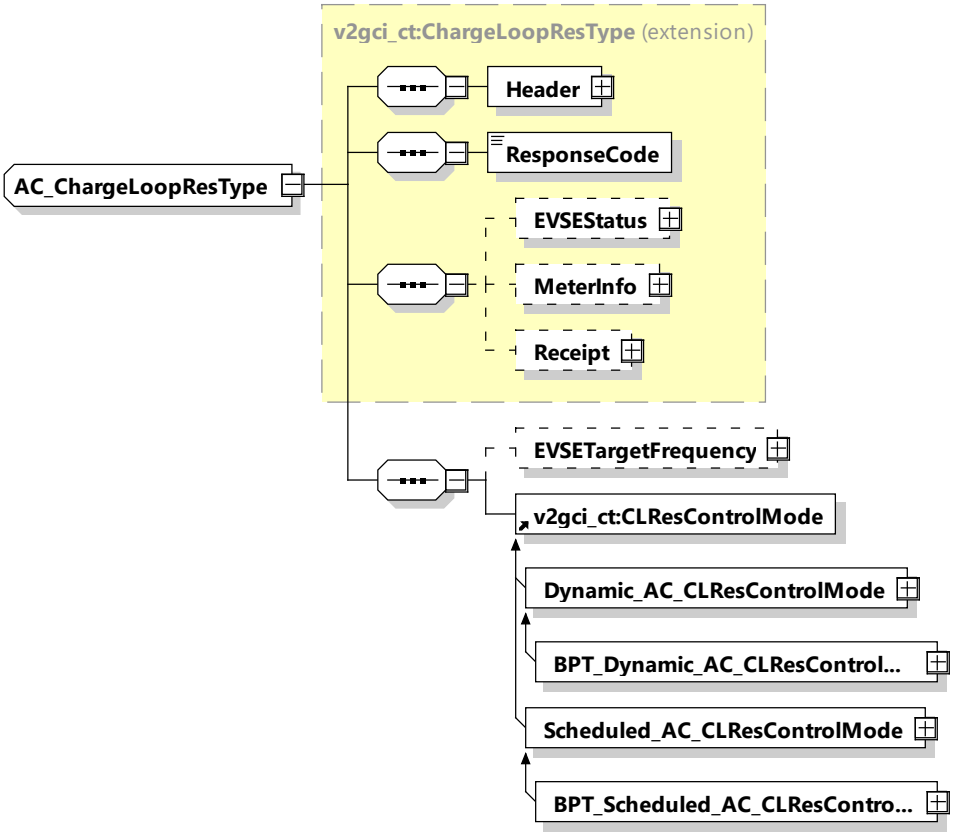

Figure 61 — Schema diagram – AC_ChargeLoopRes

The elements of this message are used according to Table 57.

Table 57 — Semantics and type definition for AC_ChargeLoopRes

Element Name	Type	Semantics
Header	complexType: MessageHeaderType Refer to 8.3.3	Contains general information, used for all messages.
ResponseCode	simpleType: responseCodeType enumeration refer to Annex A for the type definition	ResponseCode indicating the acknowledgment status of any of the V2G messages received by the SECC.

Element Name	Type	Semantics
EVSEStatus	complexType: EVSEStatusType refer to 8.3.5.3.26	Optional: This element is used by the SECC for indicating the EVSE status and for signaling an event the SECC expects the EVCC to react to.
MeterInfo	complexType: MeterInfoType refer to 8.3.5.3.6	Optional: Includes the energy charged during this service session and other meter relevant data.
Receipt	complexType: ReceiptType Refer to 8.3.5.3.59	Optional: Receipt related information.
EVSETargetFrequency	complexType: RationalNumberType refer to 8.3.5.3.8	Optional: Target frequency requested by the EVSE
Dynamic_AC_CLResControlMode	complexType: Dynamic_AC_CLResControlModeType refer to 8.3.5.4.5	This element is used by the SECC for offering and setting parameters for dynamic control mode energy transfer.
BPT_Dynamic_AC_CLResControlMode	complexType: BPT_Dynamic_AC_CLResControlModeType refer to 8.3.5.4.7.5	This element is used by the SECC for offering and setting parameters for dynamic control mode charging and discharging.
Scheduled_AC_CLResControlMode	complexType: Scheduled_AC_CLResControlModeType refer to 8.3.5.4.6	This element is used by the SECC for offering and setting parameters for scheduled control mode energy transfer.

Element Name	Type	Semantics
BPT_Scheduled_AC_CLResControlMode	complexType: BPT_Scheduled_AC_CLResControlModeType refer to 8.3.5.4.7.5	This element is used by the SECC for offering and setting parameters for scheduled control mode charging and discharging.

[V2G20-1555] The SECC shall send EVSETargetFrequency values only in situations when the EVSENominalFrequency is no longer the desired equilibrium point.

NOTE 1 This might be necessary in situations like the reconnection of residential power island to the main power grid.

[V2G20-1556] The SECC shall not terminate the charging session only for the reason that an EVSETargetFrequency has not been achieved, as the frequency cannot be attributed to the EV's behavior.

NOTE 2 In AC power grids the frequency is the result of the collective behavior of all connected devices. The frequency is always drifting unless perfect equilibrium has been reached. The grid is typically never running at exactly the EVSENominalFrequency. The EVSENominalFrequency only defines a theoretical target frequency and provides a reference point for the definition of technical requirements which define the detection of and the reaction to abnormal situations. However, in some situations (power grid emergencies, small power islands, etc.) the desired frequency for the equilibrium point intentionally gets pushed outside the normal operating bandwidth. Only in those situations the EVSETargetFrequency can be used. The goal of the EVSETargetFrequency is to communicate the equilibrium point and to enable the EV's power inverter to operate in a robust way under extreme circumstances.

[V2G20-1558] In case EVCC selects the dynamic control mode with the service parameter MobilityNeedsMode set to "2", the SECC shall send a departure time in AC_ChargeLoopRes if it intends to update the DepartureTime sent in the latest ScheduleExchangeRes message.

[V2G20-2179] In dynamic control mode the SECC shall provide the target setpoints for the power transfer by the means of EVSETargetActivePower and EVSETargetReactivePower in AC_ChargeLoopRes.

8.3.4.5 DC messages

8.3.4.5.1 Overview

Messages defined as DC-Messages belong to the DC message set(s).

8.3.4.5.2 DC_ChargeParameterDiscoveryReq/Res

8.3.4.5.2.1 DC_ChargeParameterDiscoveryReq/Res handling

After being authorized for charging at the EVSE (SECC) the EVCC and the SECC negotiate the energy transfer parameters with the DC_ChargeParameterDiscovery message pair.

Concepts treated for an optimal supply of energy that corresponds to the customer needs.

When using scheduled control mode, the energy transfer parameters negotiation that precedes the delivery of energy or may be engaged during the energy delivery phase is destined to ensure that the user

will be satisfied while at the same time ensuring that the energy will effectively be available and fall within the capacity of power supply grid at the local level (private network) and at the regional level (public network). This required negotiation will become more and more necessary as the number of EVs increase, as well as an increase in volatility of local renewable energy production.

When using the dynamic control mode, the energy transfer parameters can be changed dynamically while in the charging loop, depending on the need of the EV supply equipment.

8.3.4.5.2.2 DC_ChargeParameterDiscoveryReq

By sending the DC_ChargeParameterDiscoveryReq message the EVCC provides its energy transfer parameters to the SECC. This message provides status information about the EV, i.e. the capabilities of the EV charging system.

[V2G20-1268] The EVCC and the SECC shall implement the message elements as defined in Table 58 and Figure 62.

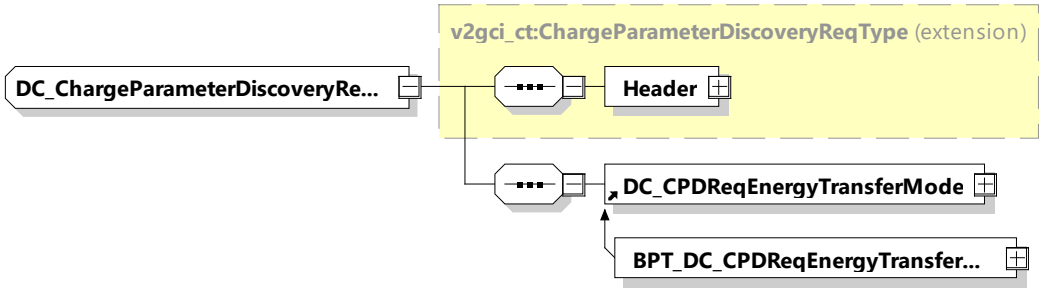

Figure 62 — Schema diagram – DC_ChargeParameterDiscoveryReq

The elements of this message are used according to Table 58.

Table 58 — Semantics and type definition for DC_ChargeParameterDiscoveryReq

Element Name	Type	Semantics
Header	complexType: MessageHeaderType refer to 8.3.3	Contains general information, used for all messages.
DC_CPDReqEnergyTransferMode	complexType: DC_CPDReqEnergyTransferModeType refer to 8.3.5.5.1	This element is used by the EVCC for initiating the target setting process for DC charging.
BPT_DC_CPDReqEnergyTransferMode	complexType: BPT_DC_CPDReqEnergyTransferModeType refer to 8.3.5.5.7.1	This element is used by the EVCC for initiating the target setting process for DC bidirectional charging.

NOTE The parameters related to current, power and voltage provided in DC_ChargeParameterDiscovery message pair can be considered as physical limitations, meaning that they are related to the physical abilities of the system under rated operating conditions. Later during the charging process, depending on the external and environmental conditions (SOC, temperatures, etc.), the values of these limitations can change into more conservative values.

8.3.4.5.2.3 DC_ChargeParameterDiscoveryRes

With the DC_ChargeParameterDiscoveryRes message the SECC provides applicable charge parameters from the grid's perspective.

[V2G20-1207] The EVCC and the SECC shall implement the message elements as defined in Table 59 and Figure 63.

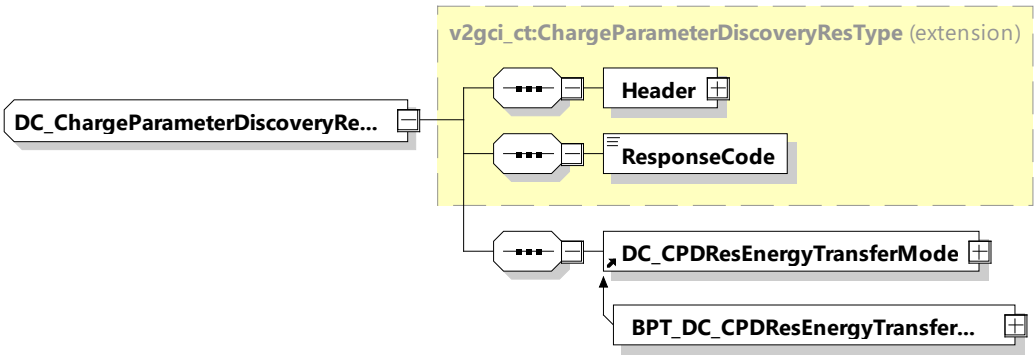

Figure 63 — Schema diagram – DC_ChargeParameterDiscoveryRes

The elements of this message are used according to Table 59.

Table 59 — Semantics and type definition for DC_ChargeParameterDiscoveryRes

Element Name	Type	Semantics
Header	complexType: MessageHeaderType refer to 8.3.3	Contains general information, used for all messages.
ResponseCode	simpleType: responseCodeType enumeration refer to Annex A for the type definition	ResponseCode indicating the acknowledgment status of any of the V2G messages received by the SECC.
DC_CPDResEnergyTransferMode	complexType: DC_CPDResEnergyTransferModeType refer to 8.3.5.5.2	This element is used by the SECC for initiating the target setting process for DC charging.
BPT_DC_CPDResEnergyTransferMode	complexType: BPT_DC_CPDResEnergyTransferModeType refer to 8.3.5.5.7.2	This element is used by the SECC for initiating the target setting process for DC bidirectional charging.

8.3.4.5.3 DC_CableCheckReq/Res

8.3.4.5.3.1 DC_CableCheckReq/Res handling

[V2G20-1557] To ensure safety in DC energy transfer, a cable check shall be performed.

8.3.4.5.3.2 DC_CableCheckReq

The DC_CableCheckReq asks for the cable check status of the EVSE and, for example, tells the EVSE if the connector is locked on EV side and if the EV is ready to transfer energy.

[V2G20-1279] The EVCC and the SECC shall implement the message elements as defined in Table 60 and Figure 64.

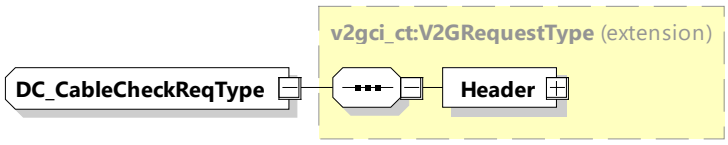

Figure 64 — Schema diagram – DC_CableCheckReq

The element of this message is used according to Table 60.

Table 60 — Semantics and type definition for DC_CableCheckReq

Element Name	Type	Semantics
Header	complexType: MessageHeaderType refer to 8.3.3	Contains general information, used for all messages.

NOTE DC_CableCheckReq contains no elements

8.3.4.5.3.3 DC_CableCheckRes

After receiving the DC_CableCheckReq from the EVCC the SECC sends the DC_CableCheckRes informing the EVCC about the result of the cable check and EVSE status.

[V2G20-1280] The EVCC and the SECC shall implement the message elements as defined in Table 61 and Figure 65.

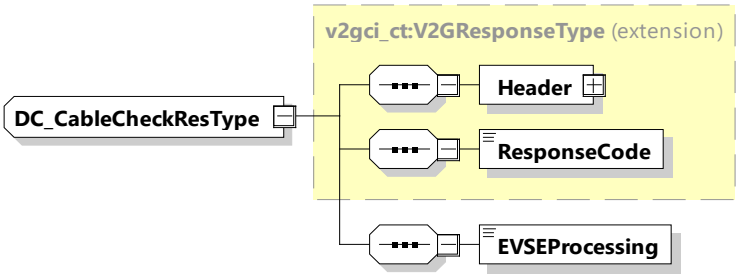

Figure 65 — Schema diagram – DC_CableCheckRes

The elements of this message are used according to Table 61.

Table 61 — Semantics and type definition for DC_CableCheckRes

Element Name	Type	Semantics
Header	complexType: MessageHeaderType refer to 8.3.3	Contains general information, used for all messages.
ResponseCode	simpleType: responseCodeType enumeration refer to Annex A for the type definition	ResponseCode indicating the acknowledgment status of any of the V2G messages received by the SECC.

EVSEProcessing	simpleType: processingType enumeration refer to Annex A for the type definition	Parameter indicating that the EVSE has finished the processing that was initiated after the DC_CableCheckReq or if the EVSE is still processing at the time, the response message was sent.

NOTE By using the EVSEProcessing parameter, the EVSE can indicate to the EVCC that the processing is not finished but a response message is sent to fulfil the timeout and performance requirements defined in 8.5.4. This allows continuing the communication session while fulfilling the performance and timeout requirements.

8.3.4.5.4 DC_PreChargeReq/Res

8.3.4.5.4.1 DC_PreChargeReq/Res handling

PreCharge is used for adjusting the EVSE output voltage to the EV battery voltage.

8.3.4.5.4.2 DC_PreChargeReq

The DC_PreChargeReq is used to start the Pre Charge process from EV side.

[V2G20-1281] The EVCC and the SECC shall implement the message elements as defined in Table 62 and Figure 66.

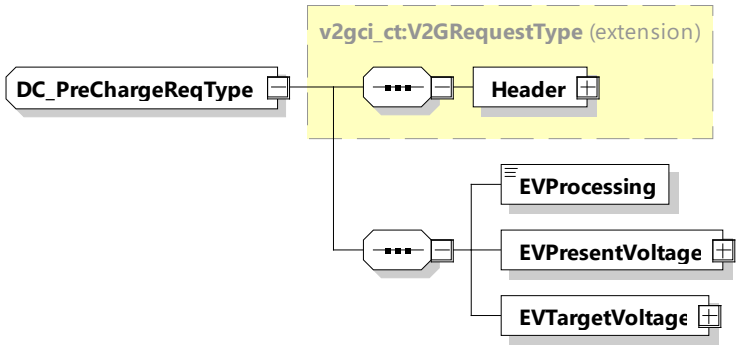

Figure 66 — Schema diagram – DC_PreChargeReq

The elements of this message are used according to Table 62.

Table 62 — Semantics and type definition for DC_PreChargeReq

Element Name	Type	Semantics
Header	complexType: MessageHeaderType refer to 8.3.3	Contains general information, used for all messages.
EVProcessing	simpleType: processingType enumeration refer to Annex A for the type definition	Parameter that indicates the stop of the DC_PreCharge process by the EV. When the EV wants to continue in the Sequence, the EVProcessing is set to "Finished", while still running it is set to "Ongoing".
EVPresentVoltage	complexType: RationalNumberType refer to 8.3.5.3.8	Present voltage of the EV
EVTargetVoltage	complexType RationalNumberType refer to 8.3.5.3.8	Target voltage of the EV (see 8.3.4.5.5.2 for more background)

The SECC shall adjust the voltage on the EVSE side, which is reported in the EVSEPresentVoltage element within the DC_PreChargeRes, to match the EVTargetVoltage as closely as necessary (for details see IEC 61851-23) in order to allow the contactors to close and to exit the PreCharge phase.

8.3.4.5.4.3 DC_PreChargeRes

After receiving the DC_PreChargeReq from the EVCC the SECC sends the DC_PreChargeRes informing the EV about the EVSE status and the present EVSE output voltage.

[V2G20-1282] The EVCC and the SECC shall implement the message elements as defined in Table 63 and Figure 67.

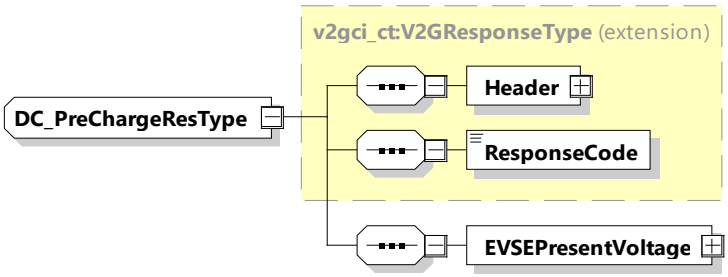

Figure 67 — Schema diagram – DC_PreChargeRes

The elements of this message are used according to Table 63.

Table 63 — Semantics and type definition for DC_PreChargeRes

Element Name	Type	Semantics
Header	complexType: MessageHeaderType refer to 8.3.3	Contains general information, used for all messages.

ResponseCode	simpleType: responseCodeType enumeration refer to Annex A for the type definition	ResponseCode indicating the acknowledgment status of any of the V2G messages received by the SECC.
EVSEPresentVoltage	complexType RationalNumberType refer to 8.3.5.3.8	Present voltage as measured by the EVSE

8.3.4.5.5 DC_ChargeLoopReq/Res

8.3.4.5.5.1 DC_ChargeLoopReq/Res handling

For DC charging control cyclic exchange of the requested current from EV side is necessary. Also, the target voltage and the difference in current and voltages is transferred.

8.3.4.5.5.2 DC_ChargeLoopReq

By sending the DC_ChargeLoopReq the EV requests a certain current from the EVSE. Also, the target voltage, current and voltage difference are transferred.

[V2G20-1283] The EVCC and the SECC shall implement the message elements as defined in Table 64 and Figure 68.

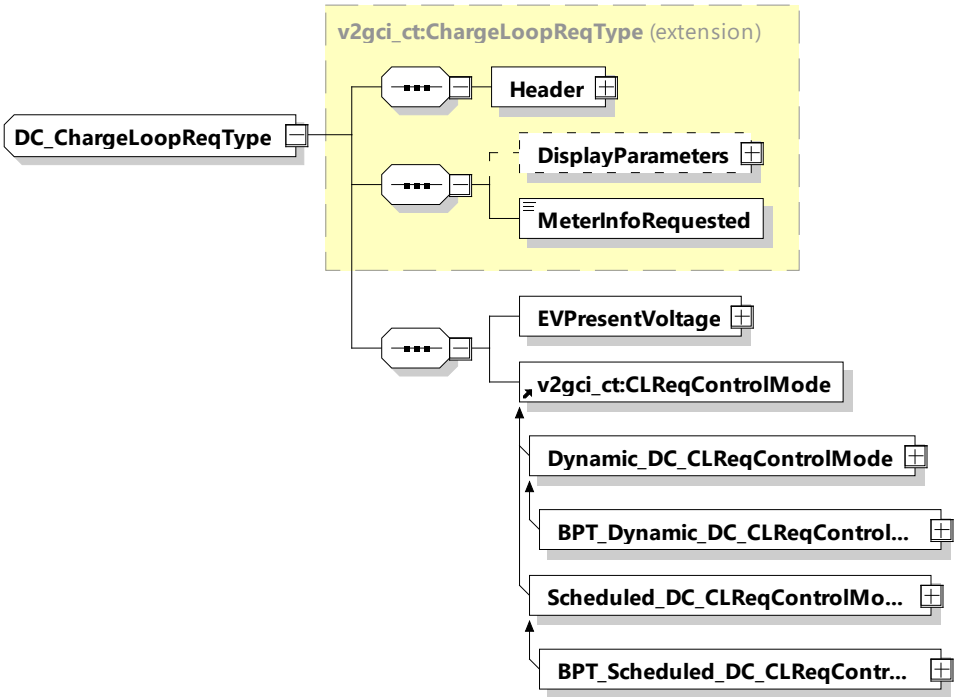

Figure 68 — Schema diagram – DC_ChargeLoopReq

The elements of this message are used according to Table 64.

Table 64 — Semantics and type definition for DC_ChargeLoopReq

Element Name	Type	Semantics
Header	complexType: MessageHeaderType refer to 8.3.3	Contains general information, used for all messages.
DisplayParameters	complexType: DisplayParametersType refer to 8.3.5.3.28	Optional: Parameters that may be displayed on the EVSE or any other user interface which is connected directly or indirectly to the EVSE. They shall under no circumstances influence the V2G communication session.
MeterInfoRequested	simpleType: xs:boolean	This Parameter indicates, if set to "TRUE" that the EV wants to receive the MeterInfo by the EVSE.
EVPresentVoltage	complexType: RationalNumberType refer to 8.3.5.3.8	Present voltage of the EV
Dynamic_DC_CLReqControlMode	complexType: Dynamic_DC_CLReqControlModeType refer to 8.3.5.5.3	This element is used by the EVCC for offering and setting parameters for dynamic control mode energy transfer.
BPT_Dynamic_DC_CLReqControlMode	complexType: BPT_Dynamic_DC_CLReqControlModeType refer to 8.3.5.5.7.3	This element is used by the EVCC for offering and setting parameters for dynamic control mode BPT.
Scheduled_DC_CLReqControlMode	complexType: Scheduled_DC_CLReqControlModeType refer to 8.3.5.5.4	This element is used by the EVCC for offering and setting parameters for Scheduled control mode energy transfer.
BPT_Scheduled_DC_CLReqControlMode	complexType: BPT_Scheduled_DC_CLReqControlModeType refer to 8.3.5.5.7.4	This element is used by the EVCC for offering and setting parameters for Scheduled control mode BPT.

NOTE 1 EVTargetVoltage and EVTargetCurrent are used by the EV in the scheduled control mode to request a certain voltage or current value from the EVSE. In dynamic control mode, where the EVSE is in charge of choosing the energy transfer plan and the related power setpoints, these elements are not available. In all DC_ChargeLoopReq variations, the EVs limitations are provided by means of EVMaximumChargeCurrent, EVMaximumChargePower, EVMaximumDischargeCurrent, EVMaximumDischargePower, EVMaximumVoltage and EVMinimumVoltage (for example, see [V2G20-2180]).

[V2G20-2180] EVMaximumVoltage and EVMinimumVoltage shall express limits for EVPresentVoltage and shall represent the state at the EV inlet. If a different physical measurement point is used inside the EV than the EVCC shall apply the necessary correction factors before communicating the EVPresentVoltage.

NOTE 2 If the SECC sees, that the EVPresentVoltage exceeds one of the limits then there is the risk of a termination of the charging session due to the EV enforcing safety protection measures.

If, for example, the EV is measuring voltage via the BMS inside the battery and is also using a DC-DC converter between the battery and the DC inlet then the EVCC shall apply a meaningful mathematical transformation to the actual measured voltage values. It is important that the EVPresentVoltage multiplied with EVSEPresentCurrent does not contradict any power limitations communicated by the EV because the SECC might use that as a plausibility check to validate its charging strategy.

[V2G20-2198] The absolute value of the following elements, if provided within any DC energy transfer control loop message, shall be less than or equal to the absolute value of the same element provided earlier in the DC_ChargeParameterDiscovery message pair:

- EVMaximumChargeCurrent
- EVMaximumDischargeCurrent
- EVMaximumChargePower
- EVMaximumDischargePower
- EVMaximumVoltage

[V2G20-2199] The absolute value of the following elements, if provided within any DC energy transfer control loop message, shall be higher than or equal to the absolute value of the same element provided earlier in the DC_ChargeParameterDiscovery message pair:

- EVMinimumChargeCurrent
- EVMinimumDischargeCurrent
- EVMinimumChargePower
- EVMinimumDischargePower
- EVMinimumVoltage

8.3.4.5.5.3 DC_ChargeLoopRes

After receiving the DC_ChargeLoopReq from the EVCC the SECC sends the DC_ChargeLoopRes informing the EV about the EVSE status and the present EVSE output voltage and current.

[V2G20-1284] The EVCC and the SECC shall implement the message elements as defined in Table 65 and Figure 69.