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IEC 61000-4-30
Power Quality Measurement Methods
Compliance Report

Schneider Electric
PM8000 & ION 7400 (with flicker)

with GPS-200 Time Code Generator
(or other GPS receiver with equivalent accuracy and functionality)

U_{din}: 230 V, 50/60 Hz

PM8000 on left, ION7400 on right
Document Release Dates: October 2014, December 2015

Summary of Results

Schneider Electric PM8000 & ION7400

IEC 61000-4-30 Ed.2 compliance

when equipped with the following accessories or options:
GPS-200 GPS Time Code Receiver
(or other GPS receiver with equivalent accuracy and functionality)

NOTE: the PM8000 and ION7400 are only specified for 61000-4-30 performance at U_{din} = 230 V, 50/60 Hz.

Table 1: Summary of Results – ION7400 & PM8000
at 230 V L-N U_{din} (equivalent to 400 L-L V_{rms}), 50/60 Hz

61000-4-30 Section	Power Quality Parameter	Class A Compliance	Class S Compliance	Class B Compliance	Remarks
5.1	Power frequency	-	Pass	Pass	
5.2	Magnitude of the supply voltage	-	Pass	Pass	
5.3	Flicker	-	Pass	(N/A)	ION7400 only. EUT meets Flicker Class F2.
5.4	Supply voltage dips and swells	-	Pass	Pass	
5.5	Voltage interruptions	-	Pass	Pass	
5.7	Supply voltage unbalance	-	Pass	Pass	
5.8	Voltage harmonics	-	Pass	Pass	
5.9	Voltage interharmonics	-	-	-	Function not supported
5.10	Mains signaling voltage	-	-	-	Function not supported
5.12	Underdeviation and overdeviation	-	(N/A)	(N/A)	
4.4	Measurement aggregation intervals	-	Pass	Pass	
4.6	Time-clock uncertainty	-	Pass	Pass	
4.7	Flagging	-	Pass	(N/A)	
6.1	Transient influence quantities	-	(N/A)	(N/A)	

(N/A) – Not Applicable. There is no requirement in the Standard.
NOTE: Manufacturer provides technical justification that the ION7400 is a variant of the PM8000. Measurement-related hardware and software is identical with the exception of the additional flickermeter in the ION7400.

All Class S tests (not including flicker) were performed on the PM8000 in October 2014. ION7400 was evaluated in December 2015 for flicker according to IEC 61000-4-15 Ed 2.

Signed: _____ Signed: _____

Thomas Pua
Senior Test Engineer, Power Standards Lab
18 December 2015

Marcos Rodriguez
Test Engineer, Power Standards Lab
18 December 2015

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Equipment under Test

EUT Manufacturer:	Schneider Electric dba Power Measurement Ltd
EUT Models:	PM8000 and ION7400
EUT S/N:	PM8000: ME-1407A008-00, ME-1407A010-00, A0nd ME-1407A024-00 ION7400: MR-1510A863-00
EUT Firmware version:	1.2.14 (ION7400) & 1.0.55(PM8000)
EUT Software version:	V3.0
Operating mode:	WYE/Star

Accessories included in test: GPS-200 Time Code Receiver

Required from Client:

- Two samples of EUT, with all necessary accessories, manuals in English, specifications, etc. PSL provides electric power signals only. Client must provide all other supplies, signals, materials, support equipment, antennas, etc.
- A designated technical contact who can answer technical questions in English and give detailed guidance on the use of the EUT.
    - Technical contact: Ward Poole
Ward.Poole@schneider-electirc.com
(250) 652-7100
Pacific Time zone
- Selection of parameters to be evaluated, expected class for each parameter, and expected range of U_{din} for each parameter. Select from the following list:
    - Frequency
    - magnitude of supply voltage
    - voltage dip and swell depth
    - voltage dip and swell duration
    - voltage interruption duration
    - voltage unbalance (or positive, negative, and zero sequence)
    - mains signaling recording
    - Flicker (ION 7400 ONLY)

- Immediate visible viewing of all values (<u>not</u> statistics, and <u>not</u> file retrieval) of parameters to be evaluated. Unless other arrangements are made, EUT will be evaluated on readings shown on user interface, and not on internally stored data.

Photo 1 Equipment Under Test (ION7400 on top-right, PM8000 in all other photos)

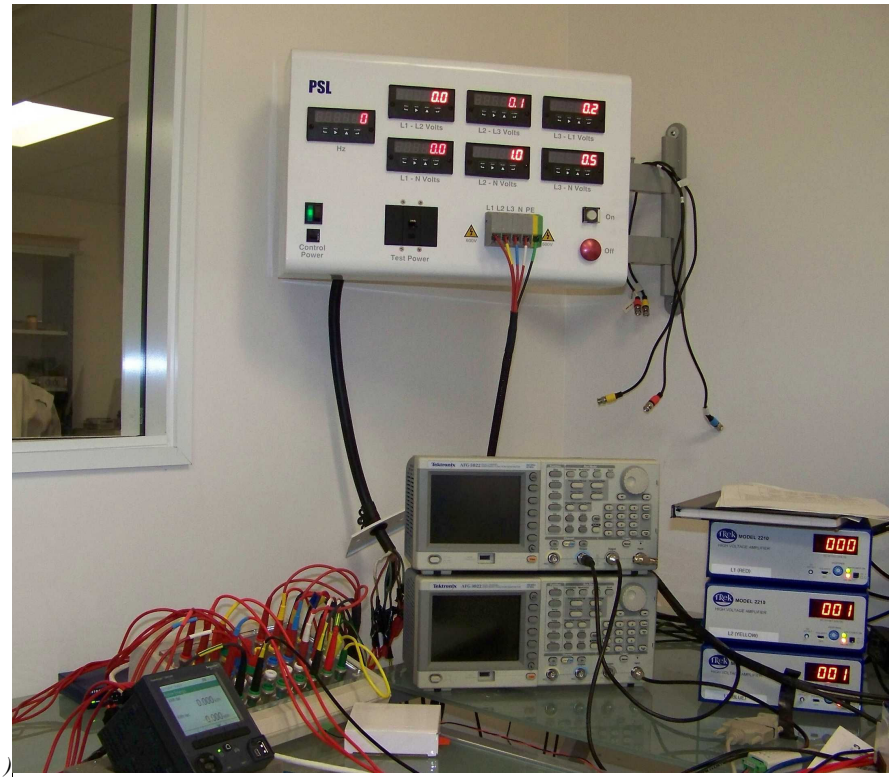

Photo 2: EUT in Test Environment

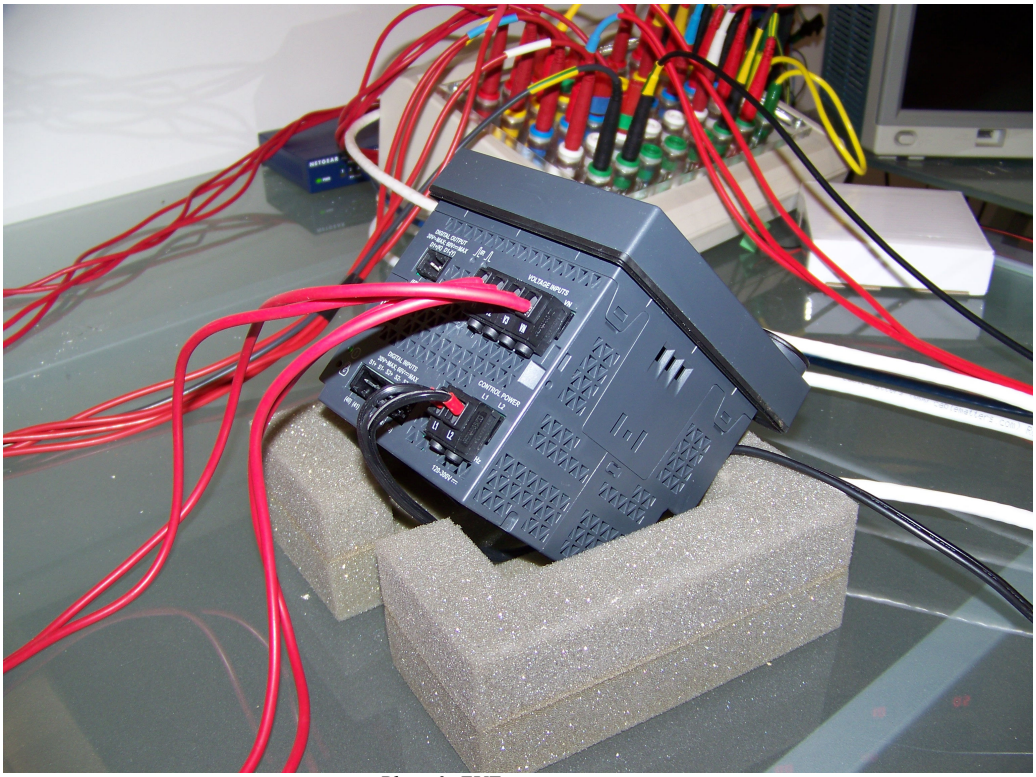

Photo 3: EUT sense connections

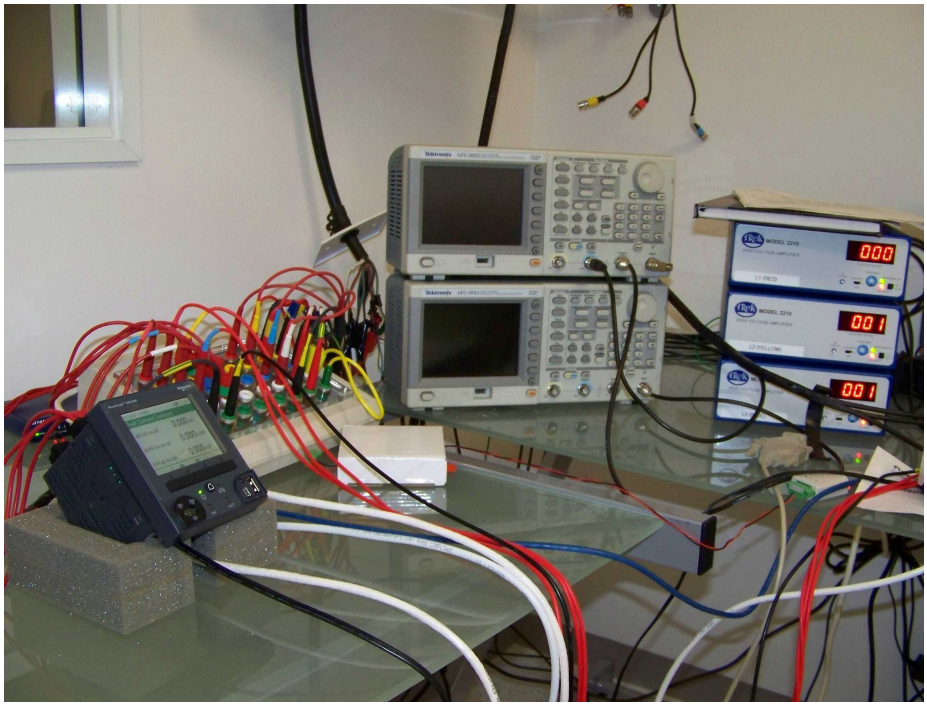

Photo 4: Test setup

Photo 5: Meter rear panel

Test standard

IEC 61000-4-30 ed.2.0 2008-10 © IEC:2008

Other required standards

61000-4-30 cites values and requirements from the following standards: (if applicable)
IEC 61000-4-15 ed.2.0 2010-08 © IEC:2010 (Flickermeter)
IEC 61000-4-7 ed.2.0 2002-08 © IEC:2002 (harmonics and interharmonics)
IEC 61000-2-4 ed 1.0 1994-02 © IEC:2002 (compatibility levels)

Test parameters

Test location:	Power Standards Lab, Alameda, California, U.S.A.
Test dates:	PM8000: October 6 – October 27, 2014 (all tests not including flicker)
	ION7400: December 6 – December 16, 2015 (flicker)
Supervising engineer:	Thomas Pua
Other participants:	Marcos A. Rodriguez

Basic EUT specifications for test

Rated maximum RMS input voltage:	400V L-N
Maximum 61000-4-30 U_{din}:	230V L-N
U_{din} selected by PSL for this report:	**U_{din} = 230 V_{rms} at F_{nom} = 50/60 Hz**
Rated operating temperature range:	-25 to 70 ºC
Rated Storing temperature range:	-40 to 85 ºC
Rated frequency range:	50/60 +/- 15%
Reference channel[1]:	L1 Voltage

[1] See IEC 61000-4-30, 3.24

5.1 Power Frequency

Summary of 5.1 Power Frequency Conformance Results

Power frequency measurements conform to Class A requirements	**N/A**
Power frequency measurements conform to Class S requirements	**Yes**
Power frequency measurements conform to Class B requirements	**Yes**

Table 5.1 Class A – Summary of Power Frequency Results

	61000-4-30 section	**Power frequency requirement**	**EUT conforms to Class A**	**Remarks**
Engineering review	Table 1 Line 1	EUT specifications meet required range for frequency	N/A	EUT is class S meter
PSL Test 5.1(a)	¶5.1.2, Paragraph 1, Sentence 1	General accuracy	N/A	EUT is class S meter
PSL Test 5.1.1(b)	¶5.1.1, Paragraph 1, Sentence 1	10-second interval	N/A	EUT is class S meter
PSL Test 5.1.1(c)	¶5.1.1, Paragraph 2, Sentence 2	Synchronized to an absolute 10-second clock	N/A	EUT is class S meter
PSL Test 5.1.1(d)	¶5.1.1, Paragraph 1, Sentence 4	Harmonics and interharmonics are attenuated	N/A	EUT is class S meter
PSL Test 5.1.2(a)	¶6.2.1	Verify accuracy over range of influence quantities	N/A	EUT is class S meter

Table 5.1 Class S – Summary of Power Frequency Results

	61000-4-30 section	**Power frequency requirement**	**EUT conforms to Class S**	**Remarks**
Engineering review	Table 1 Line 1	EUT specifications meet required range for frequency	Yes	Pass
PSL Test 5.1(a)	¶5.1.2, Paragraph 1, Sentence 1	General accuracy	Yes	Pass
PSL Test 5.1.1(b)	¶5.1.1, Paragraph 1, Sentence 1	10-second interval	Yes	Pass
PSL Test 5.1.1(c)	¶5.1.1, Paragraph 2, Sentence 2	Synchronized to an absolute 10-second clock	Yes	Pass
PSL Test 5.1.1(d)	¶5.1.1, Paragraph 1, Sentence 4	Harmonics and interharmonics are attenuated	Yes	Pass
PSL Test 5.1.2(a)	¶6.2.1	Verify accuracy over range of influence quantities	Yes	Pass

Table 5.1 Class B – Summary of Power Frequency Results

	61000-4-30 section	Power frequency requirement	EUT conforms to Class B	Remarks
Engineering review	Table 2 Line 1	EUT specifications meet required range for frequency	Yes	Pass
PSL Test 5.1(a)	¶5.1.2, Paragraph 2, Sentence 1	General accuracy	Yes	Pass
Engineering review	¶5.1.2, Paragraph 2, Sentence 1	Manufacturer shall specify frequency uncertainty	Yes	Pass
Engineering review	¶5.1.3, Paragraph 2, Sentence 1	Manufacturer shall indicate process used for frequency measurement	Yes	Pass

PSL Test Suite 5.1: Frequency

PSL Test 5.1(a) – Simple steady-state frequency measurement

Purpose of test: Verifies general steady-state frequency accuracy. Verifies that we know how to make frequency measurements with the EUT. Test is single-phase, applied to EUT reference channel. Voltage is sinusoidal, approx V_{din}.

Table 5.1(a)

Applied frequency Hz	Voltage applied V_{rms}	Ambient temperature ºC	EUT frequency reading Hz	Error Hz[1]	Remarks
50.0000	230	21	50.001	.001	Pass
60.0000	230	21	60.001	.001	Pass
43.0000	230	21	43.001	.001	Pass
68.5000	230	21	68.501	.001	Pass
55.0000	230	21	55.001	.001	Pass

[1] Rounded to closest 0.001 Hz. Includes error of EUT plus error of PSL test equipment: ±0.0001 Hz

PSL Test 5.1.1(b) – Verify 10-second averaging interval for frequency measurement

Purpose of test: Verifies "The frequency reading shall be obtained every 10-s." Test is single-phase, applied to EUT reference channel. Because this test does not require precision frequency measurements from the EUT, temperature and voltage are non-critical. Voltage is proprietary series of sinusoidal waveforms, approx U_{din}. Ambient temperature approx 21ºC.

Table 5.1.1(b)

Applied waveform	Applied frequency	Remarks	Result
PSL511b1.csv	Varying	Verifies that frequency averaging interval is an integer multiple of 10 seconds.	Pass
PSL511b2.csv	Varying	Verifies that frequency averaging interval is shorter than 20 seconds.	Pass

PSL Test 5.1.1(c) – Verify 10-second averaging interval for frequency measurement begins on absolute 10-s time clock

Purpose of test: Verifies "Each 10-s interval shall begin on an absolute 10-s time clock..." Test is single-phase, applied to EUT reference channel. Because this test does not require precision frequency measurements from the EUT, temperature and voltage are non-critical. Proprietary voltage waveform is sinusoidal, varying frequency synchronized to absolute time. Amplitude approx U_{din}. Ambient temperature approx 21ºC.

NOTE: This test is performed only if EUT conforms to Class A requirements in PSL Test 5.1.1(b).

Table 5.1.1(c)

Applied waveform	Applied frequency	Remarks	Result
PSL511c1.csv	Varying	Verifying that frequency averaging interval is synchronized to an absolute 10-second clock	Pass

PSL Test 5.1.1(d) – Verify harmonics do not affect frequency measurement

Purpose of test: Verifies "Before each assessment, harmonics and interharmonics shall be attenuated to minimize the effects of multiple zero-crossings." Test is single-phase, applied to EUT reference channel. Non-standard fundamental frequency is used to detect snap-to-standard-frequency algorithms. Temperature and voltage are non-critical. Proprietary voltage waveforms are non-sinusoidal, RMS value is approx U_{din}. Ambient temperature approx 21ºC.

Table 5.1.1(d)

Applied waveform	Applied fundamental frequency Hz	EUT frequency reading Hz	Remarks	Result
PSL511d1.csv	55.137	55.138	Additional zero-crossings: Low-amplitude high-frequency	Pass[1]
PSL511d2.csv	55.137	55.138	Additional zero-crossings: high-amplitude high-frequency	Pass[1]
PSL511d3.csv	55.137	55.138	Additional zero-crossings: low-amplitude low-frequency	Pass[1]
PSL511d4.csv	55.137	55.138	Additional zero-crossings: high-amplitude low-frequency	Pass[1]

[1]: *Reading on display was 55.14Hz. Readings provided are from ION software.*

PSL Test 5.1.2(a) – Verify frequency uncertainty over range of influence quantities
Purpose of test: Verifies frequency measurement according to Table 2, IEC 61000-4-30, Section 6.2. "Over the range of influence quantities, and under the conditions described in 6.1, the measurement uncertainty…" Checks frequency measurements with distorted voltages, flicker, and other influence quantities. Voltage is non-sinusoidal, RMS value varies. Ambient temperature approx 21ºC.

NOTE: This test is performed only if EUT conforms to Class A requirements in PSL Test 5.1.1(b).

Table 5.1.2(a)

Applied waveform	Applied fundamental frequency Hz	Applied waveform definition	EUT frequency reading Hz	Error / Remarks
PSL512a1.csv	42.500	Table 2 Testing State 1	42.501	0.001% / Pass
PSL512a2.csv	46.250	Table 2 Testing State 1	46.251	0.001% / Pass
PSL512a3.csv	50.000	Table 2 Testing State 1	50.001	0.001% / Pass
PSL512a4.csv	53.750	Table 2 Testing State 1	53.751	0.001% / Pass
PSL512a5.csv	57.500	Table 2 Testing State 1	57.501	0.001% / Pass
PSL512a6.csv	42.500	Table 2 Testing State 2	42.501	0.001% / Pass
PSL512a7.csv	46.250	Table 2 Testing State 2	46.501	0.001% / Pass
PSL512a8.csv	50.000	Table 2 Testing State 2	50.001	0.001% / Pass
PSL512a9.csv	53.750	Table 2 Testing State 2	53.751	0.001% / Pass
PSL512a10.csv	57.500	Table 2 Testing State 2	57.501	0.001% / Pass
PSL512a11.csv	42.500	Table 2 Testing State 3	42.501	0.001% / Pass
PSL512a12.csv	46.250	Table 2 Testing State 3	46.501	0.001% / Pass
PSL512a13.csv	50.000	Table 2 Testing State 3	50.001	0.001% / Pass
PSL512a14.csv	53.750	Table 2 Testing State 3	53.751	0.001% / Pass
PSL512a15.csv	57.500	Table 2 Testing State 3	57.501	0.001% / Pass

NOTE: For Testing State 3, and only for Testing State 3, U_{din} is set to 170 V_{rms} due to limitations in PSL's power amplifier. This corresponds to a worst-case voltage of approximately 306 V_{rms} L-N, and 530 V_{rms} L-L.

5.2 Magnitude of the Supply Voltage

Summary of 5.2 Magnitude of the Supply Voltage Conformance Results

Magnitude of the supply voltage measurements conform to Class A requirements	**N/A**
Magnitude of the supply voltage measurements conform to Class S requirements	**Yes**
Magnitude of the supply voltage measurements conform to Class B requirements	**Yes**

Table 5.2 Class A – Summary of Magnitude of the Supply Voltage Results

	61000-4-30 section	**Magnitude of the supply voltage requirement**	**EUT conforms to Class A**	**Remarks**
Engineering review	Table 1 Line 2	EUT specifications meet required range for voltage magnitude	N/A	EUT is class S meter
PSL Test 5.2.1 (a)	none	Simple voltage magnitude measurement	N/A	EUT is class S meter
PSL Test 5.2.1 (b)	¶5.2.1, Paragraph 1, Sentence 1	True RMS	N/A	EUT is class S meter
PSL Test 5.2.1(c)	¶5.2.1, Paragraph 1, Sentence 1	10/12-cycle RMS interval	N/A	EUT is class S meter
PSL Test 5.2.1(d)	¶5.2.1, Paragraph 1, Sentence 1	Contiguous non-overlapping intervals	N/A	EUT is class S meter
Engineering review	¶5.2.2, Paragraph 1, Sentence 1	±0,1% of U_{din} uncertainty according to specifications	N/A	EUT is class S meter
PSL Test 5.2.2(b)	¶6.2.1	±0,1% of U_{din} uncertainty over range of influence quantities	N/A	EUT is class S meter
PSL Test 5.2.3(a)	¶5.2.3, Paragraph 1, Sentence 1	Aggregation conforming to ¶4.5 shall be used	N/A	EUT is class S meter

Table 5.2 Class S – Summary of Magnitude of the Supply Voltage Results

	61000-4-30 section	Magnitude of the supply voltage requirement	EUT conforms to Class S	Remarks
Engineering review	Table 1 Line 2	EUT specifications meet required range for voltage magnitude	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.2.1 (a)	none	Simple voltage magnitude measurement	Yes	Pass
PSL Test 5.2.1 (b)	¶5.2.1, Paragraph 1, Sentence 1	True RMS	Yes	Pass
PSL Test 5.2.1(c)	¶5.2.1, Paragraph 1, Sentence 1	10/12-cycle RMS interval	Yes	Pass
PSL Test 5.2.1(d)	¶5.2.1, Paragraph 1, Sentence 1	Contiguous non-overlapping intervals	Yes	Pass
Engineering review	¶5.2.2, Paragraph 1, Sentence 1	±0,5% of U_{din} uncertainty according to specifications	Yes	Pass
PSL Test 5.2.2(b)	¶6.2.1	±0,5% of U_{din} uncertainty over range of influence quantities	Yes	Pass
PSL Test 5.2.3(a)	¶5.2.3, Paragraph 1, Sentence 1	Aggregation conforming to ¶4.5 shall be used	Yes	Pass

Table 5.2 Class B – Summary of Magnitude of the Supply Voltage Results

	61000-4-30 section	Magnitude of the supply voltage requirement	EUT conforms to Class B	Remarks
Engineering review	Table 2 Line 2	EUT specifications meet required range for voltage magnitude	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.2.1 (a)	none	Simple voltage magnitude measurement	Yes	Pass
PSL Test 5.2.1(b)	¶5.2.1, Paragraph 2, Sentence 1	True RMS	Yes	Pass
Engineering review	¶5.2.1, Paragraph 2, Sentence 1	Manufacturer shall specify the RMS period	Yes	Pass
Engineering review	¶5.2.2, Paragraph 2, Sentence 1	Manufacturer shall specify the uncertainty, which shall not exceed ±1% of U_{din}	Yes	Pass
PSL Test 5.2.2(b)	¶5.2.2 and ¶6.1	±1 % of U_{din} uncertainty	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.2.3(a)	¶5.2.3, Paragraph 2, Sentence 1	Manufacturer shall specify the aggregation process	Yes	Pass

PSL Test Suite 5.2: Magnitude of the Supply

PSL Test 5.2.1(a) – Simple voltage magnitude measurement

Purpose of test: Verifies general steady-state RMS magnitude accuracy. Verifies that we know how to make magnitude measurements with the EUT. Test is single-phase, applied to EUT reference channel. Voltage is sinusoidal.

Table 5.2.1(a)

Applied frequency Hz	Applied V_{rms}	Ambient temperature ºC	EUT voltage reading V_{rms}	Error V_{rms}[1]	Remarks
50.0000	229.94	22	230.045	0.0456%	Pass
60.0000	230.52	22	230.623	0.0446%	Pass

[1] Rounded to closest 0.01 Volts. Includes error of EUT plus error of PSL test equipment: ±0.01 V_{rms}

PSL Test 5.2.1(b) – Verify true RMS measurements

Purpose of test: Verifies "The measurement shall be the r.m.s. value ...." Test is single-phase, applied to EUT reference channel. Voltage is proprietary series of non-sinusoidal waveforms, approx U_{din}. Ambient temperature approx 21ºC.

Table 5.2.1(b)

Applied waveform	Applied V_{rms}, frequency	EUT voltage reading V_{rms}	Remarks	Error / Result
PSL521b1.csv	245.15V, 50Hz	245.278	Verifies that EUT is using true RMS measurement method	0.052% / Pass
PSL521b2.csv	245.92V, 60Hz	246.060	Verifies that EUT is using true RMS measurement method	0.056% / Pass

PSL Test 5.2.1(c) – Verify 10/12 cycle RMS interval

Purpose of test: Verifies "The measurement shall be ... over a 10-cycle time interval for 50 Hz power system or 12-cycle time interval for 60 Hz power system." Test is single-phase, applied to EUT reference channel. Proprietary voltage waveform is sinusoidal, varying amplitude. Amplitude ranges around U_{din}. Ambient temperature approx 21ºC.

NOTE: This test is performed only if EUT conforms to Class A requirements in PSL Test 5.2.1(b).

Table 5.2.1(c)

Applied waveform	Applied V_{rms}, frequency	Remarks	Result
PSL521c1.csv	Varying, 50 Hz	Verifies that EUT is measuring RMS voltage over an integer multiple of 10 cycles	Pass
PSL521c2.csv	Varying, 50 Hz	Verifies that EUT is measuring RMS voltage over fewer than 20 cycles	Pass
PSL521c3.csv	Varying, 60 Hz	Verifies that EUT is measuring RMS voltage over an integer multiple of 12 cycles	Pass
PSL521c4.csv	Varying, 60 Hz	Verifies that EUT is measuring RMS voltage over fewer than 24 cycles	Pass

PSL Test 5.2.1(d) – Verify contiguous non-overlapping RMS intervals

Purpose of test: Verifies "Every 10/12-cycle interval shall be contiguous with, and not overlap, adjacent 10/12 cycle intervals." Test is single-phase, applied to EUT reference channel. Proprietary voltage waveforms are sinusoidal, varying amplitude. Amplitude ranges around U_{din}. Ambient temperature approx 21ºC.

NOTE: This test is performed only if EUT conforms to Class A requirements in PSL Test 5.2.1(c).

Table 5.2.1(d)

Applied waveform	Applied V_{rms}, frequency	Remarks	Result
PSL521d1.csv	Varying, 50 Hz	Verifies that EUT is measuring RMS voltage over contiguous 10-cycle intervals	Pass
PSL521d2.csv	Varying, 50 Hz	Verifies that EUT is measuring RMS voltage over non-overlapping 10-cycle intervals	Pass

PSL Test 5.2.2(a) – Verify required accuracy specification – magnitude of supply voltage measurements

Purpose of test: Verifies "…the measurement uncertainty shall not exceed ±0,1% of U_{din}." For this test, we examine the published specifications to determine if they meet this requirement. Note that U_{din} never exceeds 50% of EUT full scale.

Table 5.2.2(a)

Published accuracy specification	Translated specification to percent of U_{din}	Remarks	Result
±0.1% U_{din}	±0.1% U_{din}		Pass

PSL Test 5.2.2(b) – Verify magnitude of supply voltage uncertainty over range of influence quantities

Purpose of test: Verifies magnitude of supply measurement according to Table 2, IEC 61000-4-30, Section 6.2 . "Over the range of influence quantities, and under the conditions described in 6.1, the measurement uncertainty…" Checks voltage magnitude measurements with distorted voltages, flicker, and other influence quantities. Voltage is non-sinusoidal, RMS value varies. Ambient temperature approx 21ºC. NOTE: Unbalance influence quantity does not apply. NOTE: This test is performed only if EUT conforms to Class A requirements in PSL Test 5.2.2(a).

Table 5.2.2(b) with U_{din} = 230 V

Applied waveform	Applied RMS voltage % U_{din}	Applied waveform definition	Reference meter reading RMS volts	EUT 10-cycle reading RMS volts	Error / Remarks
PSL522b1.csv	10%	Table 2 Testing State 1	22.75	22.754	0.0176% / Pass
PSL522b2.csv	45%	Table 2 Testing State 1	103.03	103.090	0.0582% / Pass
PSL522b3.csv	80%	Table 2 Testing State 1	183.70	183.800	0.0544% / Pass
PSL522b4.csv	115%	Table 2 Testing State 1	264.45	264.650	0.0756% / Pass
PSL522b5.csv	150%	Table 2 Testing State 1	345.45	345.610	0.0463% / Pass
PSL522b6.csv	10%	Table 2 Testing State 2	22.84	22.860	0.0875% / Pass
PSL522b7.csv	45%	Table 2 Testing State 2	103.50	103.520	0.0193% / Pass
PSL522b8.csv	80%	Table 2 Testing State 2	184.43	184.510	0.0433% / Pass
PSL522b9.csv	115%	Table 2 Testing State 2	265.55	265.870	0.1205% / Pass
PSL522b10.csv	150%	Table 2 Testing State 2	346.46	346.972	0.1478% / Pass
PSL522b11.csv	10%	Table 2 Testing State 3	16.98	16.920	0.3534% / Pass
PSL522b12.csv	45%	Table 2 Testing State 3	76.21	76.125	0.1115% / Pass
PSL522b13.csv	80%	Table 2 Testing State 3	135.55	135.683	0.0981% / Pass
PSL522b14.csv	115%	Table 2 Testing State 3	195.25	195.346	0.0491% / Pass
PSL522b15.csv	150%	Table 2 Testing State 3	255.01	255.119	0.0427% / Pass

NOTE: For Testing State 3, and only for Testing State 3, U_{din} is set to 170 V_{rms} due to limitations in PSL's power amplifier. This corresponds to a worst-case voltage of approximately 306 V_{rms} L-N, and 530 V_{rms} L-L.

PSL Test 5.2.3(a) – Verify aggregation method –magnitude of supply voltage measurements

Purpose of test: Verifies "Aggregation intervals as described in 4.5 shall be used." For this test, we examine the published specifications to determine if they meet this requirement. Note that U_{din} never exceeds 50% of EUT full scale.

Table 5.2.3(a)

Aggregation interval	Verification	Remarks	Result
150/180 cycle interval	PSL523a1.csv		Pass
10 minute interval, absolute 10-min boundary	PSL523a2.csv		Pass
2-hour interval	PSL523a3.csv		Pass

5.3 Flicker

Summary of 5.3 Flicker Conformance Results

Flicker measurements conform to Class A requirements	**No**
Flicker measurements conform to Class S requirements	**Yes**

Per IEC 61000-4-30 5.3.1& IEC 62586 6.3, all tests were performed with reference to IEC 61000-4-15 (Ed2), Table 4.

Table 5.3 Summary of Flicker Results

	Test voltage characteristics	Value used for test	Conforms to Class F1	Conforms to Class F2	Conforms to Class F3
PSL Test 5.3.1	Sinusoidal / rectangular voltage changes, Tables 1, 2	P_{inst}	-	Yes	Yes
PSL Test 5.3.2	Rectangular voltage changes and performance testing, Table 5	P_{st}	-	Yes	Yes
PSL Test 5.3.3	Frequency changes, Table 6	P_{inst}	-	(N/A)	(N/A)
PSL Test 5.3.4	Distorted voltage with multiple zero crossings, Table 8	P_{inst}	-	(N/A)	(N/A)
PSL Test 5.3.5	Harmonics with side band, Table 9	P_{inst}	-	(N/A)	(N/A)
PSL Test 5.3.6	Phase jumps, Table 10	P_{st}	-	(N/A)	(N/A)
PSL Test 5.3.7	Rectangular voltage changes with duty ratio, Table 11	P_{st}	-	Yes	(N/A)
PSL Test 5.3.8	Verify P_{lt} aggregation	P_{lt}	-	Yes	Yes
PSL Test 5.3.9	Measurement uncertainty over range of influence quantities	P_{st}	-	Yes	Yes

Note: Results for this section are based off readings provided by the ION7400 ONLY.

5.3: Flicker

5.3.1(a) – Sinusoidal voltage changes

Purpose of test: Verifies instantaneous flicker accuracy according to Table 1 of IEC 61000-4-15. Test is single-phase, applied to EUT reference channel. Sinusoidal amplitude modulation. Pass/fail criteria is ±8% of P_{inst} reading.

Table 5.3.1(a)

Lamp voltage	Modulation frequency (Hz)	Applied P_{inst}	EUT measured P_{inst}	Result
230 V, 50 Hz	0.5	1.00	0.9784	Pass
	1.5	1.00	0.9732	Pass
	8.8	1.00	0.9976	Pass
	20	1.00	0.9968	Pass
	25	1.00	1.0097	Pass
	33 1/3	1.00	1.0060	Pass
	40	1.00		*N/A* *230V 60Hz only*
120 V, 60 Hz	0.5	1.00	1.0006	Pass
	1.5	1.00	1.0201	Pass
	8.8	1.00	1.0703	Pass
	20	1.00	1.0318	Pass
	25	1.00	1.0227	Pass
	33 1/3	1.00	1.0089	Pass
	40	1.00	0.9817	Pass

5.3.1(b) – Rectangular voltage changes

Purpose of test: Verifies general steady-state flicker accuracy according to Table 2 of IEC 61000-4-15. Test is single-phase, applied to EUT reference channel. Rectangular amplitude modulation. Pass/fail criteria is ±8% of P_{inst} reading.

Table 5.3.1(b)

Lamp voltage	Modulation frequency (Hz)	Applied P_{inst}	EUT measured P_{inst}	Result
230 V, 50 Hz	0.5	1.00	1.0012	Pass
	3.5	1.00	1.0097	Pass
	8.8	1.00	1.0025	Pass
	18	1.00	1.0027	Pass
	21.5	1.00	1.0032	Pass
	22	1.00	1.0094	Pass
	25	1.00	1.0009	Pass
	25.5	1.00	1.0008	Pass
	28	1.00	1.0054	Pass
	30.5	1.00	1.0005	Pass
	33 1/3	1.00	1.0014	Pass
	37 (230V, 60Hz)	1.00	1.0025	-
	40 (230V, 60Hz)	1.00	1.0000	-
120 V, 60 Hz	0.5	1.00	1.0012	Pass
	3.5	1.00	1.0010	Pass
	8.8	1.00	1.0022	Pass
	18	1.00	0.9945	Pass
	21.5	1.00	0.9922	Pass
	22	1.00	0.9929	Pass
	25	1.00	0.9935	Pass
	25.5	1.00	1.0017	Pass
	28	1.00	0.9918	Pass
	30.5	1.00	0.9953	Pass
	33 1/3	1.00	0.9975	Pass
	37	1.00	0.9976	Pass
	40	1.00	0.9963	Pass

5.3.2(a) – Rectangular voltage changes and performance testing

Purpose of test: Verifies the measured value of P_{st} according to Table 5 of IEC 61000-4-15. Applied waveforms are sinusoidal, Rectangular amplitude modulation. Pass/fail criteria is ±5% of P_{st} reading.

Table 5.3.2(a)

Lamp voltage	Applied P_{st}	EUT P_{st} reading	Remarks	Result
230 V, 50 Hz	1.00	0.980	1 change per minute	Pass
	1.00	0.987	2 changes per minute.	Pass
	1.05	1.090	7 changes per minute.	Pass
	0.99	0.987	39 changes per minute.	Pass
	0.99	1.003	110 changes per minute.	Pass
	0.98	0.990	1620 changes per minute.	Pass
	1.00	1.010	4000 changes per minute. This test only applies to 50 Hz.	Pass
120 V, 60 Hz	0.99	0.997	1 change per minute	Pass
	1.00	0.993	2 changes per minute.	Pass
	1.00	0.994	7 changes per minute.	Pass
	1.00	0.989	39 changes per minute.	Pass
	0.99	0.996	110 changes per minute.	Pass
	0.99	0.995	1620 changes per minute.	Pass
	0.99	0.990	4800 changes per minute. N/A because this particular test only applies to 60 Hz.	Pass

5.3.3(a) – Combined frequency and voltage changes

Purpose of test: Verifies the measured value of $P_{inst,max}$ using the test signal defined in Table 6 of IEC 61000-4-15. Frequency and amplitude are changed in 4 second intervals at the zero crossing of the voltage. Pass/fail criteria is ±8% of $P_{inst,max}$ reading.

Table 5.3.3(a)

Lamp voltage	Changing frequency (Hz)	Changing voltage (V)	Applied $P_{inst,max}$	EUT measured $P_{inst,max}$	Result
230 V, 50 Hz	49.75	230.000	1.01	1.036	Pass
	50.25	228.812			
120 V, 60 Hz	59.75	120.000	1.02	1.040	Pass
	60.25	119.266			

Note: Not required for F2 classification, data provide for information purpose ONLY.

5.3.4(a) – Distorted voltage with multiple zero crossings

Purpose of test: Verifies the measured value of $P_{inst,max}$ using the test signal defined in Tables 7 and 8 of IEC 61000-4-15. Applied waveforms with multiple zero crossings consist of the fundamental voltage U and harmonic levels according to Table 7. All harmonics are 180° relative to the fundamental. The distorted voltage is modulated at 8.8 Hz using the levels in Table 8. Pass/fail criteria is ±8% of $P_{inst,max}$ reading.

Table 5.3.4(a)

Lamp voltage	Applied $P_{inst,max}$	EUT measured $P_{inst,max}$	Result
230 V, 50 Hz	1.04	1.054	Pass
120 V, 60 Hz	0.990	0.998	Pass

Note: Not required for F2 classification, data provide for information purpose ONLY.

5.3.5(a) – Bandwidth test using harmonic and inter-harmonic side band modulation

Purpose of test: Verifies the input bandwidth of the flickermeter. Applied waveforms are modulated by superimposing two voltages with frequencies that are 10 Hz apart. Frequency pairs are increased starting from the values in Table 9 until $P_{inst,max} > 1.08$ or $P_{inst,max} < 0.92$. Pass/fail criteria is $f_{v,max} \geq 450$ Hz.

Table 5.3.5(a)

Lamp voltage	$f_i/f_{v,max}$ (Hz)	EUT measured $P_{inst,max}$	Result
230 V, 50 Hz	140/150 – 440/450	@ 400Hz, 0.83	Fail
120 V, 60 Hz	170/180 – 470/480	@ 480Hz, 0.88	Fail

Note: Not required for F2 classification, data provide for information purpose ONLY.

5.3.6(a) – Phase jumps

Purpose of test: Verifies the measured value of P_{st} using the test signals defined in Table 10 of IEC 61000-4-15. Each phase jump occurs at the positive zero crossing after 1 min, 3 min, 5 min, 7 min, and 9 min after the beginning of a 10 min observation period. Pass/fail criteria is ±5% of P_{st} reading or ±0.05, whichever is bigger.

Table 5.3.6(a)

Lamp voltage	Phase jump angle $\Delta\beta$	Applied P_{st}	EUT measured P_{st}	Result
230 V, 50 Hz	+30°	0.913	.908	Pass
	-30°	0.913		Pass
	+45°	1.060	1.090	Pass
	-45°	1.060		Pass
120 V, 60 Hz	+30°	0.587	.591	Pass
	-30°	0.587		Pass
	+45°	0.681	.671	Pass
	-45°	0.681		Pass

Note: Not required for F2 classification, data provide for information purpose ONLY.

5.3.7(a) – Rectangular voltage changes with 20% duty cycle

Purpose of test: Verifies the measured value of P_{st} using the test signal defined in Table 11 of IEC 61000-4-15. The voltage U is rectangularly modulated at a rate of 28 Hz and a duty cycle of 20%. Pass/fail criteria is ±5% of P_{st} reading.

Table 5.3.7(a)

Lamp voltage	Voltage fluctuation (%)	Applied P_{st}	EUT measured P_{st}	Result
230 V, 50 Hz	1.418	1.00	1.008	Pass
120 V, 60 Hz	2.126	1.00	0.988	Pass

5.3.8(a) – Verify flicker P_{lt} aggregation

Purpose of test: Verifies the aggregation value of P_{lt} according to 5.7.3 of IEC 61000-4-15. Applied waveforms are sinusoidal. Vdin nominal, 50/60 Hz.

Table 5.3(d)

Applied waveform	Applied Plt	EUT Plt reading	Remarks	Result
PSL53d1.csv	0.995	0.987	Error = 0.084%	Pass

5.3.9(a) – Verify flicker uncertainty over range of influence quantities

Purpose of test: Verifies flicker measurement according to Table 2, IEC 61000-4-30, Section 6.2 . "Over the range of influence quantities, and under the conditions described in 6.1, the measurement uncertainty…" Checks flicker measurements with distorted voltages, and other influence quantities. Voltage is non-sinusoidal, RMS value varies. Ambient temperature approx 21ºC.

NOTE: This test is performed only if EUT conforms to Flicker F3 requirements or better in PSL Tests 6.3.1 through 6.3.8. All applied P_{st} flicker values are tested at 39 changes per minute for State 2 and 110 changes per minute for State 3.

Table 5.3.9(b)

Applied waveform	Applied Pst flicker	Applied flicker definition	EUT Pst flicker	Error % / Result
PSL639a1.csv	0.210	Table 2 Testing State 1	0.211	0.476% / Pass
PSL639a2.csv	2.510	Table 2 Testing State 1	2.485	0.996% / Pass
PSL639a3.csv	5.010	Table 2 Testing State 1	4.986	0.479% / Pass
PSL639a4.csv	7.520	Table 2 Testing State 1	7.445	0.997% / Pass
PSL639a5.csv	10.020	Table 2 Testing State 1	9.895	1.247% / Pass
PSL639a6.csv	0.203	Table 2 Testing State 2	0.204	0.492% / Pass
PSL639a7.csv	2.480	Table 2 Testing State 2	2.444	1.452% / Pass
PSL639a8.csv	5.00	Table 2 Testing State 2	4.886	2.280% / Pass
PSL639a9.csv	7.45	Table 2 Testing State 2	7.354	1.288% / Pass
PSL639a10.csv	9.95	Table 2 Testing State 2	9.758	1.929% / Pass
PSL639a11.csv	0.210	Table 2 Testing State 3	0.209	0.476% / Pass
PSL639a12.csv	2.480	Table 2 Testing State 3	2.480	0.000% / Pass
PSL639a13.csv	4.980	Table 2 Testing State 3	4.989	0.180% / Pass
PSL639a14.csv	7.400	Table 2 Testing State 3	7.256	2.081% / Pass
PSL639a15.csv	9.970	Table 2 Testing State 3	9.744	2.266% / Pass

Note: State 3 testing Udin=170V AC

5.4 Supply Voltage Dips and Swells

Summary of 5.4 Supply Voltage Dips and Swells Conformance Results

Supply voltage dip and swell measurements conform to Class A requirements	**N/A**
Supply voltage dip and swell measurements conform to Class S requirements	**Yes**
Supply voltage dip and swell measurements conform to Class B requirements	**Yes**

Table 5.4 Class A – Summary of Dips and Swells Results

	61000-4-30 section	Dip/Swell requirement	EUT conforms to Class A	Remarks
PSL Test 5.4 (a)	none	Simple single-phase voltage dip measurement	N/A	EUT is class S meter
PSL Test 5.4 (b)	none	Simple three-phase voltage dip measurement	N/A	EUT is class S meter
PSL Test 5.4.1(a)	¶3.2.2	$U_{rms(1/2)}$ values are RMS values measured over a single cycle	N/A	EUT is class S meter
PSL Test 5.4.1(b)	¶3.2.2	$U_{rms(1/2)}$ values are synchronized to zero crossings	N/A	EUT is class S meter
PSL Test 5.4.1(c)	¶3.2.2	$U_{rms(1/2)}$ values are refreshed every ½ cycle	N/A	EUT is class S meter
PSL Test 5.4.1(d)	¶3.2.2	$U_{rms(1/2)}$ values – each channel independently synchronized	N/A	EUT is class S meter
PSL Test 5.4.2(a)	¶5.4.2.1	Verify dip hysteresis voltage	N/A	EUT is class S meter
PSL Test 5.4.2(b)	¶5.4.2.2	Verify polyphase dip evaluation - magnitude	N/A	EUT is class S meter
PSL Test 5.4.2(c)	¶5.4.2.2	Verify polyphase dip evaluation - duration	N/A	EUT is class S meter
PSL Test 5.4.3(a)	¶5.4.3.1	Verify swell hysteresis voltage	N/A	EUT is class S meter
PSL Test 5.4.3(b)	¶5.4.3.2	Verify polyphase swell evaluation - magnitude	N/A	EUT is class S meter
PSL Test 5.4.3(c)	¶5.4.3.2	Verify polyphase swell evaluation - duration	N/A	EUT is class S meter
PSL Test 5.4.4(a)	¶5.4.4	Verify sliding reference voltage value calculation	N/A	EUT is class S meter
PSL Test 5.4.3(b)	¶5.4.4	Verify sliding reference voltage calculation excludes flagged values	N/A	EUT is class S meter
Engineering review	¶5.4.5.1	Verify residual voltage magnitude meets required uncertainty in EUT specifications	N/A	EUT is class S meter
PSL Test 5.4.5.1(b)	¶5.4.5.1	Verify residual voltage magnitude meets required uncertainty – measured performance	N/A	EUT is class S meter

Table 5.4 Class S – Summary of Dips and Swells Results

	61000-4-30 section	Dip/Swell requirement	EUT conforms to Class S	Remarks
PSL Test 5.4 (a)	none	Simple single-phase voltage dip measurement	Yes	Pass
PSL Test 5.4 (b)	none	Simple three-phase voltage dip measurement	Yes	Pass
PSL Test 5.4.1(a)	¶3.2.2	Manufacturer shall specify $U_{rms(1/2)}$ or $U_{rms(1)}$	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.4.2(a)	¶5.4.2.1	Verify dip hysteresis voltage	Yes	Pass
PSL Test 5.4.2(b)	¶5.4.2.2	Verify polyphase dip evaluation - magnitude	Yes	Pass
PSL Test 5.4.2(c)	¶5.4.2.2	Verify polyphase dip evaluation - duration	Yes	Pass
PSL Test 5.4.3(a)	¶5.4.3.1	Verify swell hysteresis voltage	Yes	Pass
PSL Test 5.4.3(b)	¶5.4.3.2	Verify polyphase swell evaluation - magnitude	Yes	Pass
PSL Test 5.4.3(c)	¶5.4.3.2	Verify polyphase swell evaluation - duration	Yes	Pass
PSL Test 5.4.4(a)	¶5.4.4	Verify sliding reference voltage value calculation	Yes	Pass
PSL Test 5.4.3(b)	¶5.4.4	Verify sliding reference voltage calculation excludes flagged values	Yes	Pass
Engineering review	¶5.4.5.1	Verify residual voltage magnitude meets required uncertainty in EUT specifications	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.4.5.1(b)	¶5.4.5.1	Verify residual voltage magnitude meets required uncertainty – measured performance	Yes	*Schneider makes reference to Technical note 70072-0185-08.*

Table 5.4 Class B – Summary of Magnitude of the Dips and Swells Results

	61000-4-30 section	Dip / Swell requirement	EUT conforms to Class B	Remarks
Engineering review	¶5.4.5.1	Verify residual voltage magnitude meets required uncertainty in EUT specifications	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.4.5.1(b)	¶5.4.5.1	Verify residual voltage magnitude meets required uncertainty – measured performance	Yes	Pass
PSL Test 5.4.2(c)	¶5.4.2.2	Verify polyphase dip evaluation - duration	Yes	Pass

For detailed results, see the following pages.

PSL Test Suite 5.4: Supply voltage dips and swells

PSL Test 5.4(a) – Simple voltage dip measurement – single-phase system

Purpose of test: Verifies general dip measurements. Verifies that we can set the dip/swell thresholds and hysteresis. Verifies that we know how to make single-phase voltage dip measurements, including depth and duration, with the EUT. Test is single-phase, applied to EUT reference channel. Voltage is sinusoidal, at U_{din} nominal.

Table 5.4(a)

Applied waveform	Applied depth	Applied duration	EUT depth reading	EUT duration reading	Remarks
PSL54a.csv	~40% U_{din}	0.030 seconds	94.4V (41.024%)	.030s	Pass

PSL Test 5.4(b) – Simple voltage dip measurement – three-phase system

Purpose of test: Verifies general dip measurements. Verifies that we know how to make three-phase voltage dip measurements, including depth and duration, with the EUT. Test is three-phase. Voltage is sinusoidal, at U_{din} nominal.

Table 5.4(b)

Applied waveform	Applied depth	Applied duration	EUT depth reading	EUT duration reading	Remarks
PSL54b.csv	~40% U_{din} on all three channels	1 cycle	94.2V (40.957%)	0.040s	Pass

PSL Test 5.4.1(a) – Verify $U_{rms(1/2)}$ measurements – measured over 1 cycle

Purpose of test: Verifies "…the value of r.m.s. voltage measured over 1 cycle…." Test is single-phase, applied to reference channel. Voltage is approx U_{din}.

Table 5.4.1(a)

Applied waveform	Applied depth	EUT depth reading	Remarks	Result
PSL541a1.csv	~40%	41.05% (94.4V)	Verifies that EUT is using true RMS measurement method	Pass
PSL541a2.csv	~50%	50.642% (116.4V)	Verifies that EUT is using single-cycle RMS	Pass

PSL Test 5.4.1(b) – Verify $U_{rms(1/2)}$ measurements – synchronized to zero-crossing
Purpose of test: Verifies "…the value of r.m.s. voltage measured over 1 cycle, commencing at a fundamental zero-crossing…." Test is single-phase, applied to reference channel. Voltage is approx U_{din}.

Table 5.4.1(b)

Applied waveform	Applied depth	EUT depth reading	Remarks	Result
PSL541b1.csv	~50%	50.642% (116.4V)	Verifies that EUT is updating r.m.s. value synchronized to zero-crossings. Same waveform as PSL541a2.csv	Pass

PSL Test 5.4.1(c) – Verify $U_{rms(1/2)}$ measurements – refreshed every half-cycle
Purpose of test: Verifies "…the value of r.m.s. voltage measured over 1 cycle…refreshed every half-cycle." Test is single-phase, applied to reference channel. Voltage is approx U_{din}.

Table 5.4.1(c)

Applied waveform	Applied depth	EUT depth reading	Remarks	Result
PSL541c1.csv	~50%	50.642% (116.4V)	Verifies that EUT is updating r.m.s. value synchronized to zero-crossings. Same waveform as PSL541a2.csv	Pass

PSL Test 5.4.1(d) – Verify $U_{rms(1/2)}$ measurements – each channel independently synchronized
Purpose of test: Verifies "This technique is independent for each channel, and will produce r.m.s. values at successive times on different channels on polyphase systems." Test is three-phase. Voltage is approx U_{din}.

Table 5.4.1(d)

Applied waveform	Applied depth	EUT depth reading	Remarks	Result
PSL541d1.csv	~50%	50.354% (115.8V)	Verifies that EUT is independently synchronizing each channel	Pass

PSL Test 5.4.1(e) – Verify that EUT reports the smallest $U_{rms(1/2)}$ value as the depth of the dip.
Purpose of test: Test is single-phase. Voltage is approx U_{din}.

Table 5.4.1(e)

Applied waveform	Applied depth	EUT depth reading	Remarks	Result
PSL541e.csv	~40%	39.725% (91.4V)	Verifies that EUT reports the correct minimum value	Pass

PSL Test 5.4.2(a) – Verify voltage dip hysteresis voltage

Purpose of test: Verifies "On single-phase systems a voltage dip begins when the $U_{rms(1/2)}$ voltage falls below a threshold, and ends when the $U_{rms(1/2)}$ voltage is equal to or above the dip threshold plus the hysteresis voltage." Test is single-phase, applied to reference channel. Voltage is approx U_{din}. EUT Dip threshold set to 80%, EUT Hysteresis is set to 4%.

Table 5.4.2(a)

Applied waveform	Applied duration	EUT duration reading	Remarks	Result
PSL542a1.csv	0.120 seconds	.100s	Verifies that EUT is using hysteresis properly	Pass

PSL Test 5.4.2(b) – Verify polyphase dip evaluation - magnitude

Purpose of test: Verifies "The residual voltage is the lowest $U_{rms(1/2)}$ value measured on any channel during the voltage dip." Test is three-phase. Voltage is approx U_{din}.

Table 5.4.2(b)

Applied waveform	Applied depth	EUT depth reading	Remarks	Result
PSL542b1.csv	~70%, ~40%, ~80%	39.602%	Verifies that EUT is evaluating the depth of three-phase dips correctly.	Pass: ION software reports all depth reading for each line.

PSL Test 5.4.2(c) – Verify polyphase dip evaluation - duration

Purpose of test: Verifies "On polyphase systems a voltage dip begins when the $U_{rms(1/2)}$ voltage of one or more channels falls below a threshold, and ends when the $U_{rms(1/2)}$ voltage of all channels is equal to or above the dip threshold plus the hysteresis voltage." Test is three-phase. Voltage is approx U_{din}.

Table 5.4.2(c)

Applied waveform	Applied duration	EUT duration reading	Remarks	Result
PSL542c.csv	0.215 seconds	0.200 s	Verifies that EUT is evaluating beginning and conclusion of three-phase dips correctly.	Pass

PSL Test 5.4.3(a) – Verify voltage swell hysteresis voltage

Purpose of test: Verifies "On single-phase systems a voltage swell begins when the $U_{rms(1/2)}$ voltage rises above a threshold, and ends when the $U_{rms(1/2)}$ voltage is equal to or less than the swell threshold minus the hysteresis voltage." Test is single-phase, applied to reference channel. Voltage is approx U_{din}. EUT Swell threshold set to 110%, EUT Hysteresis is set to 5%.

Table 5.4.3(a)

Applied waveform	Applied duration	EUT duration reading	Remarks	Result
PSL543a1.csv	0.120 seconds	0.110 s	Verifies that EUT is using hysteresis properly	Pass

PSL Test 5.4.3(b) – Verify polyphase swell evaluation - magnitude

Purpose of test: Verifies "The maximum swell magnitude voltage is the largest $U_{rms(1/2)}$ value measured on any channel during the voltage swell." Test is three-phase.

Table 5.4.3(b)

Applied waveform	Applied maximum	EUT maximum reading	Remarks	Result
PSL543b1.csv	~112%, ~122%, ~132%	132.494%	Verifies that EUT is evaluating the magnitude of three-phase swells correctly.	Pass: ION Software provides reading on ALL 3 lines. Max reading is provided

PSL Test 5.4.3(c) – Verify polyphase swell evaluation - duration

Purpose of test: Verifies "On polyphase systems a voltage swell begins when the $U_{rms(1/2)}$ voltage of one or more channels rises above a threshold, and ends when the $U_{rms(1/2)}$ voltage of all channels is equal to or below the swell threshold minus the hysteresis voltage." Test is three-phase. Voltage is approx 109-112% U_{din}.

Table 5.4.3(c)

Applied waveform	Applied duration	EUT duration reading	Remarks	Result
PSL543c1.csv	0.215 seconds	0.220s	Verifies that EUT is evaluating beginning and conclusion of three-phase swells correctly.	Pass

PSL Test 5.4.4(a) – (Optional) Verify sliding voltage reference – value calculation

Purpose of test: Verifies method given in 5.4.4 for calculating sliding reference voltage, including filter. Voltage is approx U_{din}.

Table 5.4.4(a)

Applied waveform	Applied sliding reference voltage value	EUT sliding reference voltage value	Remarks	Result
PSL544a1.csv	-	-	Verifies that EUT is calculating sliding reference voltage correctly	-

PSL Test 5.4.4(b) – (Optional) Verify sliding voltage reference – exclude flagged values

Purpose of test: Verifies that the flagged values are excluded from sliding voltage reference calculations. Test is single-phase. Voltage is approx U_{din}.

Table 5.4.4(b)

Applied waveform	Applied sliding reference voltage value	EUT sliding reference voltage value	Remarks	Result
PSL544b1.csv	-	-	Verifies that EUT is excluding flagged values from the sliding reference voltage calculation.	-

PSL Test 5.4.5.1(a) – Verify residual voltage and swell voltage magnitude uncertainty – specifications

Purpose of test: Verifies that the specifications of the EUT meet the requirements of 5.4.5.1, i.e. ±0,2% of U_{din}.

Table 5.4.5.1(a)

EUT dip/swell specified accuracy	Remarks	Result
±0,2% of U_{din}		Pass

PSL Test 5.4.5.1(b) – Verify residual voltage and swell voltage magnitude uncertainty – measured performance

Purpose of test: Verifies that the measured voltage dip and swell values are within the requirements, i.e. ±0,2% of U_{din}. Test is single-phase. Voltage is percent of U_{din}.

Table 5.4.5.1(b)

Applied waveform	Applied dip or swell	EUT reading	Remarks	Result
PSL5451b1.csv	80%	79.776%	Voltage dip accuracy test	Pass
PSL5451b2.csv	70%	69.683%	Voltage dip accuracy test	Pass
PSL5451b3.csv	40%	39.619%	Voltage dip accuracy test	Pass
PSL5451b4.csv	115%	115.139%	Voltage swell accuracy test	Pass
PSL5451b5.csv	125%	125.474%	Voltage swell accuracy test	Pass
PSL5451b6.csv	135%	135.753%	Voltage swell accuracy test	Pass

Note: For Class S devices, the maximum uncertainty for dips and swells is 1% of $U_{din.}$

5.5 Voltage Interruptions

Summary of 5.5 Voltage Interruptions Conformance Results

Voltage interruption measurements conform to Class A requirements	**N/A**
Voltage interruptions measurements conform to Class S requirements	**Yes**
Voltage interruptions measurements conform to Class B requirements	**Yes**

Table 5.5 Class A – Summary of Voltage Interruption Results

	61000-4-30 section	Voltage interruption requirement	EUT conforms to Class A	Remarks
PSL Test 5.5.1(a)	¶5.5.1	Verify that $U_{rms(1/2)}$ values are used for voltage interruption measurements	N/A	EUT is class S meter
PSL Test 5.5.2(a)	¶5.5.2	Verify polyphase interruption duration evaluation	N/A	EUT is class S meter
PSL Test 5.5.2(b)	¶5.5.2	Verify interruption threshold hysteresis	N/A	EUT is class S meter

Table 5.5 Class S – Summary of Voltage Interruption Results

	61000-4-30 section	Voltage interruption requirement	EUT conforms to Class S	Remarks
PSL Test 5.5.1(a)	¶5.5.1	Verify that $U_{rms(1/2)}$ or $U_{rms(1)}$ values are used for voltage interruption measurements	Yes	Pass
PSL Test 5.5.2(a)	¶5.5.2	Verify polyphase interruption duration evaluation	Yes	Pass
PSL Test 5.5.2(b)	¶5.5.2	Verify interruption threshold hysteresis	Yes	Pass

Table 5.5 Class B – Summary of Voltage Interruption Results

	61000-4-30 section	Voltage interruption requirement	EUT conforms to Class B	Remarks
PSL Test 5.5.2(a)	¶5.5.2	Verify polyphase interruption duration evaluation	Yes	Pass

For detailed results, see the following pages.

PSL Test 5.5.1(a) – Verify $U_{rms(1/2)}$ measurements are used for voltage interruption measurements

Purpose of test: Verifies "The basic measurement of a voltage interruption shall be the $U_{rms(1/2)}$ on each measurement channel." Test is single-phase, applied to reference channel. Voltage is approx U_{din}.

Table 5.5.1(a)

Applied waveform	Applied signal	EUT interruption duration	Remarks	Result
PSL551a1.csv	0.100 seconds at 0 volts	.110 s	Verifies that EUT is using $U_{rms(1/2)}$ for interruption measurements	Pass

PSL Test 5.5.2(a) – Verify polyphase interruption duration evaluation

Purpose of test: Verifies "On polyphase systems, an interruption begins when $U_{rms(1/2)}$ of all channels fall below the voltage interruption threshold and ends when the $U_{rms(1/2)}$ of any one channel rises above the voltage interruption threshold plus the hysteresis." Voltage is approx U_{din}.

Table 5.5.2(a)

Applied waveform	Applied signal	EUT interruption duration	Remarks	Result
PSL552a1.csv	2.5 seconds at 0 volts	2.463 s	Verifies that EUT is correctly determining the beginning and end of an interruption on polyphase systems.	Pass

PSL Test 5.5.2(b) – Verify interruption hysteresis voltage

Purpose of test: Verifies "On single-phase systems a voltage interruption begins when the $U_{rms(1/2)}$ voltage falls below the voltage interruption threshold, and ends when the $U_{rms(1/2)}$ voltage is equal to or greater than the voltage interruption threshold plus the hysteresis." Test is single-phase, applied to reference channel. Voltage is approx U_{din}.

Table 5.5.2(b)

Applied waveform	Applied signal	EUT interruption duration	Remarks	Result
PSL552b1.csv	0.2 seconds at 0 volts followed by 0.2 seconds at 5% U_{din}	0.211s	Verifies that EUT is using hysteresis properly	Pass

5.7 Supply Voltage Unbalance

Summary of 5.7 Supply Voltage Unbalance Conformance Results

Supply voltage unbalance measurements conform to Class A requirements	**N/A**
Supply voltage unbalance measurements conform to Class S requirements	**Yes**
Supply voltage unbalance measurements conform to Class B requirements	**Yes**

Table 5.7 Class A – Summary of Unbalance Results

	61000-4-30 section	Unbalance requirement	EUT conforms to Class A	Remarks
Engineering review	¶5.7.1	Verify negative-sequence-unbalance u_2 and zero-sequence-unbalance u_0 are available.	N/A	EUT is class S meter
Engineering review	Table 1 Line 5	EUT specifications meet required range for voltage unbalance	N/A	EUT is class S meter
PSL Test 5.7.1(a)	¶5.7.1	Verify unbalance measurement method – symmetrical components	N/A	EUT is class S meter
PSL Test 5.7.2(a)	¶5.7.2	Verify unbalance measurement uncertainty	N/A	EUT is class S meter
PSL Test 5.7.3(a)	¶5.7.3	Verify unbalance measurement aggregation	N/A	EUT is class S meter

Table 5.7 Class S – Summary of Unbalance Results

	61000-4-30 section	Unbalance requirement	EUT conforms to Class S	Remarks
Engineering review	¶5.7.1	Verify negative-sequence-unbalance u_2 is available.	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
Engineering review	Table 1 Line 5	EUT specifications meet required range for voltage unbalance	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.7.1(a)	¶5.7.1	Verify unbalance measurement method – symmetrical components	Yes	Pass
PSL Test 5.7.2(a)	¶5.7.2	Verify unbalance measurement uncertainty	Yes	Pass
PSL Test 5.7.3(a)	¶5.7.3	Verify unbalance measurement aggregation	Yes	Pass

Table 5.7 Class B – Summary of Unbalance Results

	61000-4-30 section	Unbalance requirement	EUT conforms to Class B	Remarks
Engineering review	Table 2 Line 3	EUT specifications meet required range for unbalance	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
Engineering review	¶5.7.1	The manufacturer shall specify method for calculating unbalance	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
Engineering review	¶5.7.2	The manufacturer shall specify unbalance uncertainty	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.7.2(a)	¶5.7.2	Verify unbalance measurement uncertainty	Yes	Pass
Engineering review	¶5.7.3	The manufacturer shall specify unbalance aggregation method	Yes	*Schneider makes reference to Technical note 70072-0185-08.*

PSL Test 5.7.1(a) – Verify unbalance measurement method

Purpose of test: Verifies "The supply voltage unbalance is evaluated using the method of symmetrical components" and other requirements in 5.7.1. Voltage is approx U_{din}.

Table 5.7.1(a)

Applied waveform	Applied negative sequence unbalance U_2	Applied zero sequence unbalance U_0	EUT measured U_2	EUT measured U_0	% Error U_2	% Error U_0	Remarks	Result
PSL571a1.csv	10.3%	9.8%	10.2%	9.77%	0.10%	0.03%	Simple unbalance, sinusoidal waveforms	Pass
PSL571a2.csv	0.5%	0.4%	0.4733%	0.4318%	.0267%	.0318%	Differing non-sinusoidal waveforms with balanced fundamental, to verify that the EUT is using only the fundamental (i.e. symmetrical component evaluation)	Pass
PSL571a3.csv	9.9%	11.0%	9.9135%	11.0092%	.0135%	.0092%	Sinusoidal waveforms with equal fundamental but angles not equal to 120º, to verify that the EUT is using symmetrical component evaluation	Pass
PSL571a4.csv	Varies	Varies	Varies	Varies	Varies	Varies	Verifies that the measurement of unbalance is over a 10/12 cycle interval	Pass

PSL Test 5.7.2(a) – Verify unbalance measurement uncertainty

Purpose of test: Verifies the uncertainty requirements in 5.7.2. Voltage is approx U_{din}.

Table 5.7.2(a)

Applied waveform	Applied negative sequence	Applied zero sequence	EUT negative sequence	EUT zero sequence	% Error U_2	% Error U_0	Remarks	Result
PSL572a1.csv	0.81%	2.11%	0.8136%	2.1266%	0.036%	0.166%		Pass
PSL572a2.csv	1.14%	4.59%	1.1543%	4.5787%	.0143%	.0113%		Pass
PSL572a3.csv	2.22%	0.90%	2.2223%	0.8851%	.0023%	.0149%		Pass
PSL572a4.csv	4.64%	1.39%	4.6340%	1.3734%	.0060%	.0166%		Pass
PSL572a5.csv	2.41%	6.84%	2.4017%	6.8344%	.0083%	.0056%		Pass
PSL572a6.csv	2.93%	6.39%	2.9227%	6.3640%	.0073%	.0260%		Pass
PSL572a7.csv	0.48%	0.45%	0.4488%	0.4410%	.0312%	.0012%	Range of Inf Qty's	Pass
PSL572a8.csv	1.20%	1.39%	1.2070%	1.3756%	.0070%	.0144%	Range of Inf Qty's	Pass
PSL572a9.csv	2.69%	2.35%	2.6742%	2.3564%	.0158%	.0064%	Range of Inf Qty's	Pass
PSL572a10.csv	4.43%	3.74%	4.4363%	3.7493%	.0063%	.0093%	Range of Inf Qty's	Pass
PSL572a11.csv	5.25%	4.88%	5.2581%	4.8692%	.0081%	.0108%	Range of Inf Qty's	Pass

PSL Test 5.7.3(a) – Verify unbalance measurement aggregation

Purpose of test: Verifies the unbalance measurement aggregation. Voltage is approx U_{din}.

Table 5.7.3(a)

Applied waveform	Applied negative sequence	Applied zero sequence	Remarks	Result
PSL573a1.csv	varies	varies		Pass

5.8 Voltage Harmonics

Summary of 5.8 Voltage Harmonics Results

Voltage harmonic measurements conform to Class A requirements	**N/A**
Voltage harmonic measurements conform to Class S requirements	**Yes**
Voltage harmonic measurements conform to Class B requirements	**Yes**

Per IEC 61000-4-30 5.8, all tests were performed with reference to IEC 61000-4-7:2002.

Table 5.8 Class A – Summary of Voltage Harmonics Results

	¶	Voltage harmonic requirement	EUT conforms to Class A	Remarks
Engineering review	IEC 61000-4-7, ¶1, Note 3	EUT specifications meet required range for harmonic order	N/A	EUT is class S meter
Engineering review	Table 1 Line 5	EUT specifications meet required amplitude range for voltage harmonics	N/A	EUT is class S meter
Engineering review	IEC 61000-4-7, Table 1, Line 1 of Class 1	EUT specifications meet required accuracy for voltage harmonics	N/A	EUT is class S meter
Engineering review	IEC 61000-4-7, ¶8	Operating conditions and errors caused by temperature, humidity, EUT supply voltage, common mode, static discharges, radiated EMF	N/A	EUT is class S meter
PSL Test 5.8(a)	IEC 61000-4-7, ¶5.3 paragraph 2	Verify suitable anti-alias filter	N/A	EUT is class S meter
PSL Test 5.8(b)	IEC 61000-4-7, ¶4.4.1 paragraph 3	Verify suitable PLL (or equivalent) performance	N/A	EUT is class S meter
PSL Test 5.8(c)	IEC 61000-4-7, ¶4.4.1	Verify 10/12 cycle window	N/A	EUT is class S meter
PSL Test 5.8(d)	IEC 61000-4-30, ¶5.8	Verify gapless measurements and G_{sgn} implementation	N/A	EUT is class S meter
PSL Test 5.8(e)	IEC 61000-4-7, ¶5.3, Table 1, Line 1	Verify single harmonic accuracy at ≥ 1%	N/A	EUT is class S meter
PSL Test 5.8(f)	IEC 61000-4-7, ¶5.3, Table 1, Line 1	Verify single harmonic accuracy at < 1%	N/A	EUT is class S meter
PSL Test 5.8(g)	IEC 61000-4-30, ¶5.8	Verify harmonics aggregation	N/A	EUT is class S meter
PSL Test 5.8(h)	IEC 61000-4-30, ¶6.1, ¶6.2, ¶5.8 61000-2-4 Table 2, 61000-4-7 Table 1	Verify accuracy over range of influence quantities	N/A	EUT is class S meter

Note: IEC 61000-4-7:2002 is referenced in the table above, due to IEC 61000-4-30 ¶ 5.8.

Table 5.8 Class S – Summary of Voltage Harmonics Results

	¶	Voltage harmonic requirement	EUT conforms to Class S	Remarks
Engineering review	IEC 61000-4-7, ¶1, Note 3	EUT specifications meet required range for harmonic order	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
Engineering review	Table 1 Line 5	EUT specifications meet required amplitude range for voltage harmonics	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
Engineering review	IEC 61000-4-7, Table 1, Line 1 of Class 1	EUT specifications meet required accuracy for voltage harmonics	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
Engineering review	IEC 61000-4-7, ¶8	Operating conditions and errors caused by temperature, humidity, EUT supply voltage, common mode, static discharges, radiated EMF	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.8(b)	IEC 61000-4-7, ¶4.4.1 paragraph 3	Verify suitable PLL (or equivalent) performance	Yes	Pass
PSL Test 5.8(c)	IEC 61000-4-7, ¶4.4.1	Verify 10/12 cycle window	Yes	Pass
PSL Test 5.8(e)	IEC 61000-4-7, ¶5.3, Table 1, Line 1	Verify single harmonic accuracy at ≥ 1%	Yes	Pass
PSL Test 5.8(f)	IEC 61000-4-7, ¶5.3, Table 1, Line 1	Verify single harmonic accuracy at < 1%	Yes	Pass
PSL Test 5.8(g)	IEC 61000-4-30, ¶5.8	Verify harmonics aggregation	Yes	Pass
PSL Test 5.8(h)	IEC 61000-4-30, ¶6.1, ¶6.2, ¶5.8 61000-2-4 Table 2, 61000-4-7 Table 1	Verify accuracy over range of influence quantities	Yes	Pass

Note: IEC 61000-4-7:2002 is referenced in the table above, due to IEC 61000-4-30 ¶ 5.8.

Table 5.8 Class B – Summary of Voltage Harmonics Results

	¶	Voltage harmonic requirement	EUT conforms to Class B	Remarks
Engineering review	IEC 61000-4-30, ¶5.8	Manufacturer specifies uncertainty and aggregation methods	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
Engineering review	IEC 61000-4-30, Table 2 Line 4	EUT specifications meet required range for voltage harmonics	Yes	*Schneider makes reference to Technical note 70072-0185-08.*
PSL Test 5.8(e)	IEC 61000-4-30, ¶5.8	Verify single harmonic accuracy at ≥ 1%	Yes	Pass
PSL Test 5.8(h)	IEC 61000-4-30, 6.1 Table 2	Verify harmonic accuracy, Testing State 1 only	Yes	Pass

PSL Test 5.8(a) – Verify suitable anti-alias filter

Purpose of test: Verifies the requirement in 61000-4-7,5.3, "An anti-aliasing low-pass filter, with a negative -3 dB frequency above the measuring range, shall be provided. The attenuation in the stop-band shall exceed 50 dB." Single-phase test. Voltage is approx U_{din}., 50 Hz nominal, with harmonics above the measured range.

Table 5.8(a)

Applied waveform	Remarks	Result
PSL58a1.csv	Checks for alias signal reflected into passband near upper end of passband	Pass
PSL58a2.csv	Checks for alias signal reflected into passband well above upper end of passband	Pass

Note: Meter has a cycle time of 128 samples per cycle.

PSL Test 5.8(b) – Verify suitable PLL (or equivalent) performance

Purpose of test: Verifies the requirement in 61000-4-7, 4.4.1, "Instruments including a phase locked loop or other synchronization means shall meet the requirements for accuracy and synchronization for measuring any signal frequency within a range of at least ±5% of the nominal system frequency." Single-phase test. Voltage is approx U_{din}.

Table 5.8(b)

Applied waveform	Remarks	Applied (V)	EUT Measured (V)	Error / Result
PSL58b1.csv	Verify proper 5th harmonic measurement at 95% of nominal frequency	23.58	23.595	0.015% / Pass
PSL58b2.csv	Triangular frequency modulation, slewing at 2 Hz per second, 50 Hz ±5%, while observing the stability of the 5th harmonic measurement	22.50	22.579	0.079% / Pass
PSL58b3.csv	Triangular frequency modulation, slewing at 2 Hz per second, 60 Hz ±5%, while observing the stability of the 5th harmonic measurement	22.52	22.875	0.355% / Pass

Note: Readings were alternating.

PSL Test 5.8(c) – Verify 10/12 cycle window

Purpose of test: Verifies the requirement in 61000-4-7, 4.4.1, "The time window shall be synchronized with each group of 10 or 12 cycles." Single-phase test. Voltage is approx U_{din}, 50 Hz nominal.

Table 5.8(c)

Applied waveform	Remarks	Result
PSL58c.csv	Verifies 10 cycle windows at 50 Hz	Pass

PSL Test 5.8(d) – Verify gapless window and G_{sgn} implementation

Purpose of test: Verifies requirement for "…gapless harmonic subgroup measurement…" Single-phase test. Voltage is approx U_{din}, 50 Hz nominal.

Table 5.8(d)

Applied waveform	Remarks	Result
PSL58d1a.csv	Verifies gapless windows at 50 Hz – part 1	Pass
PSL58d1b.csv	Verifies gapless windows at 50 Hz – part 2 – must pass both parts to confirm gapless harmonics measurements	Pass
PSL58d2.csv	Verifies G_{sgn} implementation – 7.1 harmonic at 50 Hz	23.721* - Pass
PSL58d3.csv	Verifies G_{sgn} implementation – 2.9 harmonic at 50 Hz	23.390* - Pass

*: Value is 10% of Udin; which is ~230V AC

PSL Test 5.8(e) – Verify single harmonic uncertainty – $U_m \geq 1\%$

Purpose of test: Verifies the uncertainty requirements of 61000-4-7 Table 1, line 1. RMS voltage is approx U_{din}. Single-phase on reference channel. Harmonic orders and amplitudes based on twice the values in IEC 61000-2-4 Class 3. (per line 5 of Table 1 and line 4 of Table 2 in IEC 61000-4-3). All percentages are percent of U_{din}. Requirement is ±5% of U_m.

Table 5.8(e)

Applied waveform	Applied harmonic (V)	EUT measured harmonic (V)	Error %	Remarks	Result
PSL58e1.csv	21.9	21.873	0.123	9% of 13th Har.	Pass
PSL58e2.csv	24.1	24.101	0.004	10% of 11th Har.	Pass
PSL58e3.csv	33.2	33.173	0.081	14% of 7th Har.	Pass
PSL58e4.csv	37.7	37.713	0.034	16% of 5th Har.	Pass

PSL Test 5.8(f) – Verify single harmonic uncertainty – $U_m < 1\%$

Purpose of test: Verifies the uncertainty requirements of 61000-4-7 Table 1, line 2. RMS voltage is approx U_{din}. Single-phase on reference channel. Requirement is ±0.05% of U_{din}.

Table 5.8(f)

Applied waveform	Applied harmonic (V)	EUT measured harmonic (V)	Error	Remarks	Result
PSL58f1.csv	2.1	2.124	0.024	0.9% of 5th Har.	Pass
PSL58f2.csv	1.2	1.186	0.014	0.5% of 5th Har.	Pass

PSL Test 5.8(g) – Verify voltage harmonic aggregation

Purpose of test: Verifies "Aggregation will be performed according to 4.5." RMS voltage is approx U_{din}. Single-phase on reference channel.

Table 5.8(g)

Applied waveform	Applied harmonic	EUT measured harmonic	Remarks	Result
PSL58g1.csv	Varies	Varies		Pass

PSL Test 5.8(h) – Verify voltage harmonics uncertainty over range of influence quantities

Purpose of test: Verifies voltage harmonics uncertainty according to Table 2, IEC 61000-4-30, Section 6.2, using twice the values of Class 3 in IEC 61000-2-4 Table 2 (per IEC 61000-4-30 Table 1 Line 5) with uncertainty requirements specified in IEC 61000-4-7, Table 1, Class I (per IEC 61000-4-30 5.8 paragraph 1). "Over the range of influence quantities, and under the conditions described in 6.1, the measurement uncertainty…" Checks harmonics measurements with unbalance, flicker, and other influence quantities. Voltage is non-sinusoidal, RMS value varies. Requirement is ±5% of reading for signals greater than 1% of U_{din} (and ±0.05% of U_{din} for smaller signals). Results are measured on the first channel (usually L1-N), but signals are applied to all three phases.

NOTE: This test is performed only if EUT conforms to Class A requirements in PSL Test 5.8(a)-5.8(g).

NOTE: Table 5.8(h) uses the 17th harmonic. Table 5.8(i) uses the 2nd harmonic.

Table 5.8(h) – 17th harmonic

Applied waveform	Testing state	Applied harmonic amplitude (V)	EUT harmonic amplitude (V)	Error	Remarks	Result
PSL58h1.csv	Table 2 Testing State 1	0.03	0.029	0.001		Pass
PSL58h2.csv	Table 2 Testing State 1	4.92	4.934	0.014		Pass
PSL58h3.csv	Table 2 Testing State 1	9.88	9.877	0.003		Pass
PSL58h4.csv	Table 2 Testing State 1	14.82	14.827	0.007		Pass
PSL58h5.csv	Table 2 Testing State 1	19.77	19.773	0.003		Pass
PSL58h6.csv	Table 2 Testing State 2	0.02	0.020	0.00		Pass
PSL58h7.csv	Table 2 Testing State 2	4.93	4.931	0.001		Pass
PSL58h8.csv	Table 2 Testing State 2	9.86	9.864	0.004		Pass
PSL58h9.csv	Table 2 Testing State 2	14.80	14.800	0.00		Pass
PSL58h10.csv	Table 2 Testing State 2	19.73	19.733	0.003		Pass
PSL58h11.csv	Table 2 Testing State 3	0.03	0.033	0.003	***Note: for Testing State 3, Udin is reconfigured 170 Vrms.***	Pass
PSL58h12.csv	Table 2 Testing State 3	3.63	3.633	0.003		Pass
PSL58h13.csv	Table 2 Testing State 3	7.29	7.294	0.004		Pass
PSL58h14.csv	Table 2 Testing State 3	10.96	10.960	0.00		Pass
PSL58h15.csv	Table 2 Testing State 3	14.61	14.622	0.012		Pass

Table 5.8(i) – 2nd harmonic

Applied Waveform	Testing state	Applied harmonic amplitude (V)	EUT harmonic amplitude (V)	Error	Remarks	Result
PSL58h1.csv	Table 2 Testing State 1	0.19	0.174	0.016		Pass
PSL58h2.csv	Table 2 Testing State 1	3.50	3.521	0.021		Pass
PSL58h3.csv	Table 2 Testing State 1	7.00	7.019	0.019		Pass
PSL58h4.csv	Table 2 Testing State 1	10.50	10.517	0.017		Pass
PSL58h5.csv	Table 2 Testing State 1	14.00	14.012	0.012		Pass
PSL58h6.csv	Table 2 Testing State 2	0.17	0.145	0.025		Pass
PSL58h7.csv	Table 2 Testing State 2	3.49	3.492	0.002		Pass
PSL58h8.csv	Table 2 Testing State 2	6.99	6.986	0.004		Pass
PSL58h9.csv	Table 2 Testing State 2	10.45	10.475	0.025		Pass
PSL58h10.csv	Table 2 Testing State 2	14.00	13.969	0.031		Pass
PSL58h11.csv	Table 2 Testing State 3	0.20	0.196	0.004	***Note: for Testing State 3, Udin is reconfigured 170 Vrms.***	Pass
PSL58h12.csv	Table 2 Testing State 3	2.60	2.607	0.007		Pass
PSL58h13.csv	Table 2 Testing State 3	5.19	5.193	0.003		Pass
PSL58h14.csv	Table 2 Testing State 3	7.80	7.779	0.001		Pass
PSL58h15.csv	Table 2 Testing State 3	10.38	10.367	0.013		Pass

5.9 Voltage Interharmonics

Summary of 5.9 Voltage Interharmonics Results

Voltage interharmonic measurements conform to Class A requirements	**N/A***
Voltage interharmonic measurements conform to Class S requirements	**N/A***
Voltage interharmonic measurements conform to Class B requirements	**N/A***

**Per manufacturer's specifications, this meter does not support interharmonics.*

Table 5.9 Class A – Summary of Voltage Interharmonics Results

	61000-4-30 section	**Voltage interharmonic requirement**	**EUT conforms to Class A**	**Remarks**
Engineering review	IEC 61000-4-30 Table 1 Line 6	EUT specifications meet required range for voltage interharmonics		
Engineering review	IEC 61000-4-30, ¶5.9	Verify interharmonics aggregation		
PSL Test 5.9(a)	IEC 61000-4-30, ¶5.9	Verify $C_{isg,n}$ implementation		
PSL Test 5.9(b)	IEC 61000-4-30, ¶5.9	Verify single interharmonic accuracy at ≥ 1%		
PSL Test 5.9(c)	IEC 61000-4-30, ¶6.1, ¶6.2, ¶5.9 61000-2-4 Table 6, 61000-4-7 Table 1	Verify accuracy over range of influence quantities		

Note: IEC 61000-4-7:2002 is referenced in the table above, due to IEC 61000-4-30 ¶ 5.9.

Table 5.9 Class S – Summary of Voltage Interharmonics Results

	61000-4-30 Section	**Voltage interharmonic Requirement**	**EUT conforms to Class S**	**Remarks**
Engineering review	IEC 61000-4-30, ¶5.9	Manufacturer specifies uncertainty and aggregation methods		
Engineering review	IEC 61000-4-30, Table 2 Line 5	EUT specifications meet required range for voltage interharmonics		
PSL Test 5.9(c)	IEC 61000-4-30, 6.1 Table 2	Verify interharmonic accuracy, Testing State 1 only		

Table 5.9 Class B – Summary of Voltage Interharmonics Results

	61000-4-30 Section	**Voltage interharmonic Requirement**	**EUT conforms to Class B**	**Remarks**
Engineering review	IEC 61000-4-30, ¶5.9	Manufacturer specifies uncertainty and aggregation methods		
Engineering review	IEC 61000-4-30, Table 2 Line 5	EUT specifications meet required range for voltage interharmonics		
PSL Test 5.9(c)	IEC 61000-4-30, 6.1 Table 2	Verify interharmonic accuracy, Testing State 1 only		

PSL Test 5.9(a) – Verify $C_{isg,n}$ implementation

Purpose of test: Verifies the implementation requirements in 61000-4-30 Edition 1 Corrigendum Item 5.9. RMS voltage is approx U_{din}. Single-phase on reference channel. Requirements for Cisg,n method can be found in IEC 61000-4-7, equations A3 and A4, and in Figure 6, and in Section 5.6.

Table 5.9(a)

Applied waveform	Applied interharmonic	EUT measured interharmonic	Remarks	Result
PSL59a1.csv	~10% 3rd interharmonic group		Basic check to see if interharmonics are measured	-
PSL59a2.csv	~18% 3rd interharmonic group		Verification that $C_{isg,n}$ is implemented correctly	-

PSL Test 5.9(b) – Verify single interharmonic uncertainty

Purpose of test: Verifies the uncertainty requirements of 61000-4-7 Table 1, line 1. RMS voltage is approx U_{din}. Single-phase on reference channel. Interharmonic amplitudes based on twice the values in IEC 61000-2-4 Table 6 Class 3, per line 6 of Table 1 and line 5 of Table 2 in IEC 61000-4-30. Interharmonic frequency is selected based on test. All percents are percent U_{din}.

Table 5.9(b)

Applied waveform	Applied interharmonic	EUT measured interharmonic	Remarks	Result
PSL59b1.csv				-
PSL59b2.csv				-
PSL59b3.csv				-
PSL59b4.csv				-

PSL Test 5.9(c) – Verify voltage interharmonics uncertainty over range of influence quantities

Purpose of test: Verifies voltage interharmonics uncertainty according to Table 2, IEC 61000-4-30, Section 6.2, using twice the values of Class 3 in IEC 61000-2-4 Table 6 (per IEC 61000-4-30 Table 1 Line 6) with uncertainty requirements specified in IEC 61000-4-7, Table 1, Class I (per IEC 61000-4-30 5.9 paragraph 1). "Over the range of influence quantities, and under the conditions described in 6.1, the measurement uncertainty…" Checks interharmonics measurements with unbalance, flicker, and other influence quantities. Voltage is non-sinusoidal, RMS value varies. Unless otherwise noted, all tests were performed with 5.5th harmonic. Requirement is ±5% of reading for signals greater than 1% of U_{din} (and ±0.05% of U_{din} for smaller signals). Results are measured on the first channel (usually L1-N), but signals are applied to all three phases.

NOTE: This test is performed only if EUT conforms to Class A requirements in PSL Test 5.9(a).

Table 5.9(c)

Applied waveform	Testing state	Applied interharmonic level	EUT measured interharmonic	Comments	Result
PSL59c1.csv	Table 2 Testing State 1				-
PSL59c2.csv	Table 2 Testing State 1				-
PSL59c3.csv	Table 2 Testing State 1				-
PSL59c4.csv	Table 2 Testing State 1				-
PSL59c5.csv	Table 2 Testing State 1				-
PSL59c6.csv	Table 2 Testing State 2				-
PSL59c7.csv	Table 2 Testing State 2				-
PSL59c8.csv	Table 2 Testing State 2				-
PSL59c9.csv	Table 2 Testing State 2				-
PSL59c10.csv	Table 2 Testing State 2				-
PSL59c11.csv	Table 2 Testing State 3			Note: for Testing State 3, Udin is reconfigured 170 Vrms.	-
PSL59c12.csv	Table 2 Testing State 3				-
PSL59c13.csv	Table 2 Testing State 3				-
PSL59c14.csv	Table 2 Testing State 3				-
PSL59c15.csv	Table 2 Testing State 3				-

5.10 Mains Signaling Voltage on the Supply Voltage

Summary of 5.10 Mains Signaling Voltage Conformance Results

Mains signaling voltage measurements conform to Class A requirements	**N/A***
Mains signaling voltage measurements conform to Class S requirements	**N/A***
Mains signaling voltage measurements conform to Class B requirements	**N/A***

**Per manufacturer's specifications, this meter is not a mains signaling device.*

Table 5.10 Class A – Summary of Mains Signaling Voltage Results

	61000-4-30 section	Mains signaling voltage requirement	EUT conforms to Class A	Remarks
Engineering review	¶5.10	Determine EUT's interpretation of value of mains signaling voltage		
Engineering review	¶5.10.1	User-selected detection threshold		
Engineering review	¶5.10.1	User-selected length of recording period		
PSL Test 5.10(a)	¶5.10.1	Verify functionality of mains signaling voltage recording		
PSL Test 5.10(b)	¶5.10.2	Verify uncertainty of mains signaling voltage recording		

Table 5.10 Class S – Summary of Mains Signaling Voltage Results

	61000-4-30 section	Mains signaling voltage requirement	EUT conforms to Class S	Remarks
Engineering review	¶5.10	Determine EUT's interpretation of value of mains signaling voltage		
Engineering review	¶5.10.1	User-selected detection threshold		
Engineering review	¶5.10.1	User-selected length of recording period		

Table 5.10 Class B – Summary of Mains Signaling Voltage Results

	61000-4-30 section	Mains signaling voltage requirement	EUT conforms to Class B	Remarks
Engineering review	¶5.10	Determine EUT's interpretation of value of mains signaling voltage		
Engineering review	¶5.10.1	User-selected detection threshold		
Engineering review	¶5.10.1	User-selected length of recording period		

PSL Test 5.10(a) – Verify mains signaling voltage measurement

Purpose of test: Verifies the parameters of mains signaling voltage can be set, per 5.10. Verifies that we can read the value. RMS voltage is approx U_{din}. Single-phase on reference channel.

Table 5.10(a)

Applied waveform	Applied mains signal	EUT measured mains signal	Remarks	Result
Engineering review	(none)		Verify that user can specify the required interharmonic(s) to be used for mains signaling voltage measurements	-
Engineering review	(none)		Verify that user can set a mains signaling voltage threshold, above 0,3% U_{din}	-
Engineering review	(none)		Verify that user can set a length of recording period, up to 120 seconds	-
PSL510a1.csv			Verify that we can detect and measure mains signaling voltage (uses second standard method)	-
PSL510a2.csv			Verify that first standard method is also implemented, and that the correct method is selected based on mains signal frequency	-

PSL Test 5.10(b) – Verify uncertainty of mains signaling voltage measurement

Purpose of test: Verifies the measurement uncertainty requirements per 5.10.2 and 6.2. RMS voltage is approx U_{din}. Single-phase on reference channel. Limit is 5% of reading. Applied mains signaling frequency for this test is 316.67 Hz.

Table 5.10(b)

Applied waveform	Applied mains signal	EUT measured mains signal	Remarks	Result
PSL510b1.csv			Testing State 1 No signal should be reported because the 0.1% threshold has not been exceeded.	-
PSL510b2.csv			Testing State 1	-
PSL510b3.csv			Testing State 1	-
PSL510b4.csv			Testing State 1	-
PSL510b5.csv			Testing State 1	-
PSL510b6.csv			Testing State 2 No signal should be reported because the 0.1% threshold has not been exceeded.	-
PSL510b7.csv			Testing State 2	-
PSL510b8.csv			Testing State 2	-
PSL510b9.csv			Testing State 2	-
PSL510210.csv			Testing State 2	-
PSL510b11.csv			Testing State 3 Note: Udin changed to 170 V_{rms} for this testing state	-
8.2-PSL510b12.csv			Testing State 3	-
PSL510b13.csv			Testing State 3	-
PSL510b14.csv			Testing State 3	-
PSL510b15.csv			Testing State 3	-

5.12 Underdeviation and Overdeviation Parameters

Summary of 5.12 Underdeviation and Overdeviation Conformance Results

Underdeviation and overdeviation measurements conform to Class A requirements	**N/A***
(Class S does not apply to underdeviation and overdeviation measurements)	**N/A***
(Class B does not apply to underdeviation and overdeviation measurements)	**N/A***

**Per manufacturer's specifications, this meter does not record this parameter.*

Table 5.12 Class A – Summary of Underdeviation / Overdeviation Results

	61000-4-30 section	Under / over deviation requirement	EUT conforms to class A	Remarks
PSL Test 5.12(a)	¶5.12	Verify 10/12 cycle RMS value is used		-
PSL Test 5.12(b)	¶5.12	Verify calculation and separation of under/over deviation		-
PSL Test 5.12(c)	¶5.12	Verify aggregation intevals		-
PSL Test 5.12(d)	¶5.12	Verify 3 values for 3-wire systems, and 6 values for 4-wire systems		-

There is no Class S or Class B for underdeviation and overdeviation.

PSL Test 5.12(a) – Verify overdeviation measurement uses 10/12 cycle RMS
Purpose of test: Verifies that EUT correctly uses 10/12 cycle RMS for calculating deviation parameters. RMS voltage is approx U_{din}. Single-phase on reference channel.

Table 5.12(a)

Applied waveform	Applied deviation	EUT measured overdeviation	EUT measured underdeviation	Remarks	Result
PSL512a1.csv	Varying			Verifies that 10/12 cycle RMS values are used. Similar to PSL521c2.csv	-

PSL Test 5.12(b) – Verify overdeviation and underdeviation measurement
Purpose of test: Verifies that EUT correctly categorizes underdeviation and overdeviation parameters. RMS voltage is approx U_{din}. Single-phase on reference channel.

Table 5.12(b)

Applied waveform	Applied deviation	EUT measured overdeviation	EUT measured underdeviation	Remarks	Result
PSL512b1.csv	20% U_{din} underdeviation			Checks both that underdeviation is calculated correctly, and that underdeviation does not affect overdeviation.	-
PSL512b1.csv	10% U_{din} overdeviation			Checks both that overdeviation is calculated correctly, and that overdeviation does not affect underdeviation.	-

PSL Test 5.12(c) – Verify deviation aggregation intervals
Purpose of test: Verifies that EUT correctly aggregates deviation parameters. RMS voltage is approx U_{din}. Single-phase on reference channel.

Table 5.12(c)

Applied waveform	Applied deviation	EUT measured overdeviation	EUT measured underdeviation	Remarks	Result
PSL512c1.csv	Varying			Verifies aggregation intervals	-

PSL Test 5.12(d) – Verify number of deviation parameters for three-phase systems
Purpose of test: Verifies that EUT correctly produces pairs of deviation parameters for three-phase systems. RMS voltage is approx U_{din}.

Table 5.12(d)

Applied waveform	Test	Remarks	Result
As required	Engineering review	Verifies 3 pairs of deviation parameters for 3-wire systems	-
As required	Engineering review	Verifies 6 pairs of deviation parameters for 4-wire systems	-

4.4 Measurement Aggregation Time Intervals

Summary of 4.4 Measurement Aggregation Time Intervals

Measurement aggregation conforms to Class A requirements	**N/A**
Measurement aggregation conforms to Class S requirements	**Yes**
Measurement aggregation conforms to Class B requirements	**No**

Results in this section are based on engineering review and tests as necessary.

Table 4.4 Class A – Summary of Aggregation Interval Results

	61000-4-30 section	Aggregation interval requirement	EUT conforms to Class A	Remarks
PSL44a1.csv	¶4.4	3-second interval based on cycles	-	N/A
Engineering review	¶4.4	10-minute interval based on time clock	-	N/A
PSL44a1.csv	¶4.4	10/12 cycle measurements re-synchronized at 10-minute RTC tick	-	N/A
Engineering review	¶4.4	Time stamp of 10-minute intervals occurs at the end of the interval.	-	N/A
Engineering review	¶4.4	2-hour interval based on time clock	-	N/A

N/A: Meter is classified as Class S, Class A requirements are Not Applicable.

Table 4.4 Class S – Summary of Aggregation Interval Results

	61000-4-30 section	Aggregation interval requirement	EUT conforms to Class S	Remarks
PSL44a1.csv	¶4.4	3-second interval based on cycles	Yes	Pass
Engineering review	¶4.4	10-minute interval based on time clock	Yes	Pass
PSL44a1.csv	¶4.4	10/12 cycle are re-synchronized according to Figure 3 and 4	Yes	Pass: Using Class A method
Engineering review	¶4.4	Time stamp of 10-minute intervals occurs at the end of the interval.	Yes	Pass
Engineering review	¶4.4	2-hour interval based on time clock	Yes	Pass

Table 4.4 Class B – Summary of Aggregation Interval Results

	61000-4-30 section	Mains signaling voltage requirement	EUT conforms to Class B	Remarks
Engineering review	¶4.4	Manufacturer shall indicate the method, number, and duration of aggregation time intervals	Yes	*Schneider makes reference to Technical note 70072-0185-08.*

4.6 Time Clock Uncertainty

Summary of 4.6 Time Clock Uncertainty

Time clock uncertainty conforms to Class A requirements	**NA**
Time clock uncertainty conforms to Class S requirements	**Yes**
Time clock uncertainty conforms to Class B requirements	**Yes**

Results in this section are based on engineering review and tests as necessary.

Table 4.6 Class A – Summary of Time Clock Uncertainty Results

	61000-4-30 section	**Time clock uncertainty requirement**	**EUT conforms to Class A**	**Remarks**
Engineering review	¶4.6 (Note 1 applies)	Max uncertainty of one period over any very long length of time	N/A	EUT is class S meter
Engineering review	¶4.6 (Note 2 applies)	Max uncertainty of 1 second per 24 hours if sync becomes lost	N/A	EUT is class S meter

Table 4.6 Class S – Summary of Time Clock Uncertainty Results

	61000-4-30 section	**Time clock uncertainty requirement**	**EUT conforms to Class S**	**Remarks**
Engineering review	¶4.6 (Note 1 applies)	Max uncertainty of 5 second per 24 hours if sync becomes lost	Yes	Pass

Table 4.6 Class B – Summary of Time Clock Uncertainty Results

	61000-4-30 section	**Time clock uncertainty requirement**	**EUT conforms to Class B**	**Remarks**
Engineering review	¶4.6	Manufacturer shall specify the method to determine 10-min intervals	Yes	*Schneider makes reference to Technical note 70072-0185-07.*

4.7 Flagging

Summary of 4.7 Flagging

Flagging conforms to Class A requirements	**NA**
Flagging conforms to Class S requirements	**Yes**
(Class B does not apply to Flagging)	**-**

Table 4.4 Class A – Summary of Flagging Results

	61000-4-30 section	Flagging requirement	EUT conforms to class A	Remarks
PSL Test 4.7(a)	¶4.7	Flagging of appropriate aggregated parameters based on dips, swells, and interruptions	N/A	EUT is class S meter
PSL Test 4.7(a)	¶4.7	If any interval is flagged, the aggregated intervals are also flagged.	N/A	EUT is class S meter

Table 4.4 Class S – Summary of Flagging Results

	61000-4-30 section	Flagging requirement	EUT conforms to class S	Remarks
PSL Test 4.7(a)	¶4.7	Flagging of appropriate aggregated parameters based on dips, swells, and interruptions	Yes	Pass
PSL Test 4.7(a)	¶4.7	If any interval is flagged, the aggregated intervals are also flagged.	Yes	Pass

Flagging does not apply to Class B.

PSL Test 4.7(a) – Flagging

Purpose of test: Verifies that EUT correctly meets the flagging requirements of 4.7. Engineering review using voltage dips, swells, and interruptions to trigger flagging.

Table 4.7(a)

	Test	Remarks	Result
Engineering review	Power frequency measurements flagged		Pass
Engineering review	Voltage magnitude measurements flagged		Pass
Engineering review	Flicker measurements flagged		N/A*
Engineering review	Unbalance measurements flagged		Pass
Engineering review	Harmonics measurements flagged		Pass
Engineering review	Interharmonics measurements flagged		N/A*
Engineering review	Mains signaling measurements flagged		N/A*
Engineering review	Over- and underdeviation measurements flagged		N/A*
Engineering review	If any interval is flagged, the aggregated intervals are also flagged		Pass

**Per manufacturer's specifications, this meter does not record these parameters..*

6.1 Range of Influence Quantities

Summary of 6.1 Range of Influence Quantities

Uncertainty over the range of influence quantities conforms to Class A requirements	**N/A**
Uncertainty over the range of influence quantities conforms to Class S requirements	**N/A**
Uncertainty over the range of influence quantities conforms to Class B requirements	**N/A**

Note: For Section 6.1, PSL tests the non-aggregated results of parameter measurements. For this reason, in Testing State 3, we use Pst=0 to 0,1 (not 4±0,1).

Table 6.1 Class A – Summary of Range of Influence Quantities Results

	61000-4-30 section	Power quality parameter	EUT conforms to class A	Remarks
PSL Test 5.1.2(a)	¶6.1, ¶6.2, and ¶5.1.2 paragraph 1	Power frequency		See Section 5.1 of this report
PSL Test 5.2.2(a)	¶6.1, ¶6.2, and ¶5.2.2 paragraph 1	Magnitude of the supply voltage		See Section 5.2 of this report
PSL Test 5.3(g)	¶6.1, ¶6.2	Flicker		See Section 5.3 of this report
N/A	N/A	Supply voltage dips and swells		Section 6.2 applies to pseudo steady-state parameters
N/A	N/A	Voltage interruptions		Section 6.2 applies to pseudo steady-state parameters
PSL Test 5.7.2(a)	¶6.1, ¶6.2, and ¶5.7.2	Supply voltage unbalance		Section 5.7.2 only requires Testing State 1 of Section 6.2. See Section 5.7 of this report
PSL Test 5.8(h)	¶6.1, ¶6.2, and ¶5.8, 61000-2-4 Table 2, 61000-4-7 Table 1	Voltage harmonics		See Section 5.8 of this report
PSL Test 5.9(b)	¶6.1, ¶6.2, and ¶5.9	Voltage interharmonics		See Section 5.9 of this report
PSL Test 5.10(b)	¶6.1, ¶6.2, and ¶5.10	Mains signaling voltage		See Section 5.10 of this report

NOTE: The "transient" set of tests in this section is performed after all other testing has been completed, due to the possibilities of damaging the EUT.

Table 6.1 supplemental Class A – Summary of Transient Results

	61000-4-30 section	Influence quantity	EUT conforms to class A	Remarks
PSL Test 6.1(a)	Table 1 Line 8	6kV transient		
PSL Test 6.1(b)	Table 1 Line 9	4kV fast transients		

PSL Test 6.1(a) – Verify parameter measurements with 6kV transients as influence quantities

Purpose of test: Verifies that EUT correctly measures parameters when "transient voltages according to IEC 61180 – 6 kV peak" are applied.

Table 6.1(a)

Influence quantity	Parameter	Applied value of parameter	EUT measured value of parameter	Remarks	Result
IEC 61180 – 6 kV peak	-	-	-	Verifies that EUT tolerates 6 kV impulse	-
IEC 61180 – 6 kV peak	Power frequency	100 kHz		6 kV transient applied to input channel terminals	-
IEC 61180 – 6 kV peak	Magnitude of supply voltage	6 kV open circuit		6 kV transient applied 3 times with positive polarity, 3 times with negative polarity	-
None applied	All other parameters			Based on engineering judgment, re-test parameters after transient has been applied	-

PSL Test 6.1(b) – Verify parameter measurements with fast transients as influence quantities

Purpose of test: Verifies that EUT correctly measures parameters when "Fast transients – 4 kV peak" are applied.

Table 6.1(b)

Influence quantity	Parameter	Applied value of parameter	EUT measured value of parameter	Remarks	Result
Fast transient 4 kV peak	-	-	-	Verification that EUT tolerates 4 kV impulse	-
Fast transient 4 kV peak	Power frequency				-
Fast transient 4 kV peak	Magnitude of supply voltage	4 kV			-
None applied	All other parameters			Based on engineering judgment, re-test parameters after transient has been applied	-

Transients are not an Influence Quantity for Class S or Class B.

PSL Instruments and Facilities used for this Test

PSL Instruments

Description	Manufacturer	Model number	Serial number	NIST trace	Remarks
Arbitrary waveform gen(s)	Tektronix	AFG3022	AFG3022C010634, AFG3022C010614	N/A	Used for signal generation
High-voltage amplifier	Pacific Power	390-GCT	0652	N/A	Used for signal generation
Reference meter(s)	Fluke	8508A	947854898	Simco cert# 4040525	
Waveform inspection	Tektronix	TDS3014	B017593	N/A	Used for verification only
Surge generator	Keytek	587	8804247	N/A	Trace not required
EFT generator	Schaffner	NSG200D NSG222	125 416	N/A	Trace not required

PSL Facilities

Description	Remarks
PSL Calibration Lab	Used as required
PSL High-voltage Test Area	Used as required for surge and transient tests. Also, High-voltage amplifier is located here, and is operated remotely from the Instrument Test Area
PSL 3-phase 15-amp Instrument Test Area	Principal test location

PSL Software / Waveform Library

Description	Revision level
PSL 61000-4-30 Compliance Verification Software + Library	1.2.3