

Section 1: Product Name and Identification

1.1 Product Identifier:

1.1.1 Product Name: Enphase AC Battery (ACB)

1.1.2 Product Number: B270-1200-LN-I-INT0-RV1, B270-1200-LN-I-EU00-RV0, B280-1200-LL-I-US00-RF0, IQ6PLUS-B1200-LL-I-US00-RV1, IQ7-B1200-LL-I-US01-RV1, IQ7-B1200-LN-I-INT01-RV0

1.1.3 Other Means of Identification

- Lithium Iron Phosphate Battery
- UN3480 – Lithium Ion Batteries

1.1.4 Product Description: The Enphase AC Battery consists of an 8-cell lithium iron phosphate battery, battery management unit (BMU), microinverter, miscellaneous electronics and protective case.

1.2 Product Use

1.2.1 Identified Uses: The product is to be used as an alternating current (AC)-coupled energy system primarily used with photovoltaic systems.

1.2.2 Use Restrictions: Operate the battery under the following conditions

- Temperature Range: Do not expose cell to temperatures outside the range of -40°C to 80°C. To minimize any adverse effects on battery performance it is recommended that the cells be kept at room temperature (25°C +/- 5°C).
- Do not store close to heat sources, such as furnaces or open flames.
- Store in a dry location.
- Protect battery from physical damage. Do not open, disassemble, crush or burn cell.

1.3 Details of the Supplier of the Safety Data Sheet

Enphase Energy
1420 N. McDowell Blvd.
Petaluma, CA 94954
(707) 763-4784

1.4 Emergency Telephone Number:

1.4.1. Inside United States Territories and Canada: (800) 255-3924

1.4.2. Outside United States Territories and Canada: +01 (813) 248-0585

Section 2: Hazard Identification

2.1. Hazard Classification and Hazard Statement

The battery is sealed inside a protective case and is not expected to expose user to hazardous ingredients under normal use conditions. Risk of exposure occurs only if ACB is mechanically, thermally, or electrically abused to the point where both the protective case and battery are compromised. If this occurs, exposure to electrolyte solutions contained within the cell may occur by

eye contact, skin contact and ingestion. The following hazard classifications only apply to the electrolyte.

- H226 - Flammable Liquid (Category 3)
- H302 - Oral Toxicity (Category 4)
- H314 - Skin Corrosion/Irritation (Category 1)
- H318 – Eye Irritation (Category 1)
- H335 - Specific organ toxicity; single exposure; respiratory tract irritation (Category 3)
- H372 – Specific organ toxicity; repeated exposure (bones , teeth) (Category 1)

2.2. GHS Label Elements

2.2.1. Pictogram (Electrolyte)



2.2.2. Signal Word: DANGER

2.3. GHS Hazard Statement (Electrolyte)

Hazard Class	Hazard Category	Hazard Code	Hazard Statement
Flammable Liquid	3	H226	Flammable liquid and vapor
Oral Toxicity	4	H302	Harmful if swallowed
Skin Corrosion	1	H314	Causes severe skin burns and eye damage
Eye Irritation	1	H318	Causes serious eye damage
Specific organ toxicity; single exposure; respiratory tract irritation.	3	H335	May cause respiratory irritation
Specific target organ toxicity; - repeated exposure, Inhalation	1	H372	Causes damages to organs (bones, teeth)

2.4. Precautionary Statement

- P101 - If medical advice is needed: Have product container or label in hand
- P102 - Keep out of reach of children
- P103 - Read label before use
- P210 - Keep away for heat, hot surfaces, sparks, open flames and other ignition sources. No smoking
- P264 - Wash hands thoroughly after using
- P280 - Wear protective gloves/eye and face protection
- P302 + P303 + P352 + P353 + P361 + P362 +P364 - If on skin (or hair): Take off all contaminated clothing and wash before reuse immediately. Rinse skin with water.

- P337 + P332 + P313 – If skin irritation occurs or eye irritation persists: get medical attention or advice
- P370 + P378 – In case of fire: Use ABC dry chemical to extinguish

2.5. Hazards Which Are Not Covered by GHS

- No data available.

Section 3: Composition/information on Ingredients

3.1. Substances

As a solid manufactured article, exposure to hazardous ingredients is not expected to occur with normal use.

Chemical Name	CAS #	EINECS EC#	Concentration Range in Electrolyte (w/w %)	Mass Range in Cell (g/g %)
Electrolyte				
Lithium Hexfluorophosphate	21324-40-3	244-334-7	10-20	1-5
Lithium bis-trifluoromethanesulfonoimide	90076-65-6	415-300-0	1-5	0.1-1
Electrolyte Solvents				
Ethylene Carbonate	96-49-1	202-510-0	80-90	10-20
Propylene Carbonate	108-32-7	203-572-1		
Diethyl Carbonate	105-58-8	203-311-1		
Dimethyl Carbonate	616-38-6	210-478-4		
Ethyl methyl carbonate	623-53-0	No listing		
1,3 - Propanesultone	1120-71-4	214-317-9		

Section 4: First-aid Measures

The ACB has a lithium ion battery contains organic electrolyte and is sealed in a protective case. Risk of exposure occurs only if the cell is mechanically, thermally, or electrically abused to the point of compromising the enclosure. In the event that the battery is physically damaged and results in electrolyte leakage, the following initial care measures should be taken in the event that person(s) are exposed to the electrolyte.

4.1. Description of First Aid Measures

4.1.1 General Advice:

- Move victim to fresh air and out of the dangerous area.
- Show this safety data sheet to the medical professional in attendance.
- Quickly transport victim to emergency care in the event of eye contact, skin irritation, ingestion or inhalation.

- 4.1.2 Eye Contact: Immediately flush the eyes with plenty of clean water for at least 15 minutes, without rubbing. If appropriate procedures are not taken, this may cause an eye irritation. Seek medical attention if eye irritation persists.
- 4.1.3 Skin Contact: Take off all contaminated clothing and wash before reuse immediately. Rinse skin with water. If appropriate procedures are not taken, this may cause skin irritation. Seek medical attention if skin irritation occurs.
- 4.1.4 Inhalation Contact: Move victim to fresh air immediately and remove source of contamination from area. Seek medical attention.
- 4.1.5 Ingestion: Have victim rinse mouth thoroughly with water. Seek medical attention.
- 4.2. Most Important Symptoms and Effects, Acute and Delayed
 - Refer to Section 2 for information on the most important known symptoms.
- 4.3. Indication of any Immediate Medical Attention and Special Treatment Needed
 - See Section 4.1.1
- 4.4. Self-protection of First Responder
 - Use personal protective equipment as described in Section 8.

Section 5: Fire-Fighting Measures

Lithium ion batteries contain flammable liquid electrolyte that may vent, ignite and produce sparks when subjected to high temperatures ($> 150\text{ }^{\circ}\text{C}$ ($302\text{ }^{\circ}\text{F}$)), when damaged or abused (e.g., mechanical damage or electrical overcharge). Burning cells can ignite other batteries in close proximity.

- 5.1 Extinguishing Media
 - Small ABC dry chemical fire extinguisher or regular foam
 - Additional extinguishing media include carbon dioxide, alcohol-resistant foams or water spray.
 - The interaction of water or water vapor and exposed lithium hexafluorophosphate may result in the generation of hydrogen and hydrogen fluoride (HF) gas.
- 5.2 Specific Hazards
 - Lithium iron phosphate batteries contain flammable liquid electrolyte that may vent, ignite and generate vapors.
 - The interaction of water or water vapor and exposed lithium hexafluorophosphate may result in the generation of hydrogen and hydrogen fluoride (HF) gas.
- 5.3 Special Protective Actions for Firefighters
 - Wear respiratory protection.
 - Use personal protective equipment as described in Section 8.

Section 6: Accidental Release Measures

- 6.1. Personal Precautions, Protective Equipment and Emergency Procedures
 - Evacuate personnel to a safe area and keep unauthorized personnel away.

- Isolate spill area to a minimum distance of 75 feet (25 meters)
- Eliminate all ignition sources (no smoking, sparks, flames, hot equipment) in the immediate area around the spill.
- Do not touch or walk through spilled material.
- Avoid breathing vapors. Ensure adequate ventilation
- Use personal protective equipment as described in Section 8. .

6.2. Environmental Precautions

- Absorb spilled material with non-combustible, non-reactive absorbent. Prevent from migration into soil, sewers and natural waterways.

6.3. Methods and Materials for Containment and Clean-Up

- Contaminant and clean-up should only be completed by qualified personnel.
- Stop leak only if it is safe to do so.
- Clean any residual electrolyte and liquid using non-combustible, non-reactive absorbent. Ensure that cleanup procedures do not expose spilled material to moisture.
- Containerize and place all leaking batteries in individual containers that are leak-proof, non-conductive, non-combustible and have absorbent (e.g., LDPE plastic bag that is sealed shut and contains sufficient absorbent for the contained electrolyte). Ensure sufficient absorbent is used to absorb the full amount of liquid from the battery.
- Place used spill response materials in leak-proof, non-conductive, non-combustible containers containing absorbent and separate from batteries that have absorbent (e.g., LDPE plastic bag that is sealed shut and contains sufficient absorbent for the contained electrolyte).
- Avoid the release of collected materials. Do not bring the collected materials near open flame.

6.4. Reference for Other Sections

- For disposal see Section 13.

Section 7: Handling and Storage

7.1. Precautions for Safe Handling

- Avoid mechanical damage of the ACB. Do not open or disassemble the ACB.
- Avoid short circuiting the cell. Remove jewelry items such as rings, wristwatches, pendants, etc. that could come in contact with the battery terminals if the terminals are exposed.
- Never use a battery that has suffered abuse. Refer to data sheet for safe operating instructions.

7.2. Conditions for Safe Storage

- Store ACBs under the following conditions when not in use:
 - Store indoors and on pallets or similar devices to enable any leaks to be visibly observed upon inspection and to ensure the items do not come into contact with water or salt breeze.
 - Store in a dry location and away from heat sources such as furnaces, open flames, etc. Do not expose cell to temperatures outside the range of -40°C to 80°C.
 - Do not open, disassemble, crush or burn cell.
 - To minimize any adverse effects on battery performance it is recommended that the cells be kept at room temperature (25°C +/- 5°C). Elevated temperatures can result in shortened cell life.

- Store in an upright position and in areas that are not likely to be damaged or disturbed by personnel, equipment or vehicles.
- Do not store unboxed items in areas with a source of spark generation within 30 cm, in direct sunlight, in direct exposure to exhaust gas such as those from automobiles or in places with continuous or intermittent vibration.

7.3. Specific Uses

- The ACB is used as a fully integrated component of the Enphase Energy Management System.

Section 8: Exposure Controls/Personal Protection

8.1 Control Parameters

8.1.1. Airborne exposure to hazardous substances in the electrolyte is not expected when the cells or batteries are used for their intended purposes.

8.1.2. United States Occupational Exposure Limits:

- Lithium Hexafluorophosphate (as fluoride)
 - USA, OSHA PEL: 2.5 mg/m³ (TWA)
 - USA, ACGIH TVL: 2.5 mg/m³ (TWA)
 - USA, ACGIH BEI: 2 mg/L (urine – prior to shift), 3 mg/L (urine –end of shift)
- No published exposure limits for the remaining electrolyte components.

8.1.3. European Union Occupational Exposure Limits

Country	Limit Value – Eight Hour		Limit Value – Short Term	
	ppm	mg/m ³	ppm	mg/m ³
Lithium Hexafluorophosphate (as fluoride)				
Austria	None	2.5	None	12.5 (30 minutes)
Belgium	None	2.5	None	None
Denmark	None	2.5	None	5
European Union	None	None	None	None
France	None	2.5	None	None
Germany	None	1.0	None	4 (15 minutes)
Hungary	None	2.5	None	10
Italy	None	None	None	None
Poland	None	2.0	None	None
Spain	None	2.5	None	None
Sweden	None	1.0	None	None
Switzerland	None	1.0	None	4 (15 minutes)
The Netherlands	None	None	None	2 (15 minutes)

- No published Occupational Exposure Limits for the remaining electrolyte components

8.2 Exposure Controls

8.2.1. Routine Handling:

- The ACB has a lithium ion battery contains organic electrolyte that is sealed in a protective case. There is no risk of exposure during routine handling. Risk of exposure occurs only if

the ACB is mechanically, thermally, or electrically abused to the point of compromising the enclosure.

- Do not eat, drink or smoke in work areas. Avoid storing food, drink or tobacco near the product. Practice and maintain good housekeeping.
- Remove jewelry items such as rings, wristwatches, pendants, etc., that could come in contact with the battery terminals if the terminals are exposed to avoid short circuiting.

8.2.2. Personal Protective Equipment:

- The following personal protective equipment should be worn if the ACB is mechanically, thermally, or electrically abused to the point where the protective case is damaged and there is a risk of exposure to the electrolyte.
 - Skin/body protection: Wear closed toe shoes, chemical resistant overalls, protective overboots
 - Gloves: 15 mm nitrile rubber gloves. Immersion protection provided when nitrile gloves worn over laminated film barrier gloves (Ansell Barrier 2-100 or equivalent).
 - Eye/Face protection: Take steps to prevent exposure to eyes and face including chemical splash goggles and face shield.
 - Respiratory protection: Wear a full face respirator with an Organic Vapor/Acid Gas/Particulate filter (3M Model No. 60923 or equivalent).

8.2.3. Engineering Controls

- See Section 6 for accidental release response measures.
- See Section 7 handling and storage measures.
- Ventilate the immediate area around a leaking the cell or battery.

Section 9: Physical and Chemical Properties

Physical and Chemical Property	ACB	Electrolyte
Physical State	Solid	No data available
Color	No data available	No data available
Odor	Odorless	No data available
Melting point/freezing point	No data available	No data available
Boiling point	No data available	No data available
Flammability	No data available	No data available
Lower/upper explosion limit	Not applicable (solid)	No data available
Flash point	Not applicable (solid)	No data available
Evaporation Rate	Not applicable (solid)	No data available

Auto-ignition temperature	Not applicable (solid)	No data available
Decomposition Temperature	90°C	No data available
pH	Not applicable	No data available
Kinematic Viscosity	Not applicable (solid)	No data available
Solubility	Insoluble	No data available
Partition Coefficient n-Octanol/water	Not applicable	No data available
Vapor Pressure	No data available	No data available
Density	Not available	No data available
Relative Vapor Density	Not applicable (solid)	No data available
Particle characteristics	No data available	No data available
Explosive Properties	No data available	No data available
Oxidizing Properties	No data available	No data available

Section 10: Stability and Reactivity

- 10.1. Reactivity
 - No data available.
- 10.2. Chemical Stability
 - The ACBs are stable under normal use and in normal storage conditions.
 - No data available.
- 10.3. Possibility of Hazardous Reactions
 - Fire may occur if the battery is physical damaged or exposed to high temperature conditions.
 - Do not expose cell to temperatures outside the range of -40°C to 80°C.
 - Do not disassemble, crush, short or install with incorrect polarity. Avoid mechanical or electrical abuse or electrical shorts.
- 10.4. Conditions to Avoid
 - See Section 7.
- 10.5. Incompatible materials
 - No data available.
- 10.6. Hazardous decomposition products
 - Hydrofluoric acid and carbon monoxide may be released in the event that a cell/battery is physically damaged to the point where the case is compromised and electrolyte is released.

Section 11: Toxicological Information

- 11.1. Likely Routes of Exposure

The ACB has a lithium ion cell that contains organic electrolyte that is sealed in a protective case. Risk of exposure occurs only if the cell is mechanically, thermally, or electrically abused to the point

of compromising the protective case. The following toxicological information only applies in the event that electrolyte leaks from the battery due to physical damage and an individual comes in contact with the electrolyte. No toxicological data is available regarding the electrolyte and the following information is provided for the electrolyte components.

11.2. Acute Toxicity

- Electrolyte:
 - Oral: Lithium hexafluorophosphate is classified as acute toxic-oral (Category 3 (H301)). Ethylene carbonate and 1,3-propanesultone are classified as acute toxic-oral (Category 4 (H302)). No oral toxicity data available for the electrolyte. The electrolyte is presumed to be acutely toxic – oral in accordance with GHS mixture rules.
 - Inhalation: No data available
 - Dermal/Eye: 1,3-propanesultone is classified as acute toxic-dermal (Category 4 (H312)). The electrolyte is not acutely toxic – dermal in accordance with GHS mixture rules.

11.3. Skin Corrosion/Irritation

- Electrolyte: Individual components of the electrolyte cause skin corrosion/irritation and serious eye damage/irritation. Lithium hexafluorophosphate is classified as causing severe skin burns (Category 1 (H314)). Diethyl carbonate, ethyl methyl carbonate and propylene carbonate are classified as causing skin irritation (Category 2 (H315)). No data is available for the electrolyte and it is presumed to cause skin corrosion/irritation per GHS mixture rules.

11.4. Serious Eye Damage/Irritation

- Electrolyte: Individual components of the electrolyte cause serious eye damage/irritation. Lithium hexafluorophosphate is classified as causing severe damage burns (Category 1 (H318)). Ethylene carbonate, dimethyl carbonate, ethyl methyl carbonate propylene carbonate and 1,3-propanesultone are classified as causing serious eye irritation (Category 2 (H319)). No data is available for the electrolyte and it is presumed to cause serious eye damage/irritation per GHS mixture rules.

11.5. Respiratory or Skin Sensitization

- Electrolyte: No available data. No ingredients of the electrolyte are identified as causing respiratory or skin sensitization.

11.6. Germ cell Mutagenicity

- Electrolyte: No available data. No ingredients of the electrolyte are identified as causing germ cell mutagenicity.

11.7. Carcinogenicity

- Electrolyte: 1,3-Propanesultone is identified as may cause (Category 1A/!B – H350). No data is available for the electrolyte.

11.8. Reproductive Toxicity

- Electrolyte: No data available. No ingredients of the electrolyte are identified as having reproductive toxicity.

- 11.9. Specific Target Organ Toxicity – Single Exposure
- Electrolyte: Diethyl carbonate, ethyl methyl carbonate and propylene carbonate are identified as causing lung irritation with a single exposure (Category 3 – H335). No data is available for the electrolyte and it is presumed to cause specific target organ toxicity damage (respiratory) with repeated exposure per GHS mixture rules.
- 11.10. Specific Target Organ Toxicity – Repeated Exposure
- Electrolyte: Individual components of the electrolyte cause specific target organ toxicity damage with repeated exposure. Lithium hexafluorophosphate is identified as causing damage to bones and teeth (Category 1 (H372)). Ethylene carbonate is classified as causing damage to the kidneys (Category 2 (H373)). No data is available for the electrolyte and it is presumed to cause specific target organ toxicity damage with repeated exposure per GHS mixture rules.
- 11.11. Aspiration Hazards
- Electrolyte: No data available.
- 11.12. Symptoms Related to Physical, Chemical and Toxicological Characteristics
- Available information pertaining to the physical, chemical and toxicological characteristics of the electrolyte is presented for each hazard class (Section 11.2 – 11.11).
- 11.13. Delayed and Immediate Effects and Chronic Effects from Short and Long Term Exposure
- Available information pertaining to the physical, chemical and toxicological characteristics of the electrolyte is presented for each hazard class (Section 11.2 – 11.11).

Section 12: Ecological Information

- 12.1 Toxicity
- No data available.
- 12.2 Persistence and Degradability
- No data available.
- 12.3 Bioaccumulative Potential
- No data available.
- 12.4 Mobility in Soil
- No data available.
- 12.5 Results of PBT and VPvB Assessment
- Not applicable
- 12.6 Other Adverse Effects

- Solid cells released into the natural environment will slowly degrade and may release harmful or toxic substances, Cells are not intended to be released into water or on land but should be disposed or recycled according to local regulations.

Section 13: Disposal Considerations

13.1 United States/Canada:

- Recycling: Follow all applicable local, state and federal recycling requirements.
- Disposal: Follow all applicable local, state and federal disposal requirements.

13.2 European Union

- ACB must be disposed of in accordance with relevant EC Directives and national, regional and local environmental control regulations.

Section 14: Transport Information

14.1 Proper Shipping Name: Lithium ion batteries.

14.2 Hazard Class: 9 – Miscellaneous Dangerous Goods.

14.3 Identification Number: UN3480

14.4 Packing Group: II (per GHS Regulations); No packing group specified under US DOT regulations.

14.5 Packing Instructions: 965-IA (IATA Dangerous Goods Regulations 59th Edition).

14.6 Not allowed on passenger aircraft.

14.7 Environmental Hazards:

- Lithium ion batteries are not classified as marine pollutants in the United States under 49 CFR Part 171.101 Appendix B.
- Follow all applicable local, state and federal requirements when identifying additional environmental hazards.

Section 15: Regulatory Information

15.1 United States

- TSCA Status: All ingredients in these products are listed on the TSCA inventory.
- OSHA: The ingredients meet criteria as per 29 CFR 1910.1200
- EPCRA 302/304: None.
- EPCRA 311/312: Reportable in excess of 10,000 lbs.
- EPCRA 313: None.
- CERCLA RQ: None.

15.2 European Union

- Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex I: Not listed.
- Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer, Annex II: Not listed.
- Regulation (EC) No. 850/2004 on persistent organic pollutants, Annex I as amended: Not listed.
- Regulation (EC) No. 689/2008 concerning the export and import of dangerous chemicals: Not listed.
- Other EU Regulations
 - Directive 96/82/EC (Seveso II) on the control of major accident hazards involving dangerous substances: Not listed.
 - Directive 94/33/EC on the protection of young people at work: Not listed.
 - This Safety Data Sheet complies with the requirements of Regulation (EC) No. 1907/2006 and amended on 28 May 2015 by (EU) 2015/830.
 - Regulation (EC) No. 1272/2008 These products are not classified as hazardous.

15.3 Additional Regulatory Not provided elsewhere

- 59th Edition of the IATA Dangerous Goods Regulations (DGR).
- 2015-2016 Edition of the CAO Technical Instructions for the Safe Transport of Dangerous Goods by Air.
- 2016 Edition of the International Maritime Dangerous Goods Code (IMDG).

Section 16: Other Information