



IECEX Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

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

Certificate No.: **IECEX CES 15.0008X** issue No.:0 Certificate history:

Status: **Current**

Date of Issue: **2015-05-18** Page 1 of 3

Applicant: **Amarc S.r.l.**
Via Artigiani, 37
I-23874 Montevecchia (LC)
Italy

Electrical Apparatus: **Equipment for indirect heating by resistance, series RC380**
Optional accessory:

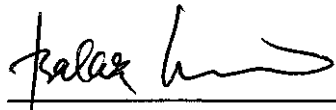
Type of Protection: **Increased safety 'e'; Intrinsic Safety 'i', Dust ignition protection 't'**

Marking: **Ex e IIC T6...T1 Gb or
Ex e ib IIC T6...T1 Gb
Ex tb IIIC T70°C...T415°C Db**

Approved for issue on behalf of the IECEx Certification Body: **Mirko Balaz**

Position: **Head of IECEx CB**

Signature: *(for printed version)*


18-05-2015

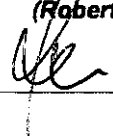
Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

CESI
Centro Elettrotecnico
Sperimentale Italiano S.p.A.
Via Rubattino 54
20134 Milano
Italy

CESI
CEST S.p.A.
Testing & Certification Division
Business Area Certification
II Responsabile
(Roberto Piccin)



PAD B5011937 (2096477) - USO RISERVATO

gl



IECEX Certificate of Conformity

Certificate No.: IECEx CES 15.0008X

Date of Issue: 2015-05-18

Issue No.: 0

Page 2 of 3

Manufacturer: **Amarc S.r.l.**
Via Artigiani, 37
I-23874 Montevercchia (LC)
Italy

Additional Manufacturing location
(s):

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 electrical apparatus 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 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-11 : 2011 Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-31 : 2008 Edition: 1	Explosive atmospheres – Part 31: Equipment dust ignition protection by enclosure 't'
IEC 60079-7 : 2006-07 Edition: 4	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

This Certificate does not indicate compliance with electrical 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:
IT/CES/ExTR15.0005/00

Quality Assessment Report:

IT/CES/QAR13.0002/02



IECEX Certificate of Conformity

Certificate No.: IECEx CES 15.0008X

Date of Issue: 2015-05-18

Issue No.: 0

Page 3 of 3

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

Equipment for indirect heating by resistance series RC380 consist of armoured pipes inside of which the electrical resistances are inserted together with magnesium oxide powder as electrical insulator. Armoured pipes are drawn, U bent or with different shape and the two edges welded to the pipe sheet (the bottom of the power supply enclosure) and sealed. The bottom plate of the power supply enclosure may coincide with the lid which closes the process side (direct connection) or, in order to limit the temperature of the enclosure, it can be kept at a distance ranging from 50 to 300 mm from the lid (connection with a neutral section). The active part of the resistance starts and ends, only process side, not less than 50 mm from the lid.

The enclosure is built using a steel sheet bent and sold with no interruption in order to guarantee its sealed tightness. Five different sizes of the enclosure are possible, all formed by a lower part having a circular section, closed at the bottom by the pipe sheet, which is surmounted by an upper part with square section having an upper hatch to access the interior and 1 or 2 drilled plates, on one side, for the cables entry.

See annex for further description.

CONDITIONS OF CERTIFICATION: YES as shown below:

- The temperature class of the equipment is defined by the manufacturer on the base of the thermal-fluidodynamic design and the maximum temperature the process fluid can reach. Usage different from the design one are not allowed.
- Design conditions shall be guaranteed by a safety thermal sensor (with manual reset and under the responsibility of the user) placed on the hottest spot of the external surface of the lid which closes the process; the intervention threshold is stated by the manufacturer and written on the marking plate. The actual temperature set on the sensor shall keep into account its precision and hence consistently lowered:
 - $T(\text{actual}) = T(\text{intervention}) - \Delta T(\text{precision})$
- Cables and glands shall be suitable for the maximum temperature stated by the manufacturer and written on the marking plate.
- The anti-condensation resistance shall be powered only when the heater is off and using cables and glands independent from those ones of the heater.
- In order to avoid excessive heating of the resistance armoured pipes, in case of malfunctioning process side, each heating section is provided with a skin temperature sensor which at the crossing of the threshold defined by the manufacturer shall turn off the heater and the reset can only be manual; The connection and the managing of these signals, made available in the auxiliary junction box, is responsibility of the user. These sensors are additional to those ones controlling the temperature of the process fluid, installed and managed by the user.
- Possible I.S. 4+20mA transmitters, placed inside the auxiliary junction box, shall be connected to the intrinsic safety barrier using cables and glands independent from the other sensors.



IECEX Certificate of Conformity



Prot: B5011937

Annex to certificate: IECEx CES 15.0008X Issue No.:0 of 2015-05-18

Applicant: Amarc S.r.l.

Via Artigiani 37; I-23874 Montevecchia (LC), Italy

Apparatus: Equipment for indirect heating by resistance, series RC380

Identification and description of the equipment

Equipment for indirect heating by resistance series RC380 consist of armoured pipes inside of which the electrical resistances are inserted together with magnesium oxide powder as electrical insulator. Armoured pipes are drawn, U bent or with different shape and the two edges welded to the pipe sheet (the bottom of the power supply enclosure) and sealed.

The bottom plate of the power supply enclosure may coincide with the lid which closes the process side (direct connection) or, in order to limit the temperature of the enclosure, it can be kept at a distance ranging from 50 to 300 mm from the lid (connection with a neutral section). The active part of the resistance starts and ends, only process side, not less than 50 mm from the lid.

The enclosure is built using a steel sheet bent and sold with no interruption in order to guarantee its sealed tightness. Five different sizes of the enclosure are possible, all formed by a lower part having a circular section, closed at the bottom by the pipe sheet, which is surmounted by an upper part with square section having an upper hatch to access the interior and 1 or 2 drilled plates, on one side, for the cables entry.

On the enclosure there can be installed devices individually certificated (Ex e and Ex t) for draining and breathing and inside there can be installed self-limiting heating cables they too certificated Ex e.

The self-limiting heating cables, powered independently from the heater, can be energized only when the latter is off. They shall also be suitable for the ambient temperature range written on the heater marking plate and self-limiting their temperature in accordance with its temperature class, anyway always below 145°C.

Each unit or heating section of the heater is provided with a temperature sensor (thermo-resistance or thermocouple) placed in a pocket, tight to the armoured pipe of the resistance, in order to measure its skin temperature. All the wires coming from the sensors are then taken inside an external auxiliary box (Ex e and Ex t certificate) and connected to terminals (Ex e); such box may also contain an intrinsic safety 4+20mA transmitter the characteristics of which, for the selection of the I.S. barrier, shall be furnished by the manufacturer. The signals of the thermal sensors are made available to the user who shall use them in order to control the skin temperature and turn off the heater when it rises over the threshold defined by the manufacturer; once the protection is activated, the reset cannot be automatic. Such auxiliary enclosure can only contain I.S. circuits and all of them (the straight connected sensors as well) shall be connected to a suitable I.S. barrier. All the circuits shall be independent one from each other.

Equipment in subject are suitable for heating fluids in liquid or gaseous phase under conditions of motion or static. In any case the process and hence the environment where the heating part is inserted must be classified as safe zone (non-combustible fluid or absence of oxidant). The apparatus can be positioned horizontally (pipes entering the process horizontally) or vertically.

The part of the apparatus stretching from the external surface of the lid, which closes the process, to the terminal boxes, included, is consistent with EPL Gb and Db, hence it is suitable for environments classified zone 1 and 21.

Being safe the zone inside the process, the temperature class shown on the marking plate refers only to the part external to the lid which could be in contact with a possible explosive atmosphere.

Equipment for indirect heating through resistance series RC380 are identified by the code:

RC 380 Cn / Ann

Where:

RC 380: Identifies the series of the equipment

Cn: Identifies the type of the power supply enclosure:

C = A: enclosure straight welded to the process lid;

B: enclosure kept separate from the lid by a neutral section (not heating);

N = Identifies the enclosure size increasing from 1 to 5 (**1=** the smallest, **5=** the biggest);

Ann: It is a progressive code from **A00** to **Z99**, used by the manufacturer, which uniquely identifies the whole apparatus.

PAD B5011937 (2096476) - USO RISERVATO



IECEX Certificate of Conformity

CESI

Prot: B5011937

Annex to certificate: IECEX CES 15.0008X Issue No.:0 of 2015-05-18

Applicant: Amarc S.r.l.

Via Artigiani 37; I-23874 Montevecchia (LC), Italy

Apparatus: Equipment for indirect heating by resistance, series RC380

Electrical characteristics:

Rated voltage:	690 Vac/dc
Frequency of the AC current:	50-60 Hz (single or three phase)
Maximum current for each resistive element:	10 A
Maximum current density on the terminals:	1.72 A/mm ²
Maximum rated power:	1725 kW (direct or single phase current) 2987 kW (three phase current)

Maximum ambient temperature range: $-50^{\circ}\text{C} \leq T_{\text{amb}} \leq +60^{\circ}\text{C}$

Gas protection marking:	Ex e IIC T6...T1 Gb Ex e ib IIC T6...T1 Gb (in case of 4+20mA I.S. transmitter)
Dust protection marking:	Ex tb IIIC T70°C...T415°C
Ingress protection:	IP65

Temperature class

Service temperatures of the parts of the apparatus placed in classified area (external to the process) depend on the temperature reached by the process fluid (due to the heat transferred by the active parts of the electrical resistances) and by heating produced by the current flowing through the neutral sections and the internal joints of the enclosure.

Changing substantially, at the same temperature of the process fluid (safe zone), the heat transfer toward the exterior (classified zone), as a function of the physical and fluid-dynamic state of the fluid itself, rather than taking, as a design datum, the fluid temperature, it is taken the external temperature of the process lid only due to the heat transfer from the internal hot fluid (*design temperature*).

The *design temperature* is evaluated by the manufacturer through thermodynamic computation which keeps into account the fluid status: the maximum temperature it can reach and the most critical conditions which maximise the heat transfer coefficient towards the lid which connects the apparatus to the process.

Starting from the *design temperature*, the maximum ambient temperature of the place where the apparatus is installed, the service temperatures of all parts of the equipment are computed. When the service temperature of a non-metallic part of the equipment reaches or goes above 145°C, the solution is not acceptable and it will be necessary, whether possible, to increase the distance of the enclosure from lid connecting to the process. Already unacceptable solutions, at $T_{\text{amb}}(\text{MAX})=20^{\circ}\text{C}$, are pointed out in the following table by the word "NO".

Tables 1 and 2 (evaluated for a ambient temperature of 20°C) show the link between the *design temperature*, the temperature class and the temperature for the selection of the cables and their glands. For the missing *design temperatures*, the data can be obtained through linear interpolation between the previous and following line or prolonging the last straight section.

In order to transport the tables to the actual maximum ambient temperature (shown on the marking plate), the figures shall be correspondingly increased.

The prerequisites of the project shall be guaranteed by a safety thermal sensor (responsibility of the user) which shall be placed on the hottest spot of the external surface of the process lid and shall turn off the power supply in case the maximum temperature foreseen for the lid itself (with a safety margin) is exceeded. Such temperature, decreased by the safety margin shown in the manufacturer's documents, is computed by the manufacturer, starting from the *design temperature*, and shown on the marking plate.

Prot: B5011937

Annex to certificate:
Applicant:

IECEX CES 15.0008X Issue No.:0 of 2015-05-18
Amarc S.r.l.

Apparatus:

Via Artigiani 37; I-23874 Montevecchia (LC), Italy
Equipment for indirect heating by resistance, series RC380

Temperature class (continue):

Table 1: Horizontal installation (For $T_{amb}=20^{\circ}\text{C}$)

T design (process lid) [°C]	Maximum temperature [°C]	Temperature class	Maximum service temperature for the selection of cables and glands [°C] As a function of the length of the neutral section						
			None	50 mm	100 mm	150 mm	200 mm	250 mm	300 mm
45	80	T6	62	59	58	57	56	56	55
70	104	T4	70	65	61	59	58	57	56
95	129	T4	78	69	64	61	59	58	57
120	154	T3	NO	73	67	63	60	59	57
145	180	T3	NO	78	70	65	62	60	58
170	207	T2	NO	82	72	67	63	61	59

Table 2: Vertical installation (For $T_{amb}=20^{\circ}\text{C}$)

T design (process lid) [°C]	Maximum temperature [°C]	Temperature class	Maximum service temperature for the selection of cables and glands [°C] As a function of the length of the neutral section						
			None	50 mm	100 mm	150 mm	200 mm	250 mm	300 mm
40	73	T6	69	66	65	65	65	64	62
60	90	T5	78	74	71	70	69	68	66
80	110	T4	85	79	75	73	72	71	69
100	130	T4	98	89	84	82	80	78	74
130	160	T3	125	109	101	96	92	90	85
160	190	T3	NO	126	115	109	106	103	94
190	220	T2	NO	NO	125	118	114	111	101
220	250	T2	NO	NO	NO	131	125	120	109
250	280	T2	NO	NO	NO	NO	NO	129	116
280	310	T1	NO	NO	NO	NO	NO	NO	122
310	340	T1	NO	NO	NO	NO	NO	NO	129

Cable entries

Accessory used for cable entries and for closing unused holes shall be certificated according to the standards IEC 60079-0, IEC 60079-7 and IEC 60079-31 and to the marking of the heater itself. The selection of the cable glands and the connections shall be carried out according to the standard IEC 60079-14. The power supply of the possible anti-condensation heater shall be made through an independent cable and cable gland.

Warning labels:

- "DO NOT OPEN WHEN ENERGIZED"
 - "SUPPLY USING CABLES SUITABLE FOR A TEMPERATURE OF ...[*]°C"
- [*]: temperature stated by the manufacturer according to the tables 1 or 2

In case a dew heater is installed:

- "WARNING ANTICONDENSATION RESISTANCE WORKING WHEN THE HEATER IS OFF"

On the auxiliary enclosure:

- "CONTAINS INTRINSIC SAFETY CIRCUITS"



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INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres
for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEX CES 15.0008X** issue No.:1

Certificate history:
Issue No. 1 (2015-9-28)
Issue No. 0 (2015-5-18)

Status: **Current**

Date of Issue: **2015-09-28** Page 1 of 4

Applicant: **Amarc S.r.l.**
Via Artigiani, 37
I-23874 Montevicchia (LC)
Italy

Electrical Apparatus: **Equipment for indirect heating by resistance, series RC380**
Optional accessory:

Type of Protection: **Increased safety 'e'; Intrinsic Safety 'i', Dust ignition protection 't'**

Marking: **Ex e IIC T6...T1 Gb or**
Ex e ib IIC T6...T1 Gb
Ex tb IIIC T70°C...T415°C Db

Approved for issue on behalf of the IECEx Certification Body: **Mirko Balaz**

Position: **Head of IECEx CB**

Signature: *(for printed version)*

Date: 28-09-2015

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Certificate issued by:
CESI
Centro Elettrotecnico
Sperimentale Italiano S.p.A.
Via Rubattino 54
20134 Milano
Italy

CESI
CESI S.p.A.
Testing & Certification Division
Business Area Certification
Il Responsabile
(Roberto Piccin)

PAD B5021530 (2145378) - USO AZIENDALE



IECEx Certificate of Conformity

Certificate No.: IECEx CES 15.0008X

Date of Issue: 2015-09-28

Issue No.: 1

Page 2 of 4

Manufacturer: **Amarc S.r.l.**
Via Artigiani, 37
I-23874 Montevecchia (LC)
Italy

Additional Manufacturing location
(s):

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 electrical apparatus 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 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-11 : 2011 Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
IEC 60079-31 : 2013 Edition: 2	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"
IEC 60079-7 : 2006-07 Edition: 4	Explosive atmospheres - Part 7: Equipment protection by increased safety "e"

This Certificate does not indicate compliance with electrical 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:
IT/CES/ExTR15.0005/00

IT/CES/ExTR15.0005/01

Quality Assessment Report:

IT/CES/QAR13.0002/02



IECEx Certificate of Conformity

Certificate No.: IECEx CES 15.0008X

Date of Issue: 2015-09-28

Issue No.: 1

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Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

Equipment for indirect heating by resistance series RC360 consist of armoured pipes inside of which the electrical resistances are inserted together with magnesium oxide powder as electrical insulator. Armoured pipes are drawn, U bent or with different shape and the two edges welded to the pipe sheet (the bottom of the power supply enclosure) and sealed. The bottom plate of the power supply enclosure may coincide with the lid which closes the process side (direct connection) or, in order to limit the temperature of the enclosure, it can be kept at a distance ranging from 50 to 300 mm from the lid (connection with a neutral section). The active part of the resistance starts and ends, only process side, not less than 50 mm from the lid.

The enclosure is built using a steel sheet bent and sold with no interruption in order to guarantee its sealed tightness. Five different sizes of the enclosure are possible, all formed by a lower part having a circular section, closed at the bottom by the pipe sheet, which is surmounted by an upper part with square section having an upper hatch to access the interior and 1 or 2 drilled plates, on one side, for the cables entry.

See annex for further description.

CONDITIONS OF CERTIFICATION: YES as shown below:

- The temperature class of the equipment is defined by the manufacturer on the base of the thermal-fluidodynamic design and the maximum temperature the process fluid can reach. Usage different from the design one are not allowed.
- Design conditions shall be guaranteed by a safety thermal sensor (with manual reset and under the responsibility of the user) placed on the hottest spot of the external surface of the lid which closes the process; the intervention threshold is stated by the manufacturer and written on the marking plate. The actual temperature set on the sensor shall keep into account its precision and hence consistently lowered:
 - $T(\text{actual}) = T(\text{intervention}) - \Delta T(\text{precision})$
- Cables and glands shall be suitable for the maximum temperature stated by the manufacturer and written on the marking plate.
- The anti-condensation resistance shall be powered only when the heater is off and using cables and glands independent from those ones of the heater.
- In order to avoid excessive heating of the resistance armoured pipes, in case of malfunctioning process side, each heating section is provided with a skin temperature sensor which at the crossing of the threshold defined by the manufacturer shall turn off the heater and the reset can only be manual; The connection and the managing of these signals, made available in the auxiliary junction box, is responsibility of the user. These sensors are additional to those ones controlling the temperature of the process fluid, installed and managed by the user.
- Possible I.S. 4+20mA transmitters, placed inside the auxiliary junction box, shall be connected to the intrinsic safety barrier using cables and glands independent from the other sensors.



IECEX Certificate of Conformity

Certificate No.: IECEX CES 15.0008X

Date of Issue: 2015-09-28

Issue No.: 1

Page 4 of 4

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Variation 1.1

Updating of the standard relevant to the protection against combustible dust: New standard IEC 60079-31: 2013 (ed. 2)

Variation 1.2

Updating of the self-limiting heating cables which can be installed inside the power supply enclosure. The new cables have an independent IECEx certifications equivalent to that one of the abandoned ones:

Heating cable	Manufacturer	T _{amb} (whole cable)	Certificate
ELSR-N40-2BOT	Eltherm	-40°C + +80°C	IECEX EPS 12.0006U issue 1
40 FSR	Heat Trace	-40°C + +85°C	IECEX SIR 11.0121 issue 0



IECEx Certificate of Conformity



Prot: B5021530

Annex to certificate: IECEx CES 15.0008X Issue No.:1 of 2015-09-28

Applicant: Amarc S.r.l.

Via Artigiani 37; I-23874 Montevercchia (LC), Italy

Apparatus: Equipment for indirect heating by resistance, series RC380

Identification and description of the equipment

Equipment for indirect heating by resistance series RC380 consist of armoured pipes inside of which the electrical resistances are inserted together with magnesium oxide powder as electrical insulator. Armoured pipes are drawn, U bent or with different shape and the two edges welded to the pipe sheet (the bottom of the power supply enclosure) and sealed.

The bottom plate of the power supply enclosure may coincide with the lid which closes the process side (direct connection) or, in order to limit the temperature of the enclosure, it can be kept at a distance ranging from 50 to 300 mm from the lid (connection with a neutral section). The active part of the resistance starts and ends, only process side, not less than 50 mm from the lid.

The enclosure is built using a steel sheet bent and sold with no interruption in order to guarantee its sealed tightness. Five different sizes of the enclosure are possible, all formed by a lower part having a circular section, closed at the bottom by the pipe sheet, which is surmounted by an upper part with square section having an upper hatch to access the interior and 1 or 2 drilled plates, on one side, for the cables entry.

On the enclosure there can be installed devices individually certificated (Ex e and Ex t) for draining and breathing and inside there can be installed self-limiting heating cables they too certificated Ex e.

The self-limiting heating cables, powered independently from the heater, can be energized only when the latter is off. The list of the anti-condensate heating cables, which can be installed in the power supply enclosure, is shown in the table below. The temperature ranges shown in the table also keeps into account the termination kit used at one edge of the cable; those ranges define the temperature limits the heating cables can be subjected.

Heating cable	Manufacturer	Tamb (whole cable)
ELSR-N40-2BOT	Eltherm	-40°C + +80°C
40 FSR	Heat Trace	-40°C + +85°C

The cables can be installed only in case the minimum ambient temperature marked on the RC380 heaters and the maximum temperature reachable in the installation position, inside the main enclosure, are within the shown ranges.

Each unit or heating section of the heater is provided with a temperature sensor (thermo-resistance or thermocouple) placed in a pocket, tight to the armoured pipe of the resistance, in order to measure its skin temperature. All the wires coming from the sensors are then taken inside an external auxiliary box (Ex e and Ex t certificate) and connected to terminals (Ex e); such box may also contain an intrinsic safety 4+20mA transmitter the characteristics of which, for the selection of the I.S. barrier, shall be furnished by the manufacturer. The signals of the thermal sensors are made available to the user who shall use them in order to control the skin temperature and turn off the heater when it rises over the threshold defined by the manufacturer; once the protection is activated, the reset cannot be automatic. Such auxiliary enclosure can only contain I.S. circuits and all of them (the straight connected sensors as well) shall be connected to a suitable I.S. barrier. All the circuits shall be independent one from each other.

Equipment in subject are suitable for heating fluids in liquid or gaseous phase under conditions of motion or static. In any case the process and hence the environment where the heating part is inserted must be classified as safe zone (non-combustible fluid or absence of oxidant). The apparatus can be positioned horizontally (pipes entering the process horizontally) or vertically.

The part of the apparatus stretching from the external surface of the lid, which closes the process, to the terminal boxes, included, is consistent with EPL Gb and Db, hence it is suitable for environments classified zone 1 and 21.

Being safe the zone inside the process, the temperature class shown on the marking plate refers only to the part external to the lid which could be in contact with a possible explosive atmosphere.

PAD B5021530 (2145377) - USO AZIENDALE



IECEX Certificate of Conformity

CESI

Prot: B5021530

Annex to certificate: IECEx CES 15.0008X Issue No.:1 of 2015-09-28

Applicant: Amarc S.r.l.

Via Artigiani 37; I-23874 Montevicchia (LC), Italy

Apparatus: Equipment for indirect heating by resistance, series RC380

Identification and description of the equipment (*follows*)

Equipment for indirect heating through resistance series RC380 are identified by the code:

RC 380 Cn / Ann

Where:

RC 380: Identifies the series of the equipment

Cn: Identifies the type of the power supply enclosure:

C = A: enclosure straight welded to the process lid;

B: enclosure kept separate from the lid by a neutral section (not heating);

N = Identifies the enclosure size increasing from 1 to 5 (1= the smallest, 5= the biggest);

Ann: It is a progressive code from **A00** to **Z99**, used by the manufacturer, which uniquely identifies the whole apparatus.

Electrical characteristics:

Rated voltage: 690 Vac/dc

Frequency of the AC current: 50-60 Hz (single or three phase)

Maximum current for each resistive element: 10 A

Maximum current density on the terminals: 1.72 A/mm²

Maximum rated power: 1725 kW (direct or single phase current)

2987 kW (three phase current)

Maximum ambient temperature range: $-50^{\circ}\text{C} \leq T_{\text{amb}} \leq +60^{\circ}\text{C}$

Gas protection marking: Ex e IIC T6...T1 Gb

Ex e ib IIC T6...T1 Gb (in case of 4+20mA I.S. transmitter)

Dust protection marking: Ex tb IIIC T70°C...T415°C

Ingress protection: IP65

Temperature class

Service temperatures of the parts of the apparatus placed in classified area (external to the process) depend on the temperature reached by the process fluid (due to the heat transferred by the active parts of the electrical resistances) and by heating produced by the current flowing through the neutral sections and the internal joints of the enclosure.

Changing substantially, at the same temperature of the process fluid (safe zone), the heat transfer toward the exterior (classified zone), as a function of the physical and fluid-dynamic state of the fluid itself, rather than taking, as a design datum, the fluid temperature, it is taken the external temperature of the process lid only due to the heat transfer from the internal hot fluid (*design temperature*).

The *design temperature* is evaluated by the manufacturer through thermodynamic computation which keeps into account the fluid status: the maximum temperature it can reach and the most critical conditions which maximise the heat transfer coefficient towards the lid which connects the apparatus to the process.

Starting from the *design temperature*, the maximum ambient temperature of the place where the apparatus is installed, the service temperatures of all parts of the equipment are computed. When the service temperature of a non-metallic part of the equipment reaches or goes above 145°C, the solution is not acceptable and it will be necessary, whether possible, to increase the distance of the enclosure from lid connecting to the process. Already unacceptable solutions, at $T_{\text{amb}}(\text{MAX})=20^{\circ}\text{C}$, are pointed out in the following table by the word "NO".



IECEx Certificate of Conformity



Prot: B5021530

Annex to certificate: IECEx CES 15.0008X Issue No.:1 of 2015-09-28

Applicant: Amarc S.r.l.

Via Artigiani 37; I-23874 Montevicchia (LC), Italy

Apparatus: Equipment for indirect heating by resistance, series RC380

Temperature class (follows):

Tables 1 and 2 (evaluated for a ambient temperature of 20°C) show the link between the *design temperature*, the temperature class and the temperature for the selection of the cables and their glands. For the missing *design temperatures*, the data can be obtained through linear interpolation between the previous and following line or prolonging the last straight section.

In order to transport the tables to the actual maximum ambient temperature (shown on the marking plate), the figures shall be correspondingly increased.

The prerequisites of the project shall be guaranteed by a safety thermal sensor (responsibility of the user) which shall be placed on the hottest spot of the external surface of the process lid and shall turn off the power supply in case the maximum temperature foreseen for the lid itself (with a safety margin) is exceeded. Such temperature, decreased by the safety margin shown in the manufacturer's documents, is computed by the manufacturer, starting from the *design temperature*, and shown on the marking plate.

Table 1: Horizontal installation (For $T_{amb}=20^{\circ}C$)

T design (process lid) [°C]	Maximum temperature [°C]	Temperature class	Maximum service temperature for the selection of cables and glands [°C] As a function of the length of the neutral section						
			None	50 mm	100 mm	150 mm	200 mm	250 mm	300 mm
45	80	T6	62	59	58	57	56	56	55
70	104	T4	70	65	61	59	58	57	56
95	129	T4	78	69	64	61	59	58	57
120	154	T3	NO	73	67	63	60	59	57
145	180	T3	NO	78	70	65	62	60	58
170	207	T2	NO	82	72	67	63	61	59

Table 2: Vertical installation (For $T_{amb}=20^{\circ}C$)

T design (process lid) [°C]	Maximum temperature [°C]	Temperature class	Maximum service temperature for the selection of cables and glands [°C] As a function of the length of the neutral section						
			None	50 mm	100 mm	150 mm	200 mm	250 mm	300 mm
40	73	T6	69	66	65	65	65	64	62
60	90	T5	78	74	71	70	69	68	66
80	110	T4	85	79	75	73	72	71	69
100	130	T4	98	89	84	82	80	78	74
130	160	T3	125	109	101	96	92	90	85
160	190	T3	NO	126	115	109	106	103	94
190	220	T2	NO	NO	125	118	114	111	101
220	250	T2	NO	NO	NO	131	125	120	109
250	280	T2	NO	NO	NO	NO	NO	129	116
280	310	T1	NO	NO	NO	NO	NO	NO	122
310	340	T1	NO	NO	NO	NO	NO	NO	129



IECEX Certificate of Conformity

CESI

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Cable entries

Accessory used for cable entries and for closing unused holes shall be certificated according to the standards IEC 60079-0, IEC 60079-7 and IEC 60079-31 and to the marking of the heater itself. The selection of the cable glands and the connections shall be carried out according to the standard IEC 60079-14. The power supply of the possible anti-condensation heater shall be made through an independent cable and cable gland.

Warning labels:

- "DO NOT OPEN WHEN ENERGIZED"
- "SUPPLY USING CABLES SUITABLE FOR A TEMPERATURE OF ...[*]°C"
[*]: temperature stated by the manufacturer according to the tables 1 or 2

In case a dew heater is installed:

- "WARNING ANTICONDENSATION RESISTANCE WORKING WHEN THE HEATER IS OFF"

On the auxiliary enclosure:

- "CONTAINS INTRINSIC SAFETY CIRCUITS"