CNEBIKES CO.,LTD.

CE LVD REPORT

Prepared For :	CNEBIKES CO.,LTD. No3. Renmin west road，Wujin District，Changzhou City, Jiangsu Province, China 213164
Product Name:	MOTOR
Model :	HH24-180,HH24-200,HH24-250,HH36-180,HH36-200,HH36-250, HH36-350,HH36-500,HH36-750,HH48-350,HH48-500,HH48-750, HH48-1000,HH48-1500,HH60-1000,HH60-1500.
Prepared By :	Shenzhen BST Technology Co., Ltd. Building No.23-24,Zhiheng Industrial Park,Guankouer Road, Nantou,Nanshan District,Shenzhen,Guangdong,China
Test Date:	Dec. 28- 29, 2017
Date of Report :	Dec. 29, 2017
Report No.:	BSTDG1712647290002SR-2

LVD REPORT

EN 60034-1

Rotating electrical machines

Part 1: Rating and performance

Testing Laboratory Name ..... :	Shenzhen BST Technology Co.,Ltd.
Address ..... :	Building No.23-24,Zhiheng Industrial Park,Guankouer Road, Nantou, Nanshan District,Shenzhen,Guangdong,China
Testing location :	Shenzhen BST Technology Co.Ltd.
Applicant's Name ..... :	CNEBIKES CO.,LTD.
Address ..... :	No3. Renmin west road，Wujin District，Changzhou City, Jiangsu Province, China 213164
Manufacturer …… ……:	CNEBIKES CO.,LTD.
Address …… ……:	No3. Renmin west road，Wujin District，Changzhou City, Jiangsu Province, China 213164
Test specification	
Standard..... :	EN 60034-1:2010/AC:2010
Procedure deviation ..... :	N/A
Non-standard test method ..... :	N/A
Test item description ..... :	MOTOR
Trademark ..... :	N/A
Model and/or type reference ..... :	HH24-180,HH24-200,HH24-250,HH36-180,HH36-200,HH36-250,HH36-350,HH36-500,HH36-750,HH48-350,HH48-500,HH48-750,HH48-1000,HH48-1500,HH60-1000,HH60-1500.1000,HH60-1500.
Rating(s)..... :	48V, 16A，750W
Test case verdicts	
Test case does not apply to the test object .. :	N/A
Test item does meet the requirement ..... :	P(ass)
Test item does not meet the requirement ..... :	F(ail)

General remarks

This report shall not be reproduced except in full without the written approval of the testing laboratory.
The test results presented in this report relate only to the item(s) tested.
”(see remark #)" refers to a remark appended to the report.
"(see Annex #)" refers to an annex appended to the report.
Clause numbers between brackets refer to clauses in IEC 60034-1 (EN 60034-1)
Throughout this report a comma is used as the decimal separator.

Attached with:
A. photo documentation
B. General product information:
The series products have the same circuit diagram, PCB layout and functionality. T
he differences are the model name and appearance, so, we select HH48-750 to

Copy of marking plate:

MOTOR
Model : HH48-750
Rating : 48V, 16A

CNEBIKES CO.,LTD.

Name and address of the testing laboratory: Shenzhen BST Technology Co.,Ltd.
Building No.23-24,Zhiheng Industrial Park,
Guankouer Road,Nantou,Nanshan District,
Shenzhen,Guangdong,China

Test by : Janice Li — Dec. 29, 2017
Signature — Date

Technician
Title

Review by : Apple Li — Dec. 29, 2017
Signature — Date

Project Engineer
Title

Approved by : — Dec. 29, 2017
Signature — Date

Christina Deng/ Manager
Name and Title

EN 60034-1			
Cl.	Requirement – Test	Result	Verdict
4	Duty		P
4.1	Declaration of duty		–
	It is the responsibility of the purchaser to declare the duty. The purchaser may describe the duty by one of the following:		P
	a) numerically, where the load does not vary or where it varies in a known manner		P
	b) as a time sequence graph of the variable quantities		P
	c) by selecting one of the duty types S1 to S10 that is no less onerous than the expected duty		P
4.2	Duty types		P
4.2.1	Duty type S1 – Continuous running duty		P
	Operation at a constant load maintained for sufficient time to allow the machine to reach thermal equilibrium, see Figure 1.		P
4.2.2	Duty type S2 – Short-time duty		P
	Operation at constant load for a given time, less than that required to reach thermal equilibrium, followed by a time de-energized and at rest of sufficient duration to re-establish machine temperatures within 2 K of the coolant temperature, see Figure 2.		P
4.2.3	Duty type S3 – Intermittent periodic duty		P
	A sequence of identical duty cycles, each including a time of operation at constant load and a time de-energized and at rest, see Figure 3.		P
4.2.4	Duty type S4 – Intermittent periodic duty with starting		P
	A sequence of identical duty cycles, each cycle including a significant starting time, a time of operation at constant load and a time de-energized and at rest, see Figure 4.		P
4.2.5	Duty type S5 – Intermittent periodic duty with electric braking		P
	A sequence of identical duty cycles, each cycle consisting of a starting time, a time of operation at constant load, a time of electric braking and a time de-energized and at rest, see Figure 5.		P
4.2.6	Duty type S6 – Continuous operation periodic duty		P
	A sequence of identical duty cycles, each cycle consisting of a time of operation at constant load and a time of operation at no-load. There is no time de-energized and at rest, see Figure 6.		P

4.2.7	Duty type S7 – Continuous operation periodic duty with electric braking		P
	A sequence of identical duty cycles, each cycle consisting of a starting time, a time of operation at constant load and a time of electric braking. There is no time de-energized and at rest, see Figure 7.		P
4.2.8	Duty type S8 – Continuous operation periodic duty with related load/speed changes		P
	A sequence of identical duty cycles, each cycle consisting of a time of operation at constant load corresponding to a predetermined speed of rotation, followed by one or more times of operation at other constant loads corresponding to different speeds of rotation (carried out, for example, by means of a change in the number of poles in the case of induction motors). There is no time de-energized and at rest (see Figure 8).		P
4.2.9	Duty type S9 – Duty with non-periodic load and speed variations		P
	A duty in which generally load and speed vary non-periodically within the permissible operating range. This duty includes frequently applied overloads that may greatly exceed the reference load (see Figure 9).		P
4.2.10	Duty type S10 – Duty with discrete constant loads and speeds		P
	A duty consisting of a specific number of discrete values of load (or equivalent loading) and if applicable, speed, each load/speed combination being maintained for sufficient time to allow the machine to reach thermal equilibrium, see Figure 10		P
5	Rating		P
5.1	Assignment of rating		P
	The rating, as defined in 3.2, shall be assigned by the manufacturer. In assigning the rating the manufacturer shall select one of the classes of rating defined in 5.2.1 to 5.2.6. The designation of the class of rating shall be written after the rated output.		P
5.2	Classes of rating		P
5.2.1	Rating for continuous running duty		P
	A rating at which the machine may be operated for an unlimited period, while complying with the requirements of this standard.		P
5.2.2	Rating for short-time duty		P

	A rating at which the machine may be operated for a limited period, starting at ambient temperature, while complying with the requirements of this standard.		P
5.2.3	Rating for periodic duty		N
	A rating at which the machine may be operated on duty cycles, while complying with the requirements of this standard.		N
5.2.4	Rating for non-periodic duty		P
	A rating at which the machine may be operated non-periodically while complying with the requirements of this standard.		P
5.2.5	Rating for duty with discrete constant loads and speeds		P
	A rating at which the machine may be operated with the associated loads and speeds of duty type S10 for an unlimited period of time while complying with the requirements of this standard. The maximum permissible load within one cycle shall take into consideration all parts of the machine, for example, the insulation system regarding the validity of the exponential law for the relative thermal life expectancy, bearings with respect to temperature, other parts with respect to thermal expansion. Unless specified in other relevant IEC standards, the maximum load shall not exceed 1,15 times the value of the load based on duty type S1. The minimum load may have the value zero, the machine operating at no-load or being de-energized and at rest. Considerations for the application of this class of rating are given in Annex A.		P
5.2.6	Rating for equivalent loading		P
	A rating, for test purposes, at which the machine may be operated at constant load until thermal equilibrium is reached and which results in the same stator winding temperature rise as the average temperature rise during one load cycle of the specified duty type.		P
5.3	Selection of a class of rating		P
	A machine manufactured for general purpose shall have a rating for continuous running duty and be capable of performing duty type S1.		P
5.4	Allocation of outputs to class of rating		P
	In the determination of the rating:		P
	For duty types S1 to S8, the specified value(s) of the constant load(s) shall be the rated output(s), see 4.2.1 to 4.2.8.		P

	For duty types S9 and S10, the reference value of the load based on duty type S1 shall be taken as the rated output, see 4.2.9 and 4.2.10.		P
5.5	Rated output		P
5.5.1	DC generators		N
	The rated output is the output at the terminals and shall be expressed in watts (W).		N
5.5.2	AC generators		N
	The rated output is the apparent power at the terminals and shall be expressed in voltamperes (VA) together with the power factor.		N
5.5.3	Motors	Rating Power 750W	P
	The rated output is the mechanical power available at the shaft and shall be expressed in watts (W).		P
5.5.4	Synchronous condensers		P
	The rated output is the reactive power at the terminals and shall be expressed in volt-amperes reactive (var) in leading (under-excited) and lagging (over-excited) conditions.		P
5.6	Rated voltage		P
5.6.1	For d.c. generators intended to operate over a relatively small range of voltage, the rated output and current shall apply at the highest voltage of the range, unless otherwise specified, see also 7.3.		P
5.6.2	AC generators		N
	For a.c. generators intended to operate over a relatively small range of voltage, the rated output and power factor shall apply at any voltage within the range, unless otherwise specified, see also 7.3.		N
5.7	Co-ordination of voltages and outputs		P
	It is not practical to build machines of all ratings for all rated voltages. In general, for a.c. machines, based on design and manufacturing considerations, preferred voltage ratings above 1 kV in terms of rated output are as shown in Table 1.		N
5.8	Machines with more than one rating	DC48V	P
	For machines with more than one rating, the machine shall comply with this standard in all respects at each rating.		P

6	Site operating conditions		P
6.1	General		P

	Unless otherwise specified, machines shall be suitable for the following site operating conditions. For site operating conditions deviating from those values, corrections are given in Clause 8.		P
6.2	Altitude		P
	The altitude shall not exceed 1 000 m above sea-level.		P
6.3	Maximum ambient air temperature		P
	The ambient air temperature shall not exceed 40 °C.		P
6.4	Minimum ambient air temperature		P
	The ambient air temperature shall not be less than −15 °C for any machine.		P
	The ambient air temperature shall be not less than 0 °C for a machine with any of the following:		P
	a) rated output greater than 3 300 kW (or kVA) per 1 000 min−1;		N
	b) rated output less than 600 W (or VA);	750W	N
	c) a commutator;		P
	d) a sleeve bearing;		P
	e) water as a primary or secondary coolant.		N
6.5	Water coolant temperature		P
	For the reference water coolant temperature see Table 4. For other water coolant temperatures see Table 9. The water coolant temperature shall not be less than +5 °C.		P
6.6	Storage and transport		P
	When temperatures lower than specified in 6.4 are expected during transportation, storage, or after installation, the purchaser shall inform the manufacturer and specify the expected minimum temperature.		P
6.7	Purity of hydrogen coolant		P
	Hydrogen cooled machines shall be capable of operating at rated output under rated conditions with a coolant containing not less than 95 % hydrogen by volume.		P
7	Electrical operating conditions		P
7.1	Electrical supply		P
	For three-phase a.c. machines, 50 Hz or 60 Hz, intended to be directly connected to distribution or utilisation systems, the rated voltages shall be derived from the nominal voltages given in IEC 60038.	DC48V Electrical supply	N
7.2	Form and symmetry of voltages and currents	15.6A	P

7.2.1	AC motors		N
7.2.1.1	AC motors rated for use on a power supply of fixed frequency, supplied from an a.c. generator (whether local or via a supply network) shall be suitable for operation on a supply voltage having a harmonic voltage factor (HVF) not exceeding:		N
	– 0,02 for single-phase motors and three-phase motors, including synchronous motors but excluding motors of design N (see IEC 60034-12), unless the manufacturer declares otherwise.		N
	– 0,03 for design N motors.		N
7.2.1.2	AC motors supplied from static converters have to tolerate higher harmonic contents of the supply voltage; see IEC 60034-17 for the case of cage motors within the scope of IEC 60034-12.	DC motors	N
7.2.2	AC generators		P
	Three-phase a.c. generators shall be suitable for supplying circuits which, when supplied by a system of balanced and sinusoidal voltages:		N
	a) result in currents not exceeding a harmonic current factor (HCF) of 0,05, and		N
	b) result in a system of currents where neither the negative-sequence component nor the zero-sequence component exceed 5 % of the positive-sequence component.		N
7.2.3	Synchronous machines		P
	Unless otherwise specified, three-phase synchronous machines shall be capable of operating continuously on an unbalanced system in such a way that, with none of the phase currents exceeding the rated current, the ratio of the negative-sequence component of current (I2) to the rated current (IN) does not exceed the values in Table 2 and under fault conditions shall be capable of operation with the product of (I2/IN)2 and time (t) not exceeding the values in Table 2.		P
7.2.4	DC motors supplied from static power converters		P
	In the case of a d.c. motor supplied from a static power converter, the pulsating voltage and current affect the performance of the machine. Losses and temperature rise will increase and the commutation is more difficult compared with a d.c. motor supplied from a pure d.c. power source.		P
7.3	Voltage and frequency variations during operation		N

	For a.c. machines rated for use on a power supply of fixed frequency supplied from an a.c. generator (whether local or via a supply network), combinations of voltage variation and frequency variation are classified as being either zone A or zone B, in accordance with Figure 11 for generators and synchronous condensers, and Figure 12 for motors.		N
7.4	Three-phase a.c. machines operating on unearthed systems		N
	Three-phase a.c. machines shall be suitable for continuous operation with the neutral at or near earth potential. They shall also be suitable for operation on unearthed systems with one line at earth potential for infrequent periods of short duration, for example as required for normal fault clearance. If it is intended to run the machine continuously or for prolonged periods in this condition, a machine with a level of insulation suitable for this condition will be required.		N
7.5	Voltage (peak and gradient) withstand levels		N
	For a.c. motors the manufacturer shall declare a limiting value for the peak voltage and for the voltage gradient in continuous operation.		N
8	Thermal performance and tests		P
8.1	Thermal class		P
	A thermal class in accordance with IEC 60085 shall be assigned to the insulation systems used in machines.		P
8.2	Reference coolant		P
	The reference coolant for a given method of cooling the machine is specified in Table 4. BS EN 60034-1:2010		P
8.3	Conditions for thermal tests		P
8.3.1	Electrical supply		P
	During thermal testing of an a.c. motor the HVF of the supply shall not exceed 0,015 and the negative-sequence component of the system of voltages shall be less than 0,5 % of the positive-sequence component, the influence of the zero-sequence component being eliminated.	DC48V	N
8.3.2	Temperature of machine before test		P
	If the temperature of a winding is to be determined from the increase of resistance, the initial winding temperature shall not differ from the coolant by more than 2 K.		P
8.3.3	Temperature of coolant		P

	A machine may be tested at any convenient value of coolant temperature. See Table 11 (for indirect cooled windings) or Table 14 (for direct cooled windings).		P
8.3.4	Measurement of coolant temperature during test		P
	The value to be adopted for the temperature of a coolant during a test shall be the mean of the readings of the temperature detectors taken at equal intervals of time during the last quarter of the duration of the test. To reduce errors due to the time lag of the change of temperature of large machines following variations in the temperature of the coolant, all reasonable precautions shall be taken to minimize such variations.		P
8.3.4.1	Open machines or closed machines without heat exchangers (cooled by surrounding ambient air or gas)		P
	The temperature of the ambient air or gas shall be measured by means of several detectors placed at different points around and halfway up the machine at 1 m to 2 m from it. Each detector shall be protected from radiant heat and draughts.		P
8.3.4.2	Machines cooled by air or gas from a remote source through ventilation ducts and machines with separately mounted heat exchangers		P
	The temperature of the primary coolant shall be measured where it enters the machine.		P
8.3.4.3	Closed machines with machine-mounted or internal heat exchangers		P
	The temperature of the primary coolant shall be measured where it enters the machine. The temperature of the secondary coolant shall be measured where it enters the heat exchanger.		P
8.4	Temperature rise of a part of a machine		P
	The temperature rise of a part of a machine is the difference between the temperature of that part measured by the appropriate method in accordance with 8.5, and the temperature of the coolant measured in accordance with 8.3.4.		P
8.5	Methods of measurement of temperature		P
8.5.1	General		P
	Three methods of measuring the temperature of windings and other parts are recognized:		P
	resistance method;		P
	embedded temperature detector (ETD) method;		P
	Different methods shall not be used as a check upon one another.		P
8.5.2	Resistance method		P

	The temperature of the windings is determined from the increase of the resistance of the windings.		P
8.5.3	Embedded temperature detector (ETD) method		P
	The temperature is determined by means of temperature detectors (e.g. resistance thermometers, thermocouples or semi-conductor negative coefficient detectors) built into the machine during construction, at points which are inaccessible after the machine is completed.		P
8.5.4	Thermometer method		P
	The temperature is determined by thermometers applied to accessible surfaces of the completed machine. The term 'thermometer' includes not only bulb-thermometers, but also non-embedded thermocouples and resistance thermometers. When bulb-thermometers are used in places where there is a strong varying or moving magnetic field, alcohol thermometers shall be used in preference to mercury thermometers.		P
8.6	Determination of winding temperature		P
8.6.1	Choice of method		P
	In general, for measuring the temperature of the windings of a machine, the resistance method in accordance with 8.5.1 shall be applied (but see also 8.6.2.3.3).		P
	The thermometer method is recognized in the following cases:		P
	a) when it is not practicable to determine the temperature rise by the resistance method as, for example, with low-resistance commutating coils and compensating windings and, in general, in the case of low-resistance windings, especially when the resistance of joints and connections forms a considerable proportion of the total resistance;		P
	b) single layer windings, rotating or stationary;		P
	c) during routine tests on machines manufactured in large numbers.		P
	For windings of armatures having commutators and for field windings, the resistance method and the thermometer method are recognized. The resistance method is preferred, but for stationary field windings of d.c. machines having more than one layer the ETD method may be used.		P
8.6.2	Determination by resistance method		N
8.6.2.1	Measurement		P

	direct measurement at the beginning and the end of the test, using an instrument having a suitable range;		P
	measurement by d.c. current/voltage in d.c. windings, by measuring the current in and the voltage across the winding, using instruments having suitable ranges;		P
	measurement by d.c. current/voltage in a.c. windings, by injecting direct current into the winding when de-energized.		P
8.6.2.2	Calculation		N
8.6.2.3	Correction for stopping time		N
8.6.2.3.1	General		N
	The measurement of temperatures at the end of the thermal test by the direct measurement resistance method requires a quick shutdown. A carefully planned procedure and an adequate number of people are required.		N
8.6.2.3.2	Short stopping time		N
	If the initial resistance reading is obtained within the time interval specified in Table 5, that reading shall be accepted for the temperature measurement.		N
8.6.2.3.3	If a resistance reading cannot be made in the time interval specified in Table 5, it shall be made as soon as possible but not after more than twice the interval specified in Table 5, and additional readings shall be taken at intervals of approximately 1 min until these readings have begun a distinct decline from their maximum value. A curve of these readings shall be plotted as a function of time and extrapolated to the appropriate time interval of Table 5 for the rated output of the machine. A semi-logarithmic plot is recommended where temperature is plotted on the logarithmic scale. The value of temperature thus obtained shall be considered as the temperature at shutdown. If successive measurements show increasing temperatures after shutdown the highest value shall be taken.		N
8.6.2.3.4	Windings with one coil-side per slot		N
	For machines with one coil-side per slot, the resistance method by direct measurement may be used if the machine comes to rest within the time interval specified in Table 5. If the machine takes more than 90 s to come to rest after switching off the power, the superposition method may be used if previously agreed.		N
8.6.3	Determination by ETD method		N
8.6.3.1	General		N

	The detectors shall be suitably distributed throughout the winding and the number of detectors installed shall be not less than six.		N
8.6.3.2	Two or more coil-sides per slot		P
	The detectors shall be located between the insulated coil-sides within the slot in positions at which the highest temperatures are likely to occur.		P
8.6.3.3	One coil-side per slot		P
	The detectors shall be located between the wedge and the outside of the winding insulation in positions at which the highest temperatures are likely to occur, but see also 8.6.1.		P
8.6.3.4	End windings		P
	The temperature detectors shall be located between two adjacent coil-sides within the end windings in positions where the highest temperatures are likely to occur. The sensing point of each detector shall be in close contact with the surface of a coil-side and be adequately protected against the influence of the coolant, but see also 8.6.1.		P
8.6.4	Determination by thermometer method		N
	All reasonable efforts, consistent with safety, shall be made to place thermometers at the point, or points where the highest temperatures are likely to occur (e.g. in the end windings close to the core iron) in such a manner that they are effectively protected against contact with the primary coolant and are in good thermal contact with the winding or other part of the machine.		N
8.7	Duration of thermal tests		P
8.7.1	Rating for continuous running duty		P
	The test shall be continued until thermal equilibrium has been reached.		P
8.7.2	Rating for short-time duty		P
	The duration of the test shall be the time given in the rating.		P

8.7.3	Normally the rating for equivalent loading assigned by the manufacturer (see 5.2.6) shall be applied until thermal equilibrium has been reached. If a test on the actual duty is agreed, the load cycle specified shall be applied and continued until practically identical temperature cycles are obtained. The criterion for this shall be that a straight line between the corresponding points of successive duty cycles on a temperature plot has a gradient of less than 2 K per hour. If necessary, measurements shall be taken at reasonable intervals over a period of time.		P
8.7.4	Ratings for non-periodic duty and for duty with discrete constant loads		P
	The rating for equivalent loading assigned by the manufacturer (see 5.2.6) shall be applied until thermal equilibrium has been reached.		P
8.8	Determination of the thermal equivalent time constant for machines of duty type S9		P
	The thermal equivalent time constant with ventilation as in normal operating conditions, suitable for approximate determination of the temperature course, can be determined from the cooling curve plotted in the same manner as in 8.6.2.3.		P
8.9	Measurement of bearing temperature		P
	Either the thermometer method or the ETD method may be used.		P
	The measuring point shall be as near as possible to one of the two locations specified in Table 6.		P
8.10	Limits of temperature and of temperature rise		P
	Limits are given for operation under site operating conditions specified in Clause 6 and at rating for continuous running duty (reference conditions), followed by rules for the adjustment of those limits when operating at site under other conditions and on other ratings. Further rules give adjustments to the limits during thermal testing when conditions at the test site differ from those at the operating site.		P
	The limits are stated relative to the reference coolant specified in Table 4.		P
	A rule is given to allow for the purity of hydrogen coolant.		P
8.10.1	Indirect cooled windings		P

	Temperature rises under reference conditions shall not exceed the limits given in Table 7 (air coolant) or Table 8 (hydrogen coolant) as appropriate.		P
8.10.2	Direct cooled windings		P
	Temperatures under reference conditions shall not exceed the limits given in Table 12.		P
	For other operating site conditions the limits shall be adjusted according to Table 13.		P
	If conditions at the test site differ from those at the operating site, the adjusted limits given in Table 14 shall apply at the test site.		P
	If the adjusted limits given in Table 14 lead to temperatures at the test site which the manufacturer considers to be excessive, the testing procedure and the limits shall be agreed.		P
8.10.3	Adjustments to take account of hydrogen purity on test		P
	For windings directly or indirectly cooled by hydrogen, no adjustment shall be made to limits of temperature rise or of total temperature if the proportion of hydrogen in the coolant is between 95 % and 100 %.		P
8.10.4	Permanently short-circuited windings, magnetic cores and all structural components (other than bearings) whether or not in contact with insulation		P
	The temperature rise or the temperature shall not be detrimental to the insulation of that part or to any other part adjacent to it.		N
8.10.5	Commutators and sliprings, open or enclosed and their brushes and brushgear		N
	The temperature rise or temperature of any commutator, slipring, brush or brushgear shall not be detrimental to the insulation of that part or any adjacent part.		P
9	Other performance and tests		N
9.1	Routine tests		N
	Routine tests are always factory tests. They can only be performed on machines which are assembled at the works of the manufacturer. The machine need not be completely assembled. It can lack components which are not significant for the testing. Routine tests do not need the machine to be coupled except for the open-circuit test on synchronous machines.		N
9.2	Withstand voltage test		N

	A test voltage, as specified below, shall be applied between the windings under test and the frame of the machine, with the core and the windings not under test connected to the frame. It shall be applied only to a new and completed machine with all its parts in place under conditions equivalent to normal working conditions and shall be carried out at the manufacturer's works or after erection on site. When a thermal test is carried out, the withstand voltage test shall be carried out immediately after that test.		N
	When a user and a repair contractor have agreed to carry out withstand voltage tests in cases where windings have been partially rewound or in the case of an overhauled machine, the following procedure is recommended:		N
	a) partially rewound windings are tested at 75 % of the test voltage for a new machine. Before the test, the old part of the winding shall be carefully cleaned and dried;		N
	b) overhauled machines, after cleaning and drying, are subjected to a test at a voltage equal to 1,5 times the rated voltage, with a minimum of 1 000 V if the rated voltage is equal to or greater than 100 V and a minimum of 500 V if the rated voltage is less than 100 V.		N
9.3	Occasional excess current		N
9.3.1	General		N
	The excess current capability of rotating machines is given for the purpose of co-ordinating these machines with control and protective devices. Tests to demonstrate these capabilities are not a requirement of this standard		N
9.3.2	Generators		N
	AC generators having rated outputs not exceeding 1 200 MVA shall be capable of withstanding a current equal to 1,5 times the rated current for not less than 30 s.		N
	AC generators having rated outputs above 1 200 MVA shall be capable of withstanding a current equal to 1,5 times the rated current for a period which shall be agreed, but this period shall be not less than 15 s.		N
9.3.3	Motors (except commutator motors and permanent magnet motors)		N
	Polyphase motors having rated outputs not exceeding 315 kW and rated voltages not exceeding 1 kV shall be capable of withstanding:		N

	– a current equal to 1,5 times the rated current for not less than 2 min.		N
9.3.4	Commutator machines		N
	A commutator machine shall be capable of withstanding, for 60 s, 1,5 times rated current under the appropriate combination of conditions as follows:		N
9.4	Momentary excess torque for motors		N
9.4.1	Polyphase induction motors and d.c. motors		P
	Motors, whatever their duty and construction, shall be capable of withstanding an excess torque of at least 60 % of their rated torque for 15 s without either stalling or exhibiting an abrupt change of speed (under gradual increase of torque). The voltage and frequency (for induction motors) shall be maintained at their rated values.		P
	In the case of special types of induction motors with special inherent starting properties, for example motors intended for use at variable frequency or induction motors supplied from static converters, the value of the excess torque shall be the subject of agreement.		P
9.4.2	Polyphase synchronous motors		N
	Unless otherwise agreed, a polyphase synchronous motor, irrespective of the duty, shall be capable of withstanding an excess torque as specified below for 15 s without falling out of synchronism, the excitation being maintained at the value corresponding to rated load. When automatic excitation is used, the limits of torque shall be the same values with the excitation equipment operating under normal conditions:		N
9.4.3	Other motors		N
	The momentary excess torque for single-phase, commutator and other motors shall be the subject of agreement.		N
9.5	Pull-up torque		N
	Unless otherwise specified (for example machines according to IEC 60034-12), the pull-up torque of cage induction motors under full voltage shall be not less than 0,3 times the rated torque.		N
9.6	Safe operating speed of cage induction motors		N
	All three-phase single-speed cage induction motors of frame number up to and including 315 and for voltages up to and including 1 000 V shall be capable of safe continuous operation at speeds up to the appropriate speed given in Table 17 unless otherwise stated on the rating plate.		N

9.7	Overspeed		N
	Machines shall be designed to withstand the speeds specified in Table 18.		N
9.8	Short-circuit current for synchronous machines		N
	Unless otherwise specified, the peak value of the short-circuit current for synchronous machines, including turbine-type machines not covered by IEC 60034-3, in the case of short circuit on all phases during operation at rated voltage, shall not exceed 15 times the peak value or 21 times the r.m.s. value of the rated current.		N
9.9	Short-circuit withstand test for synchronous machines		N
	The three-phase short-circuit test for synchronous machines shall be carried out only at the request of the purchaser. In this case, the test shall be carried out on the machine running on no-load with an excitation corresponding to the rated voltage unless otherwise agreed. The test shall not be carried out with an excitation greater than that corresponding to 1,05 times the rated voltage at no load.		N
9.10	Commutation test for commutator machines		N
	A d.c. or a.c. commutator machine shall be capable of operating from no-load to operation with the excess current or excess torque, specified in 9.3 and 9.4 respectively, without permanent damage to the surface of the commutator or brushes and without injurious sparking, the brushes remaining in the same set position. If possible, the commutation test shall be performed in warm conditions.		P
9.11	Total harmonic distortion (THD) for synchronous machines		--
9.11.1	General		N
	The requirements of this subclause apply only to synchronous machines having rated outputs of 300 kW (or kVA) or more, intended for connection to power networks operating at nominal frequencies of 16 2/3 Hz to 100 Hz inclusive, with a view to minimizing interference caused by the machines.		P
9.11.2	Limits		N
	When tested on open-circuit and at rated speed and voltage, the total harmonic distortion (THD) of the line-to-line terminal voltage, as measured according to the methods laid down in 9.11.3, shall not exceed 5 %.		N
9.11.3	Tests		N

	Type tests shall be carried out on a.c. machines to verify compliance with 9.11.2. The range of frequencies measured shall cover all harmonics from rated frequency up to the 100th harmonic.		P
10	Rating plates		P
10.1	General		P
	Every electrical machine shall be provided with a rating plate(s). The plates shall be made of durable material and be securely mounted. The writing has to be made with durable print.		P
10.2	Marking		P
	Machines with rated outputs up to and including 750 W (or VA) and dimensions not covered by IEC 60072 shall be marked with the information given in items a, b, k, l and z below as a minimum. For special-purpose and built-in machines with rated outputs up to and including 3 kW (or kVA) items a, b, k and l shall be marked as a minimum and item z may be provided in another form.		P
	The items are numbered for convenient reference, but the order in which they appear on the rating plate(s) is not standardized. Items may be suitably combined.		P
	a) The manufacturer's name or mark.	See the label	P
	b) The manufacturer's serial number, or identification mark.	HH48-750	P
	c) Information to identify the year of manufacture.		P
	d) The manufacturer's machine code.		P
	e) For a.c. machines, the number of phases.	AC machine, Single phase	N
	f) The number(s) of the rating and performance standard(s) which are applicable		P
	g) The degree of protection provided by the integral design of the rotating electrical machine(IP code) in accordance with EN 60034-5.		P
	h) For motors within the scope of EN 60034-30, the efficiency class (IE code) and the rated		P
	i) The thermal class and the limit of temperature or of temperature rise		P
	j) The class(es) of rating of the machine if designed for other than rating for continuous running duty S1, see 5.2.		P
	k) The rated output(s) or range of rated output.		N
	l) The rated voltage(s) or range of rated voltage.		N
	m) For a.c. machines the rated frequency or range of rated frequency.		N

	n) For synchronous machines excited by permanent magnets the open circuit voltage at rated speed		N
	o) The rated current(s) or range of rated current.	16A	P
	p) The rated speed(s) or range of rated speed.		P
	q) The permissible overspeed if other than specified in 9.7.		N
	r) For d.c. machines with separate excitation or with shunt excitation and for synchronous machines, the rated field voltage and the rated field current.		P
	s) For a.c. machines, the rated power factor(s).		N
	t) For wound-rotor induction machines, the rated open-circuit voltage between slip-rings and the rated slip-ring current.		P
	u) For d.c. motors with armatures intended to be supplied by static power converters		P
	v) The maximum ambient air temperature, if other than 40 °C.		P
	w) The minimum ambient air temperature if other than specified in 6.4.		P
	x) The altitude for which the machine is designed (if exceeding 1 000 m above sea-level).		P
	y) For hydrogen-cooled machines, the hydrogen pressure at rated output.		N
	z) When specified, the approximate total mass of the machine, if exceeding 30 kg.		N
	bb) The connecting instructions in accordance with IEC 60034-8 by means of a diagram or text located near the terminals.		N
	Except for normal maintenance, when a machine is repaired or refurbished an additional plate shall be provided to indicate the name of the company undertaking the work, the year of repair and the changes made.		P

11	Miscellaneous requirements		N
11.1	Protective earthing of machines		N
	Machines shall be provided with an earthing terminal or another device to permit the connection of a protective conductor or an earthing conductor.		N
	a) they are fitted with supplementary insulation, or;		N
	b) they are intended for assembly in apparatus having supplementary insulation, or;		N
	c) they have rated voltages up to 50 V a.c. or 120 V d.c. and are intended for use on SELV circuits.		N

	For other cross-sectional areas of phase conductors, the earthing or protective conductor shall have a cross-sectional area at least equivalent to:		N
	– that of the phase conductor for cross-sectional areas less than 25 mm2;		N
	– 25 mm2 for cross-sectional areas between 25 mm2 and 50 mm2;		N
	– 50 % of that of the phase conductor for cross-sectional areas exceeding 50 mm2.		N
11.2	Shaft-end key(s)		N
	When a machine shaft end is provided with one or more keyways, each shall be provided with a full key of normal shape and length.		N

12	Tolerances		N
12.1	Tolerance is the maximum allowed deviation between the test result of a quantity from Table 20 and the declared value on the rating plate or in the catalogue. As long as test procedures and test equipment according to IEC standards are used, the test result shall not exceed the allowed deviation independent of test laboratory or equipment. Tolerance does not cover the uncertainty of a test procedure, i.e. the deviation between the test result and the true value.		N
12.2	Tolerances on values of quantities		N
	Unless stated otherwise, tolerances on declared values shall be as specified in Table 20.		N
13	Electromagnetic compatibility (EMC)		N
13.1	General		N
	The following requirements apply to rotating electrical machines with rated voltages not exceeding 1 000 V a.c. or 1 500 V d.c. and which are intended for operation in industrial environments.		N
13.2	Immunity		--
13.2.1	Machines not incorporating electronic circuits		N
	Machines without electronic circuits are not sensitive to electromagnetic emissions under normal service conditions and, therefore, no immunity tests are required.		N
13.2.2	Machines incorporating electronic circuits		N
	As electronic circuits which are incorporated in machines generally utilize components that are passive (for example diodes, resistors, varistors, capacitors, surge suppressors, inductors), immunity tests are not required.		N
13.3	Emission		--

13.3.1	Machines without brushes		N
	Radiated and conducted emissions shall comply with the requirements of CISPR 11, Class B, Group 1, see Table B.1.		N
13.3.2	Machines with brushes		N
	Radiated and conducted (if applicable) emissions shall comply with the requirements of CISPR 11, Class A, Group 1, see Table B.2.		N
13.4	Immunity tests	Immunity tests are not required.	N
13.5	Emission tests		N
	Type tests shall be carried out in accordance with CISPR 11, CISPR 14 and CISPR 16 as applicable.		N
13.5.1	Machines without brushes		N
	Machines without brushes shall comply with the emission limits of 13.3.1.		N
13.5.2	Machines with brushes		N
	Machines with brushes, when tested at no-load, shall comply with the emission limits of 13.3.2.		N

14	Safety		P

Annex A	Guidance for the application of duty type S10 and forestablishing the value of relative thermal life expectancy TL		P

Annex B	Electromagnetic compatibility (EMC) limits		N

ANNEX A:

Photo-documentation

Photo 1 General Appearance of the EUT

Photo 2 General Appearance of the EUT

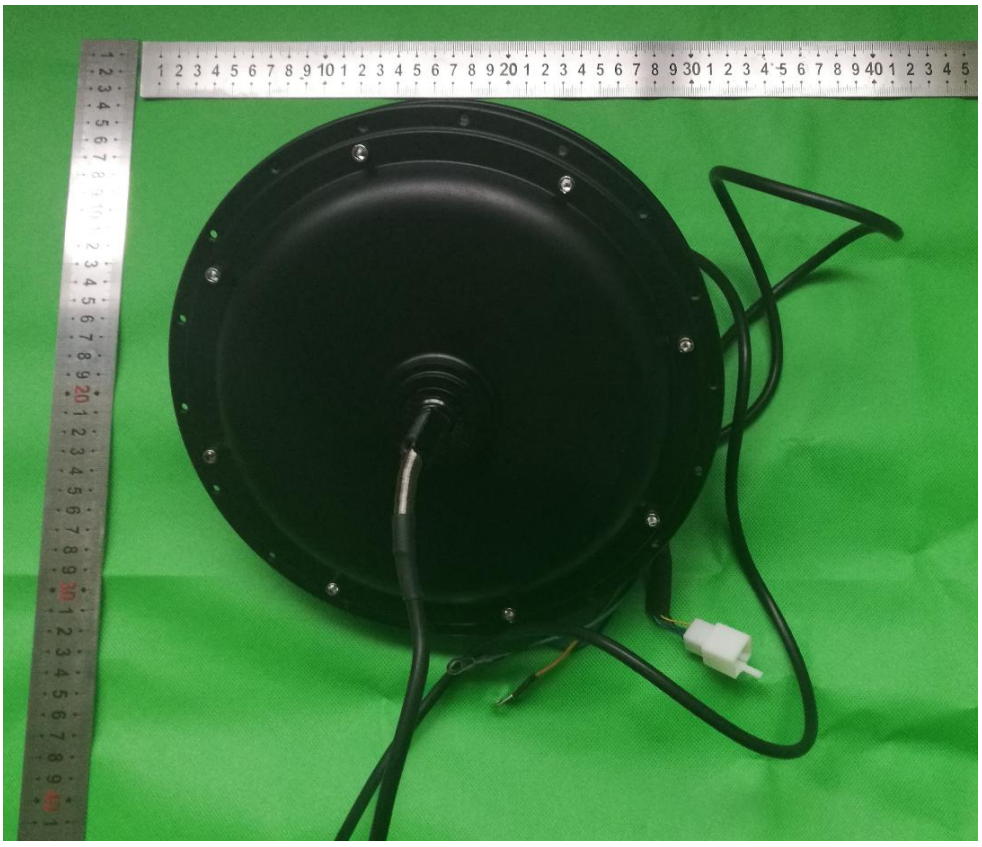

Photo 3 General Appearance of the EUT