Electric Vehicles (EVs) in Europe

Table of Contents

1. Glossary 3

2. Electric Vehicles (EVs) in Europe 4

2.1. Policy Initiatives 4

2.2. Standardization of EVs 5

3. References 8

4. Annexure: List of standards published/Under drafting by CEN and CENELEC 9

4.1 Annexure 1: List of Standards by CENELEC: TC 69X: 9

4.2 Annexure 2: List of Standards published by CEN/TC 301 10

4.3 Annexure 3: List of published standards by CLC/TC 64 11

4.4 Annexure 4: List of published standards by CLC/TC 23BX 11

1. Glossary

S. No.	Acronym	Expansion
1	EVs	Electric Vehicles
2	EBA	European Battery Alliance
3	EU	European Union
4	CAGR	Compound Annual Growth Rate
5	CEN	European Committee for Standardization
6	CENELEC	European Committee for Electro-technical Standardization
7	ETSI	European Telecommunications Standards Institute (ETSI)
8	ISO	International Organization for Standardization
9	IEC	International Electro-Technical Commission
10	TC	Technical Committee
11	CG	Coordination Group
12	NOx	Nitrogen oxides
13	CO2	carbon dioxide
14	NMHC	non-methane hydrocarbons
15	PM	particulate matter
16	ICE	Internal combustion engine

2. Electric Vehicles (EVs) in Europe

The EU automotive sector is at the heart of Europe's industrial landscape. **The sector provides more than 11 million employed in automotive & mobility sectors (3.3 million in manufacturing).**

The challenge facing cities throughout Europe with regard to climate change, air and noise emissions are substantial. Just like the rest of the world, the EU started off with traditional Internal combustion engines (ICEs) dominating the automotive market. Electric vehicle 'tank-to-wheels' efficiency is a factor of about 3 higher than internal combustion engine vehicles. Electric vehicles emit no tailpipe carbon dioxide (CO2) and other pollutants such as Nitrogen oxides (NOx), non-methane hydrocarbons (NMHC) and particulate matter (PM) at the point of use. Electric vehicles provide quiet and smooth operation and consequently create less noise and vibration.

The policy related to battery-powered vehicles is mainly focused on technological optimisation and market development. Future challenges in this field include reliability and durability of batteries and super-capacitors, reducing battery weight and volume, safety, cost reduction, improved hybrid electric power-trains, charging infrastructure and plug-in solutions.

Standardization in the field of electric vehicles is becoming an important issue. The need for clean energy and the support provided by smart grids have led to new European policies that encourage the deployment of infrastructures to recharge (or replace) the batteries of electrical vehicles.

European and National government policies and objectives are setting increasingly stringent environmental standards and it is the responsibility of the local and regional authorities to achieve them.

International work on the development of charger and connector standards is currently ongoing. It will be necessary to ensure that international standards meet European needs, including (for example) compatibility with national rules for wiring.

2.1. Policy Initiatives

The following are some key initiatives and regulations taken by the EU over the last few years, in order to boost EV growth:

- **Directive 2014/94/EU:** This is essential to reduce transport oil-dependence, mitigate its environmental impact and, thereby, deliver on the Strategy for Low-Emission Mobility adopted by the Commission on 20 June 2016**.** The Directive sets out minimum requirements for the building-up of alternative fuels infrastructure, including recharging points for electric vehicles and refuelling points for natural gas and hydrogen. This has been fully completed on November 18, 2016, and member states not in compliance with the same will be held liable.

- **European Battery Alliance (EBA):** European Battery Alliance (EBA) was launched on 11 October 2017, aiming to spur entrepreneurs towards the manufacture of 'made in Europe' batteries, to be used as components in electrical vehicles. The industrial objectives underpinning the EBA extend to 2023, with a view to contributing to the 2025 and 2030 policy goals laid out in the European Commission's Clean Mobility Package, which puts forward a set of legislative proposals aimed at sending a 'green' light to electro mobility. With the strategic action plan for batteries, the Commission adopted **a comprehensive set of concrete**

measures to develop an innovative, sustainable and competitive battery 'ecosystem' in Europe.

- **Charge everywhere:** EU (European Union) has approved regulations that require any new house or apartment building to include electric car chargers starting 2019, in a move that has been considered vital to the success of EV uptake. Along with this European commission has proposed that 1 in 10 parking spaces (of new buildings for offices and shopping complexes) should have an EV charging station by 2025.

- **Wireless charging for EVs:** The partnership between the German automotive giant Qualcomm and Daimler AG to test wireless charging technologies for in-car charging applications and for wireless charging of electric vehicles is a major leap in the automotive wireless charging market for EVs. This is one of many partnerships being formed between automotive and technology-based companies to leverage an exciting opportunity in a market that is expected to multiply rapidly over the next few years. The wireless charging market for electric vehicles in Europe is expected to grow at a CAGR of 8.4% by 2023. Sweden was the first country to pilot the use of wireless charging for electric cars, with which research project taking the lead with partners Stockholm Municipality, Vattenfall and others.

2.2. Standardization of EVs

CEN, CENELEC, and ETSI are the three recognised European Standards Organisations. CEN is the European counterpart of ISO; CENELEC is the European counterpart of IEC; ETSI is more or less the European counterpart of ITU-T (but like its other European counterparts is non-governmental). Apart from the specific communications aspects, broadly the responsibility of ETSI, electro-mobility issues are the responsibility of CEN and CENELEC, as well as their respective global counterparts ISO and IEC.

CEN and CENELEC established a Focus Group on European Electro-Mobility which produced in October 2011, as a reply to Mandate M/468 on charging of electric vehicles, a report on 'Standardization for road vehicles and associated infrastructure' that represents the specific standardization requirements for European Electro-mobility.

One of the main recommendations of the Focus Group was to establish a CEN-CENELEC Co-ordination Group on e-Mobility with the aim to support coordination of standardization activities during the critical phase of writing new standards or updating existing standards.

The CEN-CENELEC e-Mobility Co-ordination Group (eM-CG) was established in March 2012. The eM-CG is responsible for making sure that standards necessary for e-Mobility are being dealt with in a coherent manner by the relevant technical bodies. The eM-CG developed a work programme and a list of relevant standards for the charging of electric vehicles.

In March 2015, CEN and CENELEC received a standardization request (M/533 - Commission Implementing Decision C(2015)1330) on the implementation of the above directive 2014/94/EU. The coordination of the 'electric supply' part of M/533 has been allocated to the eM-CG.

As smart charging is seen as a necessity to optimize the use of electric grid for electric vehicles charging, the CEN-CENELEC e-Mobility Coordination Group established a specific working group which developed a report on smart charging . The European EV infrastructure standardization efforts are led by Germany, and they have published the German Standardization Roadmap for Electric Mobility

2020, which expects all the relevant EV infrastructure Standards to be placed by 2020 a for long term sustainable electric mobility.

- **CENELEC: TC 69X – Electrical systems for electric road vehicles**

  TC 69X is responsible to prepare European standards related to electrical systems for road vehicles, totally or partly propelled from self-contained power sources.

  CENELEC TC 69X Subcommittees and Working Groups:

Working Group	Title
WG 01	A.C. charging
WG 02	D.C. charging
WG 03	Inductive charging
WG 04	EMC
WG 05	Light Electric Vehicles
WG 06	Battery swap systems

  List of published standards is available as Annexure 1.

- **CEN: TC 301 – Road Vehicles**

  CEN TC301 is responsible for preparation of road vehicle European Standards answering essentially to European mandates. Since the automotive industry is acting globally, the international level (ISO/TC 22 Road vehicles) shall have top priority for any other standardization projects.

  CEN/TC 301 Subcommittees and Working Groups:

Working group	Title
CEN/TC 301/WG 11	Safety of roller brake testers
CEN/TC 301/WG 14	Electricity Fuel labelling
CEN/TC 301/WG 15	Safety of machines for mounting and demounting vehicles tyres
CEN/TC 301/WG 16	Performance assessment of the Portable Emission Measuring Systems (PEMS)
CEN/TC 301/WG 6	M/421 Vehicle OBD, repair and maintenance information
CEN/TC 301/WG 7	Supplementary grip devices

  List of published standards by CEN/TC 301 is available as Annexure 2.

- **CLC/TC 64: Electrical installations & Protection against electric shock**

  CLC/TC 64 is responsible for preparation International standards concerning protection against electric shock arising from equipment, from installations and from systems without limit of voltage, for the design, erection foreseeable correct use and verification of all kind of electrical installations at supply voltage up to 1 kV a.c or 1,5 kV d.c., except those installations covered by the following IEC committees: TC 9X, TC 18X, TC 44X, TC 97, TC 99X, in co-ordination with TC 99X, concerning requirements additional to those of TC 99X for the design, erection and verification of electrical installations of buildings above 1 kV up to 35 kV. Working group 27 is focused on Electric Vehicles (EVs).

  List of relevant standards for the charging of electric vehicles published by CLC/TC 64 is available as annexure 3.

- **CLC/TC 23BX: Switches, boxes and enclosures for household & similar purposes, plugs & socket outlets for d.c & for the charging of electrical vehicles including their connectors**

  CLC/TC 23BX is responsible to prepare standards for:
  - General purpose switches
  - Switches and related accessories for use in Home and Building Electronic Systems (HBES)
  - General purpose plugs and fixed and portable socket outlets
  - General purpose boxes and enclosures for household devices
  - Ancillary products which relate to/incorporate products covered by a), b), c), e.g. luminaire couplers, adaptors/cable reels, indicator light units, etc.

  CLC/TC 23BX: Subcommittees and Working Groups:

Working Group	Title
WG 01	Requirements and tests on EN 60669 - Parts 2
WG 03	Boxes and enclosures for electrical accessories for household and similar fixed electrical installations
WG 04	Cable reels
WG 06	Luminaire Couplers
WG 07	WG on plug and socket-outlet system for d.c.
WG 08	Socket protectors
WG 10	Accessibility
WG 11	EN 60669-1
WG 12	Cord Extension Sets

  List of relevant standards for electric vehicles published by CLC/TC 23BX is available as Annexure 4.

3. References

- **CEN**
  https://www.cen.eu/

- **CENELEC**
  https://www.cenelec.eu/

- **CEN-CENELEC Electric Vehicles**
  https://www.cencenelec.eu/standards/Sectors/Transport/ElectricVehicles/Pages/default.aspx

- **Strategy for Low-Emission Mobility**
  https://ec.europa.eu/transport/sites/transport/files/themes/strategies/news/doc/2016-07-20-decarbonisation/com%282016%29501_en.pdf

- **DIRECTIVE 2014/94/EU on the deployment of alternative fuels infrastructure**
  https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0094

- **European Battery Alliance**
  https://ec.europa.eu/growth/industry/policy/european-battery-alliance_en

- **Strategic Action Plan on Batteries**
  http://eur-lex.europa.eu/resource.html?uri=cellar:0e8b694e-59b5-11e8-ab41-01aa75ed71a1.0003.02/DOC_3&format=PDF

- **European Commission-MOBILITY AND TRANSPORT**
  https://ec.europa.eu/transport/themes/urban/vehicles/road/electric_en

- **European Committee for Standardization (CEN/TC 301- Road Vehicle)**
  https://standards.cen.eu/dyn/www/f?p=204:7:0::::FSP_ORG_ID:6282&cs=12018B2C1236D7DDF2BF081418E32DEB5

- **European Committee for Electro-Technical Standardization (CENLEC/TC 69X)**
  https://www.cenelec.eu/dyn/www/f?p=104:7:2226701401231001::::FSP_ORG_ID:1258145

- **M/533 - Commission Implementing Decision C(2015)1330**
  http://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=search.detail&id=552

- **Mandate M/468 on charging of electric vehicles**
  https://ec.europa.eu/energy/sites/ener/files/documents/2010_06_04_mandate_m468_en.pdf

- **Report on "Standardization for road vehicles and associated infrastructure"**
  ftp://ftp.cen.eu/CEN/Sectors/List/Transport/Automobile/EV_Report_incl_annexes.pdf

- **German Standardization Roadmap for Electric Mobility 2020**

https://www.din.de/blob/235254/a0d14b63b9685859b1c0c297827e50f8/roadmap-en-2020-data.pdf

- **"Plans for an electric car charging point in every new home in Europe"** ***The Guardian*** https://www.theguardian.com/sustainable-business/2016/oct/11/electric-car-charging-point-new-home-europe-renault

- **"Europe Wireless Charging Market for Electric Vehicles"** ***PRNewswire*** https://www.prnewswire.com/news-releases/europe-wireless-charging-market-for-electric-vehicles---segmented-by-geography-and-vendors---trends-and-forecasts-2018---2023-300648841.html

4. Annexure: List of standards published/Under drafting by CEN and CENELEC

4.1 Annexure 1: List of Standards by CENELEC: TC 69X:

S. No.	Reference, title	Status
1	EN 61851-1:2011 (pr=22334) Electric vehicle conductive charging system - Part 1: General requirements	Published
2	EN 61851-21-1:2017/AC:2017-11 (pr=66195) Electric vehicle conductive charging system - Part 21-1: Electric vehicle on-board charger EMC requirements for conductive connection to an AC/DC supply	Published
3	EN 61851-21-1:2017 (pr=59580) Electric vehicle conductive charging system - Part 21-1: Electric vehicle on-board charger EMC requirements for conductive connection to an AC/DC supply	Published
4	EN 61851-21:2002 (pr=14255) Electric vehicle conductive charging system - Part 21: Electric vehicle requirements for conductive connection to an a.c/d.c. supply	Published
5	EN 61851-22:2002 (pr=14256) Electric vehicle conductive charging system - Part 22: AC electric vehicle charging station	Published
6	EN 61851-23:2014/AC:2016-06 (pr=62786) Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station	Published
7	EN 61851-23:2014 (pr=24554) Electric vehicle conductive charging system - Part 23: DC electric vehicle charging station	Published

8	EN 61851-24:2014 (pr=24517) Electric vehicle conductive charging system - Part 24: Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging	Published
9	EN 61851-24:2014/AC:2015 (pr=60940) Electric vehicle conductive charging system - Part 24: Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging	Published
10	EN 62576:2010 (pr=22094) Electric double-layer capacitors for use in hybrid electric vehicles - Test methods for electrical characteristics	Published
11	EN IEC 62576:2018 (pr=63480) Electric double-layer capacitors for use in hybrid electric vehicles - Test methods for electrical characteristics	Published

4.2 Annexure 2: List of Standards published by CEN/TC 301

S. No.	Reference, Title	Status
1	CR 1955:1995 (WI=00301014) Proposals for the braking of electrical vehicles	Published
2	EN ISO 15118-1:2015 (WI=00301034) Road vehicles - Vehicle to grid communication interface - Part 1: General information and use-case definition (ISO 15118-1:2013)	Published
3	EN ISO 15118-2:2016 (WI=00301035) Road vehicles - Vehicle-to-grid communication Interface - Part 2: Network and application protocol requirements (ISO 15118-2:2014)	Published
4	EN ISO 15118-3:2016 (WI=00301033) Road vehicles - Vehicle to grid Communication interface - Part 3: Physical and data link layer requirements (ISO 15118-3:2015)	Published
5	EN ISO 17409:2017 (WI=00301036) Electrically propelled road vehicles - Connection to an external electric power supply - Safety requirements (ISO 17409:2015, Corrected version 2015-12-15)	Published
6	EN ISO 18246:2017 (WI=00301049) Electrically propelled mopeds and motorcycles - Safety requirements for conductive connection to an external electric power supply (ISO 18246:2015)	Published
7	FprEN ISO 18243 (WI=00301055)	

	Electrically propelled mopeds and motorcycles - Test specifications and safety requirements for lithium-ion battery systems (ISO 18243:2017)	Under Approval
8	prEN 17186 (WI=00301056) Identification of vehicles and infrastructures compatibility - Graphical expression for consumer information on EV power supply	Under Approval
9	prEN ISO 19363 (WI=00301048) Electrically propelled vehicles - Magnetic field wireless power transfer - Safety and interoperability requirements	Under Drafting

4.3 Annexure 3: List of published standards by CLC/TC 64

S. No.	Reference	Title	Status
1	HD 60364-7-722:2016 (pr=24483)	Low voltage electrical installations - Part 7-722: Requirements for special installations or locations - Supply of electric vehicle	Published
2	EN 61140:2002 (pr=13844)	Protection against electric shock - Common aspects for installation and equipmen	Published
3	EN 61140:2002/A1:2006 (pr=16044)	Protection against electric shock - Common aspects for installation and equipmen	Published
4	EN 61140:2016 (pr=24640)	Protection against electric shock - Common aspects for installation and equipmen	Published

4.4 Annexure 4: List of published standards by CLC/TC 23BX

S. No.	Reference	Title	Status
1	FprEN 62196-1:2014/FprAA (pr=58649)	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements	Approval stage