

विद्युतीय वाहन चालकता चार्जिंग पद्धति

भाग 2 प्लग, साकेट – निकास, वाहन कनेक्टर्स,
और वाहन के इनलेट्स

अनुभाग 6 डीसी पिन और संसर्ग की आयामीय अनुकूलता
अपेक्षाएं – विद्युत वियोजन पर निर्भर सुरक्षा के लिए डीसी ईवी
आपूर्ति उपस्कर हेतु प्रयुक्त अभीष्ट ट्यूब वाहन युग्मक

Electric Vehicle Conductive Charging System

Part 2 Plugs, Socket–Outlets, Vehicle Connectors and
Vehicle Inlets

Section 6 Dimensional compatibility requirements for DC
pin and contact–tube vehicle couplers intended to be used
for DC EV supply equipment where protection relies on
electrical separation

ICS 43.120

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FOREWORD

This Indian Standard (Part 2/Sec 6) was adopted by the Bureau of Indian Standards, after the draft finalized by the Electrotechnology in Mobility Sectional Committee had been approved by the Electrotechnical Division Council.

This standard (Part 2) is the series of standards which covers the mechanical, electrical and performance requirements for dedicated plugs, socket outlets, vehicle connectors and vehicle inlets for interfacing between such dedicated charging equipment and the electric vehicle. This series consists of the following sections.

Section 1 General requirements, comprising clauses of a general character.

Section 2 Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories.

Section 3 Dimensional compatibility and interchangeability requirements for d.c. and a.c./d.c. pin and contacttube vehicle couplers.

Considerable assistance has been obtained from IEC 62196-6: CDV while preparing this standard. The standard is to be read in conjunction with IS 17017 (Part 2/Sec 1) : 2020.

The regulatory bodies have decided that an India specific charging system be defined and the development of this has been entrusted to the Department of Science and Technology. As such, some provisions for inclusion of the outcome of this scientific exercise has been left in this standard. The standard will be modified/amended once the new design is validated and found stable.

The cross references of IEC have been modified to refer Indian Standards wherever available. Where corresponding Indian Standards are not available, the IEC references have been retained. The committee has decided that these IEC standards are suitable to be used till equivalent/corresponding Indian Standards are published. The comma(,) used as a decimal marker in the figures may be read as point(.) .

The composition of the committee responsible for formulation of this standard is given at Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding of numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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Indian Standard

ELECTRIC VEHICLE CONDUCTIVE CHARGING SYSTEM

Part 2 Plugs, Socket–Outlets, Vehicle Connectors and Vehicle Inlets

Section 6 Dimensional compatibility requirements for DC pin and contact – tube vehicle couplers intended to be used for DC EV supply equipment where protection relies on electrical separation

1 SCOPE

This standard is applicable to vehicle couplers with pins and contact-tubes of standardized configuration, herein also referred to as “accessories”, intended for use in electric vehicle (EV) conductive charging systems which incorporate control means, with rated operating voltage up to 120 V DC and rated current up to 100 A.

These accessories are intended to be used for a DC interface of the conductive charging system, where the protection against electric shocks relies on electrical separation between the primary circuit and the secondary circuit of the EV supply equipment, specified in IS 17017 (Part 25).

This section of IS 17017 (Part 2) applies to accessories and cable assemblies to be used in an ambient temperature of between -0°C and $+5^{\circ}\text{C}$.

These accessories and cable assemblies are intended to be connected only to cables with copper or copper-alloy conductors.

2 REFERENCES

This Clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Addition:

<i>Other Publication</i>	<i>Title</i>	
IS/IEC 60947 (Part 3) : 2012	Low-voltage switchgear and controlgear — Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units	The accessories covered by this standard shall only be used with EV supply equipment that comply with the requirements of IS 17017 (Part 25) : 2021. Accessories shall be so designed and constructed that in normal use their performance is reliable and minimises the risk of danger to the user or surroundings. Compliance is checked by meeting all the relevant requirements and tests specified.
IS 17017 (Part 2/Sec 1) : 2020	Plugs, socket-outlets, vehicle connectors and vehicle inlets — Conductive charging of electric vehicles — Part 1: General requirements	Accessories shall be so designed and constructed that it is not possible to make a cord extension set (see clause 11.4, IS : 17017 (Part 1)-2018). The plug and the vehicle connector shall not be compatible. Compliance is checked by a manual test.

<i>Other Publication</i>	<i>Title</i>
IS 17017 (Part 25) : 2021	Electric vehicle conductive charging system — Part 25: DC EV supply equipment where protection relies on electrical separation

3 TERMINOLOGY

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

4 GENERAL

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

4.1 General requirements

The accessories covered by this standard shall only be used with EV supply equipment that comply with the requirements of IS 17017 (Part 25) : 2021.

Accessories shall be so designed and constructed that in normal use their performance is reliable and minimises the risk of danger to the user or surroundings.

Compliance is checked by meeting all the relevant requirements and tests specified.

Accessories shall be so designed and constructed that it is not possible to make a cord extension set (see clause 11.4, IS : 17017 (Part 1)-2018). The plug and the vehicle connector shall not be compatible.

Compliance is checked by a manual test.

5 RATINGS

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

5.1 Preferred rated operating voltage ranges

The preferred rated operating voltage ranges are:

- a) 0 V to 30 V (signal or control purposes only); and
- b) 120 V DC

5.2 Preferred rated currents

5.2.1 General

5.2.1.1 The DC rated current for vehicle coupler is 100 A

5.2.1.2 The DC rated current for cable assembly are 16, 20, 50, 70 and 100 A.

6 CONNECTION BETWEEN THE POWER SUPPLY AND THE ELECTRIC VEHICLE

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

6.1 Interfaces

This clause provides a description of the physical conductive electrical interface requirements between the vehicle and the power supply for the DC interface.

6.2 Basic interface

Not applicable

6.3 DC interface

The DC interface may contain up to 7 (power or signal) contacts, with only one physical configuration of contact positions. The electrical ratings and their function are described in Table 601. They shall be used in a system according to IS 17017 (Part 25) : 2021.

Table 601 Overview of the DC Vehicle Interface

(Clause 6.3)

Position number ^a	U _{max} V	I _{max} A	Symbol	Function
1	120	100	DC +	DC +
2	120	100	DC -	DC -
3	30	2	CP	Control pilot
4	30	2	COM1	Communication 1 (+)
5	30	2	COM2	Communication 1 (-)
6	30	2	AUX1	Auxiliary power supply 1 (+)
7	30	2	AUX2	Auxiliary power supply 1 (-)

^a Position number does not refer to the location and/or identification of the contact in the accessory.

6.4 Combined interface

Not applicable

7 CLASSIFICATION OF ACCESSORIES

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

7.1 According to purpose

- vehicle connectors,
- vehicle inlets,
- cable assemblies.

7.5 According to interface

- DC

8 MARKING

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Addition:

8.5

- AUX1 and AUX2 for auxiliary power supply.

9 DIMENSIONS

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

9.1 The vehicle connector and vehicle inlet shall comply with configuration shown in standard sheet 6.

10 PROTECTION AGAINST ELECTRIC SHOCK

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

10.3 Contact sequencing and order of contact insertion and withdrawal

The contact sequence during the connection process shall be:

- DC power contacts
- Control Pilot (CP) and others (i.e. AUX and COM)

During disconnection the order shall be reversed.

Accessories shall be so designed that

- a) when inserting the vehicle connector, the control pilot (CP) and others (i.e. AUX and COM) connection are made after DC +/- contacts are made;

b) when withdrawing the vehicle connector, the control pilot (CP) and others (i.e. AUX and COM) connection are broken before DC +/– contacts are broken.”

Compliance is checked by inspection and manual test, if required.

11 SIZE AND COLOUR OF PROTECTIVE EARTHING AND NEUTRAL CONDUCTORS

Not applicable.

12 PROVISIONS FOR EARTHING

Not applicable.

13 TERMINALS

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement of Table 1:

Table 1 Size for conductors
(Clause 13)

Current rating	Internal Connection		
Current	Flexible cables for vehicle connectors ^a	Solid or stranded cables for vehicle inlets ^b	
A	mm ²	AWG/MCM ^c	
16 to 20	1.0 to 2.5	16 to 14	
50	6 to 10	10 to 8	
70	10 to 16	8 to 6	
100	16 to 25	6 to 4	

^a Flexible cables according to IEC 62893 series.

^b Classification of conductors: according to IEC 60228.

^c The nominal cross-sectional areas of conductors are given in square millimeters (mm²). AWG/MCM values are considered as equivalent to mm² for the purpose of this document.

Reference IEC 60999-1 : 1999 (Annex A), IEC 60999-2 : 2003 (Annex C).

AWG: American Wire Gauge is a system of identifying wires in which the diameters are found in geometric progression between size 36 and size 0000.

MCM: Mille Circular Mils denotes circle surface unit. 1 MCM = 0.5067 mm².

14 INTERLOCKS

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

14.1.6 The vehicle coupler is fixed to the support of an apparatus as shown in Figure 14 a) so that the axis of separation is horizontal. With the latching devices holding the vehicle connector into the vehicle inlet in the engaged position, an axial pull is applied to the

cable attached at an appropriate vehicle connector inserted in the vehicle inlet with interlock.

The contacts are wiped free from grease before test.

The test sample is inserted into and withdrawn from the vehicle connector ten times. It is then again inserted with a mass being attached to it by means of a suitable clamp. The total mass of the vehicle connector, the clamp, the carrier, the principal and the supplementary weight shall exert a pull force of 750 N. The supplementary weight shall be such that it exerts a force equal to one-tenth of the withdrawal force. The retaining means, if any, shall be opened.

The principal weight is hung without jolting on the test vehicle connector, and the supplementary weight is allowed to fall from a height of 5 cm onto the principal weight.

After this test, the total weight shall be maintained for 60 s.

The test of **14.1.6** is repeated three times, rotating the socket-outlet of 90° on the vertical plane each time (see Fig. 9B of IS 17017 (Part 2/Sec 1)).

During the tests of **14.1.6**, the vehicle connector shall not come out of the vehicle inlet and the latching devices holding the vehicle connector in the vehicle inlet shall remain in locked position.

During the test the electrical continuity shall be maintained, and the cable shall not be damaged.

After the test, the vehicle connector with interlock shall show no damage or deformation which may impair the function of the product. The cable shall not have been displaced by more than the values indicated in Table 17. For rewirable accessories, the ends of the conductors shall not have moved noticeably in the terminals; for non-rewirable accessories, there shall be no break in the electrical connections.

For the measurement of the longitudinal displacement, a mark is made on the cable at a distance of approximately 2 cm from the end of the sample or the cable anchorage before starting the tests. If, for non-rewirable accessories, there is no definite end to the sample, an additional mark is made on the body of the sample.

After the tests, the displacement of the mark on the cable in relation to the sample or the cable anchorage is measured.

Compliance is checked by inspection and test.

14.2 Accessories with integral switching device

Integral switching devices shall comply with IS/IEC 60947 (Part 3) : 2012 as far as it is applicable and, for DC application, shall have a rated current, at a utilization category of at least DC-21A, not less than the rated current of the associated vehicle connector.

14.4 Pilot contacts and auxiliary circuits

Pilot contacts and auxiliary circuits used for interlocks shall make after the DC+ and DC- are made.

Pilot contacts and auxiliary circuits used for interlocks shall break before the DC+ and DC- are broken.

Compliance is checked by inspection and by the test of 14.1.5.

Addition:

14.601 Latching function

The vehicle connector shall be provided with a latching device.

NOTE — An example of latching device is given in the standard sheet 6-d.

The interlock function shall be performed by the proper functioning of the latching device.

A means shall be provided to indicate that the interlock is properly engaged.

Compliance is checked by inspection and manual test in accordance with 14.1.5 and 14.1.6.

15 RESISTANCE TO AGEING OF RUBBER AND THERMOPLASTIC MATERIAL

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

16 GENERAL CONSTRUCTION

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

16.16 The force to insert and withdraw a vehicle connector shall be less than 100 N. Means to facilitate the insertion and withdrawal of the vehicle connector from the vehicle inlet may be provided. If a vehicle coupler is equipped with an assist device to reduce this force (e.g. mechanical assist device), the operating force of assist device shall be less than 100 N.

Compliance is checked by inspection.

17 CONSTRUCTION OF SOCKET-OUTLETS

Not applicable.

18 CONSTRUCTION OF PLUGS AND OF VEHICLE CONNECTORS

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

19 CONSTRUCTION OF VEHICLE INLETS

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

19.2 Not applicable.

20 DEGREES OF PROTECTION

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

20.1 Accessories shall have the minimum degrees of protection as required in IS 17017 (Part 25) : 2021.

Compliance is checked by the appropriate tests mentioned in 20.2 and 20.3.

The tests are made on accessories fitted with the cables or conduits for which they are designed, screwed glands and fixing screws of enclosures and covers being tightened with a torque equal to two-thirds of that applied in the tests of 26.5 or 27.1, as appropriate.

Screwed caps or lids, if any, are tightened as in normal use.

Socket-outlets are mounted on a vertical surface so that the open drain-hole, if any, is in the lowest position and remains open.

Vehicle inlets are mounted in position as intended in the vehicle. Tests shall be conducted with any doors, access panels, covers, etc., provided by the vehicle both in the unmated, open, and closed (in the road position) positions. Vehicle connectors are placed in the most unfavourable position and the drain-hole, if any, remains open.

Socket-outlets and vehicle connectors are tested with and without the complementary accessory in engagement, the means for ensuring the required degree of protection against moisture being positioned as in normal use. Plugs and vehicle inlets are tested as described in 18.3 or 19.1.

21 INSULATION RESISTANCE AND DIELECTRIC STRENGTH

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

Breaking capacity

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

22.3 Not applicable.

23 NORMAL OPERATION

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

Table 9 Normal operation
(Clause 23)

Rated Current	Cycles of Operation
A (DC)	No-load
16 to 20	10 000
50	10 000
70	10 000
100	10 000

24 TEMPERATURE RISE

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

24.1 Accessories shall be so constructed that the temperature rise in normal use is not excessive. Compliance is checked by testing any accessory with a new complementary accessory. Accessories are to be mounted as intended in normal use.

The test current is an alternating current of the value shown in Table 17.

Unless a dedicated cable is provided as specified by the manufacturer, rewirable accessories are fitted with conductors of a cross-sectional area as specified in Table 17, the terminal screws or nuts being tightened with a torque specified on the product or in the instruction sheets by the manufacturer or equal to two-thirds of that specified in Table 23.

For the purposes of the temperature rise test, any thermal cut-out device shall be short circuited (i.e. the test results shall be acceptable without relying on the thermal cut-out).

Non-rewirable accessories are tested as delivered.

For accessories having three or more poles per circuit, for multiphase circuits, the test current during the test shall be passed through the phase contacts. If there is a neutral contact, a separate test shall be carried out passing the test current through the neutral contact and the nearest phase contact.

A current of 2 A shall be passed through the pilot contact and clean data (signal) earth, if any, at the same time as any of these tests.

The test shall be continued until thermal stabilization is reached.

NOTE — Thermal stabilization is considered to have occurred when three successive readings, taken at intervals of not less than 10 min, indicate no increase greater than 2 K.

The temperature is determined by means such as melting particles, colour-changing indicators, or thermocouples, which are so chosen and positioned that they have negligible effect on the temperature being determined.

The temperature rise of terminals shall not exceed 50 K.

Accessories shall be so constructed that the surface temperatures in normal use are not excessive, as indicated in **16.5**.

Compliance is checked by repeating the test in **24.1**, except for the test on the neutral contact. The accessory is tested at rated current.

At the discretion of the manufacturer, surface temperature measurements may be made during the temperature rise tests in **24.1**.

A thermal cut-out in the vehicle connector is optional for DC charging.

Table 10 Test Current and Nominal Cross-Sectional Areas of Copper Conductors for Temperature Rise Test
(Clause 24.1)

Rated Current	Test Current	Cross-Sectional Area(s) of the Conductors of vehicle inlets and vehicle connectors	
A	A	mm ²	AWG/MCM
16 to 20	22	2.5	14
50	50	10	8
70	70	16	6
100	100	25	4

25 FLEXIBLE CABLES AND THEIR CONNECTION

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

Table 11 Pull Force and Torque Test Values for Cable Anchorage
(Clause 25)

Rated current	Pulling force	Torque	Maximum displacement
A	N	Nm	mm
16 to 20	160	0.6	2
50	225	1.0	2
70	240	1.2	2
100	240	1.5	2

26 MECHANICAL STRENGTH

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

27 SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

28 CREEPAGE DISTANCES, CLEARANCES AND DISTANCES

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

29 RESISTANCE TO HEAT AND FIRE

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

30 CORROSION AND RESISTANCE TO RUSTING

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

31 CONDITIONAL SHORT-CIRCUIT CURRENT

Not Applicable.

32 ELECTROMAGNETIC COMPATIBILITY

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable.

33 VEHICLE DRIVEOVER

This clause of IS 17017 (Part 2/Sec 1) : 2020 is applicable, except as follows:

Replacement:

33.3 Not applicable.

33.4 Not applicable.

34 THERMAL CYCLING

Under consideration.

35 HUMIDITY EXPOSURE

Under consideration.

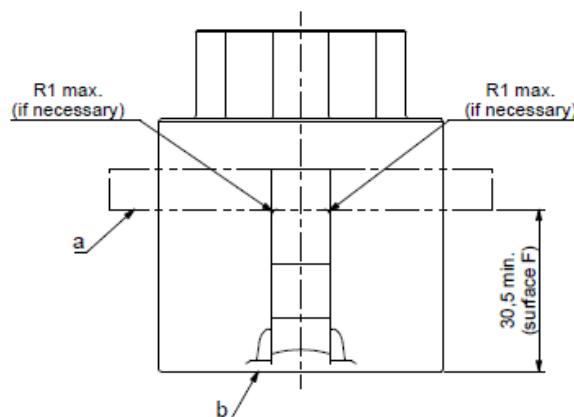
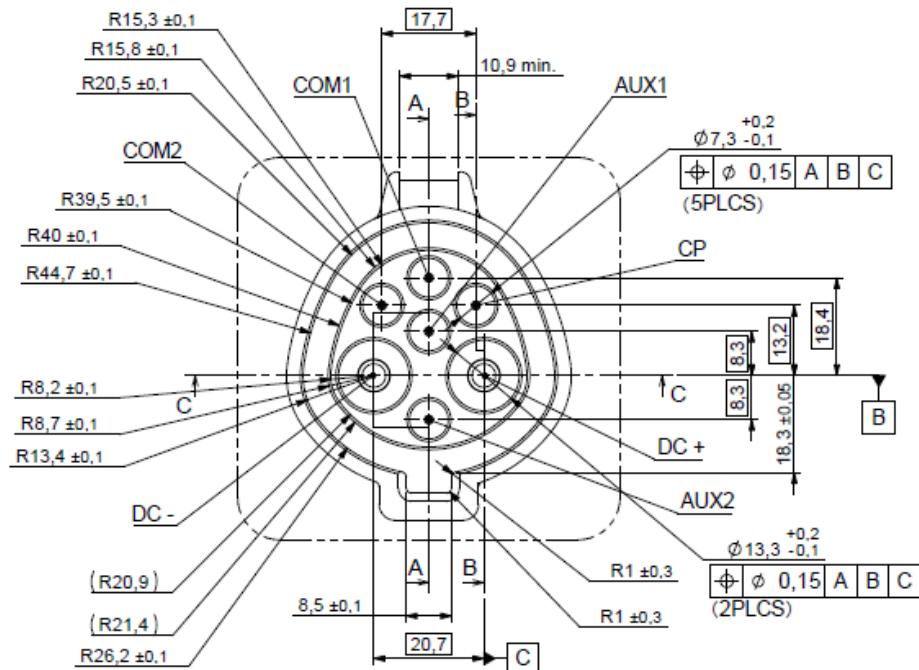
36 MISALIGNMENT

Under consideration.

37 CONTACT ENDURANCE TEST

Under consideration.

STANDARD SHEETS
STANDARD SHEET 6-a
Sheet 1
VEHICLE INLET 100 A, 120 V DC

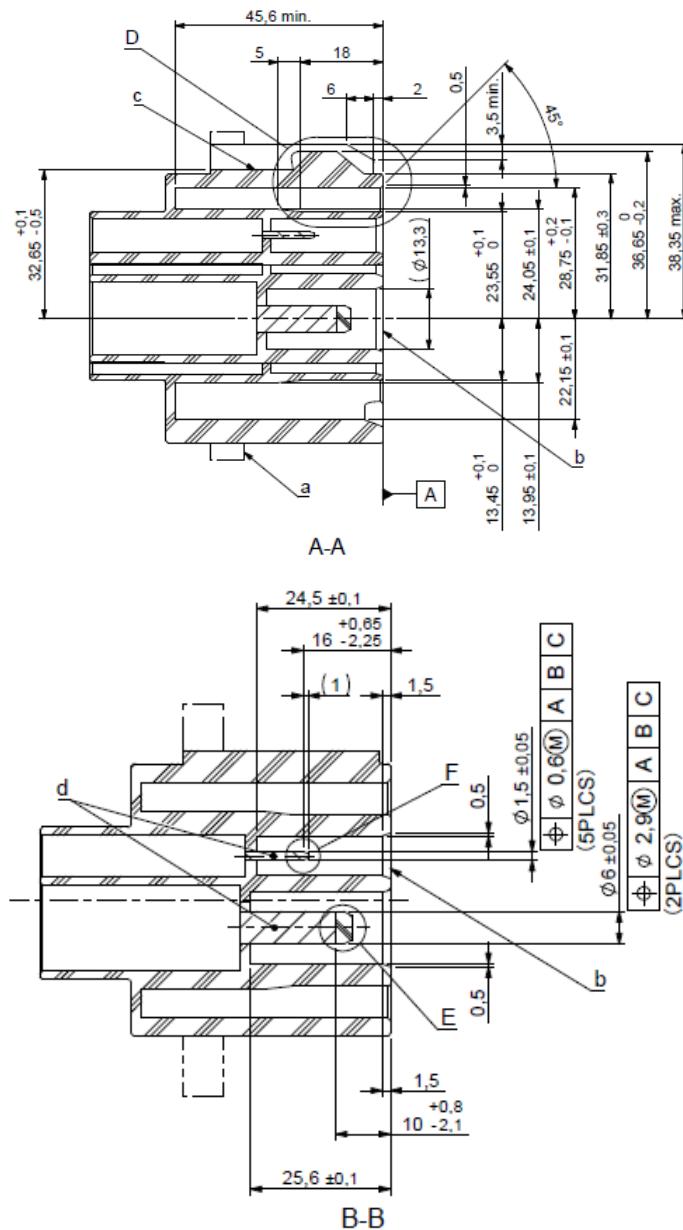
**Key**

- a surface F (if any)
- b standard datum plane of vehicle inlet

Dimensions in millimeter
Value in parenthesis is for reference

GENERAL TOLERANCE			
10 MAX	50 MAX	100 MAX	ANGLE
± 0.15	± 0.2	± 0.3	± 30°

STANDARD SHEET 6-a
Sheet 2 (Continuation of Sheet 1)

**Key**

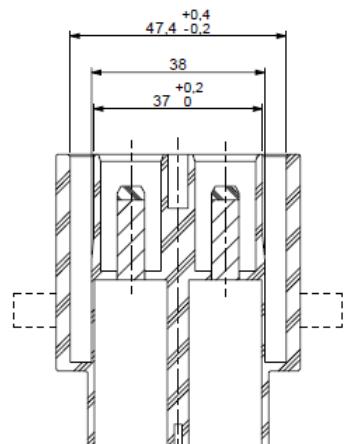
- a surface F (if any)
- b standard datum plane of vehicle inlet
- c surface P
- d These contacts have the self-aligning mechanism.

For example, the contact floats within related tolerance.

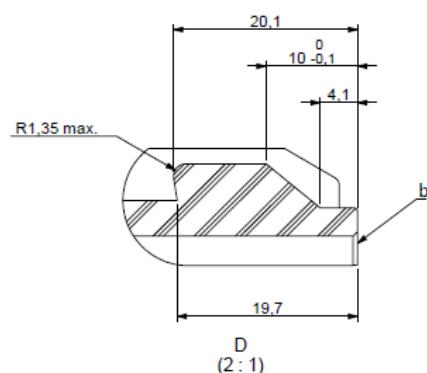
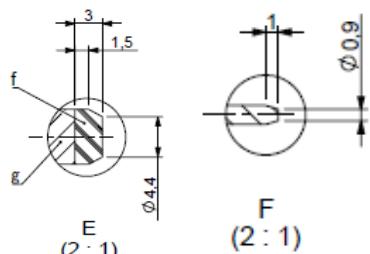
Dimensions in millimeter

GENERAL TOLERANCE			
10 MAX	50 MAX	100 MAX	ANGLE
± 0.15	± 0.2	± 0.3	± 30

STANDARD SHEET 6-a
Sheet 3 (Continuation of Sheet 2)



C-C

D
(2 : 1)

Key

- b standard datum plane of vehicle inlet
- e isolated cap
- f terminal

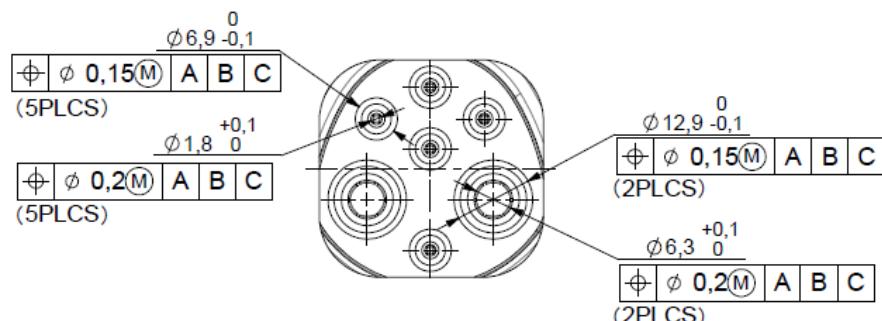
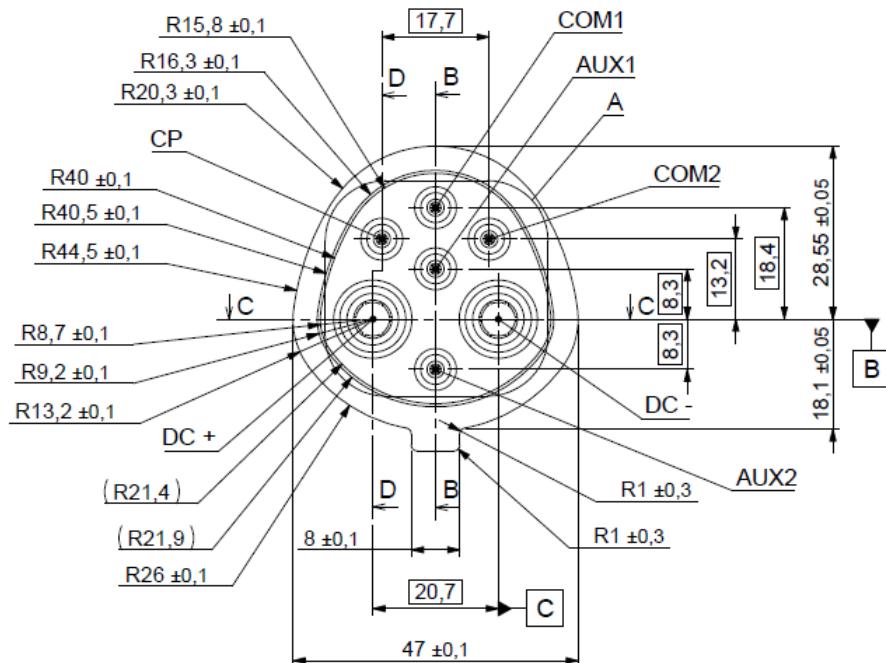
Dimensions in millimeter
Value in parenthesis is for reference

GENERAL TOLERANCE			
10 MAX	50 MAX	100 MAX	ANGLE
± 0.15	± 0.2	± 0.3	$\pm 30^\circ$

STANDARD SHEET 6-b

Sheet 1

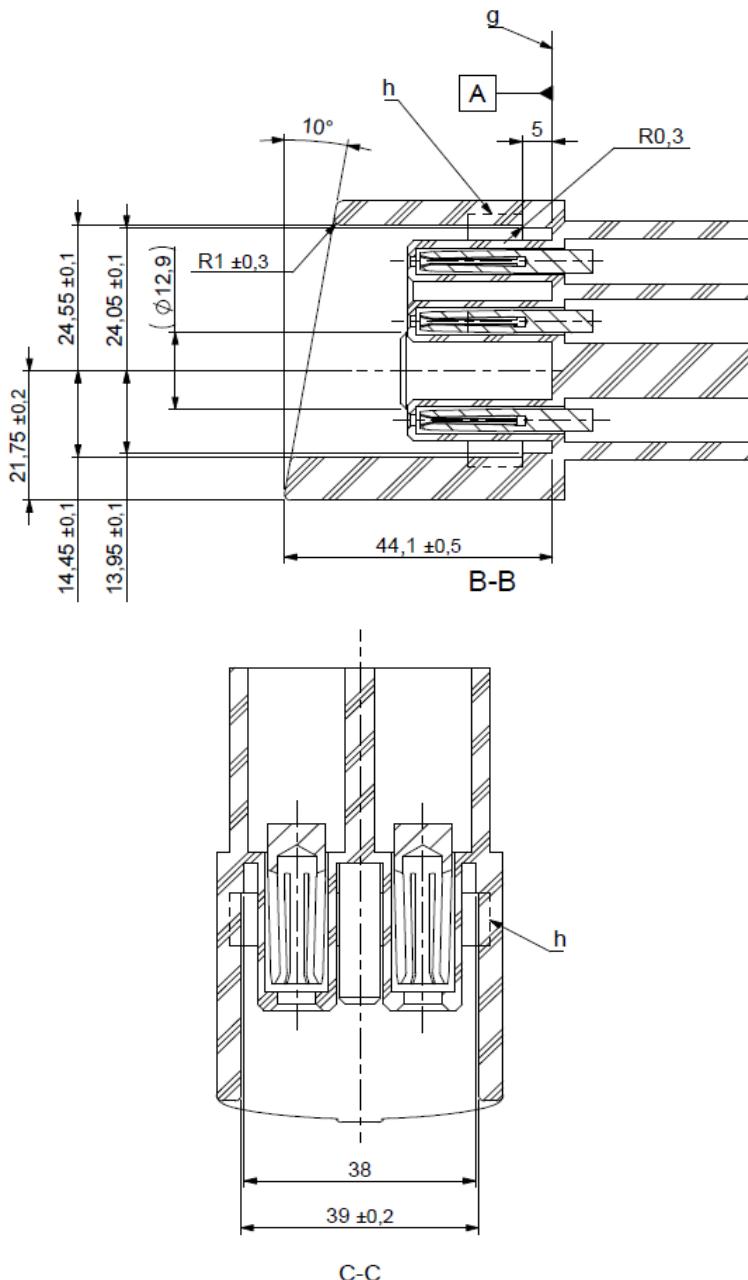
VEHICLE CONNECTOR 100 A, 120 V DC



Dimensions in millimeter
Value in parenthesis is for reference

GENERAL TOLERANCE			
10 MAX	50 MAX	100 MAX	ANGLE
± 0.15	± 0.2	± 0.3	± 30'

STANDARD SHEET 6-b
Sheet 2 (Continuation of Sheet 1)

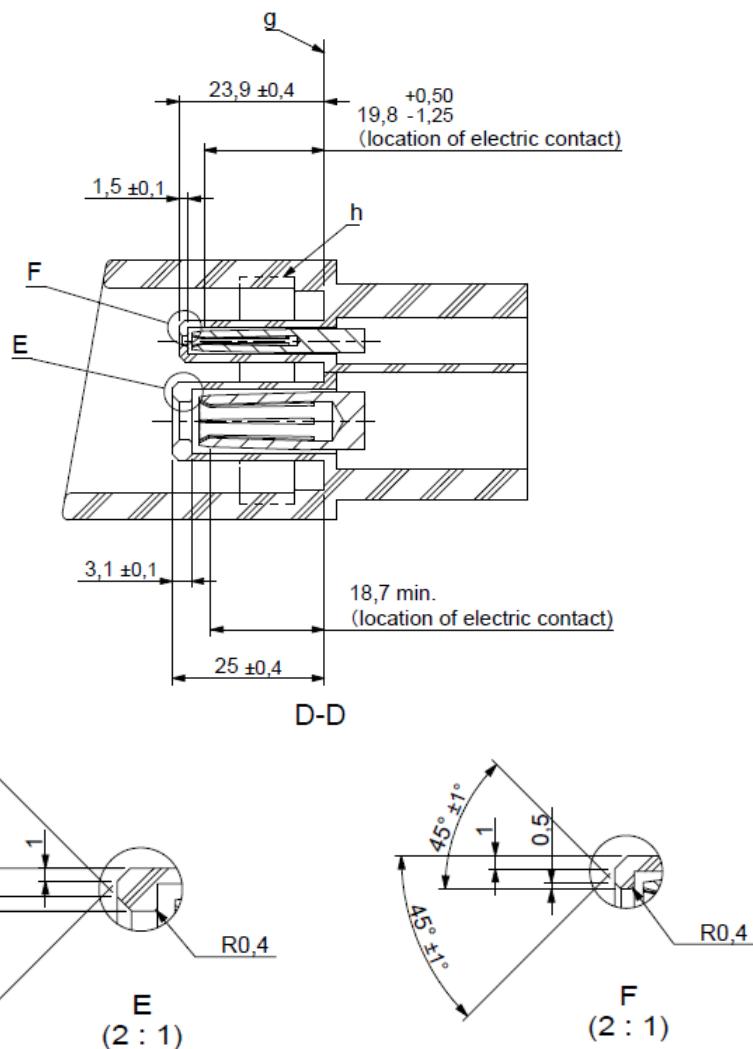
**Key**

- g standard datum plane of vehicle connector
- h packing(if necessary)
one of sealing method for IP44 when coupled with vehicle inlet.

Dimensions in millimeter
Value in parenthesis is for reference

GENERAL TOLERANCE			
10 MAX	50 MAX	100 MAX	ANGLE
± 0.15	± 0.2	± 0.3	± 30'

STANDARD SHEET 6-b
Sheet 3 (Continuation of Sheet 2)



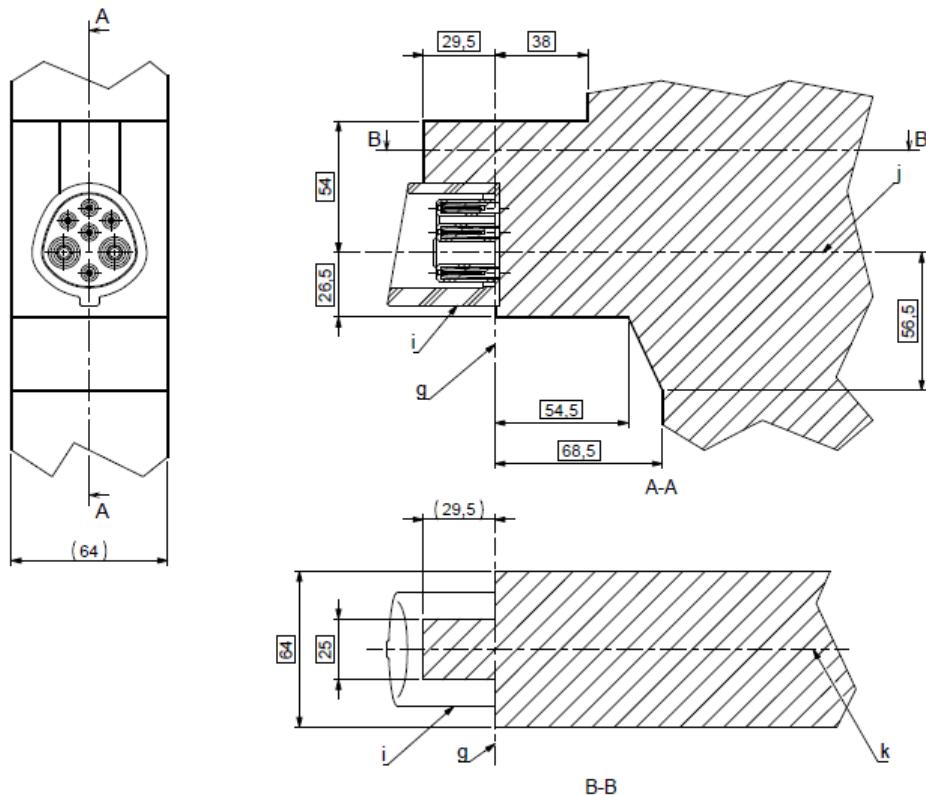
Key

- g standard datum plane of vehicle connector
 h packing (if necessary) one of sealing methods for IP44 when coupled with vehicle inlet

Dimensions in millimeter
 Value in parenthesis is for reference

GENERAL TOLERANCE			
10 MAX	50 MAX	100 MAX	ANGLE
$\pm 0,15$	$\pm 0,2$	$\pm 0,3$	$\pm 30'$

STANDARD SHEET 6-c
Sheet 1
PACKAGING ROOM FOR VEHICLE CONNECTOR



Vehicle connector body shape shall be within the shaded area.

Key

- g standard datum plane of vehicle connector
- i vehicle connector
- j datum B of vehicle connector
- k center line of vehicle connector

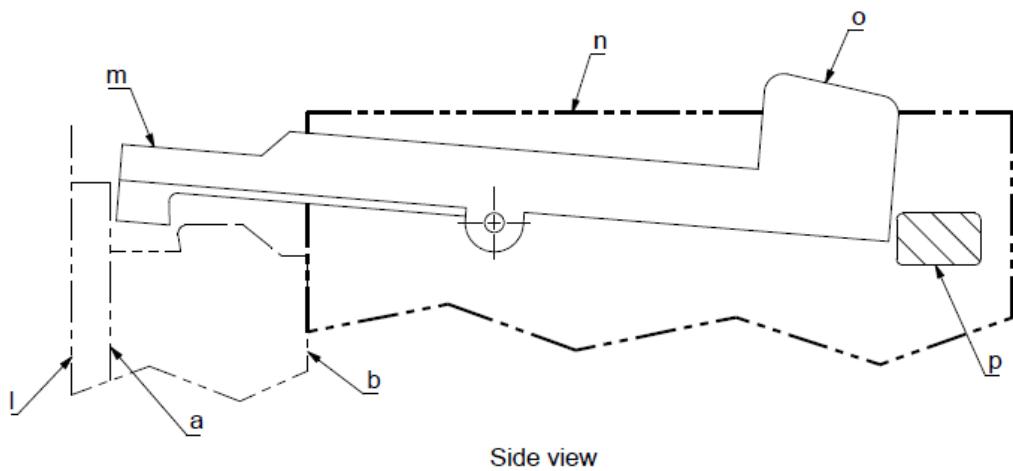
STANDARD SHEET 6-d

Sheet 1

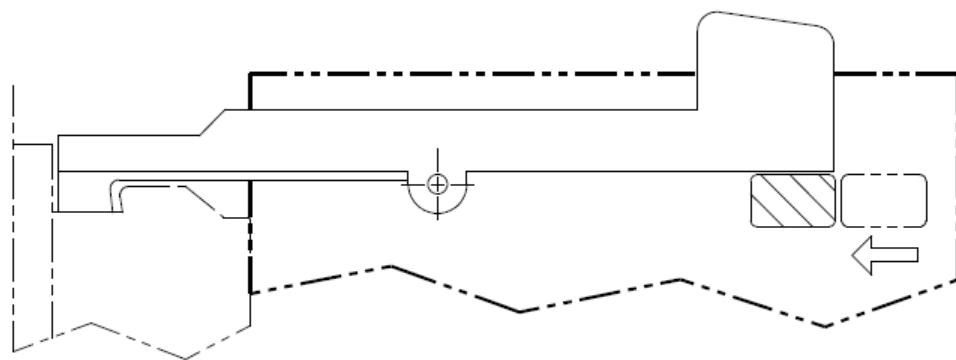
RETAINING MEANS AND EXAMPLE OF LATCHING DEVICE

An example of latching device

Latching device and retaining means shown in opened position



Latching device and retaining means shown in latched position



Side view

Retaining means cannot be opened by latching device (key r).

Key

- a surface F (if any)
- b standard datum plane of vehicle inlet
- l vehicle surface
- m retaining means of vehicle connector
- n vehicle connector body
- o push button
- Retaining means moved to open position by pushing this button.
- p Latching device

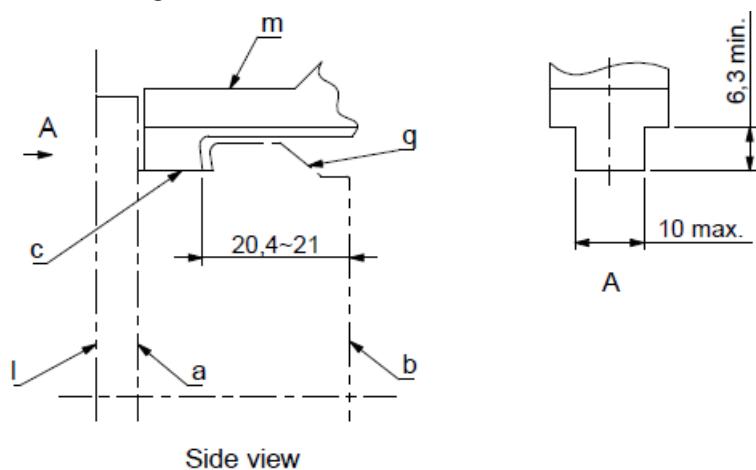
NOTES

1 In this example, the latching device consists of keys "m" and "p".

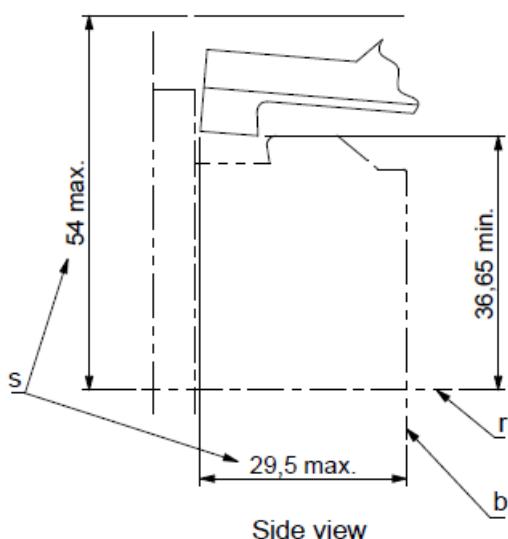
2 Other constructions of a retaining device are permitted.

STANDARD SHEET 6-d
Sheet 2 (Continuation of Sheet 1X)

Retaining means shown in touching surface P



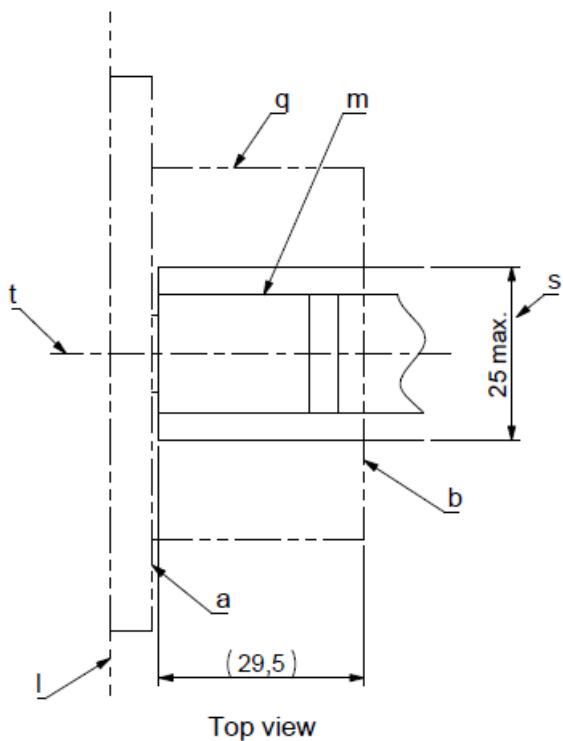
Retaining means shown in opened position



Key

- a surface F (if any)
- b standard datum plane of vehicle inlet
- c surface P
- l vehicle surface
- m retaining means of vehicle connector
- q vehicle inlet
- r datum B of vehicle inlet
- s Retaining means shall be within these ranges.

STANDARD SHEET 6-d
Sheet 3 (Continuation of Sheet 2)



Key

- a surface F (if any)
- b standard datum plane of vehicle inlet
- l vehicle surface
- m retaining means of vehicle connector
- q vehicle inlet
- s Retaining means shall be within these ranges.
- t center line of vehicle inlet

ANNEX A

(Foreword)

COMMITTEE COMPOSITION

Electrotechnology in Mobility Sectional Committee, ETD 51

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Department of Science and Technology, New Delhi	SHRI SAJID MUBASHIR (Chairman)
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Dialogue and Development Commission of Delhi, Delhi	SHRI ASHOK KUMAR JHA
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Expert in Individual Capacity	SHRI P. K. MUKHERJEE
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SCIENTIST 'C' (ETD), BIS

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