DUTCH ACCREDITATION COUNCIL RvA

PO Box 2768 NL-3500 GT Utrecht

The Dutch Accreditation Council RvA, operating as accreditor for calibration laboratories, hereby declares that

SIQ, Slovenian Institute of Quality and Metrology
Testing and Measuring Technologies Department
Ljubljana, Slovenia

complies with the accreditation criteria for calibration laboratories as laid down in ISO/IEC 17025:2005. The accreditation covers the quality system of the laboratory as well as the calibrations and measurements as described in the authorized annex bearing the accreditation number.

The accreditation is valid provided that the laboratory continues to meet the criteria as laid down by the Dutch Accreditation Council RvA.

This certificate with accreditation number:

K097

is granted on 25 June 2008 and is valid until

2 June 2012

The accreditation has been granted for the first time on

18 April 1996

The Chief Executive

Ir. J.C. van der Poel

ACCREDITATION CERTIFICATE

Annex to ISO/IEC 17025 Accreditation
with number: **K 097**

of **SIQ, Slovenian Institute of Quality and Metrology**
Testing and Measuring Technologies Department
Ljubljana, Slovenia

Valid from: **29-05-2009** to **02-06-2012** Replaces annex dated: **25-06-2008**

Premises: **Ljubljana**

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
LF 0 0	DC/LF Quantities			
LF 1 0	DC voltage			
	100 mV		$2 \cdot 10^{-6} \cdot U$	Measuring and Generating
	1 / 1,018 / 100 V		$7 \cdot 10^{-7} \cdot U$	
	10 V		$5 \cdot 10^{-7} \cdot U$	
	1 kV		$9 \cdot 10^{-7} \cdot U$	
	0 - 10 µV		$1{,}5 \cdot 10^{-2} \cdot U$ + 0,04 µV	Measuring
	10 µV - 100 µV		$1{,}5 \cdot 10^{-3} \cdot U$ + 0,04 µV	
	100 µV - 1 mV		$1{,}5 \cdot 10^{-4} \cdot U$ + 0,04 µV	
	1 mV - 10 mV		$1{,}5 \cdot 10^{-5} \cdot U$ + 0,04 µV	
	10 mV - 100 mV		$5 \cdot 10^{-6} \cdot U$ + 0,04 µV	
	0 - 10 µV		$7 \cdot 10^{-3} \cdot U$ + 0,01 µV	Generating
	10 µV - 100 µV		$7 \cdot 10^{-4} \cdot U$ + 0,01 µV	
	100 µV - 1 mV		$7 \cdot 10^{-5} \cdot U$ + 0,01 µV	
	1 mV - 10 mV		$1 \cdot 10^{-5} \cdot U$ + 0,01 µV	
	10 mV - 100 mV		$5 \cdot 10^{-6} \cdot U$ + 0,01 µV	
	100 mV - 1 V		$2{,}5 \cdot 10^{-6} \cdot U$	Measuring and Generating
	1 V - 100 V		$1{,}5 \cdot 10^{-6} \cdot U$	
	100 V - 1000 V		$4 \cdot 10^{-6} \cdot U$	

This annex has been approved by:

Ir. J.C. van der Poel
Chief Executive

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
LF 1 2	DC Voltage ratio			
	10^{-7} - 10^{-1}		$1 \cdot 10^{-7} \cdot (10 \cdot S)^{1/3}$ of input	S = setting
	10^{-1} - unity		$1{,}1 \cdot 10^{-7}$ of input	1 V < Ui < 100 V increased uncert. at Ui > 100 V due to power coefficient
LF 1 3	DC High Voltage			
	1 kV - 10 kV		$3 \cdot 10^{-4} \cdot U$	Measuring and Generating Uncertainty increases when calibration is made on the field
LF 2 1	DC Current			
	10 nA - 20 nA		$9 \cdot 10^{-5} \cdot I$	Measuring and Generating
	20 nA - 50 nA		$7{,}5 \cdot 10^{-5} \cdot I$	
	50 nA - 200 nA		$2{,}5 \cdot 10^{-5} \cdot I$	
	200 nA - 2 µA		$1{,}5 \cdot 10^{-5} \cdot I$	
	2 µA - 200 µA		$8 \cdot 10^{-6} \cdot I$	
	200 µA - 200 mA		$5 \cdot 10^{-6} \cdot I$	
	200 mA - 1 A		$8 \cdot 10^{-6} \cdot I$	
	1 A - 2 A		$1{,}8 \cdot 10^{-5} \cdot I$	
	2 A - 500 A		$3 \cdot 10^{-5} \cdot I$	
	1 A to 500 A		$1{,}0 \cdot 10^{-3} \cdot I$	For calibration of current clamps
	500 A to 1000 A		$1{,}5 \cdot 10^{-3} \cdot I$	
LF 3 0	AC Voltage			
	2 mV - 5 mV	10 Hz - 20 Hz	$1{,}1 \cdot 10^{-3} \cdot U$	Measuring and Generating
		20 Hz - 20 kHz	$1{,}0 \cdot 10^{-3} \cdot U$	
		20 kHz - 50 kHz	$1{,}4 \cdot 10^{-3} \cdot U$	
		50 kHz - 100 kHz	$1{,}7 \cdot 10^{-3} \cdot U$	
		100 kHz - 200 kHz	$2{,}7 \cdot 10^{-3} \cdot U$	
		200 kHz - 500 kHz	$5{,}5 \cdot 10^{-3} \cdot U$	
		500 kHz - 1 MHz	$7{,}8 \cdot 10^{-3} \cdot U$	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (k=2)	Remarks
	5 mV - 10 mV	10 Hz - 20 Hz	$5{,}0\cdot10^{-4}\cdot U$	
		20 Hz - 20 kHz	$4{,}1\cdot10^{-4}\cdot U$	
		20 kHz - 50 kHz	$6{,}0\cdot10^{-4}\cdot U$	
		50 kHz - 100 kHz	$7{,}0\cdot10^{-4}\cdot U$	
		100 kHz - 200 kHz	$1{,}1\cdot10^{-3}\cdot U$	
		200 kHz - 500 kHz	$2{,}4\cdot10^{-3}\cdot U$	
		500 kHz - 1 MHz	$4{,}3\cdot10^{-3}\cdot U$	
	10 mV - 20 mV	10 Hz - 20 Hz	$2{,}5\cdot10^{-4}\cdot U$	
		20 Hz - 20 kHz	$2{,}0\cdot10^{-4}\cdot U$	
		20 kHz - 50 kHz	$3{,}0\cdot10^{-4}\cdot U$	
		50 kHz - 100 kHz	$4{,}0\cdot10^{-4}\cdot U$	
		100 kHz - 200 kHz	$6{,}0\cdot10^{-4}\cdot U$	
		200 kHz - 500 kHz	$1{,}4\cdot10^{-3}\cdot U$	
		500 kHz - 1 MHz	$2{,}7\cdot10^{-3}\cdot U$	
	20 mV - 60 mV	10 Hz - 20 Hz	$1{,}2\cdot10^{-4}\cdot U$	
		20 Hz - 20 kHz	$8{,}0\cdot10^{-5}\cdot U$	
		20 kHz - 50 kHz	$1{,}0\cdot10^{-4}\cdot U$	
		50 kHz - 100 kHz	$1{,}5\cdot10^{-4}\cdot U$	
		100 kHz - 200 kHz	$2{,}5\cdot10^{-4}\cdot U$	
		200 kHz - 500 kHz	$5{,}5\cdot10^{-4}\cdot U$	
		500 kHz - 1 MHz	$1{,}4\cdot10^{-3}\cdot U$	
	60 mV - 200 mV	10 Hz - 20 Hz	$1{,}0\cdot10^{-4}\cdot U$	
		20 Hz - 40 Hz	$6{,}0\cdot10^{-5}\cdot U$	
		40 Hz - 50 kHz	$5{,}0\cdot10^{-5}\cdot U$	
		50 kHz - 100 kHz	$9{,}0\cdot10^{-5}\cdot U$	
		100 kHz - 200 kHz	$1{,}8\cdot10^{-4}\cdot U$	
		200 kHz - 500 kHz	$4{,}0\cdot10^{-4}\cdot U$	
		500 kHz - 1 MHz	$1{,}2\cdot10^{-3}\cdot U$	
	200 mV - 2 V	10 Hz - 20 Hz	$8{,}0\cdot10^{-5}\cdot U$	
		20 Hz - 40 Hz	$4{,}0\cdot10^{-5}\cdot U$	
		40 Hz - 20 kHz	$2{,}8\cdot10^{-5}\cdot U$	
		20 kHz - 50 kHz	$3{,}0\cdot10^{-5}\cdot U$	
		50 kHz - 100 kHz	$6{,}5\cdot10^{-5}\cdot U$	
		100 kHz - 200 kHz	$1{,}4\cdot10^{-4}\cdot U$	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (k=2)	Remarks
		200 kHz - 500 kHz	$2{,}8\cdot10^{-4}\cdot U$	
		500 kHz - 1 MHz	$1{,}1\cdot10^{-3}\cdot U$	
	2 V - 20 V	10 Hz - 20 Hz	$8{,}0\cdot10^{-5}\cdot U$	
		20 Hz - 40 Hz	$4{,}0\cdot10^{-5}\cdot U$	
		40 Hz - 20 kHz	$2{,}8\cdot10^{-5}\cdot U$	
		20 kHz - 50 kHz	$3{,}5\cdot10^{-5}\cdot U$	
		50 kHz - 100 kHz	$8{,}0\cdot10^{-5}\cdot U$	
		100 kHz - 200 kHz	$1{,}8\cdot10^{-4}\cdot U$	
		200 kHz - 500 kHz	$4{,}5\cdot10^{-4}\cdot U$	
		500 kHz - 1 MHz	$1{,}4\cdot10^{-3}\cdot U$	
	20 V - 200 V	10 Hz - 20 Hz	$8{,}0\cdot10^{-5}\cdot U$	
		20 Hz - 40 Hz	$4{,}0\cdot10^{-5}\cdot U$	
		40 Hz - 20 kHz	$3{,}3\cdot10^{-5}\cdot U$	
		20 kHz - 50 kHz	$4{,}5\cdot10^{-5}\cdot U$	
		50 kHz - 100 kHz	$9{,}0\cdot10^{-5}\cdot U$	
	200 V - 1000 V	10 Hz - 20 Hz	$8{,}0\cdot10^{-5}\cdot U$	
		20 Hz - 40 Hz	$5{,}0\cdot10^{-5}\cdot U$	
		40 Hz - 20 kHz	$4{,}0\cdot10^{-5}\cdot U$	
		20 kHz - 50 kHz	$1{,}3\cdot10^{-4}\cdot U$	
		50 kHz - 100 kHz	$6{,}0\cdot10^{-4}\cdot U$	
LF 3 1	AC Current			
	100 µA - 10 mA	20 Hz - 1 kHz	$1{,}2\cdot10^{-4}\cdot I$	Measuring
		1 kHz - 5 kHz	$1{,}6\cdot10^{-4}\cdot I$	
		5 kHz - 10 kHz	$3{,}6\cdot10^{-4}\cdot I$	
	100 µA to 220 µA	20 Hz to 40 Hz	$2{,}5\cdot10^{-4}\cdot I$	Generating
		40 Hz to 1 kHz	$2{,}0\cdot10^{-4}\cdot I$	
		1 kHz to 5 kHz	$4{,}0\cdot10^{-4}\cdot I$	
		5 kHz to 10 kHz	$1{,}7\cdot10^{-3}\cdot I$	
	220 µA to 10 mA	20 Hz to 40 Hz	$2{,}1\cdot10^{-4}\cdot I$	
		40 Hz to 1 kHz	$1{,}7\cdot10^{-4}\cdot I$	
		1 kHz to 5 kHz	$3{,}0\cdot10^{-4}\cdot I$	
		5 kHz to 10 kHz	$1{,}7\cdot10^{-3}\cdot I$	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
	10 mA to 300 mA	10 Hz to 20 Hz	$5{,}5\cdot10^{-5}\cdot I$	Measuring and Generating
		20 Hz to 40 Hz	$4{,}5\cdot10^{-5}\cdot I$	
		40 Hz to 10 kHz	$3{,}0\cdot10^{-5}\cdot I$	(Generating only up to 10 kHz)
		10 kHz to 30 kHz	$3{,}5\cdot10^{-5}\cdot I$	
	300 mA to 1 A	10 Hz to 20 Hz	$6{,}0\cdot10^{-5}\cdot I$	
		20 Hz to 40 Hz	$5{,}0\cdot10^{-5}\cdot I$	
		40 Hz to 10 kHz	$3{,}5\cdot10^{-5}\cdot I$	
		10 kHz to 30 kHz	$4{,}0\cdot10^{-5}\cdot I$	
	1 A to 5 A	10 Hz to 20 Hz	$6{,}0\cdot10^{-5}\cdot I$	
		20 Hz to 40 Hz	$5{,}0\cdot10^{-5}\cdot I$	
		40 Hz to 30 kHz	$4{,}0\cdot10^{-5}\cdot I$	
	5 A to 10 A	10 Hz to 20 Hz	$6{,}5\cdot10^{-5}\cdot I$	
		20 Hz to 40 Hz	$5{,}5\cdot10^{-5}\cdot I$	
		40 Hz to 10 kHz	$5{,}0\cdot10^{-5}\cdot I$	
		10 kHz to 30 kHz	$5{,}5\cdot10^{-5}\cdot I$	
	10 A to 20 A	10 Hz to 20 Hz	$7{,}0\cdot10^{-5}\cdot I$	
		20 Hz to 40 Hz	$6{,}5\cdot10^{-5}\cdot I$	
		40 Hz to 1 kHz	$5{,}5\cdot10^{-5}\cdot I$	
		1 kHz to 10 kHz	$6{,}5\cdot10^{-5}\cdot I$	
		10 kHz to 30 kHz	$8{,}0\cdot10^{-5}\cdot I$	
	1 A to 20 A	40 Hz to 1000 Hz	$1{,}0\cdot10^{-3}\cdot I$	For calibration of current clamps
	20 A to 150 A	45 Hz to 440 Hz	$1{,}0\cdot10^{-3}\cdot I$	
	150 A to 800 A	45 Hz to 100 Hz	$1{,}5\cdot10^{-3}\cdot I$	
		100 Hz to 440 Hz	$2{,}0\cdot10^{-3}\cdot I$	
	800 A to 1000 A	45 Hz to 100 Hz	$1{,}8\cdot10^{-3}\cdot I$	
		100 Hz to 440 Hz	$2{,}2\cdot10^{-3}\cdot I$	
	Current coil's ratio	DC to 440 Hz	$6{,}0\cdot10^{-4}\cdot I$	
LF 3 3	AC High Voltage			
	1 kV - 25 kV	50 Hz	$5\cdot10^{-3}\cdot U$	Measuring

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
	1 kV - 25 kV	50 Hz	$4 \cdot 10^{-3} \cdot U$	Generating
	Pulse amplitude			
	0,2 mV to 2 mV	DC or square wave @ 1 kHz	$1 \cdot 10^{-3} \cdot U$ + 1 µV	Calibration of scope calibrators
	2 mV to 100 V		$5 \cdot 10^{-4} \cdot U$	
	0,2 mV to 10 mV	DC or square wave @ 1 kHz	$5 \cdot 10^{-3} \cdot U$ + 1 µV	Calibration of scopes
	10 mV to 100 V		$3 \cdot 10^{-3} \cdot U$	
LF 4 4	AC/DC transfer			
	0,6 V; 1 V; 2 V; 6 V; 10 V, 20 V	110 Hz; 1 kHz; 10 kHz; 20 kHz	$2{,}1 \cdot 10^{-5}$	*Uncertainty related to nominal input voltage. *Can be measured at other voltages and frequencies with higher uncertainties
	60 V	110 Hz; 1 kHz; 10 kHz; 20 kHz	$2{,}2 \cdot 10^{-5}$	
	0,2 V; 100 V ; 200 V	110 Hz; 1 kHz; 10 kHz; 20 kHz	$2{,}5 \cdot 10^{-5}$	
	0,1 V	110 Hz; 1 kHz; 10 kHz; 20 kHz	$2{,}7 \cdot 10^{-5}$	
	0,6 V; 1 V; 2 V; 6 V; 10 V; 20 V	45 Hz; 50 kHz	$3{,}0 \cdot 10^{-5}$	
	60 V; 100 V; 200 V	45 Hz	$3{,}0 \cdot 10^{-5}$	
	600 V	110 Hz; 1 kHz; 10 kHz; 20 kHz	$3{,}0 \cdot 10^{-5}$	
	1000 V	110 Hz; 1 kHz; 10 kHz	$3{,}0 \cdot 10^{-5}$	
	0,05 V	110 Hz; 1 kHz; 10 kHz; 20 kHz	$3{,}5 \cdot 10^{-5}$	
	0,1 V; 0,2 V	45 Hz	$3{,}5 \cdot 10^{-5}$	
	60 V	50 kHz	$3{,}5 \cdot 10^{-5}$	
	0,05 V	45 Hz	$4{,}0 \cdot 10^{-5}$	
	0,1 V; 0,2 V	50 kHz	$4{,}0 \cdot 10^{-5}$	
	0,6 V; 1 V; 2 V; 6 V; 10 V; 20 V; 60 V	20 Hz	$4{,}0 \cdot 10^{-5}$	
	100 V; 200 V	20 Hz; 50 kHz	$4{,}0 \cdot 10^{-5}$	
	600 V	45 Hz	$4{,}0 \cdot 10^{-5}$	
	1000 V	45 Hz; 20 kHz	$4{,}0 \cdot 10^{-5}$	
	0,2 V	20 Hz	$4{,}5 \cdot 10^{-5}$	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
	0,02 V	110 Hz; 1 kHz; 10 kHz; 20 kHz	$5{,}0 \cdot 10^{-5}$	
	0,05 V	50 kHz	$5{,}0 \cdot 10^{-5}$	
	0,1 V	20 Hz; 100 kHz	$5{,}0 \cdot 10^{-5}$	
	0,2 V	100 kHz	$5{,}0 \cdot 10^{-5}$	
	0,6 V; 1 V; 2 V; 6 V; 10 V; 20 V; 60 V	10 Hz; 100 kHz	$5{,}0 \cdot 10^{-5}$	
	100 V; 200 V	10 Hz	$5{,}0 \cdot 10^{-5}$	
	600 V; 1000 V	10 Hz; 20 Hz; 50 kHz	$5{,}0 \cdot 10^{-5}$	
	0,02 V	45 Hz; 50 kHz	$6{,}0 \cdot 10^{-5}$	
	0,05 V	20 Hz; 100 kHz	$6{,}0 \cdot 10^{-5}$	
	0,2 V	10 Hz	$6{,}0 \cdot 10^{-5}$	
	100 V; 200 V	100 kHz	$6{,}0 \cdot 10^{-5}$	
	0,1 V	10 Hz	$6{,}5 \cdot 10^{-5}$	
	0,02 V	20 Hz	$7{,}0 \cdot 10^{-5}$	
	0,02 V	10 Hz; 100 kHz	$8{,}0 \cdot 10^{-5}$	
	0,05 V	10 Hz	$8{,}0 \cdot 10^{-5}$	
	0,6 V; 1 V; 2 V; 6 V; 10 V; 20 V; 60 V	200 kHz	$8{,}0 \cdot 10^{-5}$	
	0,2 V	200 kHz	$9{,}0 \cdot 10^{-5}$	
	0,05 V; 0,1 V; 100 V	200 kHz	$1{,}0 \cdot 10^{-4}$	
	0,005 V	45 Hz; 110 Hz; 1 kHz; 10 kHz; 20 kHz; 50 kHz	$1{,}5 \cdot 10^{-4}$	
	0,02 V	200 kHz	$1{,}5 \cdot 10^{-4}$	
	600 V; 1000 V	100 kHz	$1{,}5 \cdot 10^{-4}$	
	0,2 V; 0,6 V; 1 V; 2 V; 6 V; 10 V	500 kHz	$1{,}6 \cdot 10^{-4}$	
	0,05 V; 0,1 V	500 kHz	$1{,}8 \cdot 10^{-4}$	
	0,005 V	10 Hz; 20 Hz; 100 kHz	$2{,}0 \cdot 10^{-4}$	
	0,005 V	200 kHz	$2{,}5 \cdot 10^{-4}$	
	0,02 V	500 kHz	$2{,}8 \cdot 10^{-4}$	
	0,002 V	45 Hz; 110 Hz; 1 kHz; 10 kHz; 20 kHz; 50 kHz	$3{,}5 \cdot 10^{-4}$	
	0,05V; 0,1 V; 0,2 V; 0,6 V; 1 V; 2 V; 6 V; 10 V	700 kHz	$3{,}8 \cdot 10^{-4}$	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
	0,002 V	10 Hz; 20 Hz; 100 kHz	$4{,}0\cdot10^{-4}$	
	0,005 V	500 kHz	$4{,}0\cdot10^{-4}$	
	0,002 V	200 kHz	$4{,}5\cdot10^{-4}$	
	0,02 V	700 kHz	$5{,}0\cdot10^{-4}$	
	0,05V; 0,1 V; 0,2 V; 0,6 V; 1 V; 2 V; 6 V; 10 V	1 MHz	$5{,}0\cdot10^{-4}$	
	0,002 V	500 kHz	$6{,}0\cdot10^{-4}$	
	0,02 V	1 MHz	$7{,}0\cdot10^{-4}$	
	0,005 V	700 kHz	$8{,}0\cdot10^{-4}$	
	0,002 V	700 kHz	$1{,}0\cdot10^{-3}$	
	0,005 V	1 MHz	$1{,}0\cdot10^{-3}$	
	0,002 V	1 MHz	$1{,}4\cdot10^{-3}$	
LF 5 0	Power and Energy			All values are relative to apparent power; Distortion < 0,1 %
	Apparent power	45 Hz to 65 Hz	25 µVA/VA	0,1 V to 700 V 1 mA to 20 mA and 1 A to 5 A
		45 Hz to 65 Hz	200 µVA/VA	0,1 V to 700 V 20 mA to 1 A and 5 A to 50 A
	Active Power	45 Hz to 65 Hz	$(20 + 5 / \cos\varphi)$ µW/VA	Power factor 1 to 0 (Angle 0° to 90°): 0,1 V to 700 V 1 mA to 20 mA and 1 A to 5 A
		45 Hz to 65 Hz	$(200 + 300 \cdot \tan\varphi)$ µW/VA	Power factor 1 to 0,8 (Angle 0° to 36,87°): 0,1 V to 700 V 20 mA to 1 A and 5 A to 50 A
		45 Hz to 65 Hz	$(550 \cdot \tan\varphi)$ µW/VA	PF 0,8 to 0 (Angle 36,87° to 90°): 0,1 V to 700 V 20 mA to 1 A and 5 A to 50 A

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
	Reactive Power	45 Hz to 65 Hz	(20 + 5 / sinφ) μVAr/VA	Power factor 0 to 1 (Angle 90° to 0°): 0,1 V to 700 V 1 mA to 20 mA and 1 A to 5 A
		45 Hz to 65 Hz	(200 + 300 / tanφ) μVAr/VA	PF 0 to 0,6 (Angle 90° to 53,13°): 0,1 V to 700 V 20 mA to 1 A and 5 A to 50 A
		45 Hz to 65 Hz	(550 / tanφ) μVAr/VA	PF 0,6 to 1 (Angle 53,13° to 0°): 0,1 V to 700 V 20 mA to 1 A and 5 A to 50 A
LF 6 1	Resistance			
LF 6 2	DC resistance			
	0,1 μΩ		$1{,}2\cdot10^{-3}\cdot R$	Measuring
	0,1 μΩ - 1 μΩ		$2\cdot10^{-4}\cdot R$	
	1 μΩ - 10 μΩ		$1{,}2\cdot10^{-4}\cdot R$	
	10 μΩ - 1 mΩ		$3{,}5\cdot10^{-5}\cdot R$	
	1 mΩ - 10 mΩ		$1{,}5\cdot10^{-5}\cdot R$	
	10 mΩ - 100 mΩ		$2\cdot10^{-6}\cdot R$	
	0,1 Ω - 1 Ω		$9\cdot10^{-7}\cdot R$	
	1 Ω - 100 Ω		$8\cdot10^{-7}\cdot R$	
	100 Ω - 100 kΩ		$7\cdot10^{-7}\cdot R$	
	10 kΩ		$6\cdot10^{-7}\cdot R$	
	100 kΩ - 1 MΩ		$1\cdot10^{-6}\cdot R$	From 1 MΩ up to 1 kV
	1 MΩ - 10 MΩ		$2\cdot10^{-6}\cdot R$	
	10 MΩ - 100 MΩ		$3\cdot10^{-6}\cdot R$	From 0,5 GΩ up to 5 kV
	100 MΩ - 1 GΩ		$1{,}5\cdot10^{-5}\cdot R$	
	1 GΩ - 10 GΩ		$4\cdot10^{-5}\cdot R$	
	10 GΩ - 100 GΩ		$3\cdot10^{-4}\cdot R$	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
	100 GΩ - 1 TΩ		$8 \cdot 10^{-4} \cdot R$	
	1 TΩ - 10 TΩ		$4 \cdot 10^{-3} \cdot R$	
	10 TΩ - 100 TΩ		$6 \cdot 10^{-3} \cdot R$	
	0,1 mΩ		$3{,}5 \cdot 10^{-5} \cdot R$	Generating
	1 mΩ		$2{,}5 \cdot 10^{-5} \cdot R$	Non-decade values can be generated from 100 mΩ up to 1 TΩ
	10 mΩ		$3 \cdot 10^{-6} \cdot R$	
	100 mΩ - 100 kΩ		$1 \cdot 10^{-6} \cdot R$	Uncertainty increases at non-decade values between 100 mΩ – 100 kΩ
	100 kΩ - 1 MΩ		$1{,}5 \cdot 10^{-6} \cdot R$	Uncertainty increases at non-decade values between 100 kΩ - 100 MΩ. From 1 MΩ up to 1 kV
	1 MΩ - 10 MΩ		$2{,}5 \cdot 10^{-6} \cdot R$	
	10 MΩ - 100 MΩ		$3{,}5 \cdot 10^{-6} \cdot R$	
	100 MΩ - 1 GΩ		$2 \cdot 10^{-5} \cdot R$	Uncertainty increases at non-decade values between 100 MΩ - 1 TΩ. From 0,5 GΩ up to 5 kV
	1 GΩ - 10 GΩ		$2 \cdot 10^{-3} \cdot R$	
	10 GΩ - 100 GΩ		$2{,}5 \cdot 10^{-3} \cdot R$	
	100 GΩ - 1 TΩ		$4 \cdot 10^{-3} \cdot R$	
	10 TΩ		$6 \cdot 10^{-3} \cdot R$	
	100 TΩ		$9 \cdot 10^{-3} \cdot R$	
LF 6 3	AC resistance			
	1 Ω	20 Hz ≤ f < 100 kHz	$2{,}0 \cdot 10^{-4} \cdot R$ to $3{,}5 \cdot 10^{-3} \cdot R$	Measuring
		100 kHz ≤ f ≤ 1 MHz	$3{,}5 \cdot 10^{-3} \cdot R$	
	10 Ω	20 Hz ≤ f < 100 kHz	$1{,}5 \cdot 10^{-4} \cdot R$ to $2{,}0 \cdot 10^{-3} \cdot R$	
		100 kHz ≤ f ≤ 1 MHz	$2{,}0 \cdot 10^{-3} \cdot R$	
		1 MHz < f ≤ 5 MHz	$2{,}0 \cdot 10^{-3} \cdot R$ to $3{,}0 \cdot 10^{-3} \cdot R$	
		5 MHz < f ≤ 13 MHz	$3{,}0 \cdot 10^{-3} \cdot R$	
	100 Ω	20 Hz ≤ f < 100 kHz	$1{,}5 \cdot 10^{-4} \cdot R$ to $2{,}0 \cdot 10^{-3} \cdot R$	
		100 kHz ≤ f ≤ 1 MHz	$2{,}0 \cdot 10^{-3} \cdot R$	
		1 MHz < f ≤ 5 MHz	$2{,}0 \cdot 10^{-3} \cdot R$ to $5{,}0 \cdot 10^{-3} \cdot R$	
		5 MHz < f ≤ 13 MHz	$5{,}0 \cdot 10^{-3} \cdot R$ to $6{,}0 \cdot 10^{-3} \cdot R$	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (k=2)	Remarks
	1 kΩ	20 Hz ≤ f < 100 kHz	$1{,}5\cdot10^{-4}\cdot R$ to $3{,}0\cdot10^{-3}\cdot R$	
		100 kHz ≤ f ≤ 1 MHz	$3{,}0\cdot10^{-3}\cdot R$	
		1 MHz < f ≤ 5 MHz	$3{,}0\cdot10^{-3}\cdot R$ to $5{,}0\cdot10^{-3}\cdot R$	
		5 MHz < f ≤ 13 MHz	$5{,}0\cdot10^{-3}\cdot R$	
	10 kΩ	20 Hz ≤ f < 100 kHz	$1{,}5\cdot10^{-4}\cdot R$ to $3{,}0\cdot10^{-3}\cdot R$	
		100 kHz ≤ f ≤ 1 MHz	$3{,}0\cdot10^{-3}\cdot R$	
	100 kΩ	20 Hz ≤ f ≤ 100 kHz	$1{,}5\cdot10^{-4}\cdot R$ to $5{,}0\cdot10^{-3}\cdot R$	
	1 Ω	20 Hz ≤ f < 100 kHz	$1{,}5\cdot10^{-4}\cdot R$ to $2{,}5\cdot10^{-3}\cdot R$	Generating
		100 kHz ≤ f ≤ 1 MHz	$2{,}5\cdot10^{-3}\cdot R$	
	10 Ω	20 Hz ≤ f < 100 kHz	$1{,}0\cdot10^{-4}\cdot R$ to $1{,}5\cdot10^{-3}\cdot R$	
		100 kHz ≤ f ≤ 1 MHz	$1{,}5\cdot10^{-3}\cdot R$	
		1 MHz < f ≤ 5 MHz	$1{,}5\cdot10^{-3}\cdot R$ to $2{,}5\cdot10^{-3}\cdot R$	
		5 MHz < f ≤ 13 MHz	$2{,}5\cdot10^{-3}\cdot R$	
	100 Ω	20 Hz ≤ f < 100 kHz	$1{,}0\cdot10^{-4}\cdot R$ to $1{,}5\cdot10^{-3}\cdot R$	
		100 kHz ≤ f ≤ 1 MHz	$1{,}5\cdot10^{-3}\cdot R$	
		1 MHz < f ≤ 5 MHz	$1{,}5\cdot10^{-3}\cdot R$ to $3{,}5\cdot10^{-3}\cdot R$	
		5 MHz < f ≤ 13 MHz	$3{,}5\cdot10^{-3}\cdot R$ to $4{,}5\cdot10^{-3}\cdot R$	
	1 kΩ	20 Hz ≤ f < 100 kHz	$1{,}0\cdot10^{-4}\cdot R$ to $2{,}5\cdot10^{-3}\cdot R$	
		100 kHz ≤ f ≤ 1 MHz	$2{,}5\cdot10^{-3}\cdot R$	
		1 MHz < f ≤ 5 MHz	$2{,}5\cdot10^{-3}\cdot R$ to $3{,}5\cdot10^{-3}\cdot R$	
		5 MHz < f ≤ 13 MHz	$3{,}5\cdot10^{-3}\cdot R$	
	10 kΩ	20 Hz ≤ f < 100 kHz	$1{,}0\cdot10^{-4}\cdot R$ to $2{,}5\cdot10^{-3}\cdot R$	
		100 kHz ≤ f ≤ 1 MHz	$2{,}5\cdot10^{-3}\cdot R$	
	100 kΩ	20 Hz ≤ f ≤ 100 kHz	$1{,}0\cdot10^{-4}\cdot R$ to $3{,}5\cdot10^{-3}\cdot R$	
				Measuring and Generating; Non-decade values
	0,1 Ω ≤ R < 1 Ω	20 Hz ≤ f ≤ 1 MHz	$1{,}0\cdot10^{-3}\cdot R$ to $9{,}0\cdot10^{-3}\cdot R$	
	1 Ω ≤ R ≤ 10 kΩ	20 Hz ≤ f ≤ 10 MHz	$1{,}0\cdot10^{-3}\cdot R$ to $9{,}0\cdot10^{-3}\cdot R$	
	10 kΩ ≤ R ≤ 1 MΩ	20 Hz ≤ f ≤ 1 MHz	$1{,}0\cdot10^{-3}\cdot R$ to $9{,}0\cdot10^{-3}\cdot R$	
	1 MΩ ≤ R ≤ 10 MΩ	20 Hz ≤ f ≤ 100 kHz	$1{,}0\cdot10^{-3}\cdot R$ to $9{,}0\cdot10^{-3}\cdot R$	
LF 6 4	Capacitance			

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
LF 6 5	LF capacitance			
	10/100/1000 pF	1 kHz	$2 \cdot 10^{-5} \cdot C$	3T measurements; add U ≈0,2 pF for 2T meas.
	1 pF - 1,1 µF	1 kHz	$1 \cdot 10^{-4} \cdot C$ + 0,03 fF	
	10 µF	1 kHz	$3 \cdot 10^{-4} \cdot C$	
	100 µF	100 Hz, 120 Hz	$4 \cdot 10^{-4} \cdot C$	Only appropriate to 4- terminal capacitors and measuring instruments
	100 µF	1 kHz	$5 \cdot 10^{-4} \cdot C$	
	1 mF	100 Hz, 120 Hz	$5 \cdot 10^{-4} \cdot C$	
	1 mF	1 kHz	$7 \cdot 10^{-4} \cdot C$	
	10 mF	100 Hz, 120 Hz	$7 \cdot 10^{-4} \cdot C$	
	10 mF	1 kHz	$2{,}1 \cdot 10^{-3} \cdot C$	
	100 mF	100 Hz	$2 \cdot 10^{-3} \cdot C$	
	1 F	100 Hz	$3 \cdot 10^{-3} \cdot C$	
	1 µF - 0,1 F	100 Hz	$1 \cdot 10^{-2} \cdot C$	
	0,1 F - 1,1 F	100 Hz	$2 \cdot 10^{-2} \cdot C$	
	10 / 100 / 1000 pF	50 Hz	$2 \cdot 10^{-4} \cdot C$	3T measurements @ < 200V; add U ≈0,2 pF for 2T meas.
	10 / 100 nF		$2 \cdot 10^{-4} \cdot C$	
	10 pF to 100 µF	50 Hz	$5 \cdot 10^{-4} \cdot C$	3T measurements; add U ≈0,2 pF for 2T meas.
	100 µF to 1 mF		$1 \cdot 10^{-3} \cdot C$	
LF 6 6	HF capacitance			
	1 pF	100 Hz - 1 MHz	$2 \cdot 10^{-3} \cdot C$	4-T BNC or coax GR900 connectors
		1 MHz - 10 MHz	$1{,}1 \cdot 10^{-2} \cdot C$	
	10 pF	100 Hz - 1 MHz	$6 \cdot 10^{-4} \cdot C$	4-T BNC or coax GR900 connectors
		1 MHz - 10 MHz	$2 \cdot 10^{-3} \cdot C$	
	100 pF	100 Hz - 1 MHz	$5 \cdot 10^{-4} \cdot C$	4-T BNC or coax GR900 connectors
		1 MHz - 10 MHz	$2 \cdot 10^{-3} \cdot C$	
	1000 pF	100 Hz - 1 MHz	$5 \cdot 10^{-4} \cdot C$	4-T BNC or coax GR900 connectors
		1 MHz - 10 MHz	$6 \cdot 10^{-3} \cdot C$	
	1 pF - 1 mF @ D < 0,1	100 Hz - 1 MHz	$1{,}3 \cdot 10^{-3} \cdot C - 3 \cdot 10^{-2} \cdot C$	f_{max}[kHz] = 10^{-4}/C [F]

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
LF 6 7	Inductance			
	100 µH	100 Hz	$3{,}0 \cdot 10^{-2} \cdot L$	Measuring
		1 kHz	$3{,}0 \cdot 10^{-3} \cdot L$	
		100 Hz < f < 1 kHz	$1{,}5 \cdot 10^{-2} \cdot L$	
	1 mH	100 Hz	$3{,}5 \cdot 10^{-3} \cdot L$	
		1 kHz	$1{,}5 \cdot 10^{-3} \cdot L$	
		100 Hz < f < 1 kHz	$2{,}5 \cdot 10^{-3} \cdot L$	
	10 mH	100 Hz	$1{,}5 \cdot 10^{-3} \cdot L$	
		1 kHz	$6{,}5 \cdot 10^{-4} \cdot L$	
		100 Hz < f < 1 kHz	$1{,}8 \cdot 10^{-3} \cdot L$	
	100 mH, 1 H, 10 H	100 Hz to 1 kHz	$6{,}5 \cdot 10^{-4} \cdot L$	
	100 µH	100 Hz	$1{,}8 \cdot 10^{-4} \cdot L$	Generating
		1 kHz	$1{,}0 \cdot 10^{-4} \cdot L$	
		100 Hz < f < 1 kHz	$2{,}0 \cdot 10^{-4} \cdot L$	
	1 mH, 10 mH, 100 mH, 1 H, 10 H	100 Hz	$1{,}3 \cdot 10^{-4} \cdot L$	
		1 kHz	$8{,}0 \cdot 10^{-5} \cdot L$	
		100 Hz < f < 1 kHz	$1{,}5 \cdot 10^{-4} \cdot L$	
	100 µH to 10 H	100 Hz to 1 kHz	$3{,}5 \cdot 10^{-2} \cdot L$ *to* $1{,}0 \cdot 10^{-3} \cdot L$	Measuring and Generating; Non-decade values
LF 6 8	Dissipation factor			
	0,0001 - 1	1 kHz	$1 \cdot 10^{-5} + 3{,}2 \cdot 10^{-4} \cdot D$	1 pF < C < 1 µF 2T and 3T
	values < 0,01	100 Hz - 1 MHz	0,00011	C = 1 pF; 10 pF; 100 pF; 1 nF
		1 MHz - 10 MHz	0,0005	C = 1 nF
		1/5/10 MHz	0,0002	BMC with 4-T BNC connectors; others with increased uncertainty
	0 < D < 1 @ 10 pF to 100 µF	50 Hz	$5 \cdot 10^{-5} + 5 \cdot 10^{-3} \cdot D$	3T measurements @ < 200V;
	0 < D < 1 @ 100 µF to 1 mF	50 Hz	$1 \cdot 10^{-4} + 5 \cdot 10^{-3} \cdot D$	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
				add U ≈0,2 pF for 2T meas.
RF 0 0	High Frequency quantities			
RF 1 0	High frequency voltage CW flatness (bandwidth)			Relative to a reference voltage level at 50 kHz
	Peak-to-peak amplitude 0,2 V to 2 V	1 MHz to 260 MHz	$4 \cdot 10^{-2} \cdot BW$	The uncertainty in terms of frequency is based on the relationship between level and frequency at the – 3 dB points of the system under test
		250 MHz to 600 MHz	$5 \cdot 10^{-2} \cdot BW$	
		600 MHz to 1,05 GHz	$6 \cdot 10^{-2} \cdot BW$	
	RF/DC transfer			
	50 Ω measuring device 1V	1 MHz to 1 GHz	(1 - 9) mV/V	N-type connector with VSWR < 1,005
	50 Ω measuring device 1V	1 MHz to 1 GHz	(1 - 20) mV/V	BNC-type connector
	200 Ω measuring device 1V	1 MHz to 1 GHz	(1 - 21) mV/V	N-type connector
	200 Ω measuring device 1V	1 MHz to 1 GHz	(1 - 25) mV/V	BNC and N-type
	RF Voltage: Matched output voltage of generator			BNC and N-type connector
	0,05 V to 1 V	1 MHz to 2 GHz	(3,4 - 13) mV/V	generators with $\Gamma_G \leq 0,1$
	1 V to 2,2 V		(3,4 - 4,2) mV/V	
	Voltmeters indicating incident voltage			
	0,05 V to 1 V	1 MHz to 2 GHz	(3,7 - 25) mV/V	Voltmeters with $\Gamma_L \leq 0,05$
	1 V to 2,2 V		(3,7 - 4,4) mV/V	
	Voltmeter indicating voltage at input terminal			
	0,05 V to 1 V	1 MHz to 1 GHz	(1,4 - 50) mV/V	Voltmeters with $\Gamma_L \leq 0,05$
	1 V to 2,2 V		(1,4 - 50) mV/V	
RF 2 0	Impedance			

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (k=2)	Remarks
	≈ 0,10 Ω	50 Hz	0,012 Ω	Clean line. Appropriate for the calibration of earth loop testers with 1 mΩ resolution
	< 5 mΩ	50 Hz	5 mΩ	Artificial mains source. Appropriate for the calibration of general earth loop testers with test current < 5 A
	0,01 Ω to 2 Ω	40 Hz - 400 Hz	$2 \cdot 10^{-3} \cdot \lvert Z \rvert$	
	2 Ω to 1 kΩ		$6 \cdot 10^{-4} \cdot \lvert Z \rvert$	
	1 kΩ to 1,5 kΩ		$1 \cdot 10^{-3} \cdot \lvert Z \rvert$	
	1,5 kΩ to 6 kΩ		$2{,}5 \cdot 10^{-3} \cdot \lvert Z \rvert$	
	6 kΩ to 10 kΩ		$4 \cdot 10^{-3} \cdot \lvert Z \rvert$	
	Impedance			VRC or test port match for non-sourcing devices
	Voltage reflection coefficient (VRC): Z_0= 50			
	< 0,1	10 MHz - 18 GHz	0,010 - 0,020	PC-7 and N-type connector
	0,1 to 1		0,020 - 0,100	
	< 0,1	10 MHz – 26,5 GHz	0,010 - 0,025	Precision 3,5 mm male connector
	0,1 to 1		0,030 - 0,200	
	< 0,1	10 MHz – 26,5 GHz	0,015 - 0,030	Precision 3,5 mm female connector
	0,1 to 1		0,030 - 0,200	
	Voltage reflection coefficient (VRC): Z_0= 75 Ω			
	< 0,1	10 MHz - 3 GHz	0,015 - 0,020	N-type connector
	0,1 to 1		0,020 - 0,150	
	Directivity: Z_0= 50 Ω			
	< 0,1	10 MHz - 2 GHz	0,003	Reference load procedure
		2 GHz – 26,5 GHz	0,003 – 0,020	Ripple extraction technique
	Directivity: Z_0= 75 Ω			
	< 0,1	10 MHz - 3 GHz	0,005	Reference load procedure

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
RF 2 2	Attenuation			
	Power Ratio			
	0 dB - 30 dB	DC to 26,5 GHz	0,03 dB - 0,12 dB	Type N and APC 3,5 mm connector, 50 Ω VRC < 0,02
	30 dB - 60 dB	10 MHz to 18 GHz	0,08 dB - 0,20 dB	Type N connector, 50 Ω VRC < 0,02
	Tuned RF Level			
	0 dB - 100 dB	2,5 MHz to 1,3 GHz	0,02 dB - 0,08 dB	Type N connector, 50 Ω VRC < 0,02
	100 dB - 120 dB		0,08 dB - 0,20 dB	Type N connector, 50 Ω VRC < 0,02
	SNA Power Ratio			
	0 dB - 50 dB	10 MHz to 26,5 GHz	0,12 dB - 0,30 dB	Type N and APC 3,5 mm connector, 50 Ω VRC < 0,02
	Voltage Ratio			
	0 dB - 70 dB	DC	0,002 dB	Type BNC and N connector, 50 Ω
	80 dB		0,004 dB	
	90 dB		0,012 dB	
	100 dB		0,04 dB	
	110 dB		0,12 dB	
	120 dB		0,4 dB	
	0 dB - 50 dB	1 Hz to 40 Hz	0,005 dB	
	60 dB		0,01 dB	
	70 dB		0,03 dB	
	80 dB		0,1 dB	
	90 dB		0,3 dB	
	100 dB		1,2 dB	
	0 dB - 50 dB	40 Hz to 1 kHz	0,003 dB	
	60 dB		0,006 dB	
	70 dB		0,02 dB	
	80 dB		0,04 dB	
	90 dB		0,12 dB	
	100 dB		0,6 dB	
	0 dB - 50 dB	1 kHz to 20 kHz	0,004 dB	
	60 dB		0,007 dB	
	70 dB		0,02 dB	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
	80 dB		0,05 dB	
	90 dB		0,15 dB	
	100 dB		1,2 dB	
	0 dB - 40 dB	20 kHz to 50 kHz	0,005 dB	
	50 dB		0,012 dB	
	60 dB		0,014 dB	
	70 dB		0,02 dB	
	80 dB		0,05 dB	
	90 dB		0,15 dB	
	100 dB		1,2 dB	
	0 dB - 40 dB	50 kHz to 100 kHz	0,015 dB	
	50 dB- 60 dB		0,05 dB	
	70 dB		0,06 dB	
	80 dB		0,1 dB	
	90 dB		0,2 dB	
	100 dB		1,3 dB	
RF 3 0	HF Power			
	Abs. HF Power			Type N, APC-7 and 3,5 mm connectors Source VRC < 0,04
	Reference source 1mW Broadband power, 50 Ω	50 MHz	$5{\cdot}10^{-3}{\cdot}P$	VRC < 0,04
	0,3 nW - 10 µW	10 MHz - 18 GHz	$(3{\cdot}10^{-2} - 5{\cdot}10^{-2}){\cdot}P$	Source VRC < 0,15
	1 µW - 100 mW	DC - 26,5 GHz	$(1{\cdot}10^{-2} - 4{\cdot}10^{-2}){\cdot}P$	
	100 mW - 3 W	100 kHz - 4,2 GHz	$(2{\cdot}10^{-2} - 4{\cdot}10^{-2}){\cdot}P$	
		10 MHz - 18 GHz	$(2{\cdot}10^{-2} - 6{\cdot}10^{-2}){\cdot}P$	
	3 W - 25 W	100 kHz - 4,2 GHz	$(2{\cdot}10^{-2} - 4{\cdot}10^{-2}){\cdot}P$	
	Tuned RF level, 50 Ω			
	0,2 fW to 100 fW	2,5 MHz to 1,3 GHz	$5{\cdot}10^{-3}{\cdot}P$	Selective power measurements, absolute
	100 fW to 1 mW	2,5 MHz to 1,3 GHz	$(1{\cdot}10^{-2} - 4{\cdot}10^{-2}){\cdot}P$	
	Rel. HF Power			

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
	Calibration Factor 1 mW and 10 mW into 50 Ω	DC - 1 GHz	$8 \cdot 10^{-3} \cdot CF$	Type N, APC-7 and 3,5 mm connectors, VRC < 0,04
		(1 - 4) GHz	$1 \cdot 10^{-2} \cdot CF$	
		(4 - 10) GHz	$1{,}5 \cdot 10^{-2} \cdot CF$	
		(10 - 18) GHz	$2 \cdot 10^{-2} \cdot CF$	
		(18 - 26,5) GHz	$2{,}5 \cdot 10^{-2} \cdot CF$	
	Power Linearity 100 fW to 100 mW into 50 Ω	10 MHz - 18 GHz	$3 \cdot 10^{-3} \cdot P$	Type N, APC-7 and 3,5 mm connectors, VRC < 0,04
TF 0 0	TIME AND FREQUENCY			
TF 1 0	Time			
TF 2 1	Frequency			
	1/2/2,5/5/10 MHz		$2 \cdot 10^{-13} \cdot f$	@ t_{avg} > 24 hrs
	1 mHz - 100 kHz		$(4 \cdot 10^{-7} \cdot f\ [Hz]^{(-3/2)} \cdot Hz^{(3/2)} + 1 \cdot 10^{-12}) \cdot f$	For measuring or generating sine-wave signals using measurement time at least 1000 s.
	100 kHz - 26,5 GHz		$1 \cdot 10^{-12} \cdot f$	
TF 2 2	Time interval			
	Absolute measurement			
	10 ps to 100 ps		$1{,}5 \cdot 10^{-2} \cdot t$ + 1 ps	Measurements are made on a sampling oscilloscope
	100 ps to 1 ns		$6 \cdot 10^{-3} \cdot t$ + 2 ps	
	1 ns to 1 μs		$1 \cdot 10^{-4} \cdot t$ + 8 ps	
	-1 s to + 5 s		$1 \cdot 10^{-9} \cdot t$ + 0,1 ns	Measurements are made on a time interval counter
	5 s to 100 000 s		$1 \cdot 10^{-9} \cdot t$ + 0,6 ns	
TF 2 4	Rise time			
	20 ps to 100 ps	up to 100 kHz	$5 \cdot 10^{-2} \cdot tr$ + 1 ps	
	100 ps or greater	up to 100 kHz	$5 \cdot 10^{-2} \cdot tr$	
TF 3 1	Modulation			
	AM Modulation; modulation index *m*: 0,05 to 0,95	Carrier: (0,15 - 10) MHz Modulation: 50 Hz - 10 kHz	$2{,}3 \cdot 10^{-2} \cdot m + 2 \cdot 10^{-3}$	For the calibration of sources and modulation meters

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
		Carrier: (10-1300) MHz Modulation :		Uncertainty refers to modulation index, distortion < -40 dBc
		50 Hz - 50 kHz	$1{,}3\cdot10^{-2}\cdot m + 1\cdot10^{-3}$	
		50 kHz – 100 kHz	$3\cdot10^{-2}\cdot m + 1\cdot10^{-3}$	
		Carrier: (1,3–26,5) GHz Modulation: 50 Hz - 50 kHz	$1{,}5\cdot10^{-2}\cdot m + 1\cdot10^{-3}$	
	Residual AM $m \cong 0$	measurement bandwidth 50 Hz to 3 kHz	$1\cdot10^{-4}$	Generating or measuring low residual AM signal
	AM Flatness m = 0,05 to 0,95	modulating frequency		
		20 Hz to 50 kHz	0,001	
		50 kHz to 100 kHz	0,0025	
	Distortion of AM Envelope up to 10 % at	modulating frequency 20 Hz to 20 kHz		*DIST* measured distortion based on signal level of at least 300 mV (*U* eff)
	m <= 0,50		$1{,}4\cdot10^{-1}\cdot DIST + 5{,}7\cdot10^{-4}$	
	m <= 0,95		$1{,}4\cdot10^{-1}\cdot DIST + 1{,}1\cdot10^{-3}$	
	FM Modulation Peak freq. deviation: 1 kHz - 200 kHz	Carrier: (0,15 - 10) MHz Modulation: 50 Hz - 10 kHz	$5\cdot10^{-3}\cdot\Delta f$	For the calibration of sources and modulation meters
		Carrier: (10-1300) MHz Modulation: 20 Hz – 20 kHz	$5\cdot10^{-3}\cdot\Delta f$	Using the Bessel zero method
		Carrier: (1,3 - 26,5) GHz Modulation: 20 Hz – 20 kHz	$1\cdot10^{-2}\cdot\Delta f$	
	Phase Modulation Peak phase deviation: 0,01 rad - 250 rad	Carrier: (0,15 - 10) MHz Modulation: 50 Hz - 10 kHz	$1{,}2\cdot10^{-2}\cdot PM$	For the calibration of sources and modulation meters
		Carrier: (10-1300) MHz Modulation: 50 Hz – 100 kHz	$1{,}2\cdot10^{-2}\cdot PM$	By relation to FM measurements
		Carrier: (1,3 - 26,5) GHz Modulation: 50 Hz – 100 kHz	$2\cdot10^{-2}\cdot PM$	
	Residual FM $\Delta f = 0$	measurement bandwidth 50 Hz to 3 kHz	3 Hz	Generating or measuring low residual FM signal
	FM Rejection Δf up to 50 kHz	modulating frequency 50 Hz to 100 kHz	0,001	Capability of measuring AM with superimposed

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (k=2)	Remarks
				FM
	FM Flatness	modulating frequency		
	Δf = 20 Hz - 100 kHz	20 Hz to 100 kHz	0,001	
		100 kHz to 200 kHz	0,0025	
	Distortion of FM or PM Envelope up to 10 % at m <= 0,50 m <= 0,95	modulating frequency		*DIST* measured distortion based on signal level of at least 300 mV *(U* eff)
		20 Hz to 20 kHz	$1{,}4\cdot10^{-1}\cdot DIST + 3{,}2\cdot10^{-4}$	
		20 kHz - 50 kHz	$2{,}7\cdot10^{-1}\cdot DIST + 5{,}5\cdot10^{-4}$	
		50 kHz - 100 kHz	$2{,}7\cdot10^{-1}\cdot DIST + 7{,}5\cdot10^{-4}$	
TF 3 2	Distortion			
	up to 10 %	20 Hz to 20 kHz	$1{,}4\cdot10^{-1}\cdot DIST + 7\cdot10^{-5}$	*DIST* measured distortion based on signal level of at least 300 mV *(U* eff)
		20 kHz to 50 kHz	$2{,}7\cdot10^{-1}\cdot DIST + 3\cdot10^{-4}$	
		50 kHz to 100 kHz	$2{,}7\cdot10^{-1}\cdot DIST + 5\cdot10^{-4}$	
	Harmonic contents			
	0 to – 70 dBc	Highest harmonic: up to 26,5 GHz	2 to 3,5 dB	
DM 0 0	Dimensional quantities			
DM 2 0	Speed (Speedometer) from 5 km/h		0,5 km/h	Measuring (also on site)
	Constant *k* an w functional control		0,15%	Generating (also on site)
DM 4 0	Diameter of the cylinder 5 mm – 150 mm		0,04 mm	Measuring
	Circumference of the cylinder (Speedometer) from 100 mm		0,1%	Measuring (also on site)
	Circumference of the wheel (Speedometer)			Generating (also on site)
	≤ 1500 mm		0,16%	
	> 1500 mm		0,12%	

HCS code	**Measured quantity, Range**	**Frequency**	**Best measurement capabilities (*k*=2)**	**Remarks**
DM 9 0	Angle			Generating (also on site)
	0 % - 4 %		0,08 %	
FQ 0 0	Force			
	0,5 N – 20 N		0,1 N	Generating (also on site)
	20 N – 100 N		$1{,}5 \cdot 10^{-3} \cdot F$ + 0,1 N	
	100 N – 2 kN		$2{,}5 \cdot 10^{-3} \cdot F$	
	10 N – 100 N		0,25 N	Measuring (also on site)
	100 N – 500 N		$2{,}5 \cdot 10^{-3} \cdot F$	
	500 N – 1 kN		$2 \cdot 10^{-3} \cdot F$	
MW 1 0	Mass			Generating (also on site)
	50 g – 10 kg		3 g	
	10 kg – 100 kg		$75 \cdot 10^{-6} \cdot m$ + 2,5 g	
	100 kg – 220 kg		$1 \cdot 10^{-4} \cdot m$	
PV 1 2	Gauge Pressure			Measuring and Generating (also on site)
	0 – 70 kPa		0,03 kPa	
	70 – 1500 kPa		1,0 kPa	
AM 0 0	Acceleration			Generating (also on site)
	(0,1 – 2,5) m/s^2		0,07 m/s^2	
	(2,5 - 9,8) m/s^2		0,06 m/s^2	
AC 0 0	ACOUSTICAL QUANTITIES			
AC 1 0	Acoustical Pressure			dB: rel. 20 μPa
	94 dB – 124 dB	31.5 Hz	0,08 dB	IEC 60942
		63 Hz to 8 kHz in 1 octave steps	0,05 dB	
		12,5 kHz, 16 kHz	0,08 dB	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (*k*=2)	Remarks
AC 2 0	Transducers (electrical quantities)			
	Microphones (WS1)	250 Hz	0,15 dB	IEC 61094
	Microphones (WS2)	31.5 Hz	0,08 dB	IEC 61094
		63 Hz to 8 kHz in 1 octave steps	0,07 dB	
		12,5 kHz, 16 kHz	0,08 dB	
	Sound level meters	20 Hz – 20 kHz		IEC 61672
	frequency weighting	4 kHz	0,25 dB	(IEC 60651)
	time weighting	20 Hz – 20 kHz	0,1 dB	
	linearity			
	0 to - 70 dB		0,25 dB	
	-80 to – 90 dB		0,3 dB	
OQ 1 0	OPTICAL QUANTITIES			
OQ 1 3	Optical system properties			
OQ 1 5	Optical power Fiber optical sources	Nominal wavelengths:		fitted with FC/PC connectors
	Absolute Power :	1310 nm and 1550 nm (single mode)		
	0 dBm to -80 dBm		0,11 dB	
	-80 dBm to -90 dBm		0,13 dB	
	Fiber optical attenuators Attenuation(Insertion loss):	1310 nm and 1550 nm (single mode)		
	0 dB to 80 dB		0,11 dB	
	80 dB to 90 dB		0,13 dB	
	Attenuation linearity (Variable attenuators)			
	0 dB to 80 dB		0,04 dB	
	80 dB to 90 dB		0,05 dB	
	Fiber optical power meters Absolute Power:	1310 nm and 1550 nm (single mode)		
	0 dBm to -80 dBm		0,11 dB	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (k=2)	Remarks
	-80 dBm to -90 dBm		0,13 dB	
	Optical Time Domain Reflectometers (OTDR) ΔSA	Nominal wavelengths:		fitted with FC/PC connectors
	loss scale attenuation coeff. region A (typical fibre trace ± 3dB/km distance, (0 - 35) km	1310 nm (single mode)	0,090 $dB \cdot km^{-1}$/ $dB \cdot km^{-1}$	
		1550 nm (single mode)	0,050 $dB \cdot km^{-1}$/ $dB \cdot km^{-1}$	
	Length scale: distance offset error ΔL0	1310 nm and 1550 nm (single mode)	0,8 SI[1]	[1]SI = distance sampling interval
	Distance scale deviation ΔSL (5 - 35) km	1310 nm and 1550 nm (single mode)	$4 \cdot 10^{-4}$ m/m	
	Event and attenuation deadzone	1310 nm and 1550 nm (single mode)	0,1 m	
	Dynamic range of an OTDR	1310 nm and 1550 nm (single mode)	1,3 dB	
OQ 1 6	Glass fibres	Nominal wavelengths:		fitted with FC/PC connectors
	Optical length at known group refractive index (0,1 - 100) km	1310 nm and 1550 nm (single mode)	$3 \cdot 10^{-4} \cdot L$	
TE 0 0	TEMPERATURE			
TE 1 0	Internal reference junction	23°C	0,14°C	Generating
TE 2 0	Resistance temperature indicators and simulators			
		- 200°C to -100°C	0,035°C	Measuring (Direct calibration)
		-100°C to 100°C	0,025°C	
		100°C to 260°C	0,06°C	
		260°C to 300°C	0,07°C	
		300°C to 630°C	0,08°C	
		- 200°C to 0°C	0,04°C	Generating (Direct calibration)
		0°C to 100°C	0,05°C	
		100°C to 260°C	0,06°C	
		260°C to 300°C	0,07°C	
		300°C to 600°C	0,085°C	

HCS code	**Measured quantity, Range**	**Frequency**	**Best measurement capabilities (*k*=2)**	**Remarks**
		600°C to 630°C	0,13°C	
TE 3 0	Thermocouple temperature indicators and simulators			Measuring and Generating (Direct calibration)
	Type B	600°C to 800°C	0,50°C	
		800°C to 1820°C	0,40°C	
	Type C	0°C to 1000°C	0,35°C	
		1000°C to 1800°C	0,60°C	
		1800°C to 2316°C	1,00°C	
	Type E	- 250°C to -100°C	0,60°C	
		- 100°C to 650°C	0,20°C	
		- 25°C to 350°C	0,16°C	
		650°C to 1000°C	0,25°C	
	Type J	- 210°C to 1200°C	0,30°C	
		- 100°C to 760°C	0,20°C	
		- 30°C to 150°C	0,16°C	
	Type K	- 200°C to -100°C	0,40°C	
		- 100°C to 120°C	0,20°C	
		120°C to 1000°C	0,30°C	
		1000°C to 1372°C	0,50°C	
	Type L	- 200°C to -100°C	0,45°C	
		- 100°C to 800°C	0,30°C	
		800°C to 900°C	0,20°C	
	Type N	- 200°C to -100°C	0,45°C	
		- 100°C to -25°C	0,25°C	
		- 25°C to 410°C	0,22°C	
		410°C to 1300°C	0,30°C	
	Type R	0°C to 250°C	0,70°C	
		250°C to 1000°C	0,40°C	
		1000°C to 1767°C	0,50°C	
	Type S	0°C to 1767°C	0,55°C	
		250°C to 1400°C	0,45°C	
	Type T	- 250°C to -150°C	0,75°C	
		- 150°C to 0°C	0,30°C	
		0°C to 400°C	0,20°C	

HCS code	Measured quantity, Range	Frequency	Best measurement capabilities (k=2)	Remarks
	Type U	- 200°C to 0°C	0,65°C	
		0°C to 600°C	0,30°C	
TE 4 0	Direct voltage temperature indicators and simulators			
	Type B	250°C to 400°C	0,65°C	Measuring
		400°C to 550°C	0,40°C	
		550°C to 700°C	0,30°C	
		700°C to 1000°C	0,24°C	
		1000°C to 1820°C	0,18°C	
	Type E	-200°C to -50°C	0,07°C	
		-50°C to 1000°C	0,04°C	
	Type J	-210°C to -115°C	0,10°C	
		-115°C to 0°C	0,07°C	
		0°C to 1200°C	0,06°C	
	Type K	-200°C to -90°C	0,12°C	
		-90°C to 500°C	0,07°C	
		500°C to 1200°C	0,08°C	
		1200°C to 1372°C	0,09°C	
	Type N	-200°C to -120°C	0,17°C	
		-120°C to 0°C	0,09°C	
		0°C to 1300°C	0,07°C	
	Type R	-50°C to 0°C	0,44°C	
		0°C to 250°C	0,31°C	
		250°C to 700°C	0,18°C	
		700°C to 1768,1°C	0,14°C	
	Type S	-50°C to 0°C	0,41°C	
		0°C to 150°C	0,30°C	
		150°C to 300°C	0,21°C	
		300°C to 900°C	0,18°C	
		900°C to 1700°C	0,15°C	
		1700°C to 1768,1°C	0,17°C	
	Type T	-200°C to -80°C	0,12°C	
		-80°C to 10°C	0,07°C	

HCS code	**Measured quantity, Range**	**Frequency**	**Best measurement capabilities (*k*=2)**	**Remarks**
		10°C to 400°C	0,05°C	
	Type B	250°C to 400°C	0,50°C	Generating
		400°C to 550°C	0,31°C	
		550°C to 700°C	0,23°C	
		700°C to 1000°C	0,19°C	
		1000°C to 1820°C	0,14°C	
	Type E	-200°C to -50°C	0,06°C	
		-50°C to 0°C	0,04°C	
		0°C to 1000°C	0,03°C	
	Type J	-210°C to -170°C	0,09°C	
		-170°C to 0°C	0,07°C	
		0°C to 1200°C	0,05°C	
	Type K	-200°C to -140°C	0,10°C	
		-140°C to 800°C	0,07°C	
		800°C to 1372°C	0,08°C	
	Type N	-200°C to -120°C	0,13°C	
		-120°C to 0°C	0,08°C	
		0°C to 1300°C	0,06°C	
	Type R	-50°C to 0°C	0,34°C	
		0°C to 250°C	0,24°C	
		250°C to 420°C	0,14°C	
		420°C to 900°C	0,12°C	
		900°C to 1720°C	0,10°C	
		1720°C to 1768°C	0,11°C	
	Type S	-50°C to 0°C	0,31°C	
		0°C to 40°C	0,23°C	
		40°C to 200°C	0,20°C	
		200°C to 700°C	0,15°C	
		700°C to 1730°C	0,12°C	
		1730°C to 1768°C	0,13°C	
	Type T	-200°C to -80°C	0,10°C	
		-80°C to 70°C	0,06°C	
		70°C to 400°C	0,04°C	

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HCS code	Measured quantity, Range	Frequency			Best measurement capabilities (*k*=2)	Remarks
TE 5 0	Resistance temperature indicators and simulators					Measuring
		-200°C to 0°C			0,005°C	
		0°C to 350°C			0,010°C	
		350°C to 600°C			0,013°C	
		-200°C to 600°C			(T [°C] + 200°C) · $14 \cdot 10^{-5}$ + 0,016°C	Generating
RM 2 0	Gas mixtures					
	Calibration of exhaust gas meters					Comparison of equal concentrations only (three gas mixtures)
	CO (% vol/vol)	2	0,5	3,5	1,0 % (rel.) vol/vol	Three gas mixtures according OIML R99 see scope I171 (also on site)
	CO2 (% vol/vol)	10	6	14	1,0 % (rel.) vol/vol	
	C3H8 (ppm vol/vol)		200		1,5 % (rel.) vol/vol	
	C3H8 (ppm vol/vol)	1000		2000	1,3 % (rel.) vol/vol	
	O2 (% vol/vol)	20,9			1,0 % (rel.) vol/vol	

Remarks:

- The ambient temperature during calibration is nom. 23 ºC.
- The best measurement capability: the highest achievable accuracy for a given measuring point or measuring range, expressed as the total positive and negative measurement uncertainty.
- The measurement uncertainty is calculated according to EA-4/02 "Expression of the Uncertainty of Measurement in Calibration.
- The measurements are carried out inside the laboratory.