \cdot 10^{-5} \cdot U$	
	100 V to 1100 V		$2 \cdot 10^{-5} \cdot U$	
	Zener Reference Standards			
	1 V and 1,018 V		3 μ V	
	10 V		20 μ V	
	High Voltage			Measuring
	1 kV to 6 kV		$2 \cdot 10^{-3} \cdot U$	
LF 2 0	DC Current			
	10 μ A to 3 A		$2 \cdot 10^{-5} \cdot I$	
	3 A to 10 A		$2,5 \cdot 10^{-5} \cdot I$	
	10 A to 20 A		$6 \cdot 10^{-5} \cdot I$	

This annex has been approved by:

Ir. J.C. van der Poel
Chief Executive

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 006**

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

This annex is valid from: **30-03-2010** to **01-03-2014**

Replaces annex dated: **30-06-2009**

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities ($k=2$)	Remarks
	20 A to 100 A		$1 \cdot 10^{-4} \cdot I$	
LF 3 1	AC Voltage			
	60 mV to 1000 V	40 Hz to 20 kHz	$2 \cdot 10^{-4} \cdot U$	
	60 mV to 1000 V	20 kHz to 50 kHz	$3 \cdot 10^{-4} \cdot U$	
	60 mV to 220 V	20 kHz to 50 kHz 50 kHz to 100 kHz	$4 \cdot 10^{-4} \cdot U$	
	220 V to 1000 V	50 kHz to 100 kHz	$4 \cdot 10^{-4} \cdot U$	
	220 V to 1000 V	50 kHz to 100 kHz	$2 \cdot 10^{-3} \cdot U$	
	High Voltage			Measuring
	1 kV tot 6 kV	50 Hz	$2 \cdot 10^{-3} \cdot U$	
LF 3 2	AC Voltage Ratio			
	(instrument transformers)			
	Primary: (10-600)V Secondary: (0,1-240)V	50 Hz and 60 Hz	$3 \cdot 10^{-5} \cdot U_{uit}/U_{in}$ and 90 μ rad	
LF 3 3	AC Current			
	0,1 mA to 300 mA	40 Hz to 5 kHz	$3 \cdot 10^{-4} \cdot I$	
	300 mA to 20 A	40 Hz to 1 kHz	$3 \cdot 10^{-4} \cdot I$	
	20 A to 50 A	40 Hz to 1 kHz	$6 \cdot 10^{-4} \cdot I$	
LF 4 2	AC Current Ratio			ambient temp. (23 \pm 2) $^{\circ}$ C
	(instrument transformers)	50 Hz and 60 Hz	$3 \cdot 10^{-5} \cdot I_{uit}/I_{in}$ and 90 μ rad	Measuring

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 006**

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

This annex is valid from: **30-03-2010** to **01-03-2014**

Replaces annex dated: **30-06-2009**

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities ($k=2$)	Remarks
	Primary: 5 A to 6000 A Secondary: 1A or 5A			
LF 4 3	High Current 10 A to 6000 A	50 Hz, 60 Hz	$3 \cdot 10^{-4} \cdot I$	
LF 5 0	Power and Energy Power			10 mV to 1100 V, 10 μ A to 100 A
	0,1 μ W to 1 μ W		$1 \cdot 10^{-4} \cdot P$	
	1 μ W to 1 kW		$5 \cdot 10^{-5} \cdot P$	
	1 kW tot 10 kW		$1 \cdot 10^{-4} \cdot P$	
	10 kW tot 110 kW		$2 \cdot 10^{-4} \cdot P$	
	3 W to 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; voltage and current as mentioned above
	3 W to 2,9 MW	50 Hz and 60 Hz	$\frac{2 \cdot 10^{-4}}{\cos \varphi} \cdot P$	measuring 20 V to 1100 V 100 mA to 6000A $\cos \varphi = 0$ to 1
	Reactive Power (P_r) 6 var to 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 6000 A
	Electrical (reactive-) energy			see (reactive-) power and time
LF 5 1	Power Factor $\cos \varphi : 0$ to 1	40 Hz to 100 Hz	$\frac{2 \cdot 10^{-3}}{\cos \varphi} \cdot PF$	

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 006**

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

This annex is valid from: **30-03-2010** to **01-03-2014**

Replaces annex dated: **30-06-2009**

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities ($k=2$)	Remarks
LF 6	Impedance (DC/LF)			
LF 6 2	DC Resistance			Non-decadic values
	20 $\mu\Omega$ to 50 $\mu\Omega$		$3 \cdot 10^{-4} \cdot R$	
	50 $\mu\Omega$ to 100 $\mu\Omega$		$1 \cdot 10^{-4} \cdot R$	
	100 $\mu\Omega$ to 20 k Ω		$1,2 \cdot 10^{-5} \cdot R$	
	1 m Ω to 10 m Ω		$6,5 \cdot 10^{-6} \cdot R$	
	10 m Ω to 1000 m Ω		$7 \cdot 10^{-6} \cdot R$	
	1 Ω to 10 k Ω		$5 \cdot 10^{-6} \cdot R$	
	10 k Ω to 1 M Ω		$1 \cdot 10^{-5} \cdot R$	
	1 M Ω to 10 M Ω		$1,2 \cdot 10^{-5} \cdot R$	
	10 M Ω to 100 M Ω		$3 \cdot 10^{-5} \cdot R$	
	100 $\mu\Omega$ to 10 k Ω		$6 \cdot 10^{-6} \cdot R$	Decadic Values
LF 6 4	Capacitance			
	LF Capacitance			accuracy depends on dissipation factor at 1 kHz
	10 pF to 100 pF	100 Hz, 1 kHz, 10 kHz	$1 \cdot 10^{-3} \cdot C$	
	1 μ F	50 Hz, 200 Hz, 1 kHz	$1 \cdot 10^{-3} \cdot C$	
LF 6 7	Inductance			
	1 mH to 10 mH	1 kHz, (400-1692)Hz	$1 \cdot 10^{-3} \cdot L$	
	100 mH	100 Hz, 1 kHz, 1,592 kHz	$1 \cdot 10^{-3} \cdot L$	
	1 H	100 Hz, 200 Hz, 400 Hz and 1 kHz	$1 \cdot 10^{-3} \cdot L$	
RF 0 0	RF Quantities			
RF 3 0	RF Power			
	- 9 dBm to +30 dBm	0,1 MHz to 4200 MHz	0,5 dB	Measuring:
	+30 dBm to +57 dBm	0,1 MHz to 500 MHz	0,6 dB	50 ohm coaxial VSWR
	-60 dBm to -10 dBm	10 MHz to 10000 MHz	0,5 dB	

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 006**

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

This annex is valid from: **30-03-2010** to **01-03-2014**

Replaces annex dated: **30-06-2009**

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities ($k=2$)	Remarks
	-80 dBm to -10 dBm	0,1 MHz to 2700 MHz	1,1 dB	source < 2 Generating: (0,09 - 3200) MHz
RF 5 0	Rise time (10% to 90%) 1 ns to 1 ms		$2 \cdot 10^{-2} \cdot \tau + 200$ ps	10 mV/div to 1 kV/div
TF 0 0	TIME and FREQUENCY			
TF2 1	Frequency	1 Hz to 1,2 GHz	$5 \cdot 10^{-10} \cdot f$	
TF 2 2	Time interval	1 μ s to ∞	$5 \cdot 10^{-10} \cdot t + 100$ ns	
TF 3 2	Harmonic Distortion			(1)
	< 0,1 %	20 Hz to 2,5 kHz	$3 \cdot 10^{-4}$	
	0,1 % to 1 %	20 Hz to 2,5 kHz	$1 \cdot 10^{-3}$	
	1 % to 10 %	20 Hz to 2,5 kHz	$3 \cdot 10^{-3}$	
	10 % to 30 %	20 Hz to 2,5 kHz	$1 \cdot 10^{-2}$	
	30 % to 100 %	20 Hz to 2,5 kHz	$3 \cdot 10^{-2}$	

Part II, Mechanical quantities and Temperature

Measured quantity, Instrument, Gauge	Range	Best measurement capabilities ($k=2$)	Remarks
PV 1 0	Pressure		(2)
	Relative Pressure	(-10 to 10) kPa	$3 \cdot 10^{-4} \cdot p_e + 4$ Pa medium: air
		(-98 to 100) kPa	$3 \cdot 10^{-4} \cdot p_e + 5$ Pa medium: nitrogen
		100 kPa to 10 MPa	$3 \cdot 10^{-4} \cdot p_e$ medium: nitrogen
		(10 to 70) MPa	$3 \cdot 10^{-4} \cdot p_e$ medium: oil

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 006**

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

This annex is valid from: **30-03-2010** to **01-03-2014**

Replaces annex dated: **30-06-2009**

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities ($k=2$)	Remarks
	Absolute Pressure	(80 to 110) kPa	$3 \cdot 10^{-4} \cdot p$	medium: air
		(2 to 200) kPa	$3 \cdot 10^{-4} \cdot p + 5 \text{ Pa}$	medium: nitrogen
		200 kPa to 10 MPa	$3 \cdot 10^{-4} \cdot p$	medium: nitrogen
		(10 to 70) MPa	$3 \cdot 10^{-4} \cdot p$	medium: oil
TE 0 0	TEMPERATURE, HUMIDITY AND THERMOPHYSICAL PROPERTIES			
TE 1 0	Resistance thermometers	-50 °C to 20 °C	0,02 K	
		20 °C to 50 °C	0,05 K	
		50 °C to 300 °C	0,05 K	
		300 °C to 550 °C	0,16 K	
		550 °C to 650 °C	0,50 K	
TE 3 0	Thermocouples	-50 °C to 20 °C	0,16 K	Including C.J. references
		20 °C to 50 °C	0,16 K	
		50 °C to 300 °C	0,16 K	
		300 °C to 550 °C	0,21 K	
		550 °C to 650 °C	0,6 K	
		650 °C to 1000 °C	1,6 K	
TE 4 0	Liquid-in-glass thermometers	-50 °C to 50 °C	0,02 K	
		20 °C to 50 °C	0,04 K	
		50 °C to 300 °C	0,02 K	
	Differential Temperature	-50 °C to 200 °C	0,05 K	$t_{\min} = -50 \text{ °C}$ $t_{\max} = 200 \text{ °C}$
TE 4 1	Self indicating thermometers			

Annex to ISO/IEC 17025 declaration of accreditation
for registration number: **K 006**

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

This annex is valid from: **30-03-2010** to **01-03-2014**

Replaces annex dated: **30-06-2009**

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities ($k=2$)	Remarks
	Dry Block Calibrators	-20 °C to 650 °C	$(8 \cdot 10^{-4} \cdot t_{90} + 0,06)$ K	
	Writing thermometers	15 °C to 50 °C	0,5 K	
	Digital thermometers	-50 °C to 20 °C	0,02 K	including C.J. references
		20 °C to 50 °C	0,05 K	resolution 1 digit
		50 °C to 300 °C	0,05 K	
		300 °C to 550 °C	0,16 K	
		550 °C to 630 °C	0,50 K	
		630 °C to 1000 °C	1,5 K	

Remarks:

The ambient temperature during calibration is, unless specified otherwise, for:

LF measurements @ $(23 \pm 1)^\circ\text{C}$

TF measurements @ $(23 \pm 1)^\circ\text{C}$

Pressure measurements @ $(23 \pm 2)^\circ\text{C}$

Temperature measurements @ $(23 \pm 2)^\circ\text{C}$

(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.

(2) $p_e = p - p_{\text{amb}}$; p_e is the relative pressure, p_{amb} is the local air pressure, p is the absolute pressure.

The best measurement capability is the highest achievable accuracy for a given measuring value or measuring range, expressed as the total positive and negative measurement uncertainty.

The uncertainty is calculated according to EA-4/02 "Expression of the Uncertainty of Measurement in Calibration".

Calibrations are performed inside the laboratory, unless specified otherwise.