

Section 1: Product Name and Identification

1.1 Product Identifier:

1.1.1 Product Name: Enphase AC Battery (ACB)

1.1.2 Product Numbers: B270-1200-LN-I-AU00-RV0, B270-1200-LN-I-EU00-RV0, B280-1200-LL-I-US00-RF0

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: -20°C to 45°C (ambient operation); -20°C to 50°C (ambient storage).
- Do not store close to heat sources, such as furnaces or open flames.

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.

- H226 - Flammable Liquid (Category 3).
- H315 - Skin Irritation (Category 2).
- H319 – Eye Irritation (Category 2/2A).

2.2. GHS Label Elements

2.2.1. Pictogram:



2.2.2. Signal Word: WARNING

2.3. GHS Hazard Statement:

| Hazard Class | Hazard Category | Hazard Code | Hazard Statement |
|------------------|-----------------|-------------|-------------------------------|
| Flammable Liquid | 3 | H226 | Flammable liquid and vapor |
| Skin Irritation | 2 | H315 | Causes skin irritation |
| Eye Irritation | 2/2A | H319 | Causes serious eye irritation |

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 from 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:

| Chemical Name | CAS # | Weight % |
|-----------------------------|------------|----------|
| Battery Cathode Materials | | |
| Lithium Iron Phosphate | 15365-14-7 | 11.6 |
| Electrolyte | | |
| Lithium Hexafluorophosphate | 21324-40-3 | 1.7 |
| Ethylene carbonate | 96-49-1 | 3.5 |
| Diethyl carbonate | 105-58-8 | 0.6 |
| Ethyl methyl carbonate | 623-53-0 | 7.0 |

Section 4: First-aid Measures:

The ACB has a lithium ion battery that 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.

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

4.4. Self-protection of First Responder

- Use personal protective equipment as described in Section 8.

Section 5: Fire-Fighting Measures

- 5.1 Extinguishing Media:
- ABC dry chemical fire extinguisher.
 - Additional extinguishing media include carbon dioxide, or alcohol-resistant foams.
- 5.2 Specific Hazards:
- Lithium iron phosphate batteries contain flammable liquid electrolyte that may vent, ignite and generate vapors.
- 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.
 - 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.
 - Use personal protective equipment as described in Section 8.
 - Avoid breathing vapors. Ensure adequate ventilation.
- 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:
- 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 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.

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 away from heat sources such as furnaces, open flames, etc. They should be stored in controlled environments where the temperature will be maintained within the following ranges; -20°C to 45°C (ambient – operation) ; -20°C to 55°C (ambient – storage)
 - 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. 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 that 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 cell 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 | Lithium Iron Phosphate (Cathode) | Electrolyte |
|---------------------------------------|------------------------|----------------------------------|-----------------------------------|
| Physical State | Solid | Powder | Liquid |
| Color | No data available | Black | Colorless |
| Odor | Odorless | Odorless | No data available |
| Melting point/freezing point | No data available | >1,000°C | < -20°C |
| Boiling point | No data available | No data available | No data available |
| Flammability | No data available | No data available | Flammable |
| Lower/upper explosion limit | Not applicable (solid) | Not applicable (solid) | 440°C (as Ethyl Methyl Carbonate) |
| Flash point | Not applicable (solid) | Not applicable (solid) | 27°C |
| Evaporation Rate | Not applicable (solid) | Not applicable (solid) | No data available |
| Auto-ignition temperature | Not applicable (solid) | Not applicable (solid) | No data available |
| Decomposition Temperature | Not applicable | Not applicable | Not applicable |
| pH | Not applicable | Not applicable | No data available |
| Kinematic Viscosity | Not applicable (solid) | Not applicable (solid) | No data available |
| Solubility | No data available | No data available | 14 g/100g H ₂ O |
| Partition Coefficient n-Octanol/water | Not applicable | Not applicable | No data available |
| Vapor Pressure | No data available | No data available | 3000pa (25°C) |
| Density | No data available | No data available | 1.07 (20°C) |
| Relative Vapor Density | Not applicable (solid) | Not applicable (solid) | No data available |
| Particle characteristics | No data available | No data available | Not applicable (liquid) |
| Explosive Properties | No data available | No data available | No data available |
| Oxidizing Properties | No data available | 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.
- 10.3. Possibility of Hazardous Reactions:
- Fire may occur if the battery is physical damaged or exposed to high temperature conditions.
- 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 battery 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 enclosure. 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.

11.2. Acute Toxicity:

- Electrolyte:
 - Oral: The electrolyte is acutely toxic and has an estimated oral toxicity (rat) of LD₅₀ > 2g/kg. Lithium hexafluorophosphate is classified as acute toxic-oral (Category 3 (H301)). Ethylene carbonate is classified as acute toxic-oral (Category 4 (H302)).
 - Inhalation: No data available
 - Dermal/Eye: No data available

- 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)). Dimethyl carbonate is 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 and ethyl methyl carbonate 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: No data available. No ingredients of the electrolyte are identified as being carcinogenic.
- 11.8. Reproductive Toxicity:
- Reproductive toxicity: No data available. No ingredients of the electrolyte are identified as having reproductive toxicity.
- 11.9. Specific Target Organ Toxicity – Single Exposure:
- Reproductive toxicity: No data available. No ingredients of the electrolyte are identified as having specific target organ toxicity – single exposure.
- 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:
- No data available.

Section 13: Disposal Considerations

- 13.1 United States
- 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. Recycling is mandated.

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 58th Edition).
- 14.6 Not allowed on passenger aircraft.
- 14.7 ACB tested and in compliance with UN Model Regulations, Manual of Test Criteria, Part III, subsection 38.3, 5th revised edition, Amendment 2.
- 14.8 Not allowed on passenger aircraft.
- 14.9 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: These products 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
- 58th 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.
- 2014 Edition of the International Maritime Dangerous Goods Code (IMDG).

Section 16: Other Information

- ACB watt-hours: 1200.