Descriptive Report and Test Results

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REPORT: 2767522
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Report pages reissued
Att1 Photos 10 added

Contents:

PRODUCTS

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

Model	Description	V	Hz	A	n/min
C14	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
CS14	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
C355	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
CS355	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
SC14	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
SCS14	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
SC355	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
SCS355	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
C14PRO	**Concrete Saw, 355mm, cord-connected, grounded**	**115**	**60**	**15**	**4500**

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APPLICABLE REQUIREMENTS

CAN/CSA-C22.2 No. 60745-2-22-12 (Upd.1) (UL 60745-2-22-1st Edition)	- Hand-Held Motor-Operated Electric Tools – Safety - Part 2-22: Particular Requirements for Cut-Off Machines
CAN/CSA-C22.2 No. 60745-1-07 (Upd.3) (UL 60745-1-4th Edition)	- Hand-Held Motor-Operated Electric Tools – Safety - Part 1: General Requirements

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

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, Hertz, Amps. Rated speed in revolutions per minute. Rated capacity in mm. An indication of direction of rotation of the spindle indicated by an arrow, raised or sunk.

Address of manufacturer. Date code or equivalent. Earthing terminal indicated by  .

The product listed is eligible to bear the CSA Mark 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 instruction manual." or the sign M002 of ISO 7010.

"  WARNING Always wear eye protection" or the sign M004 of ISO 7010.

"WARNING To reduce the risk of injury, use proper guard and use only accessories rated at least equal to the maximum speed marked on the tool."

The word "WARNING" shall be in capital letters not less than 2.4 mm high, and shall not be separated from the cautionary statement.

INSTRUCTIONS

An instruction manual and safety instructions shall be provided with the tool and packaged in such a way that it is noticed by the user when the tool is removed from the packaging. The safety instructions may be separate from the instruction manual. An explanation of the symbols required by the standard 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.
They shall be legible and contrast with the background.
They shall include the name and address of the manufacturer or supplier or any other agent responsible for placing the tool on the market.

The General Power Tool Safety Warnings and the specific tool Safety Warnings, if in English, shall be verbatim and in any other official language to be equivalent.

Format of all Safety Warnings must differentiate, by font highlighting or similar means, the context of clauses as illustrated below.

All notes in the safety instructions are not to be printed, they are information for the designer of the manual.

General Power Tool Safety Warnings

WARNING Read all safety warnings and instructions. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.

Save all warnings and instructions for future reference.

The term "power tool" in the warnings refers to your mains-operated (corded) power tool or battery-operated (cordless) power tool.

1) Work area safety

- **a) Keep work area clean and well lit.** Cluttered or dark areas invite accidents.
- **b) Do not operate power tools in explosive atmospheres, such as in the presence of flammable liquids, gases or dust.** Power tools create sparks which may ignite the dust or fumes.
- **c) Keep children and bystanders away while operating a power tool.** Distractions can cause you to lose control.

2) Electrical safety

- **a) Power tool plugs must match the outlet. Never modify the plug in any way. Do not use any adapter plugs with earthed (grounded) power tools.** Unmodified plugs and matching outlets will reduce risk of electric shock.
- **b) Avoid body contact with earthed or grounded surfaces such as pipes, radiators, ranges and refrigerators.** There is an increased risk of electric shock if your body is earthed or grounded.
- **c) Do not expose power tools to rain or wet conditions.** Water entering a power tool will increase the risk of electric shock.
- **d) Do not abuse the cord. Never use the cord for carrying, pulling or unplugging the power tool. Keep cord away from heat, oil, sharp edges or moving parts.** Damaged or entangled cords increase the risk of electric shock.
- **e) When operating a power tool outdoors, use an extension cord suitable for outdoor use.** Use of a cord suitable for outdoor use reduces the risk of electric shock.
- **f) If operating a power tool in a damp location is unavoidable, use a residual current device (RCD) protected supply.** Use of an RCD reduces the risk of electric shock.

NOTE The term "residual current device (RCD)" may be replaced by the term "ground fault circuit interrupter (GFCI)" or "earth leakage current breaker (ELCB)".

3) Personal safety

- **a) Stay alert, watch what you are doing and use common sense when operating a power tool. Do not use a power tool while you are tired or under the influence of drugs, alcohol or medication.** A moment of inattention while operating power tools may result in serious personal injury.

b) **Use personal protective equipment. Always wear eye protection.** Protective equipment such as dust mask, non-skid safety shoes, hard hat, or hearing protection used for appropriate conditions will reduce personal injuries.
c) **Prevent unintentional starting. Ensure the switch is in the off-position before connecting to power source and/or battery pack, picking up or carrying the tool.** Carrying power tools with your finger on the switch or energising power tools that have the switch on invites accidents.
d) **Remove any adjusting key or wrench before turning the power tool on.** A wrench or a key left attached to a rotating part of the power tool may result in personal injury.
e) **Do not overreach. Keep proper footing and balance at all times.** This enables better control of the power tool in unexpected situations.
f) **Dress properly. Do not wear loose clothing or jewellery. Keep your hair, clothing and gloves away from moving parts.** Loose clothes, jewellery or long hair can be caught in moving parts.
g) **If devices are provided for the connection of dust extraction and collection facilities, ensure these are connected and properly used.** Use of dust collection can reduce dust-related hazards.

4) Power tool use and care

a) **Do not force the power tool. Use the correct power tool for your application.** The correct power tool will do the job better and safer at the rate for which it was designed.
b) **Do not use the power tool if the switch does not turn it on and off.** Any power tool that cannot be controlled with the switch is dangerous and must be repaired.
c) **Disconnect the plug from the power source and/or the battery pack from the power tool before making and adjustments, changing accessories, or storing power tools.** Such preventive safety measures reduce the risk of starting the power tool accidentally.
d) **Store idle power tools out of the reach of children and do not allow persons unfamiliar with the power tool or these instructions to operate the power tool.** Power tools are dangerous in the hands of untrained users.
e) **Maintain power tools. Check for misalignment or binding of moving parts, breakage of parts and any other condition that may affect the power tool's operation. If damaged, have the power tool repaired before use.** Many accidents are caused by poorly maintained power tools.
f) **Keep cutting tools sharp and clean.** Properly maintained cutting tools with sharp cutting edges are less likely to bind and are easier to control.
g) **Use the power tool, accessories and tool bits etc. in accordance with these instructions, taking into account the working conditions and the work to be performed.** Use of the power tool for operations different from those intended could result in a hazardous situation.

5) Service

a) **Have your power tool serviced by a qualified repair person using only identical replacement parts.** This will ensure that the safety of the power tool is maintained.

In addition, the instruction shall include in substance the following:

Cut-off machine safety warnings

a) **The guard provided with the tool must be securely attached to the power tool and positioned for maximum safety, so the least amount of wheel is exposed towards the operator. Position yourself and bystanders away from the plane of the rotating wheel.** The guard helps to protect operator from broken wheel fragments and accidental contact with wheel.
b) **Use only diamond cut-off wheels for your power tool.** Just because an accessory can be attached to your power tool, it does not assure safe operation.
c) **The rated speed of the accessory must be at least equal to the maximum speed marked on the power tool.** Accessories running faster than their rated speed can break and fly apart.

d) **Wheels must be used only for recommended applications. For example: do not grind with the side of cut-off wheel.** Abrasive cut-off wheels are intended for peripheral grinding, side forces applied to these wheels may cause them to shatter.
e) **Always use undamaged wheel flanges that are of correct diameter for your selected wheel.** Proper wheel flanges support the wheel thus reducing the possibility of wheel breakage.
f) **Do not use worn down reinforced wheels from larger power tools.** Wheels intended for a larger power tool are not suitable for the higher speed of a smaller tool and may burst.
g) **The outside diameter and the thickness of your accessory must be within the capacity rating of your power tool.** Incorrectly sized accessories cannot be adequately guarded or controlled.
h) **The arbour size of wheels and flanges must properly fit the spindle of the power tool.** Wheels and flanges with arbour holes that do not match the mounting hardware of the power tool will run out of balance, vibrate excessively and may cause loss of control.
i) **Do not use damaged wheels. Before each use, inspect the wheels for chips and cracks. If power tool or wheel is dropped, inspect for damage or install an undamaged wheel. After inspecting and installing the wheel, position yourself and bystanders away from the plane of the rotating wheel and run the power tool at maximum no load speed for one minute.** Damaged wheels will normally break apart during this test time.
j) **Wear personal protective equipment. Depending on application, use face shield, safety goggles or safety glasses. As appropriate, wear dust mask, hearing protectors, gloves and shop apron capable of stopping small abrasive or workpiece fragments.** The eye protection must be capable of stopping flying debris generated by various operations. The dust mask or respirator must be capable of filtrating particles generated by your operation. Prolonged exposure to high intensity noise may cause hearing loss.
k) **Keep bystanders a safe distance away from work area. Anyone entering the work area must wear personal protective equipment.** Fragments of workpiece or of a broken wheel may fly away and cause injury beyond immediate area of operation.
l) **Hold the power tool by insulated gripping surfaces only, when performing an operation where the cutting accessory may contact hidden wiring or its own cord.** Cutting accessory contacting a "live" wire may make exposed metal parts of the power tool "live" and could give the operator an electric shock.
m) **Position the cord clear of the spinning accessory.** If you lose control, the cord may be cut or snagged and your hand or arm may be pulled into the spinning wheel.
n) **Never lay the power tool down until the accessory has come to a complete stop.** The spinning wheel may grab the surface and pull the power tool out of your control.
o) **Do not run the power tool while carrying it at your side.** Accidental contact with the spinning accessory could snag your clothing, pulling the accessory into your body.
p) **Regularly clean the power tool's air vents.** The motor's fan will draw the dust inside the housing and excessive accumulation of powdered metal may cause electrical hazards.
q) **Do not operate the power tool near flammable materials.** Sparks could ignite these materials.

Kickback and related warnings

Kickback is a sudden reaction to a pinched or snagged rotating wheel. Pinching or snagging causes rapid stalling of the rotating wheel which in turn causes the uncontrolled power tool to be forced in the direction opposite of the wheel's rotation at the point of the binding.

For example, if an abrasive wheel is snagged or pinched by the workpiece, the edge of the wheel that is entering into the pinch point can dig into the surface of the material causing the wheel to climb out or kick out. The wheel may either jump toward or away from the operator, depending on direction of the wheel's movement at the point of pinching. Abrasive wheels may also break under these conditions.

Kickback is the result of power tool misuse and/or incorrect operating procedures or conditions and can be avoided by taking proper precautions as given below:

a) **Maintain a firm grip on the power tool and position your body and arm to allow you to resist kickback forces. Always use auxiliary handle, if provided, for maximum control over kickback or torque reaction during start-up.** The operator can control torque reactions or kickback forces, if proper precautions are taken.
b) **Never place your hand near the rotating accessory.** Accessory may kickback over your hand.
c) **Do not position your body in line with the rotating wheel.** Kickback will propel the tool in direction opposite to the wheel's movement at the point of snagging.
d) **Use special care when working corners, sharp edges etc. Avoid bouncing and snagging the accessory.** Corners, sharp edges or bouncing have a tendency to snag the rotating accessory and cause loss of control or kickback.
e) **Do not attach a saw chain, woodcarving blade, segmented diamond wheel with a peripheral gap greater than 10 mm or toothed saw blade.** Such blades create frequent kickback and loss of control.
f) **Do not "jam" the wheel or apply excessive pressure. Do not attempt to make an excessive depth of cut.** Overstressing the wheel increases the loading and susceptibility to twisting or binding of the wheel in the cut and possibility of kickback or wheel breakage.
g) **When wheel is binding or when interrupting a cut for any reason, switch off the power tool and hold the power tool motionless until the wheel comes to a complete stop. Never attempt to remove the wheel from the cut while the wheel is in motion otherwise kickback may occur.** Investigate and take corrective action to eliminate the cause of wheel binding.
h) **Do not restart the cutting operation in the workpiece. Let the wheel reach full speed and carefully re-enter the cut.** The wheel may bind, walk up or kickback if the power tool is restarted in the workpiece.
i) **Support panels or any oversized workpiece to minimize the risk of wheel pinching and kickback.** Large workpieces tend to sag under their own weight. Supports must be placed under the workpiece near the line of cut and near the edge of the workpiece on both sides of the wheel.
j) **Use extra caution when making a "pocket cut" into existing walls or other blind areas.** The protruding wheel may cut gas or water pipes, electrical wiring or objects that can cause kickback.

ALTERATIONS

(a) Markings as noted above.

FACTORY TESTS

Correct Operation Test
The safe operation shall be checked, for example, by electrical measurements, by verifying the functional devices, such as switches and manually-operated controls, and by verifying the direction of rotation of motors.

Electric Strength Test:
The insulation of the tools shall be checked by the following tests:

A voltage of substantially sine-wave form, having a frequency of 50 Hz or 60 Hz and the value shown in Table 1, is immediately applied, for 3 s, between live parts and:

a) accessible metal parts which may become live in the event of an insulation fault or as a result of incorrect assembly;

b) inaccessible metal parts.

The tests of item a) are made on the assembled tool; the test of item b) is made on the tool, either completely assembled, or in the production line.

The tests of item a) are made on all tools, the tests of item b) being only made on class II tools.

The high-voltage transformer used for the tests shall be so designed that, when the output terminals are short-circuited after the output voltage has been adjusted to the appropriate test voltage, the output current is at least 200 mA.

The overcurrent relay shall trip when the output current exceeds 5 mA.

Care shall be taken that the r.m.s. value of the test voltage applied is measured within ± 3% and that the voltage measuring device or other indicator responds to the output voltage of the transformer.

Attention is drawn to the fact that the test described cannot always be used if the tool incorporates d.c. components; in such cases, tests with d.c. may be necessary.

The inherent resistance of the d.c. source shall allow a short-circuit current of at least 200 mA.

No flashover or breakdown shall occur during the tests.

Table 1 - Test voltages for the electric strength test

Application of test voltage	Test voltage V		
	Class III tools	Class II tools	Class I tools
Over basic insulation	400	1000	1000
Over double insulation or reinforced insulation	-	2500	-

Earthing Continuity Test:
For Class I tools, a current of at least 10 A, derived from an a.c. source having a no-load voltage not exceeding 12 V, is passed between the earthing terminal or the earthing contact and, in turn, each of the accessible metal parts which need to be earthed for safety reasons.

The voltage drop between the earthing contact of the plug or the external end of an earth continuity conductor or of the appliance inlet and the accessible metal part is measured, and the resistance calculated from the current and this voltage drop.

In no case shall the resistance exceed 0.3 ohm. This value is applicable to supply cable lengths up to 5 m. In case of supply cables having a length exceeding 5 m, it is increased by 0.12 ohm for any further length of 5 m.

Care shall be taken that he contact resistance between the tip of the measuring probe and the metal parts under test does not influence the test results.

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.

SPECIAL INSTRUCTIONS FOR FIELD SERVICES

1. Component descriptions marked with either the "(INT)" or "(INT*)" identifiers may be substituted with other components providing the requirements specified under the notes in the "Description" are complied with.

COMPONENT SPECIAL PICKUP

1. Component descriptions marked with the identifier “(CT)” are subject to annual pickup and Conformity Testing.

DESCRIPTION

Notes:

1. Component Substitution
   a) Critical components (those identified by mfr name, cat no), which are NOT identified with either "INT" or "INT*" are not eligible for substitution without evaluation and report updating
   b) The term "INT" means a "Certified" and/or "Listed" (or a "Recognized" and/or "Accepted") component may be replaced by one "Certified" and/or "Listed" by another certification organization accredited by the appropriate accreditation body or scheme requirements to the correct standard, for the same application; providing the applicable country identifiers are included and requirements in item "d" below are complied with.
   c) The Term "(INT*)" means a "Recognized" and/or "Accepted" component may be replaced by a component that is CSA Certified. The applicable country identifiers shall be included, the requirements in item "d" below as well as any "conditions of suitability" for the component (as recorded in this descriptive report) shall be complied with;
   d) Components which have been substituted, must be of an equivalent rating, configuration (size, orientation, mounting) and the applicable minimum creepage and clearance distances are to be maintained from live parts to bonded metal parts and secondary parts.
   e) Substitution of a "Certified" and/or "Listed" component with a component that is "Recognized" or "Accepted" is not permitted without evaluation and report updating.
   f) Substitution of a "Recognized" and/or "Accepted" component by one that is not CSA Certified is not permitted without a proper evaluation as well as a report update because the Conditions of Acceptance of the original component may be different than the Conditions of Acceptance of the substitute component.

The subject models are grounded concrete saws equipped with an integrated GFCI and water feed system and to be used with a diamond cut-off wheel for diamond cutting. They are intended to cut materials such as concrete, masonry and tile. Shaft and commutator are double insulated construction. They are similar in constructions except for model designation.

The following table itemizes these products covered along with their electrical ratings.

Model	Description	V	Hz	A	n/min
C14	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
CS14	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
C355	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
CS355	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
SC14	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
SCS14	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
SC355	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
SCS355	Concrete Saw, 355mm, cord-connected, grounded	115	60	15	4500
C14PRO	**Concrete Saw, 355mm, cord-connected, grounded**	**115**	**60**	**15**	**4500**

Model	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CS14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
C355	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CS355	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SC14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCS14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SC355	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
SCS355	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
C14PRO	**X**	**X**	**X**	**X**	**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	QMFZ2	Motor Housing	Nan Ya (E130155)	Polyamide 6 2210G6	HB, 1.5mm, all colour, HAI-0, HWI-2, CTI-0, 100°C. Accepted with glow wire test at 550°C for 3mm thick and resistance to tracking test at 175V. Overall 110mm tapering to 106mm by 110mm tapering to 96mm by 140mm long by 3mm nominal thickness. Provided with a guide roller assembly secured to motor housing by a butterfly bolt.	UL
2	QMFZ2	Handle	Same as Motor Housing	Same as Motor Housing	Two-piece construction, secured together by screws. Overall 105mm by 118mm by 256mm long by 3mm nominal thickness. Provided with 11 ventilation openings on each side, 13 to 26mm long by 2mm wide, and 6 ventilation openings at the rear of each piece, 16 to 26mm long by 2mm wide. Provided with integral boss for Strain Relief. Provided with a 19mm dia opening for Lock Off Button, a 40mm by 20mm opening for Switch Actuator, and a 14mm dia opening for LED Lamp Cover. Provided with two integral clips for securing Hose. Secured to Motor Housing by screws.	UL
3	QMFZ2	Brush Cover	Same as Motor Housing	Same as Motor Housing	Two provided. Overall 59mm by 36mm by 3mm nominal thickness. Secured to Handle by a screw.	UL
4	QMFZ2	Lock Off Button	Same as Motor Housing	Same as Motor Housing	Must be depressed before switch trigger can be activated.	UL
5	-	Switch Actuator	-	-	Encloses live parts. Part of switch. Overall 62mm by 18mm wide by 52mm high by 2mm thick.	-
6	QMFZ2	LED Lamp Cover	LG Chemical (E67171)	Polycarbonate PC1201	V-2, 1.6mm, all colour, HAI-1, HWI-2, CTI-2, 115°C. Overall 13mm by 6mm by 1.6mm thick Trapped and secured between two handle halves.	UL
7	-	Auxiliary Handle	-	Steel	Overall 234mm by 179mm by 28mm by 4mm thick. Provided with integrally moulded soft grip surface at handle area. Secured to Gear Box with screws.	UL

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
8	-	Gear Box	-	Die Cast Aluminium	Two-piece construction, secured together with screws and spring washers. Overall 114mm by 110mm by 113mm by 3mm thick. Provided with exhaust openings, 3 slots, 77mm by 7mm at top and both sides. Secured to Motor Housing with four screws and spring washers. Provided with an arbour lock button and a cut-off wheel guard locking lever.	-
9	-	Cut-Off Wheel Guard	-	Die Cast Aluminium	Overall 391mm by 45mm by 220mm by 2.5mm thick. Covers upper half of blade. An arrow sunk on both sides. Secured to Gear Box with screws.	-
10	-	Splash Guard	-	Plastic	Provided with a vacuum port and a cut-off wheel guard brush. Secured to Cut-Off Wheel Guard with screws.	-
11	-	Cut-Off Wheel	-	Diamond	355mm OD, 20mm or 25.4mm ID, 2.0mm minimum thickness but 6.35mm maximum. Segmented or continuous rim type. Provided with maximum 10 mm peripheral gap between segments and with negative rake angle, if segmented type used. Marked Maximum 4500 rpm.	-
12	-	Flanges	-	Steel	Two provided, including inner and outer flanges, 76mm dia by 5mm thick. Provided with a double D-shaped opening on flanges to lock to the output spindle. Secured to output spindle with a bolt, a washer and a spring washer.	-
13	-	Water Feed System	-	-	Integral with the tool. Consists of hose, hose sheath, tube guides, water nozzles, water feed valve set and water quick-release connector.	-
14	ELBZ2	Power Supply Cord	-	Type SJTW, 14/3 AWG.	105°C min. greater than 1.8 m long. 41 strands per conductor, one end terminated in certified crimp type ring terminal and connected to a direct plug-in type GFCI described below, the other end terminated in certified crimp type ring terminal and connected to power switch terminal with machine screw. Type Y attachment.	UL CSA
I	-	Ground Fault Circuit Interrupter (GFCI)	Nandao Electromachinery Co., Ltd.	NA15	Rated 120V, 60Hz, 15A. Direct Plug-in type. Class A.	cETL ETL

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
-	-	**Alternate Ground Fault Circuit Interrupter (GFCI)**	**Zhongshan Kaper Electrical (e353279)**	**GF01-I3-12**	**Rated 120V, 60Hz, 15A. Direct Plug-in type. Class A.**	**UL cUL**
II	-	Bonding	-	-	The bonding conductor of power supply cord is connected with a certified 14 AWG green bonding conductor from Gear Box by a certified closed-end crimp-on type wire connector. This crimp-on type wire connector is suitable for size and number of wires used. The bonding conductor is terminated with a certified closed loop crimp type connector and secured to Gear Box by an external toothed washer and a minimum No. 6 machine screw. Two threads are engaged in Gear Box.	-
15	-	Cord Guard Bushing	-	Rubber	Overall 73mm long with a 24mm OD by 3.4mm thick lip at one end, 16mm OD by 2mm thick lip at the other end. Projected outside the tool beyond the inlet opening of 68mm (at least 5 times the overall diameter of power supply cord). Fitted over Power Supply Cord and trap-fitted in Handle.	-
16	QMFZ2	Strain Relief	Same as Motor Housing	Same as Motor Housing	Overall 20mm by 9mm by 5mm. Secured to integral U-shaped boss on Handle with two self-tapping screws.	UL
17	WOYR 2	Power Switch	Defond	BGV-2115	15A, 125Vac. Accepted with test for 31LRA. Momentary contact. Lock off type, DPDT, 5E4. Screw type terminals.	UL CUL
18	-	Control Board	-	-	Ill. 1. Secured to inside Motor Housing by two screws. Consists of the following major components soldered to the printed wiring board, unless otherwise stated.	-
I	QMFZ2	Support of Control Board	Nan Ya (E130155)	Polyamide 6 2210G6	HB, 0.75mm, all colour, HAI-0, HWI-4, CTI-0, 120°C. Accepted with glow wire test at 550°C for 3mm thick. Overall 75mm by 64mm by 9mm by 2mm nominal thickness.	UL
II	-	Printed Wiring Board	-	Phenolic	Rated V-1 or better. Overall 70mm by 60mm by 1.6mm thick. The board is located in Support of Control Board and potted with epoxy.	UL
III	VZCA2	Varistor (TNR) (INT)	Dongguan Littelfuse Electronics	10D471K	Rated 300Vrms, varistor voltage 470Vdc, surge current 2500A.	CSA UL
IV	-	Bleed Resistor (RL1)	-	SMD type	Rated 1/4W, 1M ohm.	-

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
V	FOWX2	Across-The-Line Capacitor (XC1) (INT)	Carli Electronics	MPX	Rated 275Vac, 0.47uF.	UL CSA
	FOWX8	Alternate Across-The-Line Capacitor	AID Electronics (E183539)	MEX	Rated 275Vac, 0.47uF.	CUL UL
VI	-	Choke (CH1)	-	-	Open type	-
a	-	Core	-	Ferrite	Overall 18mm OD by 10mm ID by 14mm thick.	-
b	OBMW2	Coil (INT)	Pacific Electric (E201757)	Enameled copper wire UEFN/U	Temperature class 155 N1 (pin 1-4): 0.13mm dia, 8 turn. N2 (pin 2-3): 0.13mm dia, 8 turn.	UL
VII	FOWX8	Line-to-Ground Capacitors (YC1, YC2)	Jyh Chung Electronics (E187963)	JY series	Rated 300Vac, 0.01uF, Y2.	CUL UL
VIII	-	Capacitor (C1, C3)	-	Electrolytic	C5: 25V, 10uF, 105°C. C7: 25V, 100uF, 105°C.	-
IX	-	Diode (D1, D2) (INT)	-	1N4007	Rated 700 V, 1 A.	-
X	-	Zener Diode (ZD1) (INT)	-	SMD type, 5C1	Rated 5.1V, 0.5W.	-
XI	-	Resistor (R1)	-	Metal oxide	6.8k ohm, 2W	-
XII	-	Integrated Circuit (IC1) (INT)	Microchip	PIC12F675	Rated 5 V dc	-
XIII	-	Triac (TR1) (INT)	ST	BTA41-600B	Rated 600V, 41A, riveted to an aluminum heatsink, overall 50mm by 40mm by 1.8mm thick.	-

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
XIV	-	NTC Thermistor (INT)	Takanawa Electronics	TG Series	Rated 100 kΩ @ 25°C, +/-3%, 250mW. Axial leaded glass encapsulated type, leads crimped to certified lead wires, type UL1332, 22AWG, 300V, 200°C. The body and integral leads are fully sleeved with certified PTFE tubing, rated 150V, 200°C, and held in place by certified heat-shrinkable polyolefin tubing, rated 600V, 125°C, and then secured onto motor winding by cable ties. Lead wires terminated in a certified connector and connected to the printed wiring board.	-
XV		Lead Wires	-	TEW/1015	16AWG. Rated 600V, 105°C. One end soldered to Printed Wiring Board; the other terminated in a certified sleeved bullet type connector or ring terminal.	UL CSA
XVI	QMFZ2	Potting Compound	Ko Ho Kagaku (E334430)	Epoxy 9824AB	Rated V-0 at 0.78mm thick, 130°C.	UL
XVII	-	LED	-	-	Rated 5Vdc, 20mA. Red. Connected to the printed wiring board by connector with certified AWM/1007, 22 AWG wires.	-
XVIII	-	Bonding	-	TEW/1015, 18 AWG	One end of the green conductor is mechanically secured and soldered to the printed wiring board, the other end is connected with a certified 18 AWG green bonding conductor from Gear Box by a certified closed-end crimp-on type wire connector. This wire connector is suitable for size and number of wires used. The bonding conductor is terminated with a certified closed loop crimp type connector and secured to Gear Box by a separate No. 6 machine screw and an external toothed washer. Two threads are engaged in Gear Box.	CSA UL
19	-	Brushes	-	Carbon	Two provided. 17mm long by 7mm wide by 17mm high. A copper pigtail lead is embedded to the brush at one end and crimped to a ring terminal at the other end. A spring is loaded on the brush. Length of shunt wire prevents further wearing of brush at end of brush life for brush spring retention feature.	-
20	-	Brush Holders	-	Brass	Two provided. The brush holder assembly measured overall 38mm by 10mm by 15mm, provided with a carrier measured 10mm by 18mm by 9mm by 1mm thick. Secured to motor housing with 2 screws.	-

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
21	-	Stator	-	Laminated Steel	100mm OD by 53.9mm ID at flat area by 65mm stack. Class A insulation.	-
I	OBMW2	Stator Winding (INT)	Pacific Electric Wire & Cable (E84081)	Enamelled Copper Wire MW5-C SS-F	155°C. 1.1mm diameter, 35 turn. Varnish impregnated, 'Elantas Italia SRL', type PE820HB, 200°C.	UL
II	QMFZ2	Stator Slot Liner	-	PET film	105°C, 0.30mm thickness. Extends min. 1.5mm beyond stator laminations.	UL
III	AVLV2	Stator Leads	-	AWM, TEW, FT1	14 AWG, 600 V, 105°C. One end is mechanically secured and welded to the coil end, and sleeved with certified silicone-coated fiberglass tubing; the other end is terminated in a certified crimp type ring terminal for connection.	UL CSA
22	-	Armature	-	Laminated Steel	53.2mm O.D. by 65mm stack. 16 slots. Class A insulation.	-
I	OBMW2	Armature Winding (INT)	Ta Ya (E84201)	Enamelled Copper Wire MW30-C TYFEI-H180	180°C. 1.1mm dia., 3+4 turns. Varnish impregnated, 'Elantas Italia SRL', type PE820HB, 200°C.	UL
II	-	Shaft	-	Steel	Double/reinforce insulated.	-
III	QMFZ2	Shaft Insulation	BMC China (E253513)	Unsaturated polyester BMC FTI-901	HB, 1.5mm, 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 2.5mm beyond commutator support and 5mm beyond windings on fan end. Bearing is spaced 8mm from commutator bars.	UL
IV	QMFZ2	Armature Slot Liner	-	PET film	105°C. 0.25mm thickness. Extends min 1.5mm beyond lamination. Slot liner is double folded to retain winding.	UL
V	QMTS2	Armature Slot Wedge (INT)	Hokuetsu Toyo Fibre (E55656)	Vulcanized Fibre HB-77	115°C, 1.0mm thickness. Extends min. 2.5mm beyond lamination.	UL
VI	QMTS2	Armature End Spider	Hokuetsu Kishu Paper (E55735)	Vulcanized Fibre FR-75H	115°C, Minimum 1.5mm thick at spider.	UL
VII	-	Commutator	-	-	38mm OD, 28mm long, including 32 integrally moulded copper alloy commutator bars.	-
VIII	-	Commutator Insulation	-	Phenolic	1.0mm thick min. Basic insulation.	-

No	UL CCN.	Component Description	Manufacturer	Material Cat. No.	Rating, Comment, Dimensions	Appr Agcy
IX	-	Fan	-	Plastic	Radial type. 80mm dia. by 15.3mm high. Provided with 30 blades, 25mm long by 15 mm high by 1.7mm thick. Secured to shaft by press-fit.	-
23	QMFZ2	Shroud	Same as Motor Housing	Same as Motor Housing	87.5mm OD by 84mm ID by 17mm high.	UL

TEST HISTORY

Edition: 1 (Project 2767522)

The following tests were performed at submittor's facilities. Lee Yeong Industrial Co., Ltd., No. 2, Kejia Rd., Douliu City, Yunlin County 64057, Taiwan, unless otherwise stated.

MODEL TESTED: Concrete saw, Model C14 was tested as being representative.

MARKED RATING: 115V, 60Hz, 15A, 4500RPM

TESTED TO:
CSA-C22.2 No. 60745-1-07 (Upd.3) / UL 60745-1-4th Ed. – Hand-Held Motor-Operated Electric Tools – Safety - Part 1: General Requirements
CSA-C22.2 No. 60745-2-22-12 (Upd.1) / UL 60745-2-22-1st Ed. - Hand-Held Motor-Operated Electric Tools – Safety - Part 2-22: Particular requirements for cut-off machines

MARKING TEST: Cl. 8.13

[X] Recognized / Certified

STARTING TEST: Cl. 10

Data Observation:			
Condition	Operated reliably	Overload tripped (15A fuse)	Switches chattered
[X]All tools started ten times at 97.8V (0.85 x rated voltage)	**[X]** Yes **[ ]** No	**[ ]** Yes **[X]** No	**[ ]** Yes **[X]** No
[ ]Tools with centrifugal switches or other automatic switches started ten times at _____V(1.1 x rated voltage)	**[ ]** Yes **[ ]** No	**[ ]** Yes **[ ]** No	**[ ]** Yes **[ ]** No

Cl.	Requirement - Test	Result – Remark	Verdict
10	Starting	See Data Observation	**[X]** P **[ ]** F **[ ]** N/A

I**NPUT CURRENT TEST:** Cl. 11

Data Observation:							
Volts	Hz	Amps	Input Watts	Output Watts	RPM	Torque kgm	Conditions
115	60	8.7	1014	-	3892	-	No Load
115	60	15	1709	-	2913	0.307	Rated Load
122	60	15.3	1858	-	3106	0.307	Rated Load
108	60	14.8	1588	-	2712	0.307	Rated Load
149.5	60	9.9	1540	-	4566	-	Over voltage
115	60	31	-	-	-	-	Locked Rotor, AC

The rated power input or rated current shall be at least 110 % of the measured no-load input or current.

Data Observation:							
Volts	Rated W	Cl. 11.1 measured W	W dev	Rated A	measured A (No load)	A dev	Conditions
115	-	-	-	15	8.7	172.4%	**[X]** Rated Load **[ ]** Normal load (Part 2)
Cl.	Requirement - Test			Result - Remark			Verdict
11	Rated input/current Dev at least 110 %?			See Data Observation **[X]** Yes **[ ]** No			**[X]** P **[ ]** F **[ ]** N/A

HEATING TEST: Cl. 12
The tool is operated in still air under normal load. While the torque is maintained, the voltage is then adjusted to 0.94 times the rated voltage or 1.06 times the rated voltage, or the mean of the rated voltage range, whichever is the most unfavourable.

Data Observation:						
Load: Brake at rated voltage and **[X]** rated input, **[ ]** normal load						
Operating period: **[ ]** rated operating time _____, **[ ]** consecutive cycles _____, **[X]** continuous operation.						
Condition of operation: i.e. Condition as required by part 2: Operated for 30 minutes						
Test voltage	108V (94%)	115V (100%)	122V (106%)			-
Input current (A)	14.8	15	15.3			-
Input wattage (W)	1588	1709	1858			-
Torque (kgm)	0.307	0.307	0.307			-
	Temperature rise in °C					Allowed Limit
Stator winding (S_1)R-R	49.1	-	51.8			75
Stator winding (S_2)R-R	49.1	-	51.8			75
Armature winding (R-R)	67.2	-	70.8			75
Stator Laminations	27.1	-	28.1			65
Enclosure inside	22.2	-	22.9			75
Enclosure outside	11.5	-	13.1			60
Handle	10.1	-	14.3			50
Switch knob	5.0	-	6.0			50
Auxiliary handle	8.5	-	10.3			50
Brush holder lead	8.6	-	11.2			80
Power supply lead	21.4	-	24.2			80
Internal wiring	8.6	-	11.2			80
Ambient of switch	19.8	-	28.1			30
Support of control board	5.2	-	7.1			95
Printed wiring board	8.5	-	10.3			120
Capacitor XC1	4.7	-	6.5			75
Capacitor XC3 adjacent to TR1 heatsink	8.6	-	9.5			75
Choke CH1	17.1	-	17.9			115
Triac TR1	25.8	-	25.9			100
Ambient	24.0	-	23.9			-

Note: For rise of resistance calculation:
Temp. rise = (R2 - R1) (234.5 + t1) - (t2 - t1) (for copper)
R1

Test voltage		108V (94%)	115V (100%)	122V (106%)			
		Resistance in ohm					Allowed Limit
R_2 (ohm) of stator winding S_1 Hot		0.119	0.119	0.120			-
R_2 (ohm) of stator winding S_2 Hot		0.119	0.119	0.120			-
R_2 (ohm) of armature winding Hot		0.189	0.190	0.191			-
Ambient temperature (t_1)		24.0	24.0	24.0			-
Ambient temperature (t_2)		24.0	24.0	23.9			-
Resistance of windings at t ambient: 24°C R_1 of stator winding S_1 = 0.100 ohm cold R_1 of stator winding S_2 = 0.100 ohm cold R_1 of armature winding = 0.150 ohm cold; between opposite segments. Insulation Class: A							
12.5	No flowing of Sealing compounds		Part:			**[X]** P [ ] F [ ] N/A	
12.5	Protective devices did not operate					**[X]** P [ ] F [ ] N/A	
Cl.	Requirement - Test		Result - Remark			Verdict	
12	Heating		See Data Observation			**[X]** P [ ] F [ ] N/A	

LEAKAGE CURRENT FOLLOWING HEATING TEST: Cl. 13

Protective impedance is disconnected from live parts before carrying out the tests.
The leakage current is measured within 5 s after the application of the test voltage and shall not exceed the following values.

Data Observation: Performed at 1.06 x rated voltage = 122 V, 60 Hz						
Leakage current, Cl. 13						
		Measured		Max. allowed		
Points of application:		Tool switch ON (mA)	Tool switch OFF*(mA)	Class I	Class II	Class III
Between line 1 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA	0.5 mA
Between line 2 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA	0.5 mA
Cl.	Requirement - Test	Result - Remark		Verdict		
13	Leakage Current After Heating	See Data Observation		**[X]** P [ ] F [ ] N/A		

Note: * If the tool incorporates one or more capacitors, and is provided with a single-pole switch, the measurements are repeated with the switch in the "off" position.

MOISTURE RESISTANCE TEST: Cl. 14

HUMIDITY TREATMENT: Cl. 14.3

Tools are kept in humidity cabinet containing air with relative humidity of 93 ± 2 %, temperature of 20 to 30°C for 48 hours.

Before being placed in the humidity cabinet, the sample is brought to a temperature between t and (t + 4)°C. The tool is considered to be brought to the specified temperature by keeping it at this temperature for at least 4 h before the humidity treatment.

Data Observation: Performed at 1.06 x rated voltage = 122 V, 60 Hz						
Leakage current, Cl. 13						
		Measured		Max. allowed		
Points of application:		Tool switch ON (mA)	Tool switch OFF*(mA)	Class I	Class II	Class III
Between line 1 and accessible metal or metal foil		0.01	-	0.5 mA	0.25 mA	0.5 mA
Between line 2 and accessible metal or metal foil		0.01	-	0.5 mA	0.25 mA	0.5 mA
Cl.	Requirement - Test	Result – Remark		Verdict		
14.3	Leakage Current After Humidity Treatment	See Data Observation		**[X]** P **[ ]** F **[ ]** N/A		

Note: * If the tool incorporates one or more capacitors, and is provided with a single-pole switch, the measurements are repeated with the switch in the "off" position.

Data Observation:						
Electric strength, Cl. 15.2						
CLASS	III	Test	II	Test	I	Test
Points of application:	Test voltage					
1. Between live parts and parts of the body that are separated from live parts by: - Basic insulation only - Reinforced insulation	 500 ---	 **[ ]**	 --- 3750	 **[ ]**	 1250 3750	 **[X]** **[X]**
2. For parts with double insulation, between metal parts separated from live parts by basic insulation only, and - Live parts - The body			 1250 2500	 **[ ]** **[ ]**	 1250 2500	 **[N/A]** **[X]**
3. Between metal enclosures or covers lined with insulating material and metal foil in contact with the inner surface of the lining, if the distance between live parts and these metal enclosures or covers, measured through the lining, is less than the clearances in Cl. 28.1	---		2500	**[ ]**	1250	**[N/A]**
4. 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	**[ ]**	2500	**[N/A]**
5. Between accessible parts and internal diameter of cord guard wrapped with metal foil	---		2500	**[ ]**	1250	**[X]**
6. Between the point where a winding and a capacitor are connected together, if a resonance	--- ---		--- 2U+1000	 **[ ]**	2U+1000 ---	**[N/A]**

voltage U occurs between this point and any terminal for external conductors, and - accessible parts 1) - insulation only metal parts separated from live parts by basic						

1) The test between the point where a winding and a capacitor are connected together, and accessible parts or metal parts, is only made where the insulation is subjected to the resonance voltage under normal running conditions. Other parts are disconnected, and the capacitor is short-circuited.

Note: * Protective impedance is disconnected from live parts before carrying out the tests.
Accessible parts of insulated material are covered with metal foil.

Cl.	Requirement - Test	Result - Remark	Verdict
14.3	Electric Strength After Humidity Treatment	See Data Observation	**[X]** P [ ] F [ ] N/A

Cl.	Requirement - Test	Result - Remark	Verdict
14.3	Humidity Treatment	See Data Observation	**[X]** P [ ] F [ ] N/A

Note: Tested at CTS Lab.

TOOLS WITH LIQUID SYSTEM (foreseeable misuse): Cl 14.4

The residual current device was disabled during the test.
The tool was operated at rated voltage with approximately 1.0% NaCl solution in the following modes if applicable:
[ ] after overfilling of the fluid reservoir by 15% of the capacity of the container, or by 0.25 l, whichever is the greater;
[X] omission of a washer or other user removable part;
[X] mis-assembly of liquid system connections routinely made by the user.

In each mode, the tool was operated for 1 min in all positions consistent with the relevant part 2 and the manufacturer's instructions while monitoring the leakage current.

Data Observation: Performed at 1.06 x rated voltage = 122 V, 60 Hz					
Leakage current, Cl. 13					
		Measured (max)		Max. allowed	
Points of application:		Tool switch ON (mA)	Tool switch OFF*(mA)	Class I	Class II
Between line 1 and accessible metal or metal foil		0.05	-	5 mA	2 mA
Between line 2 and accessible metal or metal foil		0.05	-	5 mA	2 mA
Cl.	Requirement - Test	Result - Remark		Verdict	
14.4	Leakage Current	See Data Observation		**[X]** P [ ] F [ ] N/A	

Following the test, the leakage current was measured after being allowed to dry for 24 h at ambient temperature:

Data Observation: Performed at 1.06 x rated voltage = 122 V, 60 Hz				
Leakage current, Cl. 13				
	Measured		Max. allowed	
Points of application:	Tool switch ON (mA)	Tool switch OFF*(mA)	Class I	Class II
Between line 1 and accessible metal or metal foil	0.05	-	0.5 mA	0.25 mA
Between line 2 and accessible metal or metal foil	0.05	-	0.5 mA	0.25 mA

Cl.	Requirement - Test	Result - Remark	Verdict
14.4	Leakage Current	See Data Observation	**[X]** P **[ ]** F **[ ]** N/A

Note: * If the tool incorporates one or more capacitors, and is provided with a single-pole switch, the measurements are repeated with the switch in the "off" position.

TOOLS WITH LIQUID SYSTEM (withstanding pressure): Cl 14.5

The residual current device was disabled during the test.
The liquid system was closed and an approximately 1.0% NaCl solution at a hydrostatic pressure equal to twice the maximum permitted pressure of the liquid supply was applied for 1 h.

Data Observation: Performed at 1.06 x rated voltage = 122 V, 60 Hz					
Leakage current, Cl. 13					
		Measured (max)		Max. allowed	
Points of application:		Tool switch ON (mA)	Tool switch OFF*(mA)	Class I	Class II
Between line 1 and accessible metal or metal foil		0.05	-	5 mA	2 mA
Between line 2 and accessible metal or metal foil		0.05	-	5 mA	2 mA
Cl.	Requirement - Test	Result – Remark		Verdict	
14.5	Leakage Current	See Data Observation		**[X]** P **[ ]** F **[ ]** N/A	

Following the test, the leakage current was measured after being allowed to dry for 24 h at ambient temperature:

Data Observation: Performed at 1.06 x rated voltage = 122 V, 60 Hz					
Leakage current, Cl. 13					
		Measured		Max. allowed	
Points of application:		Tool switch ON (mA)	Tool switch OFF*(mA)	Class I	Class II
Between line 1 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA
Between line 2 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA
Cl.	Requirement - Test	Result – Remark		Verdict	
14.5	Leakage Current	See Data Observation		**[X]** P **[ ]** F **[ ]** N/A	

Note: * If the tool incorporates one or more capacitors, and is provided with a single-pole switch, the measurements are repeated with the switch in the "off" position.

OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS: Cl. 16
N/A

ENDURANCE TEST: Cl. 17
[X] Operated per Part 1; 24 hours at 1.1 times rated voltage then 24 hours at 0.9 times rated voltage
[X] Operated in cycles comprising an "on" period of 100 sec and an "off" of 20 sec.
[ ] Tools for short-time or intermittent operation per standard 60745-2-____.

During the test, the tool is placed in three different positions, the operating time, at each test voltage, being approximately 8 h for each position.

Tools provided with a centrifugal or other automatic starting switch is started 10,000 times under normal load, and at a voltage equal to 0.9 times rated voltage, the operating cycle being that specified in 17.2.

Electric strength, after above test, conducted at 75 % of the specified values, per Cl. 17.1.

Data Observation:						
Electric strength, Cl. 15.2						
CLASS	III	Test	II	Test	I	Test
Points of application:	Test voltage					
1. Between live parts and parts of the body that are separated from live parts by: - Basic insulation only - Reinforced insulation	 375 ---	 [ ]	 --- 2813	 [ ]	 938 2813	 **[X]** **[X]**
2. For parts with double insulation, between metal parts separated from live parts by basic insulation only, and - Live parts - The body			 938 1875	 [ ] [ ]	 938 1875	 **[N/A]** **[X]**
3. Between metal enclosures or covers lined with insulating material and metal foil in contact with the inner surface of the lining, if the distance between live parts and these metal enclosures or covers, measured through the lining, is less than the clearances in Cl. 28.1	---		1875	[ ]	938	**[N/A]**
4. 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	[ ]	1875	**[N/A]**
5. Between accessible parts and internal diameter of cord guard wrapped with metal foil	---		1875	[ ]	938	**[X]**
6. Between the point where a winding and a capacitor are connected together, if a resonance voltage U occurs between this point and any terminal for external conductors, and - accessible parts 1) - insulation only metal parts separated from live parts by basic	 --- ---	 	 --- 1.5U+750	 [ ]	 1.5U+75 0 ---	 **[N/A]**
1) The test between the point where a winding and a capacitor are connected together, and accessible parts or metal parts, is only made where the insulation is subjected to the resonance voltage under normal running conditions. Other parts are disconnected, and the capacitor is short-circuited.						

Data Observation:			
Was insulation system damaged?	Did the overload protection operate?	Did connection come loose?	Were there other conditions that impaired safety?
[ ] Yes **[X]** No	[ ] Yes **[X]** No [ ] N/A	[ ] Yes **[X]** No	[ ] Yes **[X]** No

Cl.	Requirement - Test	Result - Remark	Verdict
17	All Tools	See Data Observation	**[X]** P [ ] F [ ] N/A

ABNORMAL TEST: Cl. 18

[X] OVERVOLTAGE ON SERIES MOTORS: Cl. 18.7
Tool is operated at 1.3 times rated voltage for 1 min.

Data Observation:			
Did windings and/or connections become loose?			[ ] Yes **[X]** No
Were there signs of corrosion at connections (Cl. 21.25).			[ ] Yes **[X]** No
Were there any other hazards created?			[ ] Yes **[X]** No
Cl.	Requirement - Test	Result - Remark	Verdict
18.7	Overvoltage on Series Motor	See Data Observation	**[X]** P [ ] F [ ] N/A

Data Observation: Performed at 1.06 x rated voltage = 122 V, 60 Hz						
Leakage current, Cl. 13						
		Measured		Max. allowed		
Points of application:		Tool switch ON (mA)	Tool switch OFF*(mA)	Class I	Class II	Class III
Between line 1 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA	0.5 mA
Between line 2 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA	0.5 mA
Cl.	Requirement - Test	Result - Remark		Verdict		
14.3	Leakage Current After Overvoltage	See Data Observation		**[X]** P [ ] F [ ] N/A		

Note: * If the tool incorporates one or more capacitors, and is provided with a single-pole switch, the measurements are repeated with the switch in the "off" position.

Cl.	Requirement - Test	Result - Remark	Verdict
17.2	Overvoltage	See Data Observation	**[X]** P [ ] F [ ] N/A

[X] OVERVOLTAGE ON TOOL INCORPORATING ELECTRONIC DEVICES: Cl. 18.10
Tool is operated for 1min at rated voltage with the electronic device short-circuited and open-circuited.

Data Observation	
Does the tool show no damage due to fire, mechanical damage impairing safety and protection against electric shock?	**[X]** Yes [ ] No

Note: * Tools incorporating a single pole switch and capacitors are to be tested in the on and off position.

Data Observation after electronic device is shorted: Performed at 1.06 x rated voltage = 122 V, 60 Hz						
Leakage current, Cl. 13						
		Measured		Max. allowed		
Points of application:		Tool switch ON (mA)	Tool switch OFF*(mA)	Class I	Class II	Class III
Between line 1 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA	0.5 mA
Between line 2 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA	0.5 mA
Cl.	Requirement - Test	Result - Remark		Verdict		
18.10	After Electronic Device Is Shorted	See Data Observation		**[X]** P [ ] F [ ] N/A		

Note: * Tools incorporating a single pole switch and capacitors are to be tested in the on and off position.

Data Observation after electronic device is opened: Performed at 1.06 x rated voltage = 122 V, 60 Hz						
Leakage current, Cl. 13						
		Measured		Max. allowed		
Points of application:		Tool switch ON (mA)	Tool switch OFF*(mA)	Class I	Class II	Class III
Between line 1 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA	0.5 mA
Between line 2 and accessible metal or metal foil		0.05	-	0.5 mA	0.25 mA	0.5 mA
Cl.	Requirement - Test	Result - Remark		Verdict		
18.10	Leakage Current After Electronic Device Is Opened	See Data Observation		**[X]** P [ ] F [ ] N/A		

Cl.	Requirement - Test	Result - Remark	Verdict
18.10	Overvoltage On Tools Incorporating Electronic Devices	See Data Observation	**[X]** P [ ] F [ ] N/A

[ ] REVERSING SWITCHES: Cl. 18.11

Data Observation: **[ ]** Interlock was provided, no test required. **[ ]** Interlock not provided, operated 25 times at rated or upper limit of the rated voltage range.			
Was the switch operable?			[ ] Yes [ ] No
Cl.	Requirement - Test	Result - Remark	Verdict
18.11	Reversing	See Data Observation	[ ] P [ ] F **[X]** N/A

EXTREME OVERLOAD TEST: Cl. 18.12

Data Observation: (**[X]** CLASS I employing class II construction, **[ ]** CLASS II, Max leakage: 2 mA) The tool is loaded to 160 % of normal load current for either 15 min or until the end result appears.	
	Sample
Percent of nameplate rating at the start of the test	160
End result occurred as one or more of the following conditions:	
Inaccessible protector opened	Yes
Flame developed and was extinguished immediately	No
An open circuit developed in a winding.	No
The tool stalled and would not run at rated load.	No
The tool still operated.	Yes
Total running time, minutes	8 min 29 sec
Maximum leakage current, mA (2.0 mA max.)	0.26
Enclosure temperature (°C)	48.3
Did adverse deterioration of the insulation cause live parts exposed? (Cl. 9)	No
Ambient °C	24

After the tool is cooled to room temperature, an electric strength test per Cl.15 is performed between live parts and accessible parts as follows:

[ ] If a tool does not operate after 15 min, apply a 1,500 V electric strength test.

[X] If a tool operates after 15 min, apply a 2,500 V electric strength test.

Cl.	Requirement - Test	Result - Remark	Verdict
18.12	Extreme Overload	See Data Observation	**[X]** P [ ] F [ ] N/A

MECHANICAL HAZARDS: Cl. 19

Data Observation:			
Were Protective enclosures, covers, guards and the like removable without the aid of a tool?			[ ] Yes **[X]** No
Did the standard test finger touch dangerous moving parts enclosed?			[ ] Yes **[X]** No
Were accessible parts likely to be touched during normal use free from sharp edges, burrs, flashes and the like?			**[X]** Yes [ ] No
Did the use and adjustment of a guard create other dangers? (e.g. by reducing or obstructing the operator's view, by transferring heat)			[ ] Yes **[X]** No
Did the guard have an easily accessible means of accurate adjustment?			**[X]** Yes [ ] No
Cl.	Requirement - Test	Result - Remark	Verdict
19	Mechanical Hazards	See Data Observation	**[X]** P [ ] F [ ] N/A

MECHANICAL STRENGTH TEST: Cl. 20

The tool was subjected to three impacts at every point of the enclosure that was expected to be weak and parts that served as decorative parts overlying an inner cover were removed prior to the impacts. A spring-operated impact test apparatus constructed according to Clause 5 of IEC 60068-2-75 was used to deliver the impacts to the tool. Impacts were also delivered to protective devices, handles, levers knobs and the like. The spring was adjusted so as to cause the hammer to strike with impact energy of:

[X] IMPACT ON SWITCH ACTUATORS: Cl. 20.2

1.0 N·m impact.

Data Observation:	
Was switch operable?	**[X]** Yes [ ] No
Were live parts accessible?	[ ] Yes **[X]** No

Cl.	Requirement - Test	Result - Remark	Verdict
20.2	After Impacts On Switch	See Data Observation	**[X]** P [ ] F [ ] N/A

Note: Conducted at CTS Lab.

[ ] EXPOSED BRUSH CAPS AND THEIR HOLDERS: Cl. 20.2

Brush cap impact: One impact, 0.5 N·m

Data Observation:			
Was there any damage or cracks?			[ ] Yes [ ] No
Cl.	Requirement - Test	Result - Remark	Verdict
20.2	Impact On Brush Cap	See Data Observation	[ ] P [ ] F **[X]** N/A

Brush cap torque (for threaded brush caps): Remove and replace brush cap 10 times.
Diameter of Blade width: _____ mm
Torque applied _____ N·m

Data Observation:			
Was there any damage or cracks?			[ ] Yes [ ] No
Cl.	Requirement - Test	Result - Remark	Verdict
20.4	After torque test	See Data Observation	[ ] P [ ] F **[X]** N/A

[X] A hand-held tool shall withstand being dropped three times on a concrete surface from a height of 1 m. The sample shall be positioned to vary the point of impact.

Data Observation:			
Did the impact expose any live parts?			[ ] Yes **[X]** No
Cl.	Requirement - Test	Result - Remark	Verdict
20.3	Impacts	See Data Observation	**[X]** P [ ] F [ ] N/A

Data Observation:						
Electric strength, Cl. 15.2						
CLASS	III	Test	II	Test	I	Test
Points of application:	Test voltage					
1. Between live parts and parts of the body that are separated from live parts by:						
- Basic insulation only	500	**[ ]**	---		1250	**[X]**
- Reinforced insulation	---		3750	**[ ]**	3750	**[X]**
2. For parts with double insulation, between metal parts separated from live parts by basic insulation only, and						
- Live parts			1250	**[ ]**	1250	**[N/A]**
- The body			2500	**[ ]**	2500	**[X]**
3. Between metal enclosures or covers lined with insulating material and metal foil in contact with the inner surface of the lining, if the distance between live parts and these metal enclosures or covers, measured through the lining, is less than the clearances in Cl. 28.1	---		2500	**[ ]**	1250	**[N/A]**
4. 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	**[ ]**	2500	**[N/A]**
5. Between accessible parts and internal diameter of cord guard wrapped with metal foil	---		2500	**[ ]**	1250	**[X]**
6. Between the point where a winding and a capacitor are connected together, if a resonance voltage U occurs between this point and any terminal for external conductors, and						
- accessible parts 1)						
- insulation only metal parts separated from live parts by basic	--- ---		--- 2U+1000	**[ ]**	2U+1000 ---	**[N/A]**

1) The test between the point where a winding and a capacitor are connected together, and accessible parts or metal parts, is only made where the insulation is subjected to the resonance voltage under normal running conditions. Other parts are disconnected, and the capacitor is short-circuited.

Cl.	Requirement - Test	Result - Remark	Verdict
20.1	Electric Strength After Impact	See Data Observation	**[X]** P [ ] F [ ] N/A

[X] AUXILIARY HANDLES AND GRASPING SURFACES: Cl. 20.5

A separate sample, at the discretion of the manufacturer, is to be subjected to a single impact on each handle and each recommended grasping surface. The impacts are carried out from a height of 1 m onto a concrete surface.

Data Observation:			
Electric strength Cl. 15.2			
Points of application:		Test voltage	
Between the grasping surfaces in contact with foil and the output shaft of the tool.		1,250	
Cl.	Requirement - Test	Result - Remark	Verdict
15.2	Electric Strength After impact	See Data Observation	**[X]** P [ ] F [ ] N/A

Data Observation:			
Did the impacts deteriorate the mechanical strength of the auxiliary handles and/or grasping surfaces?			[ ] Yes **[X]** No
Cl.	Requirement - Test	Result - Remark	Verdict
20.5	Impacts on auxiliary handle	See Data Observation	**[X]** P [ ] F [ ] N/A

CAPACITOR DISCHARGE TEST: Cl. 21.21

The tool was operated at rated voltage. The tool switch, if any, was then moved to the "off" position and the tool was disconnected from the supply by means of the plug. One second after disconnection, the voltage between the pins of the plug was measured with an instrument which does not appreciably affect the value to be measured. The voltage shall not exceed 34V. The test was made 10 times.

Data Observation: Performed at rated voltage = 115 V, 60 Hz											
Capacity discharge, Cl. 21.21											
		Measured (V)									
Points of application:		No 1	No 2	No 3	No 4	No 5	No 6	No 7	No 8	No 9	No 10	Max. allowed
Between the pins of the plug		0	0	0	0	0	0	0	0	0	0	34 V
Cl.	Requirement - Test	Result – Remark										Verdict
21.21	Capacitor discharge	See Data Observation										**[X]** P [ ] F [ ] N/A

Note: Conducted at CTS Lab.

COMPONENTS: Cl. 23

[X] SWITCH: Cl. 23.1.10

50 operations on switch at 115 volts AC, 31 Amps, motor stalled.

Switch Type	Manufacture	Catalogue No	Tested at:		
			Volts	Hz	Amps
On-off switch	Defond	BGV-2115	115	60	31

Note: Uncertified switches shall be tested to CSA/UL 61058-1

Data Observation:			
Was the switch operable?			**[X]** Yes [ ] No
Cl.	Requirement - Test	Result - Remark	Verdict
23.1.10	Switch Overload	See Data Observation	**[X]** P [ ] F [ ] N/A

Note: The switch was evaluated by UL and 50,000 cycles of operation was tested with satisfactory result, switch description.

SUPPLY CONNECTIONS: Cl. 24

[X] FLEXING TEST: Cl. 24.12
20,000 cycles of operation
Tool Mass (Kg) = 8.3 kg, Mass applied 2 kg to 6 kg

Note: Mass of tool does not include the supply cord.

After 10,000 flexings, the sample is turned through 90° about the centre line of the cord guard.

Mass (kg)	Cord Manufacture	AWG	Conductors	Type
8.3	Ta An Electric Co., Ltd.	14	3	SJTW

Data Observation:								
Broken strands not more than 10 percent.								
Neutral Conductor			Line Conductor			Ground Conductor		
# strands	# broken strands	% broken	# strands	# broken strands	% broken	# strands	# broken strands	% broken
41	0	0	41	0	0	41	0	0

Cl.	Requirement - Test	Result - Remark	Verdict
24.12	Flexing	See Data Observation	**[X]** P [ ] F [ ] N/A

[X] Immediately after this test the cord anchorage and the terminal screws were loosened, without removing the conductors of the flexible cable or cord.
[ ] The cord anchorage was not loosened since the cord guard was clamped under the cord anchorage, but the terminals screws were loosened.

The tool was then lifted by the cord guard without jerks, over a distance of 500 mm in one second and replaced on a supporting surface. This was repeated ten (10) times.

Data Observation:			
Did Cord Guard slip out of its location?			[ ] Yes **[X]** No
Cl.	Requirement - Test	Result - Remark	Verdict
24.12	Flexing	See Data Observation	**[X]** P [ ] F [ ] N/A

Note: Conducted at CTS Lab.

[X] CORD GUARD BENDING TEST: Cl. 24.13
[ ] Since the cord guard was temperature sensitive, the test was conducted at a temperature of 23 ± 2 °C.

Data Observation:				
Diameter of cord (D)	Length of guard	Mass $10(D^2)$	Curvature in mm	
9.3 mm	66.9 mm	865 g	Measured: 64.4	Calculated 1.5D: 13.95

Cl.	Requirement - Test	Result - Remark	Verdict
24.13	Cord Guard Bending	See Data Observation	**[X]** P [ ] F [ ] N/A

Note: Conducted at CTS Lab.

[X] STRAIN RELIEF TEST: Cl. 24.14

The cord is subjected 25 times to a pull of the value shown in Table below. The pulls are applied without jerks in the most unfavorable direction each time for 1 s.
Immediately afterwards, the cord, other than that of an automatic cord reel, is subjected for 1 min to a torque of the value shown in Table below.

	Mass of tool (kg)	Pull (N)	Torque (N·m)
[ ]	Up to and including 1	30	0.1
[ ]	Over 1 up to and including 4	60	0.25
[X]	Over 4	100	0.35

Data Observation:			
Is the cord damaged?			[ ] Yes **[X]** No
Displacement			
0 mm on cord		0 mm on conductor at terminal	
Cl.	Requirement - Test	Result - Remark	Verdict
24.14	Strain Relief	See Data Observation	**[X]** P [ ] F [ ] N/A

Note: Conducted at CTS Lab.

[ ] WIRE PULL TEST: Cl. 24.20

Applies to all terminals including ground connections. (Tools with a type X attachment)
Terminal screw is loosened.
A force of 2N applied to all conductors including grounding and bonding conductors.

Data Observation:			
Does the end of conductor contact exposed metal parts?			[ ] Yes [ ] No
Cl.	Requirement - Test	Result - Remark	Verdict
24.20	Wire Pull Test	See Data Observation	[ ] P [ ] F **[X]** N/A

TERMINALS FOR EXTERNAL CONDUCTORS: Cl. 25

PROVISION FOR EARTHING (CLASS I ONLY): Cl. 26

Test Current (A)	Max Volt Drop (V)	Test Time (min)	Calculated Resistance (ohm)	From	To
40	1.76	2	0.044	Eathing terminal	Accessible metal part

Data Observation:			
The resistance not exceed 0.1 ohm.			
Cl.	Requirement - Test	Result - Remark	Verdict
26.5	Resistance of Earthing Terminal	See Data Observation	**[X]** P [ ] F [ ] N/A

Note: Conducted at CTS Lab.

SCREWS AND CONNECTIONS: Cl. 27

[X] TORQUE TEST WITHOUT DAMAGE TO SCREW CONNECTIONS: Cl. 27.1

Fixings, and electrical connections, the failure of which may impair compliance with this standard, shall withstand the mechanical stresses occurring in normal use.

Data Observation:

Type of screw (I, II, III)	Location	Diameter of screw (mm)	Torque applied (N·m)	No. of applications (5 or 10)	Damage screw connections
II	Anchorage	4	1.2	10	[ ]Yes [**X**]No
II	Grip	4	1.2	10	[ ]Yes [**X**]No
II	Earthing	4	1.2	5	[ ]Yes [**X**]No
II	Terminal screw of switch	3.3	0.8	5	[ ]Yes [**X**]No
II	Gear box	5	2.0	10	[ ]Yes [**X**]No

Cl.	Requirement – Test	Result - Remark	Verdict
27.1	Torque test on Screw Connection	See Data Observation	[**X**] P [ ] F [ ] N/A

RESISTANCE TO HEAT, FIRE AND TRACKING: Cl. 29

[X] RESISTANCE TO HEAT: Cl. 29.1

External parts of non-metallic material, parts of insulating material supporting live parts, including connections and parts of thermoplastic material providing supplementary insulation or reinforced insulation, the deterioration of which might cause the tool to fail to comply with this standard, shall be sufficiently resistant to heat.

Prior to starting the test, the part was maintained for 24 hours in an atmosphere having a temperature between 15 °C and 35 °C, and a relative humidity between 45-75 %. The apparatus was brought to specified oven temperature prior to starting the test.

The part was supported so that its upper surface was supported horizontally. The spherical part of the apparatus was pressed against the surface of the test sample with a force of 20 N. The thickness of the part under test was at least 2.5 mm. In specific situations, as identified below, two or more sections of the part were placed on top of one another to obtain the minimum test thickness.

The test was made in a heating cabinet set at a temperature of (40 ± 2) °C plus the maximum temperature rise occurring on the part during the Heating Test, but it was at least

[X] (75 ± 2) °C for external parts;

[X] (125 ± 2) °C for parts retaining live parts in position.

Data Observation:

	Impression diameter limited to ≤ 2 mm	-	-

Parts under test	Test Temperature (°C)	Measured impression dia. (mm)
Enclosure	125	0.6
Support of control board	125	1.1
Handle	75	1.1

Supplementary information:			
Cl.	Requirement – Test	Result - Remark	Verdict
29.1	ball-pressure test	See Data Observation	**[X]** P [ ] F [ ] N/A

Note: Conducted at CTS Lab.

[X] RESISTANCE TO FIRE: Cl. 29.2

Parts of non-metallic material shall be adequately resistant to ignition and to spread of fire.
[ ] Recognized HB40, or
[ ] Recognized V-rated material, or
[X] Glow wire test.

Data Observation:					
Test Conditions	Tested according to IEC 60695-2-11				
Test Temperature (°C)	550				
Test specimen	Material type	Specified layer placed underneath test specimen	Material ignited	Specified layer under test specimen ignited	Results
Enclosure	PA6, 2210G6	No	No	No	**[X]** P [ ] F
Support of control board	PA6, 2210G6	No	No	No	**[X]** P [ ] F
Handle	PA6, 2210G6	No	No	No	**[X]** P [ ] F

Supplementary information:			
Cl.	Requirement – Test	Result - Remark	Verdict
29.2	Resistance to fire test	See Data Observation	**[X]** P [ ] F [ ] N/A

Note: Conducted at CSA Taiwan Lab.

[X] RESISTANCE TO TRACKING: Cl. 29.3

Insulating parts supporting or retaining bare live parts in position and subjected to disposition of dirt (i.e. Brush holders, brush holder supports, etc.) shall meet the following:

[ ] CTI of 175V or greater, or
[X] Resistance to tracking test

Data Observation:				
Test Conditions	Tested according to IEC 60112			
Test Solution	0.1% NH4CL			
Test Voltage (V)	175			
Test specimen	Material type	Tracking occurred	Rate of tracking	Results
Support of control board	PA6, 2210G6	No	2 drops/min	**[X]** P [ ] F

Supplementary information:			
Cl.	Requirement - Test	Result - Remark	Verdict
29.3	Resistance to tracking test	See Data Observation	**[X]** P [ ] F [ ] N/A

Note 1: Support of control board was tested as being representative of enclosure and handle.
Note 2: Conducted at CSA Taiwan Lab.

Edition 2: Project 80006015

Update report 2767522 to alternate new GFCI Zhongshan kaper electrical, Model GF01-I3-12 and new model C14PRO which is equivalent with C14.

Only the following test were considered necessary.

CAN/CSA-C22.2 No. 60745-2-22-12 (Upd.1) - (UL 60745-2-22-1st Edition)	**Hand-Held Motor-Operated Electric Tools – Safety - Part 2-22: Particular Requirements for Cut-Off Machines**
CAN/CSA-C22.2 No. 60745-1-07 (Upd.3) - (UL 60745-1-4th Edition)	**Hand-Held Motor-Operated Electric Tools – Safety - Part 1: General Requirements**

Test location: CSA Group – Taiwan Canadian Standards Association (Far East Operations) Ltd. No.26, Fuxing 3rd Rd., Guishan Dist., Taoyuan City 333, Taiwan.

RESIDUAL CURRENT DEVICES - Cl. 14.6 b)

The RCD shall be reliable for its intended use.

Test:
Compliance is checked at rated voltage by operating the residual current device under conditions of simulated leakage as in leakage exceeds 10 mA and with a maximum response of 300 ms during conditions of locked rotor of the tool for 50 cycles. The residual current device shall operate correctly for all cycles.

Performed at rated voltage = __120___V, __60___ Hz.

Data Observation:	
The RESIDUAL CURRENT DEVICE shall operate correctly for all cycles.	**[x] Yes [] No**

Cl.	**Requirement - Test**	**Result - Remark**	**Verdict**
14.6	**Residual Current Devices**	**See Data Observation**	**[x] P [] F [] N/A**

Construction Review:

Construction applicable.

This Edition supersedes all previous editions.

---End of Report---