1. Identification

A. Product name

- Model LF Battery Pack Assembly

B. Recommended use and restriction

- General use : Lithium-Ion Polymer Battery
- Restriction on use : Not available

C. Manufacturer / Supplier / Distributor information

◎ Manufacturer information

- Company name : HL Green Power Inc.
- Address : 69, Gieopdosi 1-ro, Daesowon-myeon, Chungju-si, Chungbuk-do, 380-871, Korea
- Dept. : R&D Team
- Telephone : +82-43-841-6700
- Emergency telephone number : +82-43-841-6700
- Fax number : +82-43-841-6890
- E-mail address :

◎ Supplier / Distributer information

- Company name : HL Green Power Inc.
- Address : 69, Gieopdosi 1-ro, Daesowon-myeon, Chungju-si, Chungbuk-do, 380-871, Korea
- Dept. : R&D Team
- Telephone : +82-43-841-6700
- Emergency telephone number : +82-43-841-6700
- Fax number : +82-43-841-6890
- E-mail address :

2. Hazard identification

A. GHS Classification

- Not applicable

B. GHS label element

◎ Hazard symbols

- Not applicable

◎ Signal words

- Not applicable

◎ Hazard statements

- Not applicable

◎ Precautionary statements

1) Prevention
   - Not applicable
2) Response
   - Not applicable
3) Storage
   - Not applicable
4) Disposal
   - Not applicable

C. Other hazard which do not result in classification : (NFPA Classification)

◎ NFPA grade (0 ~ 4 level)

- Health : 0, Flammability : 0, Reactivity : 0

3. Composition / Information on ingredients

a. Cell

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Aluminum Foil	7429-90-5	2~10
Metal Oxide (propietary)	-	20~50
1,1-Difluoroethene homopolymer /PVDF	27937-79-9	<5
Copper Foil	7440-50-8	5~20
Carbon (proprietary)	7440-44-0	10~30
Electrolyte (proprietary)	-	10~30
Aluminum, Copper plate and inert materials	-	remainder

b-1. Housing Assembly

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
2,6-Dimethyphenol homopolymer	35134-01-4	50~60
Ethenylbenzene polymer with 1,3-butadiene	9003-55-8	15~25
Glass Fiber	65997-17-3	8~15
others	-	13-20

b-2. Busbar Cover Assembly

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Ethylene-Propylene Polymer	9010-79-1	95~100
others	-	<1

b-3. Fuse Box Assembly

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Urethon Aeylate	-	50~5
Acrylic Resin	-	2~8
Isobonyl Acrylate	5888-33-5	20~25
Hydroxy Ethyl Methacrylate	868-77-9	20~25
Epoxy Silicone	2530-83-8	2~5
(1-Hydroxycyclohexyl) Phenyl methanone	67762-90-7	5~10

c. Member Assembly

Emergency Overview

May explode in a fire, which could release hydrogen fluoride gas.

Use extinguishing media suitable for materials burning in fire.

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Mn	7439-96-5	<1.4

Fe / Ferrium	7439-89-6	90<
Zn	7440-66-6	<3

d-1. Cell Cover Assembly

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Aluminium (metal)	7429-90-5	96.3
Magnesium (metal)	7439-95-4	2.5
Iron	7439-89-6	0.4
Chromium	7440-47-3	0.25
Silicon	7440-21-3	0.25
others	-	0.3

d-2. Busbar

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Copper	7440-50-8	99.7
Iron	7440-02-0	0.3

d-3. End Plate Assembly

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Iron	7439-89-6	97.1
Manganese	7439-96-5	1.3
Zinc (metal)	9010-79-1	1.1
others	-	0.5

d-4. Duct & Upper Plate Assembly

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Iron	7439-89-6	77.6
Polyethylene	9002-88-4	16.4
1-Propene, polymer with ethane	9010-79-1	2.5
Manganese	7439-96-5	1.1
Aluminium (metal)	7429-90-5	1.0
Talc	14807-96-6	0.7
others	-	0.7

d-5. Support Bar Assembly

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Iron	7439-89-6	96.6
Acetone	67-64-1	0.46
Bicyclo(2,2,1)hept-2-ene, 5-ethylidene polymer with ethene and 1-p…	25038-36-2	0.46
Manganese	7439-96-5	0.4
2-Ehylhexyl acrylate	103-11-7	0.4
Talc	14807-96-6	0.31
Carbon black	1333-86-4	0.27
Distillates(petroleum), solvent-dewaxed heavy paraffinic	64742-65-0	0.27
others	-	0.83

e. Wire Harness etc.

Chemical Name / Trade names and Synonyms	CAS No.	Content(%)
Copper	7440-50-8	60.56
PBT	-	11.64
Polyvinylchloride	9002-86-2	8.51
1,2-Benzenedicarboxylic acid, di-C8-10-branched alkyl esters, C9-rich	68515-48-0	7.09
Limestone	1317-65-3	6.86
Polyamid 6.6	32131-17-2	2.08
Hexanedioic acid, polymer with hexahydro-2H-azepin-2-one and 1,6-hex...	24993-04-2	1.1
Polypropylene	9003-07-0	0.48
Zinc (metal)	7440-66-6	0.17

4. First aid measures

A. Inhalation

- Not a health hazard.

B. Eye contact

- Not a health hazard.

C. Skin contact

- Not a health hazard.

D. Ingestion contact

- If swallowed, obtain medical attention immediately.

If exposure to internal materials within battery due to damaged outer casing, the following actions are recommended ;

A. Inhalation

- Leave area immediately and seek medical attention.

B. Eye contact

- Rinse eyes with water for 15 minutes and seek medical attention.

C. Skin contact

- Wash area thoroughly with soap and water and seek medical attention.

D. Ingestion contact

- Drink milk/water and induce vomiting; seek medical attention.

5. Firefighting measures

A. General hazard

- Battery is not flammable but internal cell organic material will burn if the cell is incinerated.
- Combustion products include, but are not limited to hydrogen fluoride, carbon monoxide and carbon dioxide.

B. Extinguishing media

- Use extinguishing media suitable for the materials that are burning.

C. Special firefighting instructions

- If possible, remove cell(s) from fire fighting area.
- If heated above 150℃, Cell(s) may explode/vent

D. Firefighting equipment

- Use NIOSH/MSHA approved full-face self-contained breathing apparatus (SCBA) with full protective gear.

6. Accidental release measures

A. On Land

- Place material into suitable containers and cell local fire/police department.

B. In Water

- If possible, remove from water and call local fire/police department.

7. Handling and storage

A. Precautions for safe handling

- No special protective clothing required for handling individual batteries.

B. Conditions for safe storage, including any incompatibilities

- Store in a cool, dry place.

8. Exposure control/personal protection

A. Exposure limits

◎ Hazard symbols

- Not applicable

B. Engineering controls

- Keep away from heat and open flame. Store in a cool, dry place.

C. Personal protective equipment

◎ Respiratory protection

- Not required during normal operations. SCBA required in the event of a fire.

◎ Eye protection

- Not required beyond safety practices of employer.

◎ Hand protection

- Not required for handling of cells.

◎ Foot protection

- Steel toed shoes recommended for large container handling.

◎ Others

- Not available

9. Physical and chemical properties

A. Appearance	
- Appearance	Solid(Other)
- Color	-
B. Odor	Not available
C. Odor threshold	Not available
D. pH	Not available
E. Melting point/Freezing point	Not available
F. Initial boiling point/Boiling ranges	Not available
G. Flash point	Not available
H. Evaporation rate	Not available
I. Flammability(solid, gas)	Not available
J. Upper/Lower flammability or explosive limits	Not available
K. Vapour pressure	Not available
L. Solubility	Insoluble
M. Vapour density	Not available
N. Specific gravity	Not available
O. Partition coefficient of n-octanol/water	Not available
P. Autoignition temperature	Not available
Q. Decomposition temperature	Not available
R. Viscosity	Not available
S. Molecular weight	Not available

10. Stability and reactivity

A. Chemical stability

- This material is stable under recommended storage and handling conditions.

B. Chemical stability

- Hazardous Polymerization will not occur.

C. Conditions to avoid

- Avoid exposure to heat and open flame. Do not puncture, crush or incinerate.

D. Incompatible materials

- None during normal operation. Avoid exposure to heat, open flame, and corrosives.

E. Hazardous decomposition products

- None during normal operating conditions. If batteries are damaged,

hydrogen fluoride and carbon monoxide may be released.

11. Toxicological information

A. Exposure limits

◎ (Respiratory tracts)

- Not available

◎ (Oral)

- Not available

◎ (Eye-Skin)

- Not available

B. Delayed and immediate effects and also chronic effects from short and long term exposure

◎ Acute toxicity
- Oral
  - Not available
- Dermal
  - Not available
- Inhalation
  - Not available

◎ Skin corrosion/irritation
- Not available

◎ Serious eye damage/irritation
- Not available

◎ Respiratory sensitization
- Not available

◎ Skin sensitization
- Not available

◎ Carcinogenicity
- IARC
  - Not available
- OSHA
  - Not available
- ACGIH
  - Not available
- NTP

◎ Germ cell mutagenicity
- Not available

◎ Reproductive toxicity
- Not available

◎ STOT-single exposure
- Not available

◎ STOT-repeated exposure
- Not available

◎ Aspiration hazard
- Not available

- Not available

- EU CLP
  - Not available

12. Ecological information

A. Ecotoxicity

◎ Fish

- Not available

◎ Crustaceans

- Not available

◎ Algae

- Not available

B. Persistence and degradability

◎ Persistence

- Not available

◎ Degradability

- Not available

C. Bioaccumulative potential

◎ Bioaccumulative potential

- Not available

◎ Biodegration

- Not available

D. Mobility in soil

- Not available

E. Other adverse effects

- Not available

13. Disposal considerations

A. Disposal methods

- Since more than two kinds of designaed waste is mixed, it is difficult to treat seperatly, then can be reduction or stabilization by incineration or similar process.
- If water separation is possible, pre-process with water separation process.
- Dispose by incineration

B. Special precautions for disposal

- The user of this product must disposal by oneself or entrust to waste disposer or person who other's waste recycle and dispose, person who establish and operate waste disposal facilities.
- Dispose of waste in accordance with all applicable laws and regulations.

14. Transport information

A. UN NO. (IMDG)

- 3481

B. Proper shipping name

- Lithium Ion Batteries contains in, or packed with, equipment

C. Hazard class

- 9

D. IMDG Packing group

- I

E. Marine pollutant

- Not available
- Not applicable

F. Special precautions for user related to transport or transportation measures

- Local transport follows in accordance with Dangerous goods Safety Management Law.
- Package and transport follow in accordance with Department of Transportation (DOT) and other regulatory agency requirements.
- EmS FIRE SCHEDULE : F-A
- EmS SPILLAGE SCHEDULE : S-I

G. 2015 IATA dangerous goods regulations 56th edition packing instruction

- 967-I

TABLE 967-I

UN number	Net quantity per package Passenger aircraft	Net quantity per package Cargo Aircraft Only
UN 3481 Lithium ion batteries contained in equipment	5 kg	35 kg

OUTER PACKAGINGS—Strong outer packagings, such as:

Type	Drums						Jericans			Boxes							
Desc.	Steel	Aluminium	Plywood	Fibre	Plastic	Other metal	Steel	Aluminium	Plastic	Steel	Aluminium	Wood	Plywood	Reconstituted wood	Fibreboard	Plastic	Other metal

15. Regulatory information

A. National and/or international regulatory information

◎ POPs management law

- Not applicable

◎ Information of EU classification

- Classification
  - Not applicable
- Risk phrases
  - Not applicable
- Safety phrase
  - Not applicable

◎ U.S. Federal regulations

- OSHA PROCESS SAFETY (29CFR1910.119)

- Not applicable

• CERCLA Section 103 (40CFR302.4)
  - Not applicable
• EPCRA Section 302 (40CFR355.30)
  - Not applicable
• EPCRA Section 304 (40CFR355.40)
  - Not applicable
• EPCRA Section 313 (40CFR372.65)
  - Not applicable

◎ Rotterdam Convention listed ingredients

- Not applicable

◎ Stockholm Convention listed ingredients

- Not applicable

◎ Montreal Protocol listed ingredients

- Not applicable

16. Regulatory information

A. Reference

- The information contained herein is believed to be accurate. It is provided independently of any sale of the product for purpose of hazard
- This Safety Data Sheet was compiled with data and information from the following sources: KOSHA, NITE, ESIS, NLM, SIDS, IPCS

B. Issue date

- 2015-03-16

C. Revision number and last date revised

- 1 time, 2015-03-16

D. Other

- This MSDS is prepared according to the Globally Harmonized System (GHS)