Trainings 2020
Charging Communication with ISO 15118
Basic Training

Get a perfect jumpstart into the industry-approved charging communication standard ISO 15118. Learn the key concepts across all communication layers of this future-proof technology so you can actively shape this thriving e-mobility market with your innovative and interoperable EV charging products.

WHAT YOU GET:
• Thorough introduction to the Combined Charging System (CCS)
• How the EV and charging station build up a stable communication link via CCS hardware, Pulse-Width Modulation (PWM), Signal Level Attenuation Characterization (SLAC), and the SECC discovery protocol (SDP)
• Mechanism used to mutually agree on DIN SPEC 70121 or ISO 15118 as the communication protocol
• Overview of the ISO 15118 document family and its relation to the seven ISO/OSI communication layers
• Identification mechanisms External Identification Means (EIM) & Plug & Charge
• In-depth walk-through of the communication sequence for AC and DC charging
• Available tools for the EV and charging station to do smart charging and renegotiate a charging schedule
• Global support of ISO 15118
• Features and outlook to the next edition of ISO 15118-2 (now called ISO 15118-20)
• Important forums, industry events, and further resources you don’t want to miss out on

YOUR TRAINER: Dr. Marc Mültin

Dr. Marc Mültin (V2G Clarity) is a recognized e-mobility expert and co-author of the ISO 15118 and related international standards. He works now with companies and research institutions across the globe to integrate ISO 15118’s promising Plug & Charge feature into their products and innovations. His mission has been to help bring convenient, secure and user-friendly electric vehicle charging to a global audience.

WHO SHOULD ATTEND:

(Electrical) engineers, managers, product designers, entrepreneurs, technology consultants; anyone interested in the field of e-mobility and charging communication.

As this is an introductory course we welcome participants with no prior experience in the field. Although a background in engineering and/or computer science is beneficial it is not required to understand the topic.

HOW

Our renowned expert in the field of Charging Communication will guide you in an interactive workshop through the intricacies of ISO 15118, using illustrative examples and a memorable step-by-step guide.
Charging Communication with ISO 15118
Basic Training

AGENDA:

Welcome

The Combined Charging System (CCS) – Short introduction of CharIN’s CCS related documents

SLAC – The solution to crosstalk in powerline communication between EV & EVSE via CCS

Efficient XML interchange (EXI) - XML on a binary level

SupportedAppProtocol – Choosing a mutually supported protocol

Introduction to ISO 15118 – Overview of the use cases within the ISO 15118

The ISO 15118 document family
  » Set up of the ISO 15118 documentation family (15118-1 – 15118-9) and its connection to 7-communication layers of the Open Systems Interconnection (OSI)
  » Publishing timeline of the single ISO parts & outlook to additional functionalities with edition 2 of ISO 15118

AC and DC charging message sequence

PMaxSchedule and SalesTariff – Influencing the charging schedule
  » Negotiation of a charging profile for the vehicle in detail incl. sales tariff information (Grid & supplier oriented incentive to affect the charging profile) & charging parameters

Global support of ISO 15118

Important forums, industry events, and further resources

COSTS:

In-house trainings upon request.

Price and booking:
CharIN member: € 975.00 (excl. applicable VAT)
Regular: € 1490.00 (excl. applicable VAT)

www.charin-academy.com
Charging Communication with ISO 15118
Advanced Training

Take a deep dive into the topic of secure charging communication with the user-convenient Plug & Charge feature of ISO 15118. We’ll focus on the certificate concept, necessary public-key infrastructures, encrypted communication via TLS, and XML-based signatures. The conveyed knowledge will enable you to build state-of-the-art secure and user-friendly EV charging products that shape the e-mobility market.

WHAT YOU GET:
- The cryptographic foundations of ISO 15118 to secure the communication
- Understanding digital certificates and digital signatures
- An overview of the ISO 15118 public-key infrastructures
- How the EV and charging station encrypt the communication using Transport Layer Security (TLS)
- How a contract certificate enables a seamless identification and authorization via the Plug & Charge feature
- The backend processes and market roles needed to establish a well-orchestrated Plug & Charge ecosystem (VDE Application Guide VDE-AR-E 2802-100-1)

HOW:
Our renowned expert in the field of Charging Communication, Dr. Marc Mültin (V2G Clarity), will guide you in an interactive workshop through the intricacies of ISO 15118, using illustrative examples and a memorable step-by-step guide. This limited-availability workshop, set in a unique automotive-related venue, is sure to be an invaluable learning experience.

YOUR TRAINER: Dr. Marc Mültin
Dr. Marc Mültin (V2G Clarity) is a recognized e-mobility expert and co-author of the ISO 15118 and related international standards. He works now with companies and research institutions across the globe to integrate ISO 15118’s promising Plug & Charge feature into their products and innovations. His mission has been to help bring convenient, secure and user-friendly electric vehicle charging to a global audience.

WHO SHOULD ATTEND:
- (Electrical) engineers, managers, product designers, entrepreneurs, technology consultants; anyone interested in the field of e-mobility and Charging Communication.
- As this is an advanced course we recommend that participants have prior experience in the field. For the best possible preparation and a smooth learning experience we recommend that participants visit our Basic Training first.

Academy
Charging Communication with ISO 15118
Advanced Training

AGENDA:

Welcome

Cryptographic Foundations of ISO 15118: symmetric and asymmetric cryptosystems, digital certificates and signatures, and key-agreement protocols

The certificate concept and public-key infrastructures outlined in ISO 15118 and their relation to the various e-mobility market roles

Setup of an encrypted communication link between the EV and charging station via TLS (Transport Layer Security) and ISO 15118 certificates

Certificate installation: how a contract certificate enables a seamless identification and authorization via the Plug & Charge feature

In-depth training on the VDE application guide VDE-AR-E 2802-100-1, titled “Certificate handling for electric vehicles, charging infrastructure and backend systems within the framework of ISO 15118”. This application guide is the blueprint for establishing a well-orchestrated Plug & Charge ecosystem

COSTS:
In-house trainings upon request.

Price and booking:
CharIN member: € 1170.00 (excl. applicable VAT)
Regular: € 1790.00 (excl. applicable VAT)

www.charin-academy.com
High Power Charging Standards and Cable Technology
Basic Training

Learn the fundamentals of high power charging and cooled cable technology. The conveyed knowledge will enable you to actively shape these key components of e-mobility. Join the seminar to be in the driver’s seat!

WHAT YOU GET:
You’ll learn the language, norms, and frameworks needed to:

» Get an overview of the standards regarding High Power Charging (HPC)
» Map the normative landscape of HPC
» Apply the relevant norms correctly
» Comprehend in depth how cooled cables are constructed and how they function
» Understand the technical limitations of cooled systems
» Get an overview of existing cooling techniques and the materials used in cooled cables
» Follow publications of relevant committees and meetings

HOW:
In our interactive lecture format you will be working through engaging real-life examples together with our renowned expert in the field of High Power Charging. This limited-availability workshop, set in a unique automotive-related venue, is sure to be an invaluable learning experience.

YOUR TRAINER: Marc André Beck
Marc André Beck is the owner of grivix GmbH (Switzerland) and responsible for business development. He used to work as a Market Manager HPC at HUBER+SUHNER AG and to manage the product Cooled Cable to charge EVs at 500 ampere. Before that he was a Product Manager ACS responsible for the worldwide product portfolio Cable Systems Automotive. At Designwork GmbH he worked as an engineer and responsible developer for batteries and embedded systems.

WHO SHOULD ATTEND:
» (Electrical) engineers, managers, product designers, entrepreneurs, technology consultants; anyone interested in the field of e-mobility and HPC.
» As this is an introductory course we welcome participants with no prior experience in the field. Although a background in engineering is beneficial it is not required to understand the topic.
High Power Charging Standards and Cable Technology
Basic Training

**AGENDA:**

**Welcome**

- Introduction in the overview of standards regarding high power charging and how they are related

**IEC 62893-4-1/2**
- Why are the cooled cables so thin?
- How is the minimum size of the cooled cable calculated (I2t)?
- What impact does I2t have on ground cables?
- Why is it still safe to use thin cables (fault cases)

**IEC 62196-3(-1)**
- Y-capacitors and what impact do they have on HPC
- Contact resistance, coating (impact of cooling)
- What liquids may be used with a cooled cable
- How much cooling is required to use cooled cables (radiation, convection)
- What cooling techniques exist

**Limitations**
- What are the technical limitations of cooled charging systems
- What is the maximum power throughput of cooled cables
- What is the power / heat (loss) ratio at different current levels

**Physical background**

- Historical background of cooled welding cables

- Publishing timeline of IEC 61851-23, IEC 62196-3(-1) and IEC 62893-4-1/2

- Relevant committees and meetings

**COSTS:**

- In-house trainings upon request.
- Price and booking:
  - CharIN member: € 975.00 (excl. applicable VAT)
  - Regular: € 1490.00 (excl. applicable VAT)
- www.charin-academy.com

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Understanding the e-mobility ecosystem
Basic Training

This training enables every participant to understand the entire eMobility ecosystem. Participants will gain a first inside into the market framework, including all relevant market players, market roles, processes and interactions.

WHAT YOU GET:

» Overview of the eMobility ecosystem
» Description of stakeholders that are part of this market
» Core IT- and business processes between all relevant players
» Get to know relevant standards and regulations – on global, European and national levels
» Products and services for the different market roles
» Overview of an EV: how works an electric vehicle, how works the charging of an electric vehicle
» Insights into the next level of EV charging

HOW:

In our interactive lecture format, you will be working through engaging real-life examples together with our renowned experts with years of practical experience in designing and realizing e-mobility services.

YOUR TRAINER: Oliver Adrian, Fabian Guse

Our training partner Hubject Consulting is an ensemble of hand-picked eMobility specialists, placing established professionals and young entrants right in the mobility market.

Fabian Guse (Head of Consulting) is a notable expert with several years consulting & industry experience who has led several consulting projects in eMobility, digitalization, telecommunication and auto-motive topics.

Oliver Adrian (Senior Consultant) is a distinguished expert with several years' experience in consulting major international companies in the area of mobility and digital platforms. Oliver has led various consulting projects with a focus on Strategic Positioning and Market Entries.

WHO SHOULD ATTEND:

Managers, product designers, entrepreneurs, technology consultants; anyone interested gaining an overview of the eMobility market.

As this is an introductory course, we welcome participants with no prior experience in the field.
Understanding the e-mobility ecosystem
Basic Training

AGENDA:

- Introduction and setting expectations
- eMobility ecosystem – which roles and players are part of this market
- What are the core IT- and business processes of the e-mobility ecosystem?
- Get an overview of the most relevant standards and regulations – on a global level, European level and national level
- Product- and service portfolio for the different market roles
- Overview of an EV: Concept of electric vehicles
- Overview of the customer journey of charging an electric vehicle
- Next level of EV charging: What are the trends of the future of EV charging?
- Wrap-up

COSTS:

In-house trainings upon request.

Price and booking:
CharIN member: € 975.00 (excl. applicable VAT)
Regular: € 1490.00 (excl. applicable VAT)

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Deep dive into the e-mobility market
Advanced Training

This training enables every participant to gain a deeper understanding into the main topics of the e-mobility market. It includes all topics to understand the market like systems and processes, grid integration and the legal framework for e-mobility.

WHAT YOU GET:

» Get to know the main differences between the European, North American and Asian EV markets
» Understand systems and processes for the charging ecosystem – what needs to be considered for a technical realization
» Learn the basics about grid integration of electric vehicles
» Overview of legal requirements for offering EV charging services

HOW:

In our interactive lecture format, you will be working through engaging real-life examples together with our renowned expert with years of practical experience in designing and realizing e-mobility Services.

YOUR TRAINER: Oliver Adrian, Fabian Guse

Our training partner Hubject Consulting is an ensemble of hand-picked eMobility specialists, placing established professionals and young entrants right in the mobility market.

Fabian Guse (Head of Consulting) is a notable expert with several years consulting & industry experience who has led several consulting projects in eMobility, digitalization, telecommunication and automotive topics.

Oliver Adrian (Senior Consultant) is a distinguished expert with several years' experience in consulting major international companies in the area of mobility and digital platforms. Oliver has led various consulting projects with a focus on Strategic Positioning and Market Entries.

WHO SHOULD ATTEND:

Managers, product designers, entrepreneurs, technology consultants; anyone interested in the field of e-mobility.

As this is an advanced course, we welcome participants with at least some experience in the field.
Deep dive into the e-mobility market
Advanced Training

AGENDA:
Introduction and setting expectations
Main Differences between the European, North American and Asian EV markets (focus standards, customers, restrictions)
Systems and processes – what needs to be considered for a technical realization of EV-Charging
Legal requirements for offering EV charging services
Grid integration of electric vehicles – most relevant roles and processes
Wrap-up

COSTS:
In-house trainings upon request.
Price and booking:
CharIN member: € 1170.00 (excl. applicable VAT)
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This training will explain the principles of Plug&Charge, the benefits of integration in your business, and a practical approach of implementing Plug&Charge based on the ISO15118 standard in your business. This training is strongly based on the implementation guide, which was developed in collaboration between CharIN and Hubject.

WHAT YOU GET:
- Background information, objectives, and benefits for Plug & Charge based on ISO15118
- Understanding the different roles in the ISO15118 ecosystem
- Facilitate and derive your position in or in between these roles
- Learn about the impact on the e-mobility ecosystem (OEM, CPO, MO, new market players)
- Understanding the necessary processes of Plug&Charge and the ISO15118 ecosystem, and the VDE Application Guide
- Identify your investments, possible new business models and strategies, involved with Plug&Charge and ISO15118

HOW:
In our interactive lecture format, you will be working on engaging real-life examples together with a Hubject expert, who has years of practical experience in designing and realizing Plug&Charge services based on ISO15118.

WHO SHOULD ATTEND:
Managers, product designers, entrepreneurs, technology consultants: anyone interested in the field of Plug&Charge.

As this is an introductory course, all participants are welcomed. A prior more detailed experience in the field is not necessary.

YOUR TRAINER: Jonel Timmergen, Steffen Rhinow
Our training partner Hubject is an eRoaming platform for customer-friendly charging of electric vehicles.

Jonel Timmergen: A senior project manager specialized in e-mobility protocols and ISO 15118. Multiple years of experience with vehicle OEMs, utilities and service provider. Working on Plug&Charge with ISO15118 since the beginning.

Steffen Rhinow: A Senior Consultant with several years of experience in consulting OEMs in the area of e-mobility. Project Management with a problem solving approach.
# Plug&Charge based on ISO15118 for your business

## Basic Training

### AGENDA:

- Introduction and definition of expectation of this technology
- Buzzword Bingo – What do you already know about the ISO15118 technology, Plug&Charge, smart Charging and value-added services?
- Understanding the relevant roles and components of Plug&Charge
- Understanding the ISO15118 ecosystem and the required processes
- Key Benefits for the e-mobility Partners of Plug&Charge based on ISO15118
- Discussion of the central question: How will Plug&Charge redefine the customer journey? How will it affect your business?
- Identify potential innovation impulses for your existing business model
- Discussion of required investments to implement Plug&Charge
- How did we build the first running ecosystem – Outline of a practical example
- Key hurdles and strategies for implementing Plug&Charge
- Impact on the EV ecosystem and what would be next steps for you?
- Wrap-up

### COSTS:

- In-house trainings upon request.
- Price and booking:
  - CharIN member: € 1170.00 (excl. applicable VAT)
  - Regular: € 1790.00 (excl. applicable VAT)
- www.charin-academy.com

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Using the CharIN guide to implement Plug&Charge based on ISO15118 for your business
Advanced Training

This training will explain the more advanced concepts of implementing Plug&Charge based on the ISO15118 standard. The training is strongly based on the implementation guide, which was created by CharIN and Hubject.

WHAT YOU GET:
- How did we build the first running Plug&Charge ecosystem – Outline of a practical example
- Description of needed Interfaces
- Concrete How-tos and deep-dive for the roles: Walkthrough the main implementation steps, identification of required role specific resources, organizational requirements and how to adapt business and IT-processes
- PnC-Best practices for the different roles based on reference projects
- Key hurdles and scenarios for implementing Plug&Charge
- Future Outlook

HOW:
In our interactive lecture format, you will be working on engaging real-life examples together with a renowned Hubject expert, who has years of practical experience in designing and realizing Plug&Charge services based on ISO15118.

YOUR TRAINER: Jonel Timbergen, Steffen Rhinow
Our training partner Hubject is an eRoaming platform for customer-friendly charging of electric vehicles.

Jonel Timbergen: A senior project manager specialized in e-mobility protocols and ISO 15118. Multiple years of experience with vehicle OEMs, utilities and service provider. Working on Plug&Charge with ISO15118 since the beginning.

Steffen Rhinow: A Senior Consultant with several years of experience in consulting OEMs in the area of e-mobility. Project Management with a problem solving approach.

WHO SHOULD ATTEND:
Managers, product designers, entrepreneurs, technology consultants; anyone interested in the field of Plug&Charge. As this is an advanced course, we would like to welcome participants with at least some prior experience in the field.
Using the CharIN guide to implement Plug&Charge based on ISO15118 for your business
Advanced Training

AGENDA:

Introduction and setting expectations
Identify needs and roles of the audience
CharIN implementation guide – content and how to use it
Certificates in ISO 15118
Deep dive into processes and components of the ecosystem
Lets do it - A walkthrough to implement Plug&Charge from perspectives of different roles incl. a live demo of important API-Calls with our Hubject ecosystem
Challenges of ISO15118 implementation
Potential obstacles of realizing a Plug&Charge EV Charging infrastructure
Time scheduling and required resources for the implementation – get the features ASAP and reach out to the new business horizon
Outlook and discussion on future possibilities with ISO15118
Wrap-up

COSTS:

In-house trainings upon request.

Price and booking:
CharIN member: € 1170,00 (excl. applicable VAT)
Regular: € 1790,00 (excl. applicable VAT)

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# Training dates 2020

Further trainings and inhouse sessions upon request

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<td>Charging Communication with ISO 15118</td>
<td>Basic Training</td>
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<td>24.04.2020</td>
<td>High Power Charging Standards and Cable Technology</td>
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<td>18.05.2020</td>
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<td>19.05.2020</td>
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<td>05.06.2020</td>
<td>Understanding the e-mobility ecosystem</td>
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The training dates and exact venues are subject to change.