UL Standards Activity

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EV standards development

- Many parties developing EV/LEV product standards including IEC, ISO, NFPA, SAE, UL

- Focus of these standards reflect different aspects, geographies, etc.

- UL EV standards date back to 1990s, with many recent developments & publications
Crucial role of safety standards

- Rapidly evolving EV technology and global supply base demands standardization relative to infrastructure, designs & safety

- A safe and secure infrastructure is key to deployment and acceptance of EVs

- UL actively involved with stakeholders to develop standards and test methods to promote safe EV use & deployment
Safety standard objectives

- Address safety for reasonable product use & misuse using Hazard-based Safety Engineering (HBSE) principles

- Compatibility with applicable model installation codes and regulations (e.g. NEC) is essential

- Compatibility with other applicable standards a goal
EV equipment safety strategies

- Product safety standards focus on minimizing risks of electric shock, fire, and injury

- Protection from abuse: e.g. consumer access, vehicle exposure, misuse

- Protection from environment: weather, temperature, exposure to solvents, etc.
EV equipment addressed by UL standards
## UL safety standards for EV equipment

<table>
<thead>
<tr>
<th>Products</th>
<th>Standards</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric Vehicle Supply Equipment</td>
<td>Sub 2594</td>
<td>Safety of EVSE products including cord sets, charge stations, and power outlets supplying power to an on board charger</td>
</tr>
<tr>
<td>Personnel Protection System</td>
<td>UL 2231-1</td>
<td>Safety of Personnel Protection Equipment (PPE) as required by the National Electrical Code to protect against electric shock</td>
</tr>
<tr>
<td>Off Board Cable</td>
<td>UL 62</td>
<td>Safety of Type EV cables in accordance with the National Electrical Code</td>
</tr>
<tr>
<td>Plug/Coupler</td>
<td>UL 2251</td>
<td>Safety of EV connector and inlet (coupler) for connecting power to an electric vehicle (referenced by SAE J1772)</td>
</tr>
<tr>
<td>On/Off Board Charger</td>
<td>UL 2202</td>
<td>Safety of on-board or off-board products supplying charging current to a battery</td>
</tr>
<tr>
<td>Batteries</td>
<td>UL 2580*</td>
<td>Safety of batteries and battery packs of Li-ion or other technologies for EV and LEV, respectively</td>
</tr>
<tr>
<td>Cables &amp; connectors</td>
<td>Sub 2733</td>
<td>Safety of on-board cables and connectors</td>
</tr>
<tr>
<td></td>
<td>Sub 2734</td>
<td></td>
</tr>
<tr>
<td>Motor</td>
<td>UL 1004-1</td>
<td>Safety of electric motors, including those for vehicle traction forces</td>
</tr>
<tr>
<td>On-board converter/inverter</td>
<td>Sub 458A</td>
<td>Safety of on-board converters &amp; Inverters to modify voltage levels</td>
</tr>
<tr>
<td>Charging Station Meters</td>
<td>Sub 2735</td>
<td>Safety of utility smart meters</td>
</tr>
<tr>
<td>Wireless Charging Equipment</td>
<td>Sub 2750*</td>
<td>Safety of wireless EV charging equipment and technologies</td>
</tr>
</tbody>
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* Under development
UL standards development initiatives

- Actively developing new safety requirements – basically all publications have been revised in last year or are being revised/developed now

- Sustained movement to consensus standards and ANSI National Standards

- Continued work on a global level to support safety of EV equipment
Issues going forward

- Completion of efforts to comprehensively address safety requirements for EV related products
- Holistic alignment and coordination of global system standards
- Supporting new technologies and innovations for the EV market through new standards development
Comprehensively address safety

- Many component standards exist, but need to continue to work to make sure the right content is defined for all safety-related components.

- Codes and standards must address key safety issues for the public.

- Comprehensively address solar integration, smart grid connectivity, local energy storage, etc.
Holistic system coordination

- Coordination of requirements to address “handshakes” among standards, and between standards and codes/regulations through balanced committees

- Responsible consideration of practical use, emerging issues, and closed-loop maintenance based on field experience
Supporting innovation

Support EV technologies & products by:

- Continuing engagement with industry and stakeholders
- Anticipating safety implications of evolving practical use
- Establishing baseline safety requirements to support safe, sustained deployment
Conclusion

- Much work has been done in EV product standards development

- Standards development is being diligently pursued by the safety community

- Collaboration with key stakeholders will result in the best set of cohesive EV standards & codes supporting safe deployment
Thank you!

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