SABS

TEST REPORT

SANS 1524-1:2018 Electricity — Systems Part 1: Payment meters	
Report Reference No. ..... :	**APP-181002-00001A**
Compiled by (+ signature)..... :	K.A Thekisho **Technical Signatory**
Checked by..... :	MS Mkhize **Senior Test Officer**
Approved by (+ signature)..... :	SG Hlatshwayo **Management Signatory**
Date of issue..... :	2018-11-09
Total number of pages.....:	**18**
Testing Laboratory..... :	**SABS Commercial (SOC) Ltd – Appliances**
Address..... :	Private Bag X191 Pretoria, 0001
Applicant's name ..... :	**Jiangsu Linyang Energy Co., Ltd**
Address..... :	No.666 Linyang Road Qidong, Jiangsu P.R.C.
Summary of test results.....:	The sample tested **COMPLIED** with the requirements of SANS 1524-1:2018.
Standard.....:	**SANS 1524-1:2018**
NOTE: SANS 1524-1:2018 Electricity Payment Systems Part 1: Payment meters refers extensively to SANS 62055-31:2006 Electricity metering — Payment systems Part 31: Particular requirements — Static payment meters for active energy (classes 1 and 2), SANS IEC 62053-21(2003) 'Electricity metering equipment (a.c.) – Particular requirements. Part 21: Static meters for active energy and SANS IEC 62052-11 (2003) 'Electricity metering equipment (a.c.) – General requirements, tests and test conditions – Part 11: Metering equipment'. For the purpose of this report the applicable clauses in these specifications have been referenced.	
Test item description..... :	**Three Phase Prepayment meter**
Trade Mark..... :	**Jiangsu Linyang Energy Co., Ltd**
Model/Type reference..... :	**SM350**
Ratings..... :	**3X230/400V 50Hz 5(100)A**

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Clause	Requirement + Test	Result - Remark	Verdict

Possible test case verdicts:

- test case does not apply to the test object.....: N/A or N
- test case not tested.....: N/T
- test object does meet the requirement .....: P(Pass)
- test object does not meet the requirement .....: F(Fail)

Testing .....:

Date of receipt of test item.....: 2018-10-08

Date (s) of performance of tests.....: 2018-10-08 to 2018-11-06

Note: Testing was conducted at Jiangsu Linyang Energy Co., Ltd, No.666 Linyang Road, Qidong, Jiangsu P.R.C. and was witnessed by SABS Commercial (SOC) Ltd – Appliances.

Exclusions:

Reference specification	*Test description*	*Remarks*
IEC 62052-11 Clause 5.4	Terminal material ISO 75-2	Sub contracted*
IEC 62052-11 Clause 7.5.3	Immunity to electromagnetic RF fields	Sub contracted*
IEC 62052-11 Clause 7.5.5	Immunity to conducted disturbances	Sub contracted*
IEC 62052-11 Clause 7.5.8	Radio interference suppression	Sub contracted*
IEC 62055-31 clause 7.9	Load Switch tests	Sub contracted*

*** Accredited facility**

****Non accredited facility**

Throughout this report a point is used as the decimal separator.

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	Test Results		
4	**Standard electrical values:** Note: Clause references are to SANS 62055-31 and SANS 62052-11		
	Standard reference voltage: The meter shall meet the requirements as stated in table 1 of SANS 62052-11.	**Complied**	**P**
	Standard current: The meter shall meet the requirements as stated in table 2 of SANS 62052-11.	**Complied**	**P**
	Standard reference frequency: The meter shall meet the requirements as stated in clause 4.3 of SANS 62052-11.	**Complied**	**P**
5	**Mechanical requirements** Note: Clause references are SANS 62055-31 and SANS IEC 62052-11		
	General Mechanical Requirements: Meters shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions.	**Complied**	**P**
	Case: The meter shall have a case which can be sealed in such a way that the internal parts of the meter are accessible only after breaking the seal(s).	**Complied**	**P**
	Spring Hammer test: Meter case and terminal cover do not sustain damage which could affect the function of the meter and if it is not possible to touch live parts. Slight damage which does not impair the protection against indirect contact or the penetration of solid objects, dust and water is acceptable.	**Complied**	**P**
	Shock test: Meter shall show no damage or change of the information and shall operate correctly in accordance with the requirements of the relevant standard.	**Complied**	**P**
	Vibration test: Meter shall show no damage or change of the information and shall operate correctly in accordance with the requirements of the relevant standard.	**Complied**	**P**
	Window: If the cover is not transparent, one or more windows shall be provided for reading the display and observation of the operation indicator, if fitted. These windows shall be of transparent material which cannot be removed undamaged without breaking the seal(s).	**Complied**	**P**
	Terminals and terminal blocks: Terminals may be grouped in (a) terminal block(s) having adequate insulating properties and mechanical strength. In order to satisfy such requirements when choosing insulating materials for the terminal block(s), adequate testing of materials shall be taken into account. The material of which the terminal block is made shall be capable of passing the tests given in ISO 75-2 for a temperature of 135 °C and a pressure of 1,8 MPa (method A). As reported in SGS test report **SHIN1801003793MR**. Reported depletion is 204°C.	**Complied**	**P**
	Terminal cover: The terminals of a meter, if grouped in a terminal block and if not protected by any other means, shall have a separate cover which can be sealed independently of the meter cover. The terminal cover shall enclose the actual terminals, the conductor fixing screws and, unless otherwise specified, a suitable length of the external conductors and their insulation.	**Complied**	**P**

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	Clearance and creepage distances: The clearance and creepage between the terminal cover, if made of metal, and the upper surface of the screws when screwed down to the maximum applicable conductor fitted shall be not less than the relevant values indicated in Tables 3a and 3b.	**Complied**	**P**
	Insulating encased meter of protective class II: A meter of protective class II shall have a durable and substantially continuous enclosure made wholly of insulating material, including the terminal cover, which envelopes all metal parts, with the exception of small parts, for example, name-plate, screws, suspensions and rivets.	**Complied**	**P**
	Resistance to heat and fire: The terminal block, the terminal cover and the meter case shall ensure reasonable safety against spread of fire. They should not be ignited by thermal overload of live parts in contact with them.	**Complied**	**P**
	Protection against penetration of dust and water: Any ingress of dust and water shall be only in a quantity not impairing the operation of the meter. An insulation test according to 7.3 shall be passed.	**Complied**	**P**
	Display and Indicators: Note: Clause references are to SANS 62055-31 and SANS 62052-11		
	General: The requirements of given SANS IEC 62052-11 shall apply.		
	Retention time of the non-volatile memory: For long outages, the payment meter shall be designed such that any data necessary for correct operation shall be retained for a minimum period of 10 years without an electrical supply being applied to the meter.	**Not Applicable**	**N/A**
	Display of measure values: The principal unit for the measured values shall be the kilowatt-hour (kWh). The display shall be visible from the front of the meter. When the meter is not energised, the display need not be visible.	**Complied**	**P**
	Minimum display capability: For payment meters operating in the prepayment mode, the following information shall be capable of being displayed: cumulative kWh energy register (energy consumption); available credit value. In addition, for virtual token carrier systems, the payment meter shall be able to display details of the last purchase transaction (time, date and amount).The height of the display characters for the numeric values shall be not less than 4,5 mm.	**Complied**	**P**
	Indicators: The following shall be indicated as a minimum and shall be visible from the front of the payment meter: indication of rate of kWh consumption (instantaneous loading); indication of token acceptance (for all manually-transported token types).	**Complied**	**P**
	Output device: The meter shall have a test output device capable of being monitored with suitable testing equipment. Output devices generally may not produce homogeneous pulse sequences.	**Complied**	**P**

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	Marking of Meter: Note: Clause references are to SANS IEC 62052-11			
	Name of manufacturer or trade mark:	**Jiangsu Linyang Energy Co., Ltd**	**Complied**	**P**
	Designation of type and space for approval mark:	**SM350**	**Complied**	**P**
	Number of phases and the number of wires:	**3Phase, 4 wires**	**Complied**	**P**
	Serial number and year of manufacture:	**Marked**	**Complied**	**P**
	Reference voltage:	**3x230/400V V**	**Complied**	**P**
	Current marking:	**05(100) A**	**Complied**	**P**
	Reference frequency:	**50 Hz**	**Complied**	**P**
	Meter constant:	**1000 imp/kWh**	**Complied**	**P**
	Accuracy class index:	**1**	**Complied**	**P**
	The sign of the double square for meters of **protective class 2:**	**Marked**	**Complied**	**P**
	Connection diagrams and terminal markings	**Marked**	**Complied**	**P**
	Utilisation category	**3**	**Complied**	**P**
	DRN Markings	**Marked**	**Complied**	**P**
	IP Rating	**54**	**Complied**	**P**
	Token carrier acceptor: The meter shall be designed such that under normal circumstances, and with a properly maintained token carrier, the minimum number of insertions for which a token carrier acceptor shall operate is 10 000.		**Not Applicable**	**N/A**
	Keypad interface: Where a keypad interface is fitted, it shall be designed to operate for a minimum of 20 000 operations of each individual key.		**Complied**	**P**
5.2	**Electromechanical metrology functions:** Where payment meters consist of an electromechanical kilowatt-hour meter fitted with an electronic payment device, the requirements given in clause 5 of SANS 62053-11:2003 shall also be applicable to the meter.		**Not Applicable**	**N/A**
5.3	**Resistance to solvents:** Meter shall show no sign of damage, the marking shall still be legible and, in the case of an adhesive label, the edges shall show no curling and the label shall still adhere firmly to the surface of the case when wiped successively for 15 s each with a cloth soaked in paraffin, petroleum ether and water.		**Complied**	**P**
5.4	**Magnetic fields:** Care shall be taken to ensure that the operation of the payment meter is not adversely affected by external magnetic fields other than by intended design.		**Complied**	**P**
6	**Climatic conditions:** Note: Clause references are to SANS IEC 62052-11			

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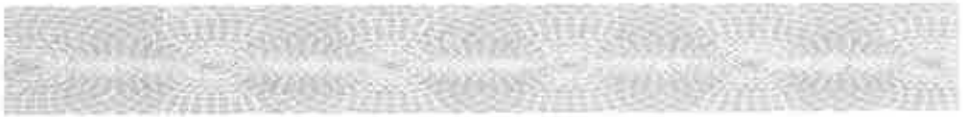
	Temperature range: The temperature range of the meter shall be as shown in Table 5.	**Complied**	**P**
	Relative humidity: The meter shall be designed to withstand the climatic conditions defined in Table 6.	**Complied**	**P**
	Dry Heat Test: The meter shall show no damage or change of the information and shall operate correctly after the test.	**Complied**	**P**
	Cold test: The meter shall show no damage or change of the information and shall operate correctly after the test.	**Complied**	**P**
	Damp Heat Cyclic test: The meter shall show no damage or change of the information and shall operate correctly after the test. An insulation test according to 7.3, except that the impulse voltage shall be multiplied by a factor of 0,8.	**Complied**	**P**
	Protection against solar radiation: The test the meter shall be visually inspected. The appearance and, in particular, the legibility of markings shall not be altered. The function of the meter shall not be impaired.(Applicable to outdoor meters only)	**Complied**	**P**
6.2	**Damp heat accuracy test:** When a meter is tested as given in 6.2.2 to 6.2.5, it shall show no sign of damage. The percentage error measured after the damp heat accuracy test shall not exceed 2,0 % in the case of a meter of accuracy class index 1, and 3,0 % in the case of a meter of accuracy class index 2.	**Complied**	**P**
7.1	**Electrical requirements** Note: Clause references are to SANS 62055-31 and SANS 62052-11 and SANS 62053-21.		
7.2	**Influence of supply voltage:**		
	Voltage range		
	Specified operating range: This is the range of supply voltage forming part of the payment meter's rated operating conditions for metrological purposes, with specified limits of variation in percentage error with supply voltage.	**Complied**	**P**
	Extended operating range: This is the range of supply voltage over which the payment meter shall operate correctly. Within this range, the operation of the power supply circuits, the display and any push buttons, the meter accounting process and any associated registers, values, parameters, and timekeeping, the load switch(es), the token carrier interface and/or any local or remote communications interface, plus any multi-rate facility and any auxiliary input and output circuits shall all be correct.	**Complied**	**P**
	Limit range of operation: Outside the extended operating range of supply voltage but within the limit range of operation and when the ambient temperature is within the specified operating range the following operational requirements shall apply. The status of all registers, values, and parameters associated with the meter accounting process shall continue to be valid and free of corruption.	**Complied**	**P**
	Withstand range: Outside the limit range of operation, but within the supply voltage withstand range (i.e. from 1,15 to 1,9 U_n), the payment meter may sustain permanent damage and degradation to its metrological and functional characteristics, but this shall not give rise to a safety hazard.	**Complied**	**P**



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	Voltage dips and short interruptions: Where the payment meter is fitted with a token carrier acceptor and the token carrier can be retained in the meter then these tests shall be carried out with and without a customer token carrier inserted in the meter during the tests.	**Complied**	**P**
	Abnormal voltage conditions: The payment meter shall withstand, without a safety hazard arising, the maximum withstand voltage (1,9 U_n). The maximum withstand voltage shall be applied for a period of 4 h together with a current of 50 % of I_{max} and unity power factor.	**Complied**	**P**
7.3	**Power consumption:** The measurement of power consumption in the voltage and current circuits shall be determined as given in SANS 62055-31. **Note: When the meter was tested according to the requirements of SANS 1524-1:2018, the meter did not comply with the Burden (VA) requirements of SANS 1524-1 as indicated in Phase1 below. However, on consultation with the client it was confirmed that the meter has multi-function capabilities and therefore it complied with the requirements of SANS 62053-61.**		

Voltage circuits: with multi-function capabilities switched on

	Phase 1	Phase 2	Phase 3		
Voltage (V)	**230.79**	**230.07**	**230.24**	**Complied**	**P**
Current (A)	**0.0537**	**0.237**	**0.228**	**Complied**	**P**
Burden (VA)	**12.36**	**5.38**	**5.258**	**Complied**	**P**
Power (W)	**1.65**	**1.74**	**1.51**	**Complied**	**P**
Current circuit: Limit	**18.4**	**18.4**	**18.4**		
Measured (VA)	**4.13**	**4.13**	**4.13**	**Complied**	**P**

Voltage circuits: without multi-function capabilities switched on

	Phase 1	Phase 2	Phase 3		
Voltage (V)	**229.96**	**230.07**	**230.24**	**Complied**	**P**
Current (A)	**0.0367**	**0.237**	**0.228**	**Complied**	**P**
Burden (VA)	**8.449**	**5.38**	**5.258**	**Complied**	**P**
Power (W)	**1.55**	**1.74**	**1.51**	**Complied**	**P**
Current circuit: Limit	**18.4**	**18.4**	**18.4**		
Measured (VA)	**4.13**	**4.13**	**4.13**	**Complied**	**P**

7.4	**Influence of short time overcurrents:** Short-time overcurrents shall not damage the load switch. The switch shall still operate under specified conditions, the surroundings of the payment meter shall not be endangered and protection against indirect contact shall be assured in all cases.	**Complied**	**P**
7.5	**Influence of Heating:** The requirements given in 7.2 of SANS 62052-11:2003 shall apply Under rated operating conditions, electrical circuits and insulation shall not reach a temperature which might adversely affect the operation of the meter. The results obtained are given in Annex 1.	**Complied**	**P**
7.6	**Influence of self–heating:** The requirements given in 7.3 of SANS 62053-21:2003 shall apply. The variation of error due to self-heating shall not exceed the values given in Table 4.	**Complied**	**P**

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Clause	Requirement + Test	Result - Remark	Verdict

7.7	**Insulation** Note: Note: Clause references are to SANS 62055-31 and SANS 62052-11 and SANS 62053-21.		
	Impulse voltage test: The meter and its incorporated auxiliary devices, if any, shall be such that they retain adequate dielectric qualities under normal conditions of use, taking into account the effects of the climatic environment and different voltages to which they are subjected under normal conditions of use.	**Complied**	**P**
	AC voltage test: The meter and its incorporated auxiliary devices, if any, shall be such that they retain adequate dielectric qualities under normal conditions of use, taking into account the effects of the climatic environment and different voltages to which they are subjected under normal conditions of use.	**Complied**	**P**
7.8	**Electromagnetic compatibility (EMC)**		
	Compatibility requirements Note: Note: Clause references are to SANS 62055-31 and SANS 62052-11.		
	Electrostatic discharge: The application of the electrostatic discharge shall not produce a change in the register of more than *x* units and the test output shall not produce a signal equivalent to more than *x* units. During the test, a temporary degradation or loss of function or performance is acceptable.	**Complied**	**P**
	Electromagnetic RF fields, Test with current. During the test, the behaviour of the equipment shall not be perturbed and the variation of error shall be within the limits as specified in the relevant standards. As referred in SIMT test report: **2018F14-30-000146.**	**Complied**	**P**
	Electromagnetic RF fields, Test without any current: The application of the RF field shall not produce a change in the register of more than *x* units and the test output shall not produce a signal equivalent to more than *x* units. During the test, a temporary degradation or loss of function or performance is acceptable. As referred in SIMT test report: **2018F14-30-000146.**	**Complied**	**P**
	Fast transient burst: During the test, a temporary degradation or loss of function or performance is acceptable; nevertheless the variation of the error shall be within the limits as specified in the relevant standard.	**Complied**	**P**
	Conducted disturbance induced by radio frequency fields: During the test, the behaviour of the equipment shall not be perturbed and the variation of the error shall be within the limits as specified in the relevant standards. As referred in SIMT test report: **2018F14-30-000146.**	**Complied**	**P**
	Surge immunity – line to line test: The application of the surge immunity test voltage shall not produce a change in the accounting and cumulative consumption register of more than *x* units and the test output shall not produce a signal equivalent to more than *x* units. (The equation used to calculate *x* is given in 7.1.2 of SANS 62052-11:2003.) A temporary degradation or loss of function or performance which is self-recoverable is acceptable.	**Complied**	**P**
	Radio interference suppression: The test results shall comply with the requirements given in CISPR 22. As referred in SIMT test report: **2018F14-30-000146.**	**Complied**	**P**

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7.9	**Load switching:** Note: Clause references are to SANS IEC 62055-31		
7.9.1	Normal operation	**Complied**	**P**
	Electrical endurance:	**Complied**	**P**
	Line to load voltage surge withstand	**Not Applicable**	**N/A**
	Fault current making capacity:	**Complied**	**P**
	Short-circuit current carrying capacity as referred in test report No. **DY18-J088-1.**	**Complied**	**P**
	Minimum switched current	**Complied**	**P**
	Power consumption	**Complied**	**P**
	Dielectric strength	**Complied**	**P**
7.9.2	**Load circuit with safety disconnection:** When a meter is provided with a safety disconnection facility, this facility shall comply with the **relevant requirements of SANS 60947-3.**	**Not Applicable**	**N/A**
7.9.3	**Load circuit with overcurrent protection:** When a meter is provided with an overcurrent protection facility in the load circuit, this facility shall comply with the relevant requirements of SANS 556-1. The breaking capacity shall be 2,5 kA, unless other values of breaking capacity have been specified in the purchase agreement.	**Not Applicable**	**N/A**
7.9.4	**Load circuit with earth leakage protection:** When a meter is provided with an earth leakage protection facility in the load circuit, this facility shall comply with the relevant requirements of SANS 767-1.	**Not Applicable**	**N/A**
7.9.5	**Load switching facilities and meter categories:** The load switching facilities per meter category are defined in table 1.	**Not Applicable**	**N/A**
7.10	**Auxiliary output switches:** The output switches shall be rated at U_n, 2 A, unity power factor for 10 000 contiguous make-and-break operations, together with U_n, 1 A, power factor 0,4 inductive for 10 000 contiguous make-and-break operations, so that a total of 20 000 make and- break operations is required for a single switch specimen. This is a design requirement only, and no testing is required as part of the type testing plan for a payment meter.	**Not Applicable**	**N/A**
7.11	**Token carrier acceptor interface and token acceptance testing:** Where the payment meter is fitted with a token carrier acceptor, the meter and token carrier acceptor shall not suffer electrical damage and all the payment metering functions shall continue to operate normally when a metallic token carrier is inserted into the token aperture such that it short circuits all contacts to the token carrier.	**Not Applicable**	**N/A**
7.12	**Voltage surge arrestor**		
7.12.1	**Removal surge arrestor:** When so required (see annex C), the meter shall be provided with a removable voltage surge arrester fitted directly across the supply line between the live and neutral terminals. The surge arrester shall comply with the requirements of SANS 61643-11.	**Not Applicable**	**N/A**

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7.12.2	**Non-removable internal surge arrester:** When a voltage surge arrester is fitted as an integral part of the meter and not intended to be removable under normal usage, the complete meter shall be treated as a surge arrester and shall be tested and marked in accordance with the requirements given in SANS 61643-11.	**Not Applicable**	**N/A**
8	**Accuracy requirements** Note: Clause references are to SANS 62055-31and SANS 62053-21		
	Limits of error due to variation of the current (8.1) When the meter is under the reference conditions given in 8.5, the percentage errors shall not exceed the limits for the relevant accuracy class given in Tables 6 and 7.	**Complied**	**P**
	Limits of error due to influence quantities		
	Limits of error due to ambient temperature variation: The additional percentage error due to the change of influence quantities with respect to reference conditions, as given in 8.5, shall not exceed the limits for the relevant accuracy class given in Table 8. The results obtained are given in Annex 1.	**Complied**	**P**
	Limits of error due to voltage variation (±10%): The additional percentage error due to the change of influence quantities with respect to reference conditions, as given in 8.5, shall not exceed the limits for the relevant accuracy class given in Table 8. The results obtained are given in Annex 1.	**Complied**	**P**
	Limits of error due to frequency variation (±2%): The additional percentage error due to the change of influence quantities with respect to reference conditions, as given in 8.5, shall not exceed the limits for the relevant accuracy class given in Table 8. The results obtained are given in Annex 1.	**Complied**	**P**
	Reversed phase sequence: The additional percentage error due to the change of influence quantities with respect to reference conditions, as given in 8.5, shall not exceed the limits for the relevant accuracy class given in Table 8. Only applicable to three phase meters.	**Complied**	**P**
	Voltage unbalance: The additional percentage error due to the change of influence quantities with respect to reference conditions, as given in 8.5, shall not exceed the limits for the relevant accuracy class given in Table 8.Only applicable to three phase meters.	**Complied**	**P**
	Accuracy test in the presence of harmonics: The additional percentage error due to the change of influence quantities with respect to reference conditions, as given in 8.5, shall not exceed the limits for the relevant accuracy class given in Table 8	**Complied**	**P**
	Tests of the influence of odd harmonics and sub-harmonics: The additional percentage error due to the change of influence quantities with respect to reference conditions, as given in 8.5, shall not exceed the limits for the relevant accuracy class given in Table 8.	**Complied**	**P**
	Tests of the influence of d.c. and even harmonics: The variation in percentage error when the meter is subjected to the test waveform given in Figure A.2 and when it is subjected to the reference waveform shall not exceed the limits of variation given in Table 8.	**Complied**	**P**

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	Continuous magnetic induction of external origin: The additional percentage error due to the change of influence quantities with respect to reference conditions, as given in 8.5, shall not exceed the limits for the relevant accuracy class given in Table 8.	**Complied**	**P**
	Initial start-up of the meter: The meter shall be functional within 5 s after the reference voltage is applied to the meter terminals.	**Complied**	**P**
	Test of no-load condition: When the voltage is applied with no current flowing in the current circuit, the test output of the meter shall not produce more than one pulse. For this test, the current circuit shall be open-circuit and a voltage of 115 % of the reference voltage shall be applied to the voltage circuits.	**Complied**	**P**
	Starting: The meter shall start and continue to register at the starting current values (and in case of polyphase meters, with balanced load) shown in Table 9.If the meter is designed for the measurement of energy in both directions, then this test shall be applied with energy flowing in each direction.	**Complied**	**P**
	Meter constant: The relation between the test output and the indication in the display shall comply with the marking on the name-plate.	**Complied**	**P**
	Token carrier acceptor accuracy: If a token carrier acceptor is fitted and a token carrier can be retained in the payment meter then additional accuracy tests shall be carried out under reference conditions at *U*n and unity power factor, with balanced loads, and at both 0,05 *I*b and *I*max.	**Not Applicable**	**N/A**
9.	**Functional requirements:**	**Complied**	**P**

Notes to report

a) Ambient temperature for accuracy testing: 23°C ± 2°C
b) Uncertainty of measurement for accuracy testing: ±0.15% of the error
c) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2 which for a normal distribution corresponds to a coverage probability of approximately 95%

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LINYANG EQUIPMENT LIST

Description	Type(Serial number)	Valid date	Uncertainty value
Verification equipment for single and three phase electrical energy meters	PTC-8320H (1409359)	2018/11/02	+/- 0.02%
Verification equipment for single and three phase electrical energy meters	SJJ-1 (1631043)	2019/03/21	+/- 0.05%
Portable inspecting device for three phase energy meters	HS-3303B (0907058)	2019/04/27	+/- 0.1%
Portable inspecting device for three phase energy meters	HS-3303B (0909071)	2019/05/17	+/- 0.1%
Portable inspecting device for single phase energy meters	HS6303 (SD1206281)	2019/05/07	+/- 0.1%
Portable inspecting device for single phase energy meters	HS6303 (SD1206282)	2019/05/07	+/- 0.1%
Three phase meter test bench	HS-3303(SD1108373	2019/05/01	+/- 0.05%
EMC 303 tester	DZ603-3(P33003K)	2019/06/13	+/- 0.1%
Programmable constant temperature and humidity chamber	MHU-150A (001003)	2019/02/25	+/- 2°C, +/-3 %RH
Programmable constant temperature and humidity chamber	MHG-408CASI (A70828)	2019/02/25	+/- 2°C, +/-3 %RH
Programmable constant temperature and humidity chamber	MHU-408AJ (X20106)	2019/02/25	+/- 2°C, +/-3 %RH
Programmable constant temperature and humidity chamber	MHU-408AJ (X20105)	2019/02/25	+/- 2°C, +/-3 %RH
Three Phase digital meters	3100	2019/02/07	+/- 0.05%
Three phase test bench	NZ2230 (0732025)	2019/02/07	+/- 0.1%
Multimeter	U1251B (MY52320042)	2019/09/11	+/- 0.025%
Electrical vibration System	MPA102/I620M (SH1707187)	2019/03/04	
Impact crash testing machine(Shock)	BIS600 (Q150902)	2019/09/01	+/- 10%

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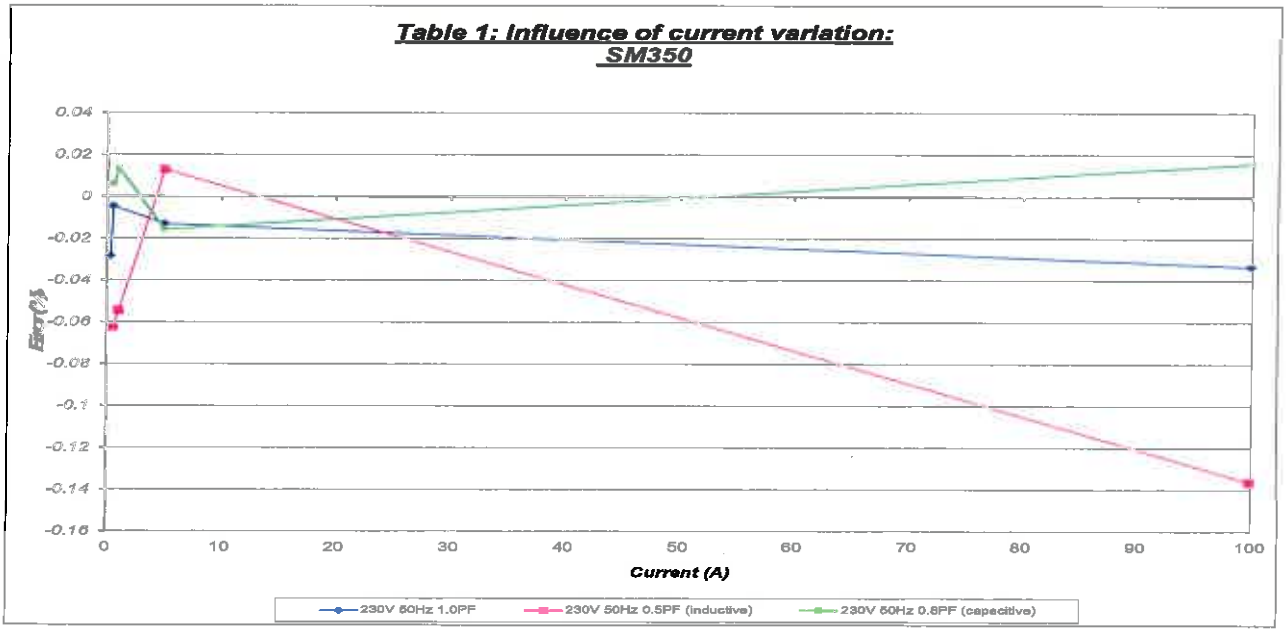
Clause	Requirement + Test	Result - Remark	Verdict

ANNEX 1

Test	Table reference
Limits of error due to variation of the current (Clause 8.1 of SANS IEC 62053-21) at:	230 V
a) 1.0PF	1
b) 0.5PF	1
c) 0.8PF	1
Limits of error due to influence quantities (Clause 8.2 of SANS IEC 62053-21)	
d) Voltage variation	2
e) Frequency variation	3
f) Influence of ambient temperature variation at 1.0PF	4
g) Influence of ambient temperature variation at 0.5PF	5
h) Influence of self-heating	6
i) Heating	7

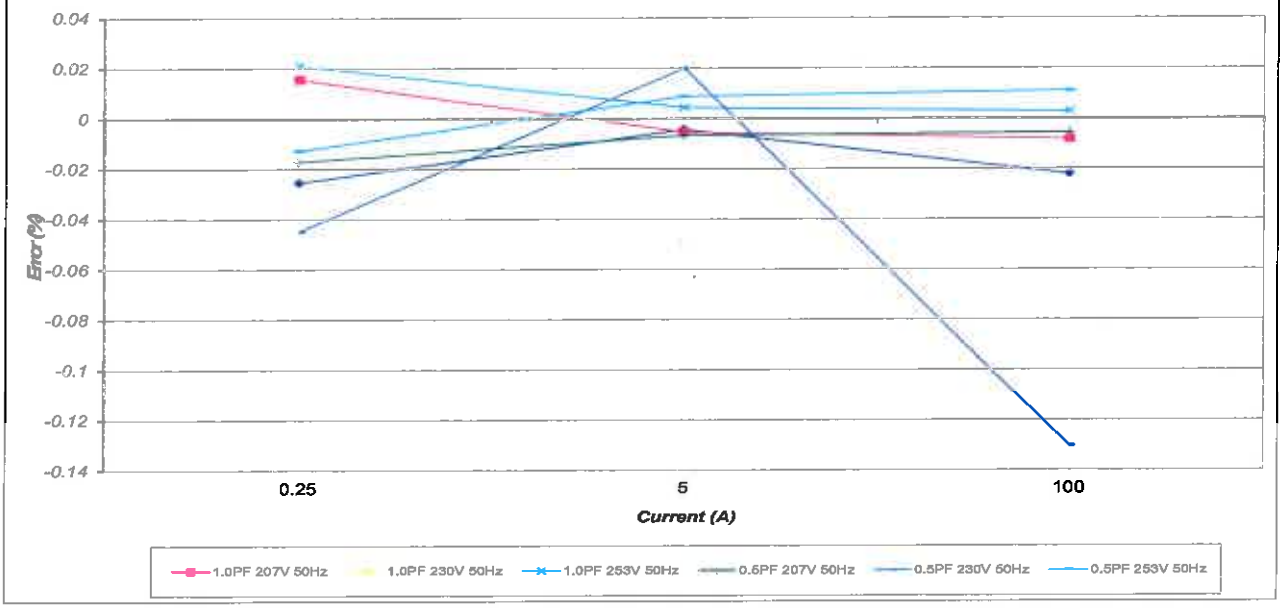
Table 1: Influence of current variation: SM350



Current (A) at 230V 50Hz	Power factor	Measured error (%)	Limit	Result
0.25	1.0	-0.028	1.5	Pass
0.5		-0.004	1.0	Pass
5		-0.013	1.0	Pass
100		-0.033	1.0	Pass
0.5	0.5 inductive	-0.062	1.5	Pass
1		-0.054	1.0	Pass
5		0.013	1.0	Pass
100		-0.136	1.0	Pass
0.5	0.8 capacitive	0.006	1.5	Pass
1		0.013	1.0	Pass
5		-0.016	1.0	Pass
100		0.016	1.0	Pass

SANS 1524-1:2018			
Clause	Requirement + Test	Result - Remark	Verdict

Table 2: Influence of voltage variation: SM350



Current (A) at 207V 1.0PF 50Hz	Measured error (%)	Calculated variation (%)	Limit of variation	Result
0.25	0.016	-0.041	0.7	Pass
5	-0.006	-0.020	0.7	Pass
100	-0.008	-0.017	0.7	Pass
Current (A) at 253V 1.0PF 50Hz	Measured error (%)	Calculated variation (%)	Limit of variation	Result
0.25	0.021	0.000	0.7	Pass
5	0.004	-0.021	0.7	Pass
100	0.003	-0.003	0.7	Pass

Current (A) at 207V 0.5PF 50Hz	Measured error (%)	Calculated variation (%)	Limit of variation	Result
0.5	-0.017	-0.028	1.0	Pass
5	-0.007	0.027	1.0	Pass
100	-0.006	-0.125	1.0	Pass
Current (A) at 253V 0.5PF 50Hz	Measured error (%)	Calculated variation (%)	Limit of variation	Result
0.5	-0.013	-0.032	1.0	Pass
5	0.009	0.011	1.0	Pass
100	0.011	-0.141	1.0	Pass

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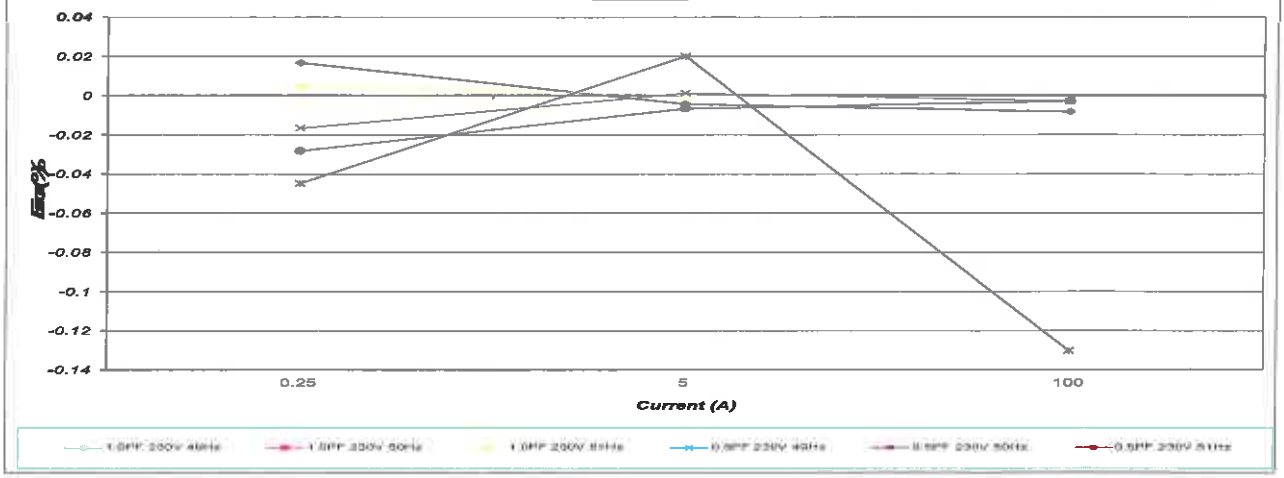
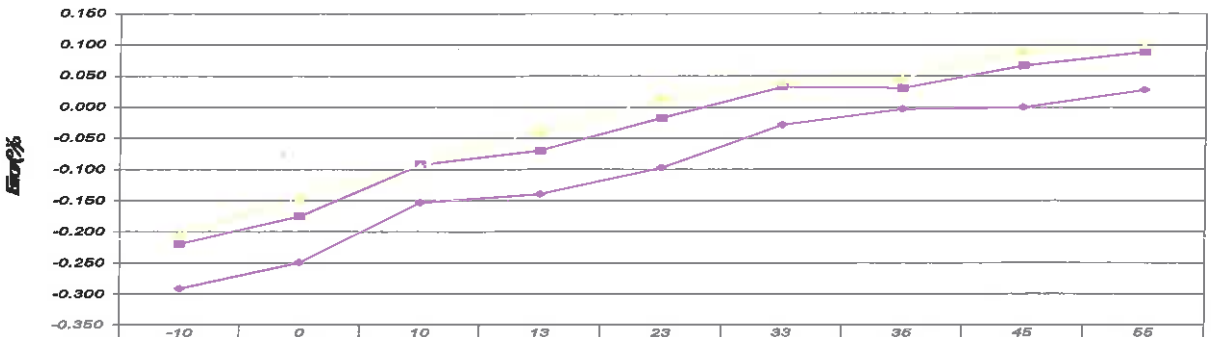
Clause	Requirement + Test	Result - Remark	Verdict

Table 3: Influence of frequency variation: SM350



Current (A) at 230V 1.0PF 49Hz	Measured error (%)	Calculated variation (%)	Limit of variation	Result
0.25	0.320	-0.026	0.5	Pass
5	-0.004	-0.026	0.5	Pass
100	-0.008	-0.026	0.5	Pass
Current (A) at 230V 1.0PF 51Hz	Measured error (%)	Calculated variation (%)	Limit of variation	Result
0.25	0.006	-0.042	0.5	Pass
5	0.000	-0.021	0.5	Pass
100	-0.003	-0.017	0.5	Pass
Current (A) at 230V 0.5PF 49Hz	Measured error (%)	Calculated variation (%)	Limit of variation	Result
0.25	-0.017	-0.028	0.7	Pass
5	0.001	0.019	0.7	Pass
100	-0.003	-0.128	0.7	Pass
Current (A) at 230V 0.5PF 51Hz	Measured error (%)	Calculated variation (%)	Limit of variation	Result
0.25	-0.028	-0.017	0.7	Pass
5	-0.007	0.027	0.7	Pass
100	-0.003	-0.128	0.7	Pass

Table 4: Influence Of Ambient Temperature Variation: SM350
The mean temperature coefficient at 1.0PF is 0.0045



	-10	0	10	13	23	33	36	45	55
100A	-0.291	-0.249	-0.153	-0.139	-0.097	-0.028	-0.003	0.000	0.028
5A	-0.219	-0.176	-0.092	-0.069	-0.017	0.033	0.031	0.067	0.089
0.5A	-0.203	-0.146	-0.094	-0.038	0.014	0.039	0.046	0.090	0.098

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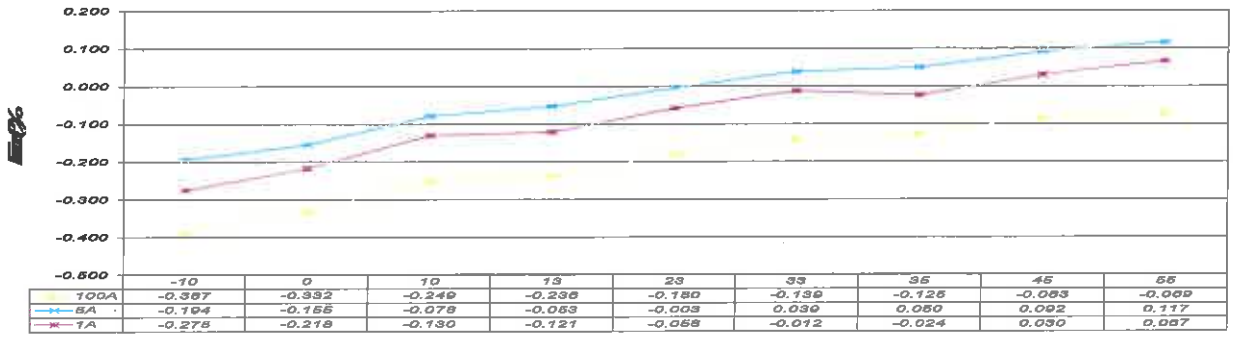
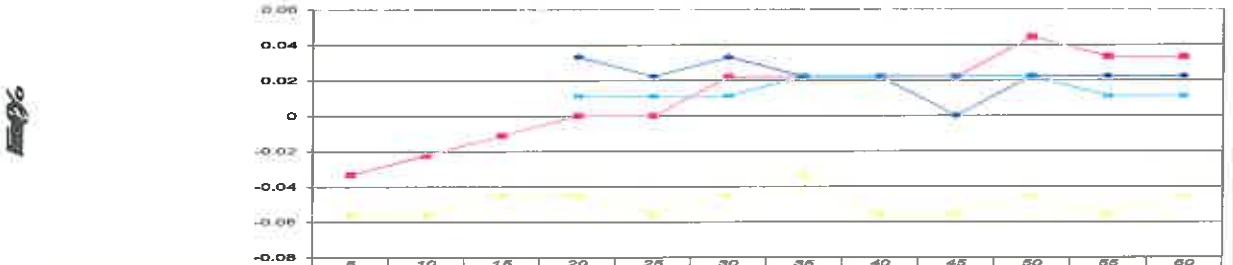
Clause	Requirement + Test	Result - Remark	Verdict

Table 5: Influence Of Ambient Temperature Variation: SM350
The mean temperature coefficient at 0.5PF is 0.0051



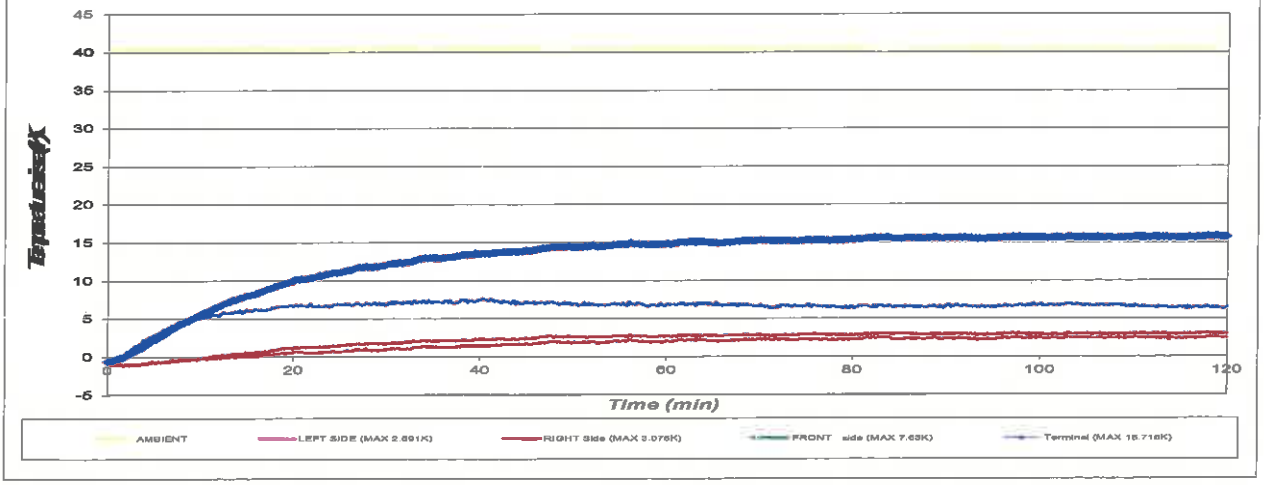
	-10	0	10	13	23	33	35	45	55
100A	-0.387	-0.332	-0.249	-0.236	-0.180	-0.139	-0.125	-0.083	-0.069
5A	-0.194	-0.155	-0.078	-0.053	-0.003	0.039	0.050	0.092	0.117
1A	-0.275	-0.218	-0.130	-0.121	-0.058	-0.012	-0.024	0.030	0.057

Table 6: Influence of self heating at 1.0 and 0.5PF (inductive): SM350



	5	10	15	20	25	30	35	40	45	50	55	60
Measured error at 1.0PF	-0.0333	-0.0222	-0.0111	0	0	0.022	0.022	0.022	0.022	0.0444	0.0333	0.0333
Variation in 20min at 1.0PF				0.033	0.022	0.033	0.022	0.022	0.000	0.022	0.022	0.022
Measured error at 0.5PF	-0.0555	-0.0555	-0.0444	-0.0444	-0.0555	-0.0444	-0.0333	-0.0555	-0.0555	-0.0444	-0.0555	-0.0444
Variation in 20min at 0.5PF				0.011	0.011	0.011	0.022	0.022	0.022	0.022	0.011	0.011

Table 7: Heating of SM350 (tested at 264.5V 100A)



SANS 1524-1:2018			
Clause	Requirement + Test	Result - Remark	Verdict

Annex 2

Meter 1 Label

Meter 2 Label

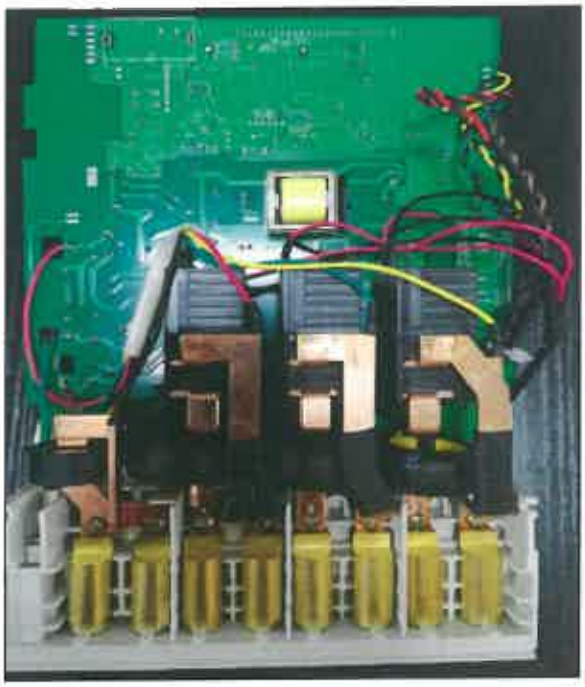
Meter 1 with CIU

Meter 2 with CIU

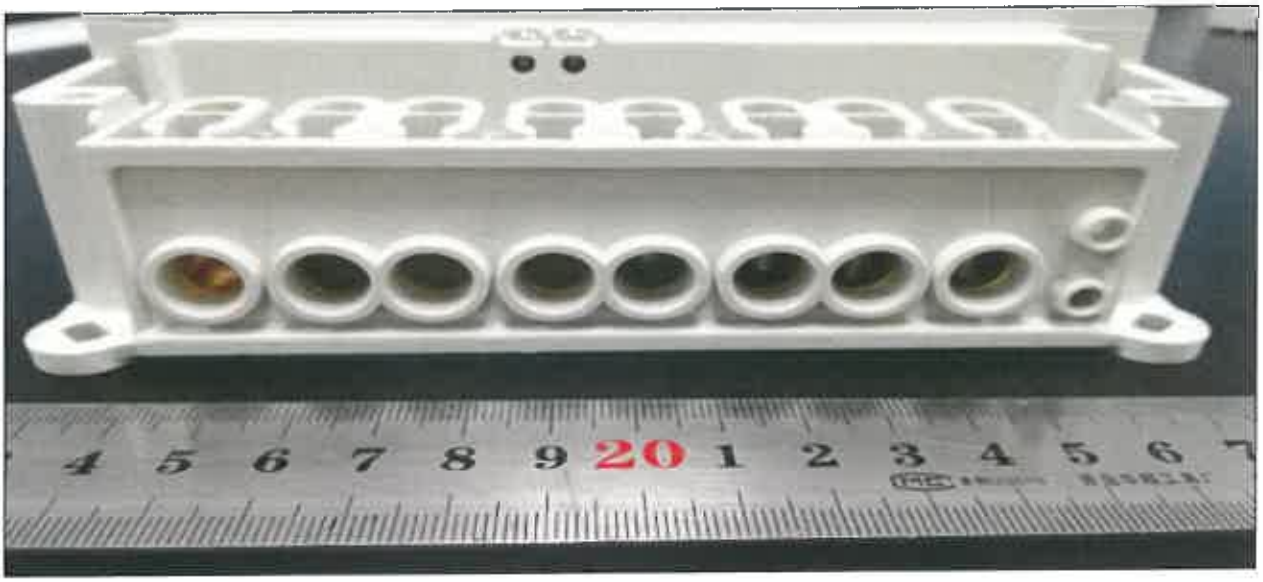
SANS 1524-1:2018			
Clause	Requirement + Test	Result - Remark	Verdict

Internal View 1

Internal view 2



Terminal view



.....End of report.....