

# IECEx Certificate of Conformity

## INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification System for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: IECEx DEK 17.0046X Page 1 of 4 Certificate history:

Issue 0 (2018-01-31)

Status: Current Issue No: 1

Date of Issue: 2021-07-30

Applicant: Thermo-Electra Temperature Sensor Solutions

Weteringweg 10, 2641 KM Pijnacker

Netherlands

Equipment: Temperature Sensors Series LEX15, LEX25, LEX30, LEX45, LEX50 and LEX55

Optional accessory:

Type of Protection: Ex db, eb, ec, ia, ia/ib, ib, nA, ta, ta/tb, tb

Marking: Ex eb IIC T6...T1 Gb

Ex ec IIC T6...T1 Gb Ex ia IIC T6...T1 Ga

Ex ia/ib IIC T6...T1 Ga/Gb

Ex ib IIC T6...T1 Gb
Ex db IIC T6...T1 Gb
Ex nA IIC T6...T1 Gc

Ex ta IIIC T85 °C...T300 °C Da

Ex ta/tb IIIC T85 °C...T300 °C Da/Db

Ex tb IIIC T85 °C...T300 °C Db

Approved for issue on behalf of the IECEx T. Pijpker

Certification Body:

Position: Certification Manager

Signature:

(for printed version)

Date:

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Certificate issued by:

DEKRA Certification B.V. Meander 1051 6825 MJ Arnhem Netherlands





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Date of issue: 2021-07-30 Issue No: 1

Manufacturer: Thermo-Electra Temperature Sensor Solutions

Weteringweg 10, 2641 KM Pijnacker

Netherlands

Additional manufacturing locations:

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended

#### **STANDARDS**:

The equipment and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards

IEC 60079-0:2011 Explosive atmospheres - Part 0: General requirements

Edition:6.0

IEC 60079-1:2014-06 Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"

Edition:7.0

IEC 60079-11:2011 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

Edition:6.0

IEC 60079-15:2010 Explosive atmospheres - Part 15: Equipment protection by type of protection "n"

Edition:4

IEC 60079-31:2013 Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

Edition:2

IEC 60079-7:2017 Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

Edition:5.1

This Certificate **does not** indicate compliance with safety and performance requirements other than those expressly included in the Standards listed above.

#### **TEST & ASSESSMENT REPORTS:**

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in:

Test Report:

NL/DEK/ExTR16.0091/01

Quality Assessment Report:

NL/DEK/QAR12.0050/06



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#### **EQUIPMENT:**

Equipment and systems covered by this Certificate are as follows:

Temperature Sensors Series LEX15 (Ex "eb"), LEX25 (Ex "i"), LEX30 (Ex "d"), LEX45 (Ex "nA"), LEX50 (Ex "t") and LEX55 (Ex "ec"), consist of a wide range of sensor types and sensor arrangements, one or more inserts, threaded insert entries, termination options, connection head options, a direct cable connection option, a feedthrough assembly, cable sensor options and a ceramic insert option.

The connection head / junction box may be provided with terminals, transmitters or a transmitter / display, depending on the type of protection.

Each temperature sensor assembly is identified by a unique article number which is shown on the marking label.

For further details per LEX Series see the Annex to this certificate.

SPECIFIC CONDITIONS OF USE: YES as shown below:

See Annex to this certificate.



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### **DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)** Extension of scope with Model LEX55 (Ex ec)

Annex:

Annex to IECEx DEK 17.0046 X .pdf



#### Series LEX 15 (Ex eb)

#### General description:

Temperature Sensors Series LEX15, in type of protection Ex eb, consist of a wide range of sensor types and sensor arrangements, inserts, threaded insert entries, termination options, connection head options, a direct cable connection option, cable sensor options, flying lead wire options and a ceramic insert option.

#### Sensors / inserts / cables:

The sensor is enclosed by a closed-end metallic tube or mineral insulated metal sheathed cable available in various diameters and length. The sensor insert can be a single or multiple thermocouple, PTC or NTC such as KTY, or resistance sensor (RTD).

Metallic inserts can have a measuring tip with various shapes, for example flat, round, etc. however always closed by welding. Internal wiring depends on the sensor type: 2, 3, 4, 6 or 8 wires per sensor.

Sensors may have optional mounting accessories such as a thermowell, a rigid or flexible protection tube and similar add-ons not affecting the type of protection.

#### Connection head / junction box:

Only separately certified Ex e enclosures are used. The connection head / junction box may be provided with terminals or may have flying leads.

#### Electrical data:

Sensor circuit, per sensor element: max. 30 Vdc, 10 mA

The sensor circuit may be connected to an (industrial) transmitter in the non-hazardous area.

#### Thermal data:

The ambient temperature range of the assembly, the service temperature range of the connection head / junction box, the transition parts and the cables depend on the material of the cable insulation as listed in the table below. This table is to be used as basis for evaluation of the complete assembly, as each situation has to be analysed with regards to the actual temperature range that each component will be subjected to in the particular application.

Cable	Service temperature	Allowed temperature of	Service temperature range
insulation	range of the cables	end seals, transition	of connection head / junction
	-	pieces and entry gland	box (typical) **
PVC*	-25 °C / +105 °C	-40 °C / +105 °C	-40 °C / +100 °C
Silicon*	-25 °C / +160 °C	-40 °C / +230 °C	-40 °C / +100 °C
PTFE*	-45 °C / +200 °C	-45 °C / +230 °C	-45 °C / +100 °C

<sup>\*</sup> Cables can have other insulation such as Kapton and/or additionally a glass fibre and / or metallic braiding / sheathing which will alter the allowable temperature range.

Maximum ambient temperature range is -45 °C to +80 °C; this can be limited depending on the materials applied (e.g. cables, connection head, junction box).

<sup>\*\*</sup> Connection heads / junction boxes can have another service temperature range, depending on the material used for the sealing, etc. The minimum can be as low as -50 °C, the maximum temperature as high as 200 °C.

#### Annex to IECEx DEK 17.0046X issue No. 1



The relation between the process temperature and the temperature class or maximum service temperature is as follows:

Maximum process	Temperature class / maximum
temperature Tp (°C)	service temperature (°C) of the
	assembly
75	T6
90	T5
125	T4
190	Т3
285	T2
435	T1
> 435	Tp + 10

#### Series LEX 25 (Ex ia or Ex ib or Ex ia/ib)

#### General description:

Temperature Sensors Series LEX25, in type of protection Ex ia or Ex ib or Ex ia/ib, consist of a wide range of sensor types and sensor arrangements, inserts, threaded insert entries, termination options, connection head options, a direct cable connection option, cable sensor options, flying lead wire options and a ceramic insert option.

#### Sensors / inserts / cables:

The sensor is enclosed by a closed-end metallic tube or mineral insulated metal sheathed cable, available in various diameters and length. The sensor insert can be a single or multiple thermocouple, PTC or NTC such as KTY, or resistance sensor (RTD).

Metallic inserts can have a measuring tip with various shapes, for example flat, round, etc. however always closed by welding. Internal wiring depends on the sensor type: 2, 3, 4, 6 or 8 wires per sensor.

Sensors may have optional mounting accessories such as a thermowell, a rigid or flexible protection tube and similar add-ons not affecting the type of protection.

#### Plugs and sockets / Connection head / Junction box:

Aluminium, cast-iron, stainless steel or non-metallic enclosures may be applied, providing a degree of protection of minimum IP65. The connection head / junction box may be provided with terminals or with a separately certified Ex i transmitter, with or without a display. Combination of an Ex ia sensor with an Ex ia or Ex ib transmitter is allowed; the resulting level of protection of the Ex i circuit is the lowest of the components, e.g. Ex ib.

Plugs and sockets may be applied in the Ex i sensor circuit provided that these are separate from and non-interchangeable with non-intrinsically safe circuits.

#### Electrical data:

Sensor circuit: only for connection to certified intrinsically safe circuits, with the following maximum values: Ui = 30 V for IIC and 50 V for IIB, Ii = 75 mA, Pi = 500 mW, Ci = 0, Li = 0.

Transmitter: the electrical data specified in the transmitter certificate shall be applied and complied with. The maximum Pi of the transmitter shall not exceed 2.25 W.

#### Thermal data:

The ambient temperature range of the assembly, the service temperature range of the connection head / junction box, the transition parts and the cables depend on the material of the cable insulation as listed in the table below. This table is to be used as basis for evaluation of the complete assembly, as each situation has to be analysed with regards to the actual temperature range that each component will be subjected to in the particular application.



Cable insulation	Service temperature range of the cables	Allowed temperature of end seals, transition	Service temperature range of connection head / junction
	-	pieces and entry gland	box
PVC*	-25 °C / +105 °C	-40 °C / +105 °C	-40 °C / +100 °C**
Silicon*	-25 °C / +160 °C	-40 °C / +230 °C	-40 °C / +100 °C**
PTFE*	-45 °C / +200 °C	-45 °C / +230 °C	-45 °C / +100 °C**

<sup>\*</sup> Cables can have other insulation such as Kapton and/or additionally a glass fibre and / or metallic braiding / sheathing which will alter the allowable temperature range.

Maximum ambient temperature range is -45 °C to +80 °C; this can be limited depending on the materials applied (e.g. cables, connection head, junction box) or in case an Ex i temperature transmitter is applied.

The relation between the process temperature and the temperature class or maximum service temperature is as follows:

Maximum process temperature Tp (°C)	Temperature class / maximum service temperature (°C) of the assembly
75	Т6
90	T5
125	T4
190	T3
285	T2
435	T1
> 435	Tp + 10

<sup>\*:</sup> if an Ex i transmitter is applied, the temperature class of the transmitter shall be taken into account.

#### Series LEX 30 (Ex db)

#### **General description:**

Temperature Sensors Series LEX30, in type of protection Ex db, consist of a wide range of sensor types and sensor arrangements, inserts, threaded insert entries, termination options, connection head options, a direct cable connection option, a feedthrough assembly, cable sensor options, flying lead wire options and a ceramic insert option.

### Sensors / inserts / cables:

The sensor is enclosed by a closed-end metallic tube or mineral insulated metal sheathed cable, available in various diameters and length. The sensor insert can be a single or multiple thermocouple, PTC or NTC such as KTY, or resistance sensor (RTD).

Metallic inserts can have a measuring tip with various shapes, for example flat, round, etc. however always closed by welding. Internal wiring depends on the sensor type: 2, 3, 4, 6 or 8 wires per sensor.

Sensors may have optional mounting accessories such as a thermowell, a rigid or flexible protection tube and similar add-ons not affecting the type of protection.

#### Connection head / junction box:

Only separately certified Ex db enclosures are used. The connection head / junction box may be provided with terminals or with an industrial transmitter, with or without a display.

#### Electrical data:

Sensor circuit: max. 50 Vdc, 10 mA

Transmitter: the electrical data specified for the transmitter shall be applied and complied with. The maximum input power to the transmitter shall not exceed 2.25 W.

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<sup>\*\*</sup> In case an Ex i transmitter is applied, the maximum service temperature shall be at least 10 K lower than the certified maximum ambient temperature of the transmitter. The minimum service temperature may be limited by the certified minimum ambient temperature of the transmitter.



#### Thermal data:

The ambient temperature range of the assembly, the service temperature range of the connection head / junction box, the transition parts and the cables depend on the material of the cable insulation as listed in the table below. This table is to be used as basis for evaluation of the complete assembly, as each situation has to be analysed with regards to the actual temperature range that each component will be subjected to in the particular application.

Cable insulation	Service temperature range of the cables	Allowed temperature of end seals, transition pieces and entry gland	Service temperature range of connection head / junction box
PVC*	-25 °C / +105 °C	-40 °C / +105 °C	-40 °C / +100 °C*
Silicon*	-25 °C / +160 °C	-40 °C / +230 °C	-40 °C / +100 °C*
PTFE*	-45 °C / +200 °C	-45 °C / +230 °C	-45 °C / +100 °C*

<sup>\*</sup> Cables can have other insulation such as Kapton and/or additionally a glass fibre and / or metallic braiding / sheathing which will alter the allowable temperature range.

Maximum ambient temperature range is -45 °C to +80 °C; this can be limited depending on the materials applied (e.g. cables, connection head, junction box) or in case a temperature transmitter is applied.

The relation between the process temperature and the temperature class or maximum service temperature is as follows:

Maximum process temperature Tp (°C)	Temperature class / maximum service temperature (°C) of the assembly
75	T6
90	T5
125	T4
190	T3
285	T2
435	T1
> 435	Tp + 10

#### Series LEX 45 (Ex nA)

#### General description:

Temperature Sensors Series LEX45, in type of protection Ex nA, consist of a wide range of sensor types and sensor arrangements, inserts, threaded insert entries, termination options, connection head options, a direct cable connection option, cable sensor options, flying lead wire options and a ceramic insert option.

#### Sensors / inserts / cables:

The sensor is enclosed by a closed-end metallic tube or mineral insulated metal sheathed cable, available in various diameters and length. The sensor insert can be a single or multiple thermocouple, PTC or NTC such as KTY, or resistance sensor (RTD).

Metallic inserts can have a measuring tip with various shapes, for example flat, round, etc. however always closed by welding. Internal wiring depends on the sensor type: 2, 3, 4, 6 or 8 wires per sensor.

Sensors may have optional mounting accessories such as a thermowell, a rigid or flexible protection tube and similar add-ons not affecting the type of protection.

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<sup>\*\*</sup> In case a transmitter is applied, the maximum service temperature shall be at least 10 K lower than the maximum allowed ambient temperature of the transmitter. The minimum service temperature may be limited by the minimum ambient temperature of the transmitter. Connection heads / junction boxes can have another service temperature range, depending on the material used for the sealing, etc. The minimum can be as low as -50 °C, the maximum temperature as high as 200 °C.



#### Connection head / junction box:

Only separately certified enclosures are used. The connection head / junction box may be provided with terminals or with a certified transmitter, with or without a display.

#### Connectors:

Ex nA certified connectors may be used.

#### Electrical data:

Sensor circuit: max. 10 Vdc, 10 mA.

Transmitter: the electrical data specified for the transmitter shall be applied and complied with. The maximum input power to the transmitter shall not exceed 2.25 W.

#### Thermal data:

The ambient temperature range of the assembly, the service temperature range of the connection head / junction box, the transition parts and the cables depend on the material of the cable insulation as listed in the table below. This table is to be used as basis for evaluation of the complete assembly, as each situation has to be analysed with regards to the actual temperature range that each component will be subjected to in the particular application.

Cable insulation	Service temperature range of the cables	Allowed temperature of end seals, transition pieces and entry gland	Maximum service temperature range of connection head / junction box
PVC*	-25 °C / +105 °C	-40 °C / +105 °C	-50 °C / +200 °C**
Silicon*	-25 °C / +160 °C	-40 °C / +230 °C	-50 °C / +200 °C**
PTFE*	-45 °C / +200 °C	-45 °C / +230 °C	-50 °C / +200 °C**

<sup>\*</sup> Cables can have other insulation such as Kapton and/or additionally a glass fibre and / or metallic braiding / sheathing which will alter the allowable temperature range.

Maximum ambient temperature range is -45 °C to +80 °C; this can be limited depending on the materials applied (e.g. cables, connection head, junction box) or in case a temperature transmitter is applied.

The relation between the process temperature and the temperature class or maximum service temperature is as follows:

Maximum process temperature Tp (°C)	Temperature class / maximum service temperature (°C) of the assembly
75	T6
90	T5
125	T4
190	T3
285	T2
435	T1
> 435	Tp + 10

#### Series LEX 50 (Ex ta or Ex tb or Ex ta/tb)

#### General description:

<sup>\*\*</sup> In case a transmitter is applied, the maximum service temperature shall be at least 10 K lower than the maximum allowed ambient temperature of the transmitter. The minimum service temperature may be limited by the minimum ambient temperature of the transmitter. Connection heads / junction boxes can have another service temperature range, depending on the material used for the sealing, etc. The minimum can be as low as -50 °C, the maximum temperature as high as 200 °C.

#### Annex to IECEx DEK 17.0046X issue No. 1



Temperature Sensors Series LEX50, in type of protection Ex ta or Ex tb or Ex ta/tb, consist of a wide range of sensor types and sensor arrangements, inserts, threaded insert entries, termination options, connection head options, a direct cable connection option, cable sensor options, flying lead wire options and a ceramic insert option.

### Sensors / inserts / cables:

The sensor is enclosed by a closed-end metallic tube or mineral insulated metal sheathed cable, available in various diameters and length. The sensor insert can be a single or multiple thermocouple, PTC or NTC such as KTY, or resistance sensor (RTD).

Metallic inserts can have a measuring tip with various shapes, for example flat, round etc. however always closed by welding. Internal wiring depends on the sensor type: 2, 3, 4, 6 or 8 wires per sensor.

Sensors may have optional mounting accessories such as a thermowell, a rigid or flexible protection tube and similar add-ons not affecting the type of protection.

#### Connection head / junction box:

Only separately certified Ex ta or Ex to enclosures are applied with a degree of protection of at least IP65. The connection head / junction box may be provided with terminals or with an industrial transmitter, with or without a display.

#### Connectors:

Certified connectors may be applied.

#### Electrical data:

Sensor circuit: max. 10 Vdc, 10 mA

Transmitter: the electrical data specified for the transmitter shall be applied and complied with. The maximum input power to the transmitter shall not exceed 2.25 W.

#### Thermal data:

The ambient temperature range of the assembly, the service temperature range of the connection head / junction box, the transition parts and the cables depend on the material of the cable insulation as listed in the table below. This table is to be used as basis for evaluation of the complete assembly, as each situation has to be analysed with regards to the actual temperature range that each component will be subjected to in the particular application.

Cable insulation	Service temperature range of the cables	Allowed temperature of end seals, transition pieces and entry gland	Service temperature range of connection head / junction box
PVC*	-25 °C / +105 °C	-40 °C / +105 °C	-40 °C / +100 °C**
Silicon* PTFE*	-25 °C / +160 °C -40 °C / +200 °C	-40 °C / +230 °C -40 °C / +230 °C	-40 °C / +100 °C** -45 °C / +100 °C**

<sup>\*</sup> Cables can have other insulation such as Kapton and/or additionally a glass fibre and / or metallic braiding / sheathing which will alter the allowable temperature range.

Maximum ambient temperature range is -40 °C to +75 °C; this can be limited depending on the materials applied (e.g. cables, connection head, junction box) or in case a temperature transmitter is applied.

The relation between the process temperature and the maximum surface temperature is as follows:

<sup>\*\*</sup> In case a transmitter is applied, the maximum service temperature shall be at least 10 K lower than the maximum allowed ambient temperature of the transmitter. The minimum service temperature may be limited by the minimum ambient temperature of the transmitter. Connection heads / junction boxes can have another service temperature range, depending on the material used for the sealing, etc. The minimum can be as low as -50 °C, the maximum temperature as high as 200 °C.



Maximum process	Maximum surface temperature
temperature Tp (°C)	(°C) of the assembly
75	85
90	100
125	135
190	200
290	300

#### Series LEX 55 (Ex ec)

#### General description:

Temperature Sensors Series LEX55, in type of protection Ex ec, consist of a wide range of sensor types and sensor arrangements, inserts, threaded insert entries, termination options, connection head options, a direct cable connection option, cable sensor options, flying lead wire options and a ceramic insert option.

#### Sensors / inserts / cables:

The sensor is enclosed by a closed-end metallic tube or mineral insulated metal sheathed cable available in various diameters and length. The sensor insert can be a single or multiple thermocouple, PTC or NTC such as KTY, or resistance sensor (RTD).

Metallic inserts can have a measuring tip with various shapes, for example flat, round, etc. however always closed by welding. Internal wiring depends on the sensor type: 2, 3, 4, 6 or 8 wires per sensor.

Sensors may have optional mounting accessories such as a thermowell, a rigid or flexible protection tube and similar add-ons not affecting the type of protection.

#### Connection head / junction box:

Only separately certified Ex e enclosures are used. The connection head / junction box may be provided with terminals or may have flying leads.

#### Electrical data:

Sensor circuit, per sensor element: max. 30 Vdc, 10 mA

The sensor circuit may be connected to an (industrial) transmitter in the non-hazardous area.

#### Thermal data:

The ambient temperature range of the assembly, the service temperature range of the connection head / junction box, the transition parts and the cables depend on the material of the cable insulation as listed in the table below. This table is to be used as basis for evaluation of the complete assembly, as each situation has to be analysed with regards to the actual temperature range that each component will be subjected to in the particular application.

Cable insulation	Service temperature range of the cables	Allowed temperature of end seals, transition pieces and entry gland	Service temperature range of connection head / junction box (typical) **
PVC*	-25 °C / +105 °C	-40 °C / +105 °C	-40 °C / +100 °C
Silicon*	-25 °C / +160 °C	-40 °C / +230 °C	-40 °C / +100 °C
PTFE*	-45 °C / +200 °C	-45 °C / +230 °C	-45 °C / +100 °C

<sup>\*</sup> Cables can have other insulation such as Kapton and/or additionally a glass fibre and / or metallic braiding / sheathing which will alter the allowable temperature range.

Maximum ambient temperature range is -45 °C to +80 °C; this can be limited depending on the materials applied (e.g. cables, connection head, junction box).

<sup>\*\*</sup> Connection heads / junction boxes can have another service temperature range, depending on the material used for the sealing, etc. The minimum can be as low as -50 °C, the maximum temperature as high as 200 °C.



The relation between the process temperature and the temperature class or maximum service temperature is as follows:

Maximum process temperature Tp (°C)	Temperature class / maximum service temperature (°C) of the assembly
75	T6
90	T5
125	T4
190	T3
285	T2
435	T1
> 435	Tp + 10

#### Specific conditions of use

#### All types and levels of protection:

In case that the actual application requires a detailed assessment regarding the service temperatures of the assembly (e.g. due to high process temperature combined with thermal insulation), a temperature measurement shall be conducted to verify that none of the specified temperature limits of the assembly is exceeded.

#### Ex eb, Ex ec and Ex nA:

The sensor assembly with connection head and extension part, in case not IP54 sealed or closed, shall have a degree of protection of at least IP54, provided by the user with a thermowell or equivalent component at the process side of the assembly.

#### Ex ia, Ex ib, Ex eb, Ex ec and Ex nA:

In case the nominal tip diameter of the mineral insulated metal sheathed sensor cable is less than 3 mm, the sensor must be considered as connected to ground. It must be assumed that it will not be able to pass the 500 Vac or 700 Vdc dielectric strength test as required by IEC 60079-14. In addition, the sensor must be protected against mechanical impacts.

#### Ex db:

Flameproof joints are not intended to be repaired.

#### Ex ta and Ex tb:

The sensor assembly with connection head and extension part shall have a degree of protection of at least IP6x, provided by the user with a thermowell or equivalent component at the process side of the assembly.

Ex ta and Ex ta/tb:
The equipment is not capable to withstand a prospective short circuit current of 10 kA. The user shall provide an overcurrent protective device to assure that the maximum current for the sensor (10 mA) or the maximum power to the transmitter (2.25 W) is not exceeded.

#### Annex to IECEx DEK 17.0046X issue No. 1



#### Connection heads of Ex i models:

- 1. If the connection head is made of aluminium and it is mounted in an area where the use of EPL Ga equipment is required, the connection head must be installed such that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.
- 2. If the connection head is made of aluminium and it is mounted in an area where the use of EPL Da, Db or Gb is required, the enclosure material shall not contain, by mass, more than 7.5 % in total of magnesium, titanium and zirconium.
- 3. If the connection head is made of non-conductive non-metallic material, precautions must be taken to avoid electrostatic charging.