

Area/domain	Needs	Standard existing/on going - Description	GAP	Criticality	#	
Electric Vehicle	Battery	Guarantee the safety of the users and operators during anomalous situations	ISO 11428 Visual danger signals ISO 12405-3 Safety performance requirements IEC 60784 Instrumentation for electric road vehicles IEC 60073 Coding principles for indicators and actuators SAE J2936 Labeling Recommended Practice	Missing a common label to guide operators during maintenance and emergency situations	M	#1
		Guarantee an effective communication among "O&Ms" and "not-O&Ms" vehicle components	None	Missing a standard way to communicate between battery and vehicle (CAN bus)	L	#2
		Allow safe and effective battery swapping on different vehicles	SAE J1766 Vehicle Crash Integrity Testing SAE J3004 Battery Packs	Missing sufficient and dedicated standards to allow battery swapping	L	#3
	Range prediction and State of Charge	Guarantee a good precision in the definition of the car range	ISO 8714 Electric road vehicles - Reference energy consumption and range ISO 8715 Electric road vehicles- Road operating characteristics SAE J1711	Missing a new and effective standardized Driving Cycle	M	#4
		Ensure a good precision in range prediction	ISO 23828 Fuel cell road vehicles - Energy consumption measurement SAE J1711 Measuring Exhaust Emission and the Fuel Economy PHEV SAE J2711 Recommended Practice for Measuring Fuel Economy and Emissions SAE J1634 Energy Consumption and Range Test Procedure SAE J2991 Range Test Protocol for PEV	Missing a standard and common way to predict driving range	M	#5
	Regenerative braking	Ensure a sufficient exploitation of regenerative braking	CEN/CENELEC CR 1955 Proposals for the braking of electrical vehicles	Missing the definition of a minimum level of energy recover	L	#6
	Modes of charging	Guarantee a safe and reliable charging at home	IEC 61851-1, -21, -22 Electric vehicle conductive charging system - Part 1: General requirements ,Part 21: Electric vehicle requirements for conductive connection to an a.c./d.c. supply , Part 22: AC electric vehicle charging station"	Missing safety restriction for Mode 1 charging (overheating risks when charging cars).	M	#7
		Guarantee a safe and reliable charging in public charging points, both for cars and for Light Electric Vehicles (LEVs);	IEC 61851-1, -21, -22 Electric vehicle conductive charging system - Part 1: General requirements ,Part 21: Electric vehicle requirements for conductive connection to an a.c./d.c. supply , Part 22: AC electric vehicle charging station"	Missing a common choice. Too many solutions used (Mode 1, 2, 3).	H	#8
	Connectors	Guarantee the connection of the vehicle to all the AC charging stations	IEC 62196 -2 Plugs, socket-outlets, vehicle couplers and vehicle inlets - Dimensional interchangeability requirements CEE 7/4 Schuko CEE 7/7	Missing a common choice. Still too many solutions used	L/M (EU Directive proposal)	#9
		Guarantee the connection of the vehicle to all the DC charging stations	IEC 62196-3 Dimensional compatibility and interchangeability requirements for pin and contact-tube couplers with rated operating voltage up to 1 000 V d.c.	Two solutions coexisting. Missing a common decision	M (Multistandard charger commercial available)	#10
		Allow the connection of the vehicle to ALL the charging stations	IEC 62196-3 Dimensional compatibility and interchangeability requirements for pin and contact-tube couplers with rated operating voltage up to 1 000 V d.c.	Defined a unique connector (Combo2), but still competition with CHAdeMO. Missing a common decision	M (Multistandard charger commercial available)	#11
	Cables	Guarantee European common quality and design rules	Only National Standards. None at EU level	Missing a common standard	M	#12

	Communication EV-EVSE	Guarantee a sufficient and secure communication between the EV and the EVSE	IEC 61851 -1 Electric vehicle conductive charging system - Part 1 ISO/IEC 15118 Vehicle to grid communication interface SAE J2836/2 Use Cases for Communication between Plug-in Vehicles and the Supply Equipment (EVSE) DIN 70121 Digital communication between a d.c. EV charging station and an electric vehicle for control of d.c. charging in the Combined Charging System SAE J2953 (WIP) Plug-In Electric Vehicle (PEV) Interoperability with Electric Vehicle Supply Equipment (EVSE) IEC 61851-23 D.C. Electric vehicle charging station IEC 61851-24 Control communication protocol between off-board d.c. charger and electric vehicle.	Too many solutions still present and sometimes even via EV OEM Backend	L/M	#13
	Inductive Charging	Guarantee a safe and effective procedure	IEC 61980 Electric vehicle wireless power transfer systems (WPT) SAE J1773 Inductively Coupling Charging UL 2750 Outline of Investigation, for Electric Vehicle Wireless Charging SAE J2954 Wireless Charging of Electric and Plug-in Hybrid Vehicles SAE J2847/6 (RIP) "Wireless Charging Communication between Plug-in Electric Vehicles and the Utility Grid SAE J2931/6 (WIP) "Digital Communication for Wireless Charging Plug-in Electric Vehicles	Open points on energy transfer aspects	L	#14

Charging Point	Identification at EVSE	Allow user identification in a simple and universal way;	ISO/IEC 14443 Identification cards - Contactless integrated circuit(s) cards - Proximity cards NEMA/eMI3 proposal	Missing a common standard that simplifies identification in a roaming perspective and with sufficient features (available digits, security, and relevant data format)	H	#15
	Communication	Guarantee a sufficient and secure communication between the EVSE and the EVSE Backend	EN 61850 Communication networks and systems in substations GSM, UMTS, GRPS NWIP handed over from GeM WP7 to eMI3 (ongoing) OCPP (commercial proposal by Open Charge Alliance)	Insufficient existing standards	H	#16
	Safety	Guarantee a safe installation and use of Fast Charging Points in petrol stations	IEC 60364-7-722 Low voltage electrical installations: Part 7-722: Requirements for special installations or locations - Supply of Electric vehicle EN 60079-10 Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres EN 50014 Electrical apparatus for potentially explosive atmospheres. General requirements EN 50018 Flameproof enclosure 'd'	Absence of a specific regulation	M	#17
	EMC	Avoid possible interferences between EVs and other equipment (e.g. Smart Meters)	EN 50065-1 Signaling on low-voltage electrical installation in the frequency range 3 kHz to 148,5 kHz: EN 50065-2-1, 2, 3 Immunity requirements	Missing effective limits in the range 3 – 150 kHz	M	#18
Connection to grid	Power Quality	Guarantee safety and quality of the grid with respects to harmonics, flicker, overvoltage, overcurrent and avoiding possible resonant phenomena	IEC 61000-X Electromagnetic compatibility (EMC)	Missing evaluations/limits on multiple EVs charging effects	M	#19
	Metering DC	Obtain reliable measures from DC metering	None	Missing standard	M	#20
	Smart charging - Load Management	Guarantee the exchange of fundamental information between EVSE Backend and DSO	IEC/TR 61850-90-7 Communication networks and systems for power utility automation - Part 90-7: Object models for power converters in distributed energy resources (DER) systems IEC61850 Communication networks and systems in substations ISO 9506 (MMS) Industrial automation systems -- Manufacturing Message Specification (MMS) SAE J2836-1 "Use Cases for Communication Between Plug-in Vehicles and the Utility Grid SAE J2836/3 (WIP) "Use Cases for Communication between Plug-in Vehicles and the Utility Grid for Reverse Power Flow OPSC (Open Smart Charge Protocol) proposal	Missing effective and common standard	H	#21
	Power Level	Ensure a "grid-safe" but sufficiently fast charging procedure	IEC 61851-1 Electric vehicle conductive charging system - Part 1 (minimum current level: 6A)	Missing maximum power limits (higher minimum limit for public charging under discussion)	M	#22

Communication	Data exchange	Guarantee a sufficient and secure communication between the EVSE Backend and the EVSP	OCHP and OICP (proposals implemented in the market)	Missing standard	H	#23
		Guarantee a sufficient and secure communication between the EVSP and the Energy Provider	OSCP Open Smart Charge Protocol (proposal)	Missing standard	H	#24
		Guarantee a sufficient and secure communication between the EVSE (or EVSP) Backend and the Clearing House	Open Clearing House Protocol (proposal implemented in the market - eMI3)	Missing standard	H	#25
	Marketplace Platform	Guarantee a sufficient and secure communication between the Marketplace and all the connected actors	On-going activities: Proposals from GeM WP3	Missing standard	H	#26
	Security - data protection	Guarantee protection from cyber attack	NERC-CIP DKE AK 1911.11.5 Information security in electromobility On-going activities in SG Information Security WG, eMI3	System wide way to handle security	M	#27
	Privacy	Guarantee users privacy	On-going activities from SG Information Security WG, eMI3	Missing common rules and guidelines to handle privacy sensitive data	M	#28
	Payment	Guarantee the possibility to pay for charging in all the public charging stations	None	Missing a common choice/common standard on business models (pay by contract/pay by cash-equivalent system/charge for free/...)	M	#29
Others	Terminology	Identify a clear and universal terminology	SAE J1715-1/2 Battery Specific Terminology ISO 8713 Electric road vehicles - Vocabulary ISO 13062 Electric mopeds and motorcycles - Terminology CEN/CENELEC 13447Electrically propelled road vehicles. Terminology IEC 60050-482 Primary and secondary cells and batteries - Vocabulary	Common choice missing	L	#30
	Emergency rescue	Guarantee safety in emergencies	Hybrid and Electric Vehicle Emergency Field Guide, published by NFPA ISO 6469-3 Protection of persons against electric shock FMVSS 305 Electrolyte Spillage and Electrical Shock Protection SAE J1495 (RIP) "Test Procedure for Battery Flame Retardant Venting Systems SAE J1766 (RIP) "Recommended Practice for Electric and Hybrid Electric Vehicle Battery Systems Crash Integrity Testing	Missing a commonly chosen procedure	L	#31