Ford and Lincoln Battery Electric Vehicle (BEV) High Voltage (HV) Battery Inspection Job Aid

Introduction and High Voltage Warnings

Certain Ford and Lincoln Battery Electric Vehicles (BEV) are equipped with under-body High Voltage (HV) Battery Packs. When the HV Battery and/or HV Battery case sustains damage through collision or transport the HV Battery pack and case should be inspected carefully to determine if the damage is purely cosmetic or if repairs to the HV battery and case are needed. This job aid provides an overview of warnings and cautions needed and acceptable/not acceptable damage, as described in this document. When servicing HV Batteries and HV components the Ford Workshop Manual (WSM) procedures should always be followed.

IMPORTANT: The information in this document is for reference only.

- **References to component locations on vehicle are approximate and may vary by vehicle and/or vehicle trim level.**
- **Refer to Ford Workshop Manual (WSM) for further information including: description and operation, component location, diagnosis and testing, repair and calibration.**

WARNING:
Service of the high voltage system on this vehicle is restricted to qualified personnel. The required qualifications vary by region. Always observe local laws and legislative directives regarding electric vehicle service. Failure to follow this instruction may result in serious personal injury or death.

WARNING:
Electric vehicles damaged by a crash may have compromised high voltage safety systems and present a potential high voltage electrical shock hazard. Exercise caution and wear appropriate Personal Protective equipment (PPE) including high voltage safety gloves and boots. Remove all metallic jewelry, including watches and rings. Isolate the high voltage system as directed by the Ford Emergency Response Guide for the vehicle. Failure to follow these instructions may result in serious personal injury or death.

WARNING:
Fires in crash-damaged electric vehicles may emit toxic or combustible gasses. Small amounts of eye, skin Or lung irritants may be present. Wear Personal Protective Equipment (PPE) and self-contained breathing Apparatus when working in close proximity or in a confined area, such as a tunnel or garage. Ventilate the vehicle interior by opening vehicle windows or doors. Ventilate the working area. Failure to follow this instruction may result in serious personal injury or death.

WARNING:
Depowering the high voltage system does not dissipate voltage inside the battery. The battery pack remains live and dangerous. Contact with the high voltage battery pack internals may result in serious Personal injury or death.

WARNING:
To prevent the risk of high-voltage shock, always follow precisely all warnings and service instructions including instructions to depower the system. The high-voltage system utilizes high-voltage cables to its components and modules. The high-voltage cables and wiring are identified by orange harness tape or orange wire covering. All high-voltage components are marked with high-voltage warning labels with a high-voltage symbol. Failure to follow these instructions may result in serious personal injury or death.

WARNING:
If the Vehicle or HV battery show signs of escaping gases, smoke, flames, excessive heat, sparks or arcing, contact the local emergency department and refer to the vehicles Emergency Response Guide. Gases or smoke exiting a lithium-ion HV battery are likely flammable and could ignite at any time.

Examples of HV Battery Damage: Dents or tears, corrosion or moisture accumulation, evidence of a previous thermal event, such as smoke residue, discoloration, deformation, melted seals, metallic splatter or abnormal odor, rupture or disassembly, coolant or electrolyte leakage.

Important Electric and Hybrid-electric Vehicle Cautions

In the event of damage to or fire involving an electric vehicle (EV) or hybrid-electric vehicle (HEV):
- Always assume the high voltage (HV) battery and associated components are energized and fully charged.
- Exposed electrical components, wires, and HV batteries present potential HV shock hazards.
- Venting/off-gassing HV battery vapors are potentially toxic and flammable.
- Physical damage to the vehicle or HV battery may result in immediate or delayed release of toxic and/or flammable gases and fire.

Important Notes on Storing a BEV Vehicle with HV Battery Damage

For specific information and safety preparation regarding the High Voltage system, refer to WWW.MOTORCRAFTSERVICE.COM, select quickguides for the appropriate emergency response guide.

- Do not store a severely damaged vehicle with a lithium-ion HV battery inside a structure or within 50 feet (15.24 meters) of any structure or vehicle.
- Ensure that passenger and cargo compartments remain ventilated.
- Prior to placing and while located in storage area/tow lot, continue to inspect vehicle for leaking fluids, sparks, smoke, flames, gurgling or bubbling sounds from the HV battery and call 911 if any of these are detected.
- Maintain clear access to stored vehicles for monitoring and emergency response if needed.

Battery Inspection Procedure

1. Prior to inspection or service create a buffer zone consisting of safety cones, tape, signs, etc. to warn people who do not have HV training that the vehicle being inspected or repaired is a HV vehicle, and only people who have taken the necessary HV training are allowed to work on the vehicle.

2. Remove items such as metal jewelry, pens, coins, belts with metal buckles, and metal clip boards from person. Consider all personal items you are wearing, or may handle, and remove or do not use any items containing metal. If you are not sure if an item contains metal, do not use it.

3. Depower the HV system following Ford Workshop Manual (WSM) procedures. Place this vehicle keys in a suitable lockout box.

4. Obtain and wear proper Personal Protective equipment (PPE) during the HV battery inspection procedure. Required PPE:

- Gloves - Class 0 / red, with leather outer gloves
  - Inspect high voltage gloves using a roll up test or glove pump. **Do not use compressed or shop air.**
  - Inspect high voltage gloves for contaminants. **Contaminants act as conductors and can bypass high voltage glove protection.**
- Full face shield - Class 2 (to protect against arc flash)

5. Raise the vehicle on a suitable hoist following Ford Workshop Manual (WSM) procedures.

6. Inspect the HV battery for physical damage, gashes, punctures, dents, fractures in welds, hissing/ gurgling sounds.

Examples of HV Battery Damage

- Dents in the battery tray that exceed 0.019 in (0.5 mm) in depth or tears in the battery tray.
- Corrosion or signs of moisture accumulation
- Evidence of a previous thermal event, such as smoke residue, discoloration, deformation, melted seals, metallic splatter, or abnormal odor.
- Rupture or disassembly
- Coolant or electrolyte leakage

If the HV battery is damaged, it should be replaced following Ford Workshop Manual (WSM) Procedures and then recycled properly, following local and government safety procedures and regulations. For additional information on recycling guidelines and procedures, refer to www.elvsolutions.org

HV Battery Inspection Zones and Criteria

Strike Strips:

- If there are scratches / scrapes to the strike strip, they can be painted
- If there are dents in the strike strip, the rivets can be drilled out and the strike strips replaced. Refer to For WSM for additional information.

Battery bottom

- Scratches can be painted
- Any dents that exceed 0.019 in (0.5 mm) in depth the HV battery pack needs to be opened, the tray and cold plates need to be inspected. Refer to Ford WSM for additional information.

IMPORTANT! There is only 0.11 in (3mm) of clearance between the bottom of the HV battery tray and the cold plate. Damage to the cold plate could result in reduced HV battery array cooling and could result in further damage.