CSA INTERNATIONAL

Descriptive Report and Test Results

MASTER CONTRACT: 215310
REPORT: 2370873
PROJECT: 2370873

Edition 1: March 25, 2011; Project 2370873 – Toronto
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Contents:

PRODUCTS

CLASS 3881 51 - TOOLS - Portable
CLASS 3881 81 - TOOLS - Portable - CERTIFIED TO U.S. STANDARDS

Model	Description	V	Hz	A	n_o/min.
PMD3530	Magnetic drill press, cord-connected, grounded	115	60	8.0	650

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APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No. 745-1-95 (UL 745-1-2nd Edition)	-	Safety of Portable Electric Tools--Part 1: General Requirements
CAN/CSA-C22.2 No. 745-2-32-95 (UL 745-2-32-1st Edition)	-	Safety of Portable Electric Tools--Part 2: Particular Requirements for Magnetic Drill Presses

MARKINGS

Submittor's name and/or Contract No. 215310, adjacent to the CSA Monogram with the C US Indicator. Model designation. Complete electrical rating in Volts, symbol for AC supply, Hertz, Amps. Protective earthing symbol. Date code or equivalent. Rated no load speed n_o/min. "off" position of the mains switch marked with "0".

The product listed is eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

"WARNING - To reduce the risk of injury, user must read and understand instruction manual. Always use safety chain. Mounting can release."
and
"AVERTISSEMENT. Afin de reduire le risque de blessures, l 'utilisateur doit lire et bien comprendre le mode d 'emploi. Employez toujours une chaine de securite. Le dispositif de montage pourrait se defaire."

Note: Minimum 2.4mm high letters for "WARNING".

Note: Bilingual Markings for products with CSA Mark.

Jurisdictions in Canada may require these markings to be also in French. It is the responsibility of the manufacturer to provide bilingual marking, where applicable, in accordance with the requirements of the Provincial Regulatory Authorities. It is the responsibility of the manufacturer to determine this requirement and have bilingual wording added to the products.

INSTRUCTIONS

See standard CAN/CSA-C22.2 No. 745-1-95 (UL745-1-2nd Edition) and CAN/CSA-C22.2 No. 745-2-32-95 (UL 745-2-32-1st Edition) for details.

An instruction manual and safety instructions shall be provided with the tool and packaged in such a way that is noticed by the user when the tool is removed from the packaging. An explanation of the symbols required shall be provided in either the instruction manual or the safety instructions.
They shall be written in the official language(s) of the country in which the tool is sold.
The Instructions shall be legible and contrast with the background.
The instruction manual shall include the name and address of the manufacturer or supplier of any other agent responsible for placing the tool on the market.
The general safety instructions may be separate from the instruction manual.
The Safety Rules specified in this clause, if in English shall be verbatim and in the exact order as given and in any other official language to be equivalent.
Format of all safety warnings must differentiate, by font highlighting or similar means.

Additional Safety Instructions

Magnetic Drill Press Safety Rules:
- Always use safety chain. Mounting can release.

ALTERATIONS

1. Marking as above.
2. The material of bonding screw and external tooth star washer is zinc-plated steel. The external tooth star washer is placed between the Aluminum Gear Case and the closed loop connector to prevent electrochemical action.
3. Power supply cord where secured by the clamp is additionally sleeved with a PVC tube.
4. A 2-piece plastic Handle Bracket wrapped around the motor enclosure and secured together with two 4x16 mm screws is provided for mounting the carrying handle.

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

1. Component Substitution
   a) Critical components (those identified by mfr name, cat no) are not eligible for substitution without evaluation and report updating.
   b) Component descriptions marked with the identifier "(CT)" are subject to annual pickup and Conformity Testing.
   c) Component descriptions marked with the identifier "(INT)" are the only components that are eligible for substitution at the factory.
   d) Substitution of a CSA Certified component with a component "Certified" or "Listed" by another organization may result in annual sample pickup and Conformity Testing.
   e) Substitution of a "Certified" or "Listed" component with a component that is "Recognized" or "Accepted" is not permitted without evaluation and report updating.
   f) When report is identified by UL CSA or UL/CSA, it means either UL or CSA is acceptable.

FACTORY TESTS

Electric Strength Test

The manufacturer shall determine by routine production-line test that each tool produced will withstand without an indication of unacceptable performance, the application of a potential as given in the following table. The duration of application shall be 1 second.

Points between which potential is to be applied	Test potential		
	Class		
	I	II	III
1. Live parts and dead metal parts insulated from each other by basic insulation.	1200	1200	500
2. Accessible dead metal parts or, for a tool with an outer enclosure of insulating material, metal foil wrapped tightly around the enclosure and inaccessible metal parts including metal foil in contact with the insulating barriers provided for spacings involving supplementary or reinforced insulation.		1500	
3. Live parts and accessible dead metal parts or, for a tool with an outer enclosure of insulating material, metal foil wrapped tightly around the enclosure.		3000	
Note A: If necessary because of the inaccessibility of parts, test in accordance with items 1 and 2 may be conducted on sub-assemblies of the tool, and, in this case, the test indicated in item 3 is to be conducted. If the tests in accordance with item 1 and 2 are conducted on the completely assembled tool, the tests indicated in item 3 may be omitted if there is no reinforced insulation.			
Note B: Those parts of the tests described in items 2 and 3 that include application of metal foil to outer enclosures of insulating material may be waived if the manufacturer has an acceptable quality control program. This program is to determine that the insulating material in question is free from cracks and metal inclusions, and that it has the physical and electrical strength required for the application. To determine that the material is free of cracks or metal inclusions, a 100 percent visual inspection is required. Periodic physical-property tests on molded parts shall also be conducted.			
Note C: The test of item 3 may be waived for accessible metal parts, such as assembly screws, that are: (1) isolated by an outer enclosure of insulating material that is subject to the control program indicated in Note B and (2) are so located that they are remote from live parts and from inaccessible metal parts separated from live parts by basic insulation only. The remoteness is to include consideration of possible displacement of parts as the result of improper assembly.			

The tool may be in a heated or unheated condition for the test.
The test shall be conducted with the tool complete, fully assembled. It is not intended that the tool be un-wired, modified, or disassembled for the test.
Parts such as snap covers, auxiliary handles, guards, or friction-fit knobs that would interfere with the performance of the test need not be in place.
The test may be performed before final assembly if such a test represents that of the completed tool.

If the tool employs a solid-state component that can be damaged by the test potential, the test on each tool may be conducted before the component is electrically connected. In such a case, additional testing is to be made of a random sampling of each day's production with the circuitry rearranged to reduce the likelihood of damage to any solid-state component but retaining representative dielectric stress of the circuit.

The specified control of the applied voltage, manual or automatic, shall be maintained under conditions of varying line voltage. Higher test potentials may be used if the higher dielectric stress is not likely to adversely affect the insulating systems of the product.
The test equipment is to have the following features and characteristics:

A. A means of indicating the test voltage that is being applied to the tool under test. This may be accomplished by sensing the voltage at the test leads or by an equivalent means.

B. An output voltage that (1) has a sinusoidal waveform, (2) has a frequency that is within the range of 40 n 70 Hz, and (3) has a peak value of the waveform that is not to be less than 1.3 and not more than 1.5 times the root-mean-square value. As an alternative, a DC potential of 1.4 times the RMS value may be used.

C. A means of effectively indicating unacceptable performance. The indication is to be (1) auditory if it can be readily heard above the background noise level, (2) visual if it commands the attention of the operator, or (3) a device that automatically rejects an unacceptable product. If the indication of unacceptable performance is auditory or visual, the indication is to remain active and conspicuous until the test equipment is reset manually.

D. When the test equipment is adjusted to produce the test voltage and a resistance of 120,000 ohms is connected across the output, the test equipment is to indicate an unacceptable performance within 0.5 second. A resistance of more than 120,000 ohms may be used to produce an indication of unacceptable performance, if the manufacturer elects to use a tester having higher sensitivity.

There is not to be any transient voltage applied to the tool under test that results in the instantaneous voltage applied to the product exceeding 120 percent of the peak value of the test voltage that the manufacturer elects to use for this test. This requirement applies for the entire duration of the test, including the time that the voltage is first applied to the product and the time that the voltage is removed from the product.

During the test, a sufficient number of primary switching components shall be in the on position so that all primary circuitry will be stressed. Both sides of the primary circuit of the appliance are to be connected together to one terminal of the test equipment. The second equipment terminal is to be connected to accessible dead metal.

Tools utilizing motors, relays, coils or transformers, having circuitry not subject to excessive secondary build-up in case of indication of unacceptable performance during the test, may be tested with only one side of the primary circuit connected to the dielectric test equipment.

WARNING: The factory test(s) specified may present a hazard of injury to personnel and/or property and should only be performed by persons knowledgeable of such hazards and under conditions designed to minimize the possibility of injury.

Grounding Continuity Test

Each tool shall be tested as a routine production-line test to determine that grounding continuity is provided between the grounding pin of the attachment plug and all accessible dead metal parts of the tool.

This continuity shall be determined through the use of a buzzer, light, ohmmeter, or other suitable indication of continuity.

DESCRIPTION

Notes:
1. The term "(INT)", following the component name, denotes a certified component that can be replaced by one from another certified source (approved by OSHA/SCC accredited body for the same application) provided that it has an equivalent rating, configuration (size, orientation, mounting) and that applicable minimum creepage and clearance distances are maintained from live parts to bonded metal parts and secondary parts.
2. The term "(CT)", following the component name, denotes a component that is subject to periodic re-testing unless evidence of re-testing equivalent to the CSA program is available.

Subject model is a grounded portable tool.
The following table itemizes the product covered along with its electrical ratings.

Model	Description	V	Hz	A	n_o/min.
PMD3530	Magnetic drill press, cord-connected, grounded	115	60	8.0	650

MODEL DIFFERENCES BY ITEM NO

Model	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
PMD3530	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
1		Magnetic Base		Steel	Overall 165mm by 80mm by 48mm high. Provided with two spaces, each 76mm dia by 36mm deep by 12mm wide, for housing magnetic coils. The bobbin end flanges act as enclosure for coils.	
2		Gear Case		Die-cast Aluminum	Serves as enclosure. Overall 280mm by 101mm by 107mm high by 3mm thick. Provided with a quick-release crank lever sleeved with a plastic grip. Secured to Magnetic Base with three screws and spring washers.	
3		Gear Cover		Die-cast Aluminum	Overall 121mm by 98mm by 100mm high by 3mm thick. Secured to Gear Case with four screws.	
4		Switch Bracket		Steel	Serves as part of enclosure. Overall 113mm by 94mm by 62mm high by 1mm thick. Secured to Gear Case with four screws.	
5		Mounting Plate		Steel	Serves as part of enclosure. Overall 67mm by 45mm by 1mm thick. Secured to Gear Case with three screws.	
6		Handle Bracket		Same material as Motor Enclosure	Two-piece construction, overall 112mm by 96mm by 42mm by 5mm thick. Wrapped around Motor Enclosure and secured together with two 4 x 16mm screws. The area for securing Carrying Handle is 14 mm thick.	
7		Carrying Handle		Rubber and steel	Rubber belt sandwiched with a 0.4 mm thick steel band. Secured to Gear Cover and Handle Bracket with 0.5mm thick steel cover on both ends and machine screws.	

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
8		Safety Chain	A.I.Q. Enterprise Co., Ltd.	Type LT003G	TUV License S50176253. Single-piece ratchet tie down & cam buckle. The material of ratchet is Steel JIS G3131 SPHC. The material of webbing is polyester (black) by 'Chi Hao'. Rated 75kg.	TUV
9		Power Supply Cord		Type SJTW	16/3 AWG, 60°C min. 1.8m long min. from the face of the attachment plug to the point of entry to the tool. 26 strands per conductor, provided with NEMA 5-15P plug. Other end terminated with sleeved quick connectors. Black lead is connected to switch terminal. Type M attachment.	CSA UL
10		Bonding			The green conductor of Power Supply Cord is secured to a certified closed loop crimp type connector and then secured to inside of Gear Case with a minimum No. 6 zinc-plated steel screw and a zinc-plated steel external tooth star washer. The external tooth star washer is placed between the Gear Case and the closed loop connector to prevent electrochemical action. Two threads are engaged in Gear Case.	CSA UL
11		Cord Guard		PVC	Overall 73mm long by 17mm OD by 12mm ID at one end, 14mm OD by 7.5mm ID at the opposite end. Provided with a 3 mm thick lip to nest inside Gear Case. External beyond the Body is 60mm (Min. 56mm) long.	
12		Cord Anchorage		PA6	Power Supply Cord is secured to Gear Case with a nylon clamp and two 4mm dia. screws. Cord where secured by the clamp is additionally sleeved with a PVC tube.	
13		Magnet Switch	Canal	R Series	Rated 16 A, 125 V ac, 1/4 hp. Special use, rocker type, illuminated. DPDT. Quick disconnect type terminals. Physical-fitted in a suitably sized opening on Switch Bracket. 1 and 0 marked on the switch.	CSA UL
14		Magnet			Two provided. Class E. Each seated in Magnetic Base and completely potted with epoxy, minimum 1.5mm thick. The bobbin material also acts as enclosure for coil. Consists of the following components:	
I	QMFZ2	Bobbin	Nan Ya	PA6 2210G6	Rated HB at 0.75mm thick, HWI-2, HAI-0, CTI-0. Overall 76mm OD by 51mm ID by 36mm high by 1.5mm thick.	UL
II		Outerwrap		Mylar	130°C, 1.6mm thick.	UL
III		Coil		Enameled copper wire	0.21mm dia, 4000 turns. Minimum 1.5mm is maintained between Coil and Magnetic Base.	UL
IV		Lead Wires		TEW/UL 1015	20AWG, rated 600Vac, 105°C. One end is terminated in a certified sleeved crimp type quick connect terminal for connection to Printed Wiring Board of Overload Protection; the other end is mechanically secured and soldered to Coil of Magnet. The lead wires where go through Magnetic Base are additionally sleeved with heat-shrinkable tubing, min 1.0mm nominal thickness.	CSA UL

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
V		Potting Compound	Shaw Huow Ent.	Epoxy 9001A/9001B	Rated V-0 at 1mm thick, CTI-0.	UL
15		Motor Switch	Zhejiang Yueqing Puqi (KEDU)	KJD-17	Rated 120Vac, 12A, 1/2HP. Electromagnetic type. Quick disconnect type terminals. Provided with plastic button guards. Provided with plastic dust cover over the buttons. Physical-fitted in a suitably sized opening on Switch Bracket. 1 and 0 marked on On and Off button, respectively.	UL CUL
16		Overload Protection			Optional. Secured to inside the Gear Case with screws and spring washers. Consists of the following major components:	
I	QMFZ2	Housing	Nan Ya	PA6 2210G6	Rated HB, all, 1.5mm, HWI-2, HAI-0, 120°C. Overall 60mm by 52mm by 13mm by 1.6mm nominal thickness.	UL
II		Printed Wiring Board		Phenolic	Rated V-1 or better. Overall 56mm by 48mm by 1.6mm thick. The board is located in the Housing and potted with epoxy.	UL
III		Relay (RY1)	Song Chuag	875B-1CH-F-C	Rated 125Vac, 20A. Coil 24Vdc. Accepted with test for 39 LRA.	CSA UL
IV		Potting Compound	Shaw Huow Ent.	Epoxy 9001A/9001B	Rated V-0 at 1mm thick, CTI-0.	
V		Leads		TEW/UL 1015	Rated 600V, 105°C. 16AWG: for connection to Magnetic Switch and Motor Switch. One end is mechanically secured and soldered to the Printed Wiring Board; the other end is terminated in certified sleeved crimp type quick connect terminals for connection. 18 AWG: for connection to Magnet. One end is mechanically secured and soldered to the Printed Wiring Board; the other end is terminated in certified sleeved crimp type male quick-connect.	CSA UL
17		Motor			Universal type, Rated 115Vac, 8A, 29000rpm. Insulation Class E. Secured to Gear Cover with four screws.	
I	QMFZ2	Enclosure	Nan Ya (E130155)	PA6 2210G6	Rated HB, all, 1.5mm. HWI-2, HAI-0, 100°C. Overall 96mm by 86mm tapering to 84mm by 77mm by 108mm long by 3mm nominal thickness. Additional provided with an integral compartment underneath the enclosure, overall 46mm by 40mm by 22mm. Secured to Gear Cover with four screws.	UL
II		End Cover	Same as Enclosure	Same as Enclosure	Overall 101mm by 76mm by 43mm by 3mm nominal thickness. Provided with 36 louvered slot openings, measured 6mm to 27mm long by 0.4mm effective width. Secured to Enclosure with two screws.	

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
III		Brush Holder		Phenolic	Overall 42mm by 22mm by 3mm thick. Provided with integral brush carrier measured 18mm by 14mm by 17mm by 3mm thick. Provided with a limit length slot, 8.5mm long, at the side to limit brush spring travel at end of brush life. Secured to Enclosure with two screws. Provided with torsion spring for loading brush. Provided with an embedded nut for connection of brush lead.	
IV		Brush		Carbon	17mm by 11mm by 7mm. Provided with shunt wire.	
V		Stator		Laminated Steel	73mm OD by 42mm ID by 45mm stack. Class E insulation.	
VI	OBM W2	Stator Winding	Pacific Electric Wire (E84081)	ANSI MW30C PEWH	Enameled copper wire. 180C. 0.95mm dia by 54 turns. 180C Varnish impregnated. Formed to space 2mm min. from stator laminations.	UL
	OBM W2	Alternate Stator Winding Material	Tai-I Electric Wire (E85640)	ANSI MW30C EIW	Enameled copper wire. 180C.	UL
VII		Stator Slot Liner		Isonom NMN0881	180C. 0.2mm thick. Extends min. 1.5mm beyond stator laminations.	UL
VIII		Coil Strap		Steel	Two provided. 7mm wide, secures each coil to the core and insulated from the winding with two wraps of polyester film coated electrical paper, 0.25 mm thick per layer. Wrap extends at least 2.5 mm beyond coil strap. Minimum 2.5 mm creepage distances and 2.0 mm clearance distances are maintained between coil and core.	
IX		Stator Lead		TEW	16AWG. Rated 600V, 105°C. Mechanically secured and welded to winding. Sleeved with a silicone-coated fiberglass tube at winding connection. Terminated in a crimp type ring connector for connection.	UL CSA
X		Armature		Laminated Steel	41mm OD by 45mm stack. 12 slots. Class E insulation.	
XI	OBM W2	Armature Winding	Pacific Electric Wire (E84081)	ANSI MW30C PEWH	Enameled copper wire. 180C. 0.6mm dia. by 10 turns. Varnish impregnated.	UL
	OBM W2	Alternate Armature Winding Material	Tai-I Electric Wire (E85640)	ANSI MW30C EIW	Enameled copper wire. 180°C.	UL
XII		Shaft		Steel	Double/reinforce insulated.	

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
XIII		Shaft Insulation	Lorenz Kunststoff techink GmbH (E132532)	BMC Polyester MK2753	HB. 130°C. Extends through centre of armature laminations, windings and commutator. Min 1mm thick under laminations and commutator as supplementary insulation. Min 1.5mm thick under windings as reinforced insulation. Extends minimum 2mm beyond commutator support and 5mm beyond windings on fan end. Provided with a 28mm OD by 1.6mm thick phenolic spacer between commutator bars and bearing.	UL
XIV		Armature Slot Liner		Mylar	0.25mm thick. Extends minimum 1.5mm beyond lamination. Slot line is double folded to retain winding	
XV		Armature Slot Wedge		Vulcanized Fibre	Minimum 1mm thick. Extending min. 1.5mm beyond laminations.	
XVI		Armature End Spider		Vulcanized Fibre	Minimum 1.5mm thick at laminations.	
XVII		Commutator			28mm OD, 16mm long, 24 bars.	
XVIII		Commutator Insulation		Phenolic	1.0mm thick min. Basic insulation	
XIX		Fan		Plastic	Radial type. 70mm OD by 10mm. 14 blades.	
18		LED Assembly			Consists of the following components:	
I		LED			Rated 3V dc, 20mA, white colour.	
II		Diode (INT)		1N4007	Rated 700V, 1A, mechanically secured and soldered in the LED lead wire and fully sleeved with a 1.0 mm thick certified heat-shrinkable tube.	
III		Resistor		Carbon type	Rated 47k ohms, 2W, mechanically secured and soldered in the LED lead wire and fully sleeved with a 1.0 mm thick certified heat-shrinkable tube.	
IV		Lead Wires		TEW	20AWG. Rated 300V, 105°C.	CSA UL
19		Tool Holder		Steel	50mm max. Quick-release type.	

TEST RESULTS

PROJECT 2370873

Tests Conducted At:
Lee Yeong Industrial Co., Ltd., No 29, Fu-Hsing Rd., Tou-Liu City industrial Zone, Yun Lin Hsien, Taiwan

MODEL TESTED: Magnetic Drill Press, Model PMD3530 equipped with overload protection circuit
MARK RATING: 115Vac, 60Hz, 8.0A, 650n_o/min.

Tested to:
CSA / UL 745-1-95 – Safety of Portable electric tools - Part 1
CSA / UL 745-2- 32 – 95 – Particular requirements for Magnetic Drill Presses

Note: The following tests with asterisk* were extracted from the submittor's report 2304045 conducted on Model SMA502 since Model PMD3530 uses same motor and switches, and similar magnet and overload protection circuit those used for Model SMA502.

STARTING: Cl. 9
No load, 10 times at 0.85 rated voltage
Fuse: 15 A ordinary.
Results: OK

INPUT CURRENT: Cl. 10
Tests were performed as required by the Part 2 Std.
Normal load:

Test	Volts	Hz	Amps	Watts	RPM	Torque	Conditions
*1	115	60	4.6	560	(25742)	-	No load (at dynamo)
2	115	60	5.3	620	636	-	No load (at tool)
3	115	60	8.0	920	-	-	Normal load (motor & coil)
*4	115	60	8.0	930	(20033)	0.35 kg-m	Rated input (at dynamo)
*5	122	60	8.0	999	(21650)	0.35 kg-m	Rated input (at dynamo)
*6	108	60	7.9	863	(18738)	0.35 kg-m	Rated input (at dynamo)
7	122	60	0.31	54	-	-	Coil only
*8	115	60	39.0	-	-	-	Locked rotor

( ) RPM measured at motor shaft.
Results: OK

*HEATING: Cl. 11
Test was performed on the brake at 0.94, 1.00 and 1.06 rated voltage and rated current or at normal load as defined in Part 2, whichever has the highest current.

Load: Brake at rated voltage shown below

Operating period: Continuous

Condition of operation: i.e. Condition as required by part 2

Resistance of windings at t ambient: 29.5 °C
R_1 of field winding F_1 = 0.288 Ω
R_1 of rotor = 0.715 Ω between opposite segments.

Test voltage (V)	115	122	108		Allowed	
Input current (A)	8.0	8.0	7.9			
Input wattage (W)	930	999	863			
R_2 (Ω) of field winding F_1	0.338	0.338	0.337			
R_2 (Ω) of rotor	0.955	0.961	0.950			
Ambient temperature (t_1)	29.5	29.5	29.5			
Ambient temperature (t_2)	34.3	34.3	33.7			

Temperature Rise in °C

Insulation class: E						
Stator winding (fan end) (TC)	37.6	36.7	35.3		80	
Stator winding (non-fan end) (TC)	26.4	26.2	25.8		80	
Motor enclosure inside	20.2	21.1	19.0		75	
Power supply leads	21.8	26.4	26.0		35	
Internal wiring	18.6	20.4	19.2		80	
Ambient of switch	8.9	11.1	11.3		30	
Motor enclosure outside	14.2	15.9	14.4		60	
Grip area	2.0	1.5	2.1		50	
Brush holder	33.9	34.5	32.7		85	
Gear housing	15.9	22.2	18.4		60	
Stator winding (F1) R-R	41.2	41.2	40.9		90	
Armature winding R-R	83.8	86.3	82.7		90	
Ambient	34.3	34.3	33.7		-	

Results: OK

HEATING: Cl. 11
Test was performed on the brake at 0.94, 1.00 and 1.06 rated voltage and rated current or at normal load as defined in Part 2, whichever has the highest current.

Load: Brake at rated voltage shown below						
Operating period: Continuous Condition of operation: i.e. Condition as required by part 2						
Resistance of windings at t ambient: 25.8 °C R_1 of magnetic coil = 392 Ω						
Test voltage (V)	115	122	108	122	Allowed	
Input current (A)	8.0	8.0	7.9	0.31		
Input wattage (W)	930	999	863	-		
R_2 (Ω) of magnetic coil	-	-	-	452		
Ambient temperature (t_1)	-	-	-	25.8		
Ambient temperature (t_2)	-	-	-	27.3		
Temperature Rise in °C						
Insulation class: E						
Housing for O/L circuit	19.5	20.7	19.3	-	75	
Relay (RY1)	10.7	11.5	10.2	-	60	
Capacitor C2	15.3	16.4	15.2	-	70	
Resistor R1	20.6	22.9	20.0	-	-	
Resistor RL	19.5	20.7	19.3	-	-	
Bridge Diode DB1	23.9	25.2	23.2	-	100	
Magnetic coil R-R	-	-	-	38.3	90	
Outer Surface of Magnet	-	-	-	13.9	60	
Ambient	27.0	27.3	27.5	27.3	-	

Note: Motor temperature were performed in report 2304045
Results: OK

LEAKAGE CURRENT: Cl. 12
To be performed after temperature normal, at 1.06 rated voltage.
Max allowed: Class I: 0.5 mA
Tested at 1.06 rated voltage ac, 60 Hz at 122 volts

Polarity	Leakage Current (mA)	
	At Ambient	Hot
	S1 Open/Closed	S1 Open/Closed
Between line and exposed parts. SWITCH A		
Normal (1)	0.042/0.050	0.041/0.047
Reverse (2)	0.042/0.050	0.040/0.047

Results: OK

*MOISTURE RESISTANCE: Cl 14

Humidity test: Cl 14.4
Ordinary tools - 48 hours, 30°C, 93% humidity
Repeat leakage current, insulation resistance and electric strength tests.
1. Leakage Current:
Tested at 1.06 rated voltage ac, 60 Hz. i.e. 122 volts

Polarity	Leakage Current (mA)	
	At Ambient	Hot
	S1 Closed	S1 Closed
Between line and exposed parts. SWITCH A		
Normal (1)	0.04	0.03
Reverse (2)	0.04	0.03

2. Insulation Resistance:

Insulation Resistance	Required (Megohms)	Measured
Between live parts and the body - for basic insulation (class I) - Reinforced insulation	2 7	200 Megohms 500 Megohms

3. Electric strength Test:

CLASS			I
Points of application of test voltage	Test voltage		
Between live parts and parts of the body that are separated from live parts by: - Basic insulation only - Reinforced insulation			 1250 3750
Between live parts of different polarity			1250
Between metal foil in contact with handles, knobs, grips, and the like and their shafts, if these shafts can become live in the event of an insulation fault.			2500
Between the body and either metal foil wrapped around the supply flexible cable or cord inside inlet bushings, or guards, cord anchorages and the like, or a metal rod of the same diameter as the cord, inserted in its place.			1250

Results: OK

ENDURANCE TEST: Cl. 16

Tools with centrifugal or other starting switch.
24 hours at 1.1 times rated voltage – 126.5 volts (115V).
24 hours at 0.9 times rated voltage -- 103.5 volts (115V).
After above tests repeat the electric strength test at 50%, Cl. 15.3.
Electric strength Test:

CLASS			I
Points of application of test voltage	Test voltage		
Percent			50%
Between live parts and parts of the body that are separated from live parts by: - Basic insulation only - Reinforced insulation			 625 1875
Between live parts of different polarity			625
Between metal foil in contact with handles, knobs, grips, and the like and their shafts, if these shafts can become live in the event of an insulation fault.			1250
Between the body and either metal foil wrapped around the supply flexible cable or cord inside inlet bushings, or guards, cord anchorages and the like, or a metal rod of the same diameter as the cord, inserted in its place.			625

Results: OK

ABNORMAL TEST: Cl. 17

(a) Series motors: Operated at 1.3 times rated voltage for 1 min.
Results: OK.
(b) *Running overload on 3 samples: Abnormal operation, see below for results.
(c) Open/short circuit test: Cl B17
Component tested: D1, C6, D2, DB1 (ac to +), Q1 (C-E), Q1 (B-E)
Type of test performed: short-circuited.

Emission of flame.	No
3 A Fuse to ground opened.	No
Maximum Leakage (mA) = 0.05	Yes
Probe Test	Yes

Results: OK

*ABNORMAL OPERATION: Cl. 17 (3 samples are required)
(FUSE: 30 A FOR CLASS I, Max leakage for class I = 5 mA)
Cycling operation, increasing load by 10 percent of rated input every 15 minutes.

Sample #1

First Cycle 140% of rated input	
End results 170% of rated input	
Motor housing maximum temperature (°C)	45
30 A line fuse opened	No
Flames.	Yes
Motor winding open-circuited.	Yes
Tool stalls.	No
Sudden increase in current.	No
Tool operates.	No
Probe test compliance (cl. 4.2.2.1)	Yes
Maximum leakage current in mA.	0.18
Results: OK	

Sample #2

First Cycle 140% of rated input	
End results 170% of rated input	
Motor housing maximum temperature (°C)	43
30 A line fuse opened	No
Flames.	Yes
Motor winding open-circuited.	Yes
Tool stalls.	No
Sudden increase in current.	No
Tool operates.	No
Probe test compliance (cl. 4.2.2.1)	Yes
Maximum leakage current in mA.	0.15
Results: OK	

Sample #3

First Cycle 140 % of rated input	
End results 170 % of rated input	
Motor housing maximum temperature (°C)	45
30 A line fuse opened	No
Flames.	Yes
Motor winding open-circuited.	Yes
Tool stalls.	No
Sudden increase in current.	No
Tool operates.	No
Probe test compliance (cl. 4.2.2.1)	Yes
Maximum leakage current in mA.	0.2
Results: OK	

MECHANICAL HAZARDS: Cl. 18

(a) Check for accessibility of live parts or inaccessible metal parts.
(b) Use test finger (fig 1).
(c) After Mechanical strength, repeat electric strength at 75% of cl 15.3
Results: OK
(d) Chuck key investigation: Cl. 18.1 of Part 2 Std.
Results: N/A (No chuck key used)

MECHANICAL STRENGTH: Cl. 19

(a) Drop test or Impact as per flow chart 19.1
(i) Portable tools:
9 drops on one sample or 3 drops on each of the 3 samples as per Table in Part 1 Std.
Results: OK

(ii) Non-portable tools:
3 impacts, 6.8 J each
Results: OK

(iii) *Impact on switch actuators.
3 impacts, 1.4 J each.
Results: OK

(iv) Brush caps.
One impact, 1.4 J each.
Results: N/A. (brush cap not provided.)

(v)Torque test on brush caps with threaded periphery, 10 times, by removing and replacing.
Dia. of brush cap:
Torque applied (N.m):
Results: N/A (brush cap not provided)

After above tests, repeat insulation resistance or electric -strength and

Probe application. Yes
Check spacings. Yes

Insulation Resistance	Required (Megohms)	Measured
Between live parts and the body - for basic insulation (class I)	2	200 Megohms
- Reinforced insulation	7	500 Megohms

Results: OK

Electric strength Test:

CLASS			I
Points of application of test voltage	Test voltage		
Percent			75%
Between live parts and parts of the body that are separated from live parts by: - Basic insulation only - Reinforced insulation			 938 2812
Between live parts of different polarity			938
Between metal foil in contact with handles, knobs, grips, and the like and their shafts, if these shafts can become live in the event of an insulation fault.			1875
Between the body and either metal foil wrapped around the supply flexible cable or cord inside inlet bushings, or guards, cord anchorages and the like, or a metal rod of the same diameter as the cord, inserted in its place.			938

Results: OK.

CONSTRUCTIONS: Cls. 20-21

(a) Aging tests on seals and rubber parts used as supplementary insulation.
Results: N/A

b) Check spacings if screws in a tool can be replaced with longer screws.
Results: Satisfactory

c) Aluminum wires shall not be used as internal wires.
Results: No aluminum wires are used.

COMPONENTS: Cl. 22
Switch overload, switch is HP rated, 120 V ac, 12 A, 1/2 hp.
Switch Manufacturer: 'Zhejiang Yuaqing Fuqi'
Cat No: KJD-17
Results: Waived since the switch is HP rated and suitable for use.

SUPPLY CONNECTIONS: Cl. 23

Investigation of Type M attachment:
Pull Test: Clause 23.5
10 times, 3 x the weight of tool (50 lbs). The weight of tool is 10 kg.
Displacement of cord = 0.5 mm
Displacement of conductor at connector (near switch or terminal strip) = 0 mm
Results: OK.

*Flexing Test: Clause 23.7
(1) 10000 cycles of operation with the weight of tool or between 2 Kg to 6 Kg.
(2) 10000 cycles of operation with the same weight and cord rotated 90 degrees.
(3) After flexing, lifted tool by the cord guard, 1 sec, 10 times to a distance of 500 mm.

Cord: 'Ta An', 16/3 AWG, type SJTW, 26 strands/conductor.
Number of broken strands:

Neutral conductor -	0
Hot conductor -	0
Grounding conductor -	0
% of strands broken: Neutral/Hot/Ground	0/0/0

Results: OK

*Bending test: Check for excessive bending as per cl 23.6
Dia of cord (d) = 8.5 mm
Length of guard = 65 mm
Mass applied (grams) $10(d^2)$ = 723 grams
Measured curvature = 70 mm
Calculated curvature 1.5d = 12.8 mm
Results: OK

TERMINALS FOR EXTERNAL CONDUCTORS: Cl. 24 N/A

PROVISION FOR EARTHING: Cl. 25
Resistance measured = 0.06 ohms
Results: OK

INVESTIGATION OF SCREWS AND CONNECTIONS: Cl. 26

Type of screw	Location	Dia of screw (mm)	Torque applied (Nm)
Machine screw	Switch bracket	3.8	1.2
Machine screw	Carry belt	5.0	2.0
Tapping screw	Motor end cover	4.0	1.2
Machine screw	Brush electrical connection	4.0	1.2
Machine screw	Cord anchorage	3.8	1.2
Tapping screw	Gear housing	5.0	2.0
Machine screw	Handle Bracket	5.0	2.0

Results: OK

EVALUATION OF SPACINGS: Cl. 27
Results: OK

*RESISTANCE TO HEAT, FIRE AND TRACKING: Cl. 28

a. All enclosures enclosing live parts shall meet the following:
Ball pressure test
Sample: Motor enclosure
Material: Nylon, Type 2210G6 by 'Nan Ya'
Test was performed for one hour at 75°C
Diameter of impression: 0.1 mm
Results: OK

Sample: Coil bobbin
Material: Nylon, Type 2210G6 by 'Nan Ya'
Test was performed for one hour at 118°C
Diameter of impression: 1.9 mm
Results: OK

b. Mold stress test for 7 hours
Sample: Motor enclosure, Housing for rectifier module, micro switch, and O/L circuit.
Test was performed at 70°C.

Sample: Coil bobbin.
Test was performed at 113°C.
Results: OK

RESISTANCE TO RUSTING: Cl. 29 N/A
All enclosure material is made of aluminum, or painted/plated steel.