SECTION 1. CHEMICIAL PRODUCT AND COMPANY NAME

Lithium-Ion Rechargeable Battery Pack
LC05

Symbol CY at the bottom of the battery.

Safety Data Sheet

Complies with the OSHA Hazard Communication Standard :
29 CFR 1910 1200

Makita U.S.A., Inc. 14930-C Northam Street La Mirada, CA 90638	Prepared By :	Stan Rodrigues
	Date Revised:	05/25/2018

EMERGENCY CONTACT INFORMATION

Telephone Number for Information: MAKITA: 1-510-657-9881

Emergency Response

For Chemical Emergency
Spills, Leak, Fire, Exposure, or Accident
Call CHEMTREC Day or Night
Within USA and Canada 1-800-424-9300

SECTION 2. HAZARD IDENTIFICATION:

PROTENTIAL HEALTH EFFECTS

Primary Routes Of Entry

Skin contact:	No
Skin absorption:	No
Eye contact:	No
Inhalation:	No
Ingestion:	No

SYMPTOMS OF EXPOSURE

Skin contact:	No effect under routine handling and use.
Skin absorption:	No effect under routine handling and use.
Eye contact:	No effect under routine handling and use.
Inhalation:	No effect under routine handling and use.

SECTION 3. COMPOSITION, INFORMATION OR INGREDIENTS:

Battery Cell		
HAZARDOUS INGREDIENTS	**%**	**CAS NUMBER**
Cobalt compound	4-50	1307-96-6
Styrene-Butadiene-Rubber	<1	27288-99-9
Aluminum Foil	2-10	7429-90-5
Polyvinylidene Fluoride (PVDF)	<5	24937-79-9
Copper Foil	2-10	7440-50-8

CONTINUED: SECTION 3. COMPOSITION, INFORMATION OR INGREDIENTS:

Carbon	10-30	7440-44-0
Electrolyte (Ethylene carbonate)	10-20	96-49-1
Lithium hexafluorophosphate	<5	21324-40-3
Stainless steel, Nickel and inert materials	Remainder	N/A

Circuit Module

HAZARDOUS INGREDIENTS	%	CAS NUMBER
Lead	0.001	7439-92-1
Mercury	0	7439-97-6
Chromium	0	7440-47-3
Cadmium	0	7440-43-9
Plastic case and Si2O	0	N/A

Plastic Parts and Paints

HAZARDOUS INGREDIENTS	%	CAS NUMBER
Lead	<0.1	7439-92-1
Nickle	<0.01	7440-02-0
CFCs	0	75-69-4
Polyclorinated Biphenyls	0	1336-36-3

SECTION 4. FIRST AID MEASURE:

INHALATION	Not a health hazard.
EYE CONTACT	Not a health hazard.
SKIN CONTACT	Not a health hazard.
INGESTION:	If swallowed, obtain medical attention immediately.

If exposure to internal materials within cell (pack) due to damaged outer casing, the Following actions are recommended.

INHALATION:	Leave area immediately and seek medical attention.
EYE CONTACT:	Rinse eyes with water for 15 minutes and seek medical attention.
SKIN CONTACT:	Wash area thoroughly with soap and water and seek medical attention.
INGESTION:	Drink milk/water and induce vomiting; seek medical attention.

SECTION 5. FIRE FIGHTING MEASURES:

5.1 GENERAL HAZARD:	Cell is not flammable but internal organic material will burn if the cell is incinerated. Combustion products include, but are not limited to hydrogen fluoride, carbon monoxide and carbon dioxide.
5.2 EXTINGUSHING MEDIA:	Use extinguishing media suitable for the materials that are burning.
5.3 SPECIAL FIREFIGHTING INSTRUCTIONS:	If possible, remove cell(s) from firefighting area. If heated above 125^{o}C, cell(s) can explode/vent.
5.4 FIREFIGHTING EQUIPMENT:	Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

SECTION 6. ACCIDENTAL RELEASE MEASURES:

6.1 ON LAND:	Place material into suitable containers and call local fire/police department.
6.2 IN WATER:	If possible, remove from water and call local fire/ police department.

SECTION 7. HANDLING AND STORAGE:

7.1 HANDLING:	No special protective clothing required for handling individual cells.
7.2 STORAGE:	Store in a cool, dry place.

SECTION 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION:

8.1 ENGINEERING CONTROLS:	Keep away from heat and open flame. Store in a cool dry place.
8.2 PERSONAL PROTECTION:	
Respirator:	Not required during normal operations. SCBA required in the event of a fire.
Eye/face protection:	Not required beyond safety practices of employer.
Gloves:	Not required for handling of cells.
Foot protection:	Steel toed shoes recommended for large container handling.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES:

State:	Solid
Odor:	N/A
PH:	N/A
Vapor pressure:	N/A
Vapor density:	N/A
Boiling point:	N/A
Solubility in water:	Insoluble
Specific gravity:	N/A
Density:	N/A

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SECTION 10. STABILITY AND REACTIVITY:

10.1 REACTIVITY:	None
10.2 INCOMPATIBILITIES:	None during normal operation. Avoid exposure to heat, open flame, and corrosives.
10.3 HAZARDOUS DECOMPOSITION PRODUCTS:	None during normal operating conditions. If cells are opened, hydrogen fluoride and carbon monoxide may be released.
10.4 CONDITIONS TO AVOID:	Avoid exposure to heat and open flame. Do not puncture, crush or incinerate.

SECTION 11. TOXICOLOGICAL INFORMATION:

This product does not elicit toxicological properties during routine handling and use.

Sensitization: No

Teratogenicity: No

Reproductive toxicity: No

Acute toxicity: No

This product does not contain any kind of the following substances and halogen-type flame retardants including Chlorine and Bromide type harmful flame retardants which are listed in Appendix of TCO documents and relevant international ECO requirements:

Polybromated Biphenyls (PBB)

Polybromated Diphenylethers (PBDE)

Polychlorinated Biphenyls (PCBs)

Polychlorinated Terphenyls(PCTs)

Polychlorinated Paphthalene(PCN)

Chlorinated Paraffins(C10-C13)

Chlorofluorocarbons(CFCs)

Polyvinyl Chloride(PVC)

Carbon Tetrachloride

None of the following substances will be exposed, leaked, or emitted during transportation, storage or any operation and any temperature condition:

Chlorinated Fluorohydrocarbon (FCKW)

Acrylonitride

Styrol

Phenol

Benzol

Mercury of greater than 0.0001 wt% for alkaline battery

Mercury of greater than 0.0005 wt% for other battery

Lithium content of greater than 0.5g/battery cell

Cadmium, lead, and other harmful heavy metal

And will comply with the regulation of 49 CFR (DOT regulation), International Air Transport Association (IATA), and Deuche Forschungsgemeinschaft (DFG) regarding concentrations of emitted substances.

This product does not contain mercury and cadmium.

Mercury content: N/A

Cadmium content: N/A

If the cells are opened through misuse or damage, discard immediately. Internal components of cell are irritants and sensitizers.

SECTION 12. ECOLOGICAL INFORMATION:

Some materials within the cell are bio-accumulative. Under normal conditions, these materials are contained and pose no risk to persons or the surrounding environment.

SECTION 13. DISPOSAL CONSIDERATIONS:

CALIFORNIA REGULATED DEBRIS

RCRA Waste Code: Non-regulated

Dispose of according to all federal, state, and local regulations.

SECTION 14. TRANSPORT INFORMATION:

- The International Civil Aviation Organization (ICAO) Technical Instructions (2018-2019 Edition).
- The International Air Transport Association (IATA) Dangerous Goods Regulations (59th Edition, 2018). Packing instruction 965 Section IB or II for Lithium Ion battery.
- The International Maritime Dangerous Goods (IMDG) Code (38-16 Edition) with special provision 188 & 230.
- US Hazardous Materials Regulations 49 CFR(Code of Federal Regulations)Sections 173- 185 Lithium batteries and cells.
- The UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria 38.3 Lithium batteries, ST-SG-AC.10-11-Rev.6-Amend1 (UN3480).

TABLE 965-II

Contents	Lithium-ion cells and/or batteries with a Watt-hour rating of 2.7 Wh or less	Lithium-ion cells with a Watt-hour rating of more than 2.7Wh but not more than 20Wh	Lithium-ion batteries with a Watt-hour rating of more than 2.7Wh but not more than 100Wh
Maximum number of cells / batteries per package	No limit	8 cells	2 Batteries
Maximum net quantity per package	2.5 kg	N/A	N/A

Lithium-ion cells and batteries meeting the requirements in this section are not subject to other additional requirements of these Regulations except for:

- Each cell and battery is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3;
  - cells and batteries must be manufactured under a quality management program;
  - for batteries, The Watt-hour rating must be marked on the outside of the battery case;
  - Each package must be capable of withstanding a 1.2m drop test in any orientation without:
    - damage to cells or batteries contained therein;
    - shifting of the contents so as to allow battery to battery (or cell to cell) contact;
    - release of contents.
- Each package must be labeled with a lithium battery handling label.

Section IB requirements apply to lithium-ion cells with a Watt-hour rating not exceeding 20 Wh and lithium-ion batteries with a Watt-hour rating not exceeding 100 Wh packed in quantities that exceed the allowance permitted in Section II, Table 965-II.

Quantities of lithium-ion cells or batteries that exceed the allowance permitted in Section II, Table 965-II must be assigned to Class 9 and are subject to all of the applicable provisions of Regulation.

Even classified as lithium batteries packed with equipment (UN3481), IATA Dangerous Goods Regulations packing instruction 966 is applied.

COINTINUED: SECTION 14. TRANSPORT INFORMATION:

Even classified as lithium batteries installed in equipment (UN3481), IATA Dangerous Goods Regulations packing instruction 967 is applied.

Package if damaged: do not load or transport.

SECTION 15. REGULATORY INFORMATION:

OSHA hazard communication standard (29 CFR 1910.1200)

__Hazardous __V_Non-hazardous

SECTION 16 OTHER INFORMATION:

UN MANUAL OF TEST CRITERIA

All battery pack model pass UN383 test and drop test

Item	Test Item	Test specification
T1	Altitude Simulation (UN38.3-1)	1-1.4 Batteries are standard charged. 4 batteries are 1C cycled 50 times, ending in fully charged state. All batteries weight is measured. The charged batteries voltage are measured and recorded. 1-2. Batteries shall be stored at a pressure of 11.6Kpa or less for at least six hours at ambient temperature 20+/-5 ℃. 1-3. Vacuum is released. All cells weight is measured. The charged cell voltage are measured and recorded.
T2	Thermal test (UN38.3-2)	2-1. Packs are stored for 6 hours at 72℃±2℃, followed by storage for 6 hours at – 40℃±2℃. The maximum time interval between test temperature extremes is 30 minutes. 2-2. Repeat 2-1 for 10 times. Then store the packs at ambient for 24 hours. All packs weight are measured. The charged battery voltage are measured and recorded.
T3	Vibration test (UN38.3-3)	3-1. Packs are firmly secured to the platform of the vibration machine without distorting the packs in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of 3 mutually perpendicular to the terminal face. 3-2. The logarithmic frequency sweep is as follows: 7-18 Hz ➔ 1gn 18-50 Hz➔ 0.8mm amplitude 50-200 Hz ➔ 8gn 3-3. All packs weight are measured. The charged packs voltage are measured and recorded.
T4	Shock test (UN38.3-4)	4-1. Packs shall be secured to the testing machine by means of a rigid mount, which will support all mounting surfaces. 4-2. Packs shall be subjected to a half-sine shock of peak acceleration 150gn and pulse duration of 6 milliseconds. Each pack shall be subjected to 3 shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicularly mounting positions of the pack for a total of 18 shocks. 4-3. All batteries weight are measured. The charged cell voltage are measured and recorded.
T5	Short Circuit Test (UN38.3-5)	5-1. Packs are placed in to a 57℃±4℃ oven, and exterior packs temperature are monitored 5-2. When packs exterior reach 57℃±4℃, they are shorted by connecting terminals with a copper wire of resistance less than 100 mOhm. 5-3. The short was continued for more than 1hour or the cell temperature return to 57℃. The packs are observed for a further 6 hours.

CONTINUED: SECTION 16 OTHER INFORMATION:

Item	Test Item	Test specification
T6	Impact test (UN38.3-6)	6-1. Cell's diameter ≧ 18mm, Execution impact test. (A 9.1 Kg mass is to be dropped from a height of 61±2.5cm onto the sample.) 6-2. Cell's diameter ＜18mm, Execution crush test (The cells are crushed with a 13 KN with the crush tester. Once the force is obtained it is to be released.)
T7	Overcharge test (UN38.3-7)	7-1. The charge current shall be twice the SPEC's recommended maximum continuous charge current. 7-2. The minimum voltage of the test shall be as follows: (a) When the SPEC's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. (b) When the SPEC's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. 7-3. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.
T8	Forced discharge test-cell only (UN38.3-8)	8-1. Cell shall be forced discharged at ambient temperature by connecting it in series with a 12 V D.C. power supply at an initial current equal to the maximum discharge current Specified by the manufacturer.

Package Drop Test

Test specification: Height: 120cm