

LITHIUM CELL/BATTERY TEST SUMMARY AND SUPPLIER INQUIRY

IN ACCORDANCE WITH SUB-SECTION 38.3
OF MANUAL OF TESTS AND CRITERIA

N/A = Not Applicable

1. Name of cell / battery	
21.6V 4.2Ah Li-Ion Battery Pack (model # EY9L62) for Panasonic cordless power tool	

2. Manufacturer of cell / battery	
Name	Panasonic Manufacturing (Shanghai) Co., Ltd.
Address	258 Jiang Tian Dong Road Songjiang Industrial Zone, Shanghai 201613 China
Phone	+86 21 5774 1006
Email	-
Website	https://panasonic.cn/about/panasonic_china/pmfsh/

3. Test laboratory of cell / battery	
Name	Shanghai Research Institute of Chemical Industry Testing Center
Address	West entrance, No. 345 East Yun Ling Road, Shanghai 200062 China
Phone	+86 21 5281 5377 0713
Email	msds123@gmail.com
Website	-

4. ID-number and date			
Unique test report identification number	1113070116	Date of test report	3-9-2013

DESCRIPTION OF CELL / BATTERY

5. Mark the type of cell/battery with an "•"			
☐	Lithium ion cell	Lithium metal cell	☐
☒	Lithium ion battery	Lithium metal battery	☐
☐	Lithium hybrid battery		

6. Parameters	Cell	Battery
Mass in gram (g):		
Lithium ion: Indicate watt-hour rating (Wh):		90.72
Lithium metal: Indicate lithium metal content in gram (g):		
Lithium hybrid: Indicate lithium metal content in gram (g) and watt-hour rating (Wh):		g Wh

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Name of cell/battery (taken from field 1)

21.6V 4.2Ah Li-Ion Battery Pack

7. Physical description of cell / battery

21.6V 4.2Ah Li-Ion Battery Pack (model # EY9L62) for Panasonic cordless power tool

8. Model numbers

EY9L62

TESTS AND RESULTS

9. List of tests conducted and results - Mark N/A, pass or fail with an "●"	N/A	pass	fail
T1 - Altitude simulation	☐	☒	☐
T2 - Thermal Test	☐	☒	☐
T3 - Vibration	☐	☒	☐
T4 - Shock	☐	☒	☐
T5 - External Short Circuit	☐	☒	☐
T6 - Impact / Crush	☐	☒	☐
T7 - Overcharge	☐	☒	☐
T8 - Forced Discharge	☐	☒	☐
	☐	☐	☐
	☐	☐	☐

10. Reference to assembled battery testing requirements

UN Recommendations on the Transport of Dangerous Goods
(21st edition) Article # 2.9.4 Lithium Batteries (a)
"Cells and batteries manufactured according to a type meeting the
requirements of sub-section 38.3 of the Manual of Tests and Criteria,
Revision 3, Amendment 1 or any subsequent revision"

N/A

11. Reference to the revised edition of the Manual of Tests and Criteria used and to amendments thereto

UN38.3 Revision 5 Amendment 1

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21.6V 4.2Ah Li-Ion Battery Pack

ADDITIONAL SUPPLIER INQUIRY

12. Quality management system for manufacturing cells / batteries Does the manufacturer of the cell/battery manufacture the products based on a documented quality management system according to transport regulations?	☒	YES	NO	☐
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13. Are the following parameters exceeded? Lithium ion cell: more than 20 Wh Lithium ion battery: more than 100 Wh Lithium metal cell: more than 1 g Lithium Lithium metal battery: more than 2 g Lithium Lithium hybrid Battery: more than 1,5 g Lithium and/or more than 10 Wh	☐	YES	NO	☒
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Check point 14 – 16 need to be answered when 13 has been ticked "YES":

14. Does each cell / battery incorporates a safety venting device or is designed to preclude a violent rupture under normal conditions of carriage?	☐	YES	NO	☐
15. Is each cell / battery equipped with an effective means of preventing external short circuits?	☐	YES	NO	☐
16. Is each battery containing cells or series of cells connected in parallel equipped with effective means as necessary to prevent dangerous reverse current flow (e.g. diodes, fuses, etc.)?	☐	N/A	YES	NO

17. Only in air transport: State of Charge (SoC) for UN 3480 Lithium ion cells/batteries and lithium polymer cells/batteries				
State of Charge (SoC) max. 30 %	☒	YES	NO	☐

CELLS/BATTERIES INSTALLED IN EQUIPMENT

18. Check point 18 needs to be answered when the cells / batteries are installed in articles:				
18.a) Only button cells enclosed?	☐	YES	NO	☐
18.b) Number of enclosed cells (other than button cells)/batteries per equipment				
Enclosed cells per equipment	Enclosed batteries per equipment			
When the equipment is intentionally active/switched on during transport e.g. data loggers:				
18.c) Confirmation that no dangerous amount of heat is emitted from the equipment	☐	N/A	☒	YES
18.d) Confirmation that the equipment when transported by air fulfills the defined air transport standards for electromagnetic radiation according to DO-160	☒	N/A	☐	YES

19. Place, Date	20. Title, Surname, First name	21. Company stamp and signature
Ottobrunn/Germany 21-1-2020	General Manager Nedachi, Kunihiro	

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Explanatory sheet about safety of products

1. Basic item

Product name	Li- ion Battery Pack
Product code (Model No.)	Refer to Table 1.and 2
Manufacture	Panasonic Corporation
Address	1668, fujikata, Tsu, Mie, 514-8555, Japan
Phone number :	+81-59-228-1141
E-mail	shimizu.hidenori@jp.panasonic.com

2. Product information

Basic composition of the product

This product is a battery which consists of such main component as core battery pack assembled with some Lithium ion cells. And it consists of any combination of plastic casing, tube casing, protection circuit boards, safety devices and interface terminals.

Table 1

No.	Product code (Model No.)	Product number	Cell Number	Wh Rating
1	EY9L10 / EZ9L10	UR18650W2	1	6 Wh
2	EY9L21 / EZ9L21	UR18650W2	2	11 Wh
3	EY9L30 / EZ9L30	CGR26650A	3	27 Wh
4	EY9L31 / EZ9L31	CGR26650B	3	34 Wh
5	EY9L32 / EZ9L32	UR18650W2	3	17 Wh
6	EY9L40 / EZ9L40	CGR26650A	4	44 Wh
7	EY9L41 / EZ9L41	CGR26650B	4	45 Wh
8	EY9L42 / EZ9L42	CGR18650K	4	22 Wh
9	EY9L44 / EZ9L44	CGR18650KA	8	48 Wh
10	EY9L45 / EZ9L45	NCR18650E	8	61 Wh
11	EY9L46 / EZ9L46	UR18650W2	8	44 Wh
12	EY9L47 / EZ9L47	UR18650RX	4	29 Wh
13	EY9L48 / EZ9L48	UR18650NSX	8	72 Wh
14	EY9L50 / EZ9L50	CGR18650KA	10	60 Wh
15	EY9L51 / EZ9L51	NCR18650E	10	76 Wh
16	EY9L52 / EZ9L52	UR18650RX	5	36 Wh
17	EY9L53 / EZ9L53	NCR20650A	5	54 Wh
18	EY9L54 / EZ9L54	UR18650NSX	10	90 Wh
19	EY9L62 / EZ9L62	NCR18650E	12	91 Wh
20	EY9L82 / EZ9L82	UR18650W2	16	87 Wh
21	EY9L84 / EZ9L84	NCR2070C	8	98 Wh

Table 2

No.	Product code (Model No.)	Product number	Cell Number	Wh Rating
F1	EYFB30 / EZFB30	UR18650W2	6	33 Wh
F2	EYFB31 / EZFB31	CGR18650K	3	17 Wh
F3	EYFB32 / EZFB32	UR18650RX	6	22 Wh
F4	EYFB40	CGR18650KA	8	48 Wh
F5	EYFB41	UR18650RX	4	29 Wh
F6	EYFB42	NCR18650E	8	61 Wh
F7	EYFB50	UR18650NSX	10	90 Wh
F8	EYFB51	NCR20650A	5	54 Wh
F9	EYFB60	NCR18650E	12	91 Wh
F10	EY9L20	UR18650W2	2	11 Wh

3. TRANSPORT INFORMATION

Regarding cautions under transportation, it is according to the related clause in the annexed or attached 'Safety data sheet for product of Lithium ion rechargeable battery cell'.

*Note : Check the latest version of transportation regulation because it is frequently revised.

Kazufumi Iji

Kazufumi Iji
 Manager
 Quality Assurance Section Power Tool Products Department
 Power Components Business Unit
 Eco Solutions Company
 Panasonic Corporation

Explanatory sheet about safety of product for transportation (Safety Data Sheet for transportation)

1. Basic item

Product name	Lithium ion battery (cell) ("Lithium ion battery (cell)" includes lithium polymer battery (cell) and battery (cell) is described by cell in this document)
UN number	3480
Product code	Refer to Table 1.
Product model name	Refer to Table 1.
Manufacturer	SANYO Electric Co., Ltd., Panasonic group
Address	222-1 Kaminaizen, Sumoto, Hyogo, Japan
Department in charge	Technology Planning Department Rechargeable Battery Business Division
Phone number	+81-799-23-3931
E-mail	prb-bp-ta@ml.jp.panasonic.com

2. Product information

Basic composition of the product

This product is a Lithium ion cell. It may have a tube casing, lead plate and a lead with a connector.

3. Safety Information

- SANYO certifies the cell has passed and satisfied the UN Manual of Tests and Criteria Part III, sub-section 38.3 testing in SANYO shipping.
- SANYO manufactured the cell under the quality management program required in UN Model regulations 2.9.4(e).

Refer to Appendix "SDS (SDS-IAT-00002)"

1. The Watt-hour rating of the cell is not more than 20Wh.
2. Packages of the cell satisfy the following conditions when SANYO ships.
 - (1) The package has passed the drop test from the height of 1.2m.
 - (2) The package net weight is not more than 10kg.
 - (3) The package is marked and labeled according to requirement of Packing Instruction 965 Section IB stated in ICAO's and IATA's dangerous goods regulations.
3. The cell is not defective for safety reasons, not damaged. It is not a collected cell for recycling or disposal.
4. The cell is not subject to the fully regulated requirements for Dangerous Goods in ocean and ground transportation.
5. The battery should be transported by Cargo aircraft as UN3480, Class 9 Dangerous Goods, and state of charge not exceeding 30%, according to Packing Instruction 965 Section IB stated in ICAO's and IATA's dangerous goods regulations.



H. Kuroda General Manager
Technology Planning Department
Rechargeable Battery Business Division
SANYO Electric Co., Ltd.
Panasonic group

Safety data sheet for product

1. PRODUCT AND COMPANY IDENTIFICATION

- Product name: Lithium ion rechargeable battery cell
- Product code: None
(All models Sanyo manufactured and whose capacity is less than or equal to 5.4Ah, including the cell branded as Panasonic, excluding the cell whose shape is prismatic and two or more short / middle / long side excess 12mm/85mm/110mm.)
- Company name: Sanyo Electric Co., Ltd., Panasonic group
- Address: 222-1, Kaminaizen, Sumoto City, Hyogo, Japan
- Telephone number: +81-799-24-4111
- Fax number: +81-799-23-2879
- Emergency telephone number: [Daytime of business day] +81-799-23-3931
[Night and holiday] +81-799-24-4131

2. HAZARDS IDENTIFICATION

For the battery cell, chemicals are contained in sealed metal or metal laminated plastic containers and the battery is designed to withstand temperatures and pressures during normal handling. Therefore, there will be no physical hazard such as ignition, rupture, etc. and no chemical hazard due to leakage of battery contents in normal handling.

However, when exposing to fire, applying strong impact, disassembling, or applying electrical stress due to misuse, the gas release vent may operate. In the worst case, battery cell case will breach, and hazardous materials may leak.

Also, if the battery is heated intensely due to surrounding fires etc., irritating or harmful gas may be generated.

- GHS classification: Not available
(This product is outside the scope of GHS system since it's considered as an "article".)
- Most important hazard and effects
Human health effects:
 - Inhalation: Vapor of the electrolyte has anesthetic effect and will stimulate the respiratory tract.
 - Skin contact: Vapor of the electrolyte will stimulate the skin. If electrolyte contacts the skin, it will cause sore and stimulation on the skin.
 - Eye contact: Vapor of the electrolyte will stimulate the eyes. If electrolyte contacts the eye, it will cause sore and stimulation on the eye. Electrolyte contains a substance which causes strong inflammation especially to the eyes.Environmental effects: Since a battery cell remains in the environment, do not throw out it into the environment.
- Specific hazards:
 - If the electrolyte contacts with water, it will generate detrimental hydrogen fluoride.
 - Since the leaked electrolyte is inflammable liquid, do not bring close to fire.

3. COMPOSITION / INFORMATION ON INGREDIENTS

- Substance or preparation: Preparation
- Information about the chemical nature of product: *1

Portion	Material name	Concentration range (wt %)
Positive electrode	Lithium transition metal oxidate ($\text{Li}[\text{M}]_m[\text{O}]_n$ *2)	20~60
Positive electrode's base	Aluminum	1~10
Negative electrode	Carbon	10~30
Negative electrode's base	Copper	1~15
Electrolyte	Organic electrolyte principally involves ester carbonate	5~25
Outer case	Aluminum, iron, aluminum laminated plastic	1~30

*1 Not every product includes all of these materials.

*2 The letter M means transition metal and candidates of M are Co, Mn, Ni and Al. One compound includes one or more of these metals and one product includes one or more of the compounds. The letter m and n means the number of atoms.

4. FIRST-AID MEASURES**Spilled internal cell materials**

- Inhalation:
Make the victim blow his/her nose, gargle. Seek medical attention if necessary.
- Skin contact:
Remove contaminated clothes and shoes immediately. Wash extraneous matter or contact region with soap and plenty of water immediately.
- Eye contact:
Do not rub one's eyes. Immediately flush eyes with water continuously for at least 15 minutes. Seek medical attention immediately.

A battery cell and spilled internal cell materials

- Ingestion:
Wash out mouth thoroughly. Do not make the victim vomit, unless instructed by medical personnel. Seek medical attention immediately.

5. FIRE-FIGHTING MEASURES

- Suitable extinguishing media: Plenty of water, carbon dioxide gas, nitrogen gas, chemical powder fire extinguishing medium and fire foam.
- Specific hazards: Corrosive gas may be emitted during fire.
- Specific methods of fire-fighting: When the battery burns with other combustibles simultaneously, take fire-extinguishing method which correspond to the combustibles. Extinguish a fire from the windward as much as possible.
- Special protective equipment for firefighters:
 - Respiratory protection: Respiratory equipment of a gas cylinder style or protection-against-dust mask
 - Hand protection: Protective gloves
 - Eye protection: Goggle or protective glasses designed to protect against liquid splashes
 - Skin and body protection: Protective cloth

6. ACCIDENTAL RELEASE MEASURES

Spilled internal cell materials, such as electrolyte leaked from a battery cell, are carefully dealt with according to the followings.

- Precautions for human body:
Remove spilled materials with protective equipment (protective glasses and protective gloves). Do not inhale the gas as much as possible. Moreover, avoid touching with as much as possible.
- Environmental precautions: Do not throw out into the environment.
- Method of cleaning up: The spilled solids are put into a container. The leaked place is wiped off with dry cloth.
- Prevention of secondary hazards: Avoid re-scattering. Do not bring the collected materials close to fire.

7. HANDLING AND STORAGE

- Handling suggestions
 - Do not connect the positive terminal to the negative terminal with electrical wire or chain.
 - Avoid polarity reverse connection when installing the battery to an instrument.
 - Do not wet the battery with water, seawater, drink or acid; or expose to strong oxidizer.
 - Do not damage or remove the external tube.
 - Keep the battery away from heat and fire.
 - Do not disassemble or reconstruct the battery; or solder the battery directly.
 - Do not give a mechanical shock or deform.
 - Do not use unauthorized charger or other charging method. Terminate charging when the charging process doesn't end within specified time.
- Storage
 - Do not store the battery with metalware, water, seawater, strong acid or strong oxidizer.
 - Make the charge amount 30~50% then store at room temperature or less (temperature= -20~35 degree C) in a dry (humidity: 45~85%) place. Avoid direct sunlight, high temperature, and high humidity.
 - Use insulative and adequately strong packaging material to prevent short circuit between positive and negative terminal when the packaging breaks during normal handling. Do not use conductive or easy to break packaging material.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION (WHEN THE ELECTROLYTE LEAKS)

- Control parameters
ACGIH has not been mentioned control parameter of electrolyte.
- Personal protective equipment
 - Respiratory protection: Respirator with air cylinder, dust mask
 - Hand protection: Protective gloves
 - Eye protection: Goggles or protective glasses designed to protect against liquid splashes
 - Skin and body protection: Working clothes with long sleeve and long trousers

9. PHYSICAL AND CHEMICAL PROPERTIES

- Appearance
 - Physical state: Solid
 - Form: Cylindrical or Prismatic or Pouch (laminated)
 - Color: Metallic color or black (without tube if it has tube)
 - Odor: No odor

10. STABILITY AND REACTIVITY

- Stability: Stable unless a strong shock is applied or heated strongly.
- Possibility of hazardous reactions: Damage to the container may cause leakage of contents. Contents may leak or ignite due to temperature rise.
- Conditions to avoid: Crushing or deformation, use and storage at 80 degree C or higher or at high humidity. Usage at a voltage or a current outside the rating and external short circuit.
- Incompatible materials: Conductive material such as water or metal pieces. Oxidizing agent such as bleach.
- Hazardous decomposition products: Acid or harmful gas is emitted during fire.

11. TOXICOLOGICAL INFORMATION

Organic Electrolyte

- Acute toxicity:
LD₅₀, oral - Rat 2,000mg/kg or more
- Irritating nature: Irritative to skin and eye

12. ECOLOGICAL INFORMATION

- Persistence/degradability:

Since a battery cell and the internal materials remain in the environment, do not bury or throw out into the environment.

13. DISPOSAL CONSIDERATIONS

- Recommended methods for safe and environmentally preferred disposal:

Product (waste from residues)

Specified collection or disposal of lithium ion battery is required by the law like as "battery control law" in several nations. Collection or recycle of the battery is mainly imposed on battery's manufacturer or importer in the nations recycle is required.

Contaminated packaging

Neither a container nor packing is contaminated during normal use. When internal materials leaked from a battery cell contaminates, dispose as industrial wastes subject to special control.

14. TRANSPORT INFORMATION

Specific safety measures and conditions:

In the case of transportation, avoid exposure to high temperature and prevent the formation of any condensation.

Avoid transportation that may result in collapse or packaging breakage.

Be careful not to let it leak into rainwater.

The container must be handled carefully not to break.

Be careful not to shock the battery (cell).

Please refer to Section 7-HANDLING AND STORAGE also.

UN regulation

- UN number: 3480 (3481 when the battery is contained in equipment or packed with equipment)

- Proper shipping name:

Lithium ion batteries ("lithium ion batteries contained in equipment" or "lithium ion batteries packed with equipment")

- Class: 9 *

** Although this product meets the criteria of "dangerous goods" and are classified as "lithium ion batteries", depending on the battery's total capacity in the packaging, etc., they may not be subject to the fully regulated provisions.*

Regulation depends on region and transportation mode

- Worldwide - Air transportation:

ICAO TI / IATA-DGR [packing instruction 965 section IB or II]

(When shipping batteries "packed with" or "contained in" equipment, use packing instruction 966 or 967 as appropriate.)

- Worldwide - Ocean transportation:

IMO-IMDG Code [special provision 188]

- Europe - Ground transportation:

ADR [special provision 188]

** Instructions or provisions in the box brackets are conditions to make the battery cell exempted from full regulation.*

15. REGULATORY INFORMATION

- Regulations specifically applicable to the product:

Wastes Disposal and Public Cleaning Law [Japan]

Law for Promotion of Effective Utilization of resources [Japan]

US Department of Transportation 49 Code of Federal Regulations [USA]

** About overlapping regulations, please refer to Section 14-TRANSPORT INFORMATION.*

16. OTHER INFORMATION

- This safety data sheet is offered an agency who handles this product to handle it safely.
- The agency should utilize this safety data sheet effectively (put it up, educate person in charge) and take proper measures.
- ***The information contained in this Safety data sheet is based on the present state of knowledge and current legislation.***
- This safety data sheet provides guidance on health, safety and environmental aspects of the product and should not be construed as any guarantee of technical performance or suitability for particular applications.

Reference

Dangerous Goods Regulations – 59th Edition Effective 1 January 2018: International Air Transport Association (IATA)

IMDG Code – 2016 Edition: International Maritime Organization (IMO)

The European Agreement concerning the International Carriage of Dangerous Goods by Road – 2017:

The United Nations Economic Commission for Europe (UNECE)

First edition:

Apr. 28, 2010

Prepared and approved by:

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