



CHARIN

Position Paper of Charging Interface Initiative e.V.
CharIN's view on adaptors within the Combined
Charging System

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1 Introduction

CharIN is dedicated to developing and establishing the Combined Charging System (CCS) as the standard for charging Battery Electric Vehicles (BEVs) of all kinds.

2 Position

- CharIN does not endorse the use of adaptors¹ for charging of electric cars with CCS charging interface. (An overview of respective adaptor scenarios is given in the appendix)
- CharIN does not support any efforts of adaptor development, specification or standardization.
- If any adaptor is put on the market the liability for safe operation lies with the respective manufacturer based on applicable laws and regulations.

3 Reasons for recommendation

- The IEC 61851-1 standard for charging equipment states that adaptors shall not be used. Adaptors at the charging station outlet are only allowed under certain conditions.
- CharIN believes that the use of adaptors has a negative impact on the handling of the charging equipment and thus the user experience during charging.
- An adaptor as additional part in the electric connection between EV and EVSE increases the probability of faults and affects the functional safety.
- No standards for adaptors between different charging systems exist that may be used as a basis for a safe product development.
- The development of adaptors is not trivial. A list of potential technical challenges with no claim for completeness is given below.

4 Technical challenges

- The additional mechanical loads caused by the extra weight of a vehicle adaptor might lead to additional wear and potentially to mechanical malfunctioning of the vehicle inlet.
- The different charging systems (e.g. CCS, CHAdeMO, GB/T, Tesla) have different electrical safety requirements (e.g. in the field of protective earthing conductor cross section requirements and maximum short-circuit energy). The resulting incompatibility of safety concepts needs to be considered in the adaptor development.
- Adaptors might have a lower current rating than EVSE and EV. The adaptor design has to ensure that its current rating is not exceeded.
- Modern cable assemblies for high power DC charging might have a liquid cooling system. Such cooling might not properly cool the entire vehicle adaptor. The resulting overheating might lead to hazardous situations as e.g. hot surfaces.

¹ Within this paper the term “adaptor” (in contrast to the definition in the appendix) describes both adaptors adapting from charging station to charging cable and vehicle adaptors adapting from charging cable to vehicle inlet. The term “vehicle adaptor” describes only adaptors adapting from charging cable to vehicle inlet.

5 Appendix

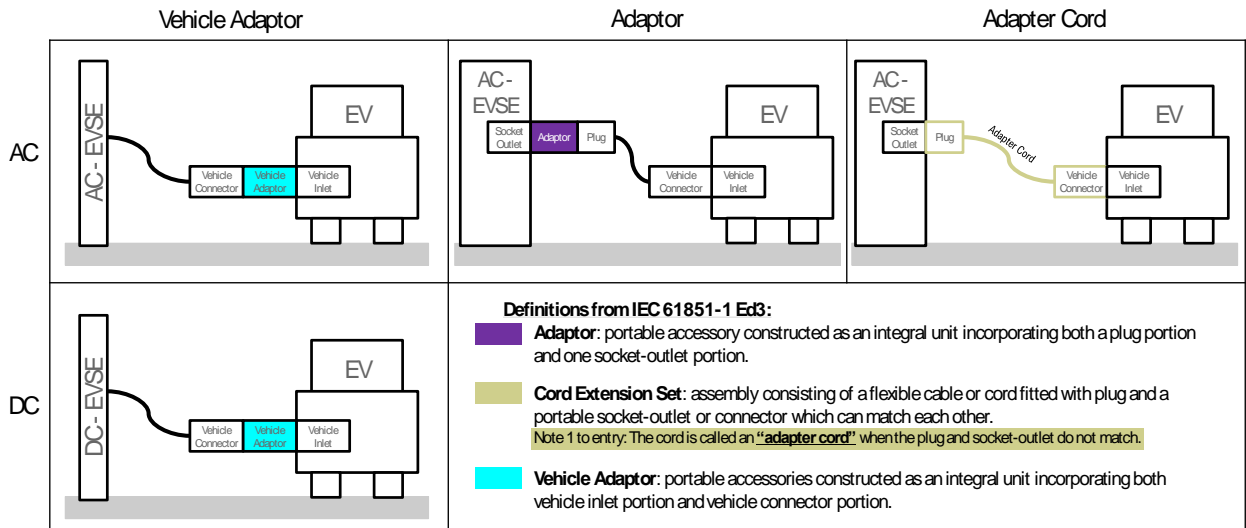


Figure 1: Definition of adaptor types.

		Vehicle Adaptor		Adaptor		Adapter Cord				
AC	AC-Charging Vehicle Adaptors	To: Vehicle Inlet								
		Type 1	Type 2	Type 2 Mode 1	Type 3a	Type 3b	Type 3c	GBT	Tesla (US)	
		Type 1	x	x	x	x	x	x	x	x
		Type 2	x			x	x	x	x	x
		Type 2 Mode 1	x	x		x	x	x	x	x
		Type 3a	x	x	x				x	x
		Type 3b	x	x	x	x			x	x
		Type 3c	x	x	x	x			x	x
		GBT	x	x	x	x			x	x
		Tesla (US)	x	x	x	x	x		x	x
DC	DC-Charging Vehicle Adaptors	To: Vehicle Inlet								
		Combo1	Combo2	CHAdeMO	GBT	Tesla (US)	Tesla (EU)			
		Combo1		x	x	x	x	x		
		Combo2	x		x	x	x	x		
		CHAdeMO	x	x		x	x	x		
		GBT	x	x	x		x	x		
		Tesla (US)	x	x	x	x		x		
		Tesla (EU)	x	x	x	x	x			
				To: Plug						
				Type 1	Type 2	Type 2 Mode 1	Type 3a	Type 3b	Type 3c	GBT
		Type 1								
		Type 2			x	x	x	x		
		Type 2 Mode 1								
		Type 3a	x			x	x	x		
		Type 3b	x		x		x	x		
		Type 3c	x		x	x		x		
		GBT	x		x	x	x			
		Tesla (US)								
		To: Vehicle Inlet								
		Type 1	Type 2	Type 2 Mode 1	Type 3a	Type 3b	Type 3c	GBT	Tesla (US)	
		Type 1								
		Type 2	x		x	x	x	x	x	
		Type 2 Mode 1								
		Type 3a	x	x	x		x	x	x	
		Type 3b	x	x	x	x		x	x	
		Type 3c	x	x	x	x		x	x	
		GBT	x	x	x	x		x	x	
		Tesla (US)								

x	theoretical adaptor scenarios
x	respective products are announced
x	respective products exist
x	adaptors which are addressed by the position paper
x	existing products in conflict with position paper

Figure 2: Overview of theoretical adaptor scenarios and their relevance for this paper.