



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 EUT 14.0005X	Page 1 of 4	<u>Certificate history:</u>
Status:	Current	Issue No: 4	Issue 3 (2019-12-20)
Date of Issue:	2023-05-19		Issue 2 (2019-07-26)
Applicant:	MASTERWATT S.r.l. Via Collegno, 31 – 10044 Pianezza Italy		Issue 1 (2018-05-28)
Equipment:	Flanged Electrical Heaters, Series: NT 80÷450 and HP 250÷700		Issue 0 (2014-07-28)
Optional accessory:			
Type of Protection:	Flameproof enclosures "d"; Equipment dust ignition protection by enclosure "t", Increased safety "e"		
Marking:	Ex db IIC T6...T1 -/Gb or Ex db eb IIC T6...T1 Gb/Gb		
	Ex tb IIIC T85°C...T450°C -/Db		

Approved for issue on behalf of the IECEx
Certification Body:

Omar Galasso

Position:

Deputy Head of IECEx Certification Body

Signature:
(for printed version)

Date:
(for printed version)

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Certificate issued by:

Eurofins Product Testing Italy S.r.l.
Via Cuorgnè
n.21 - 10156 Torino
Italy

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Manufacturer: **MASTERWATT S.r.l.**
Via Collegno, 31 – 10044 Pianezza
Italy

Manufacturing locations: **MASTERWATT S.r.l.**
Via Collegno, 31 – 10044 Pianezza
Italy

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 60079-0:2017](#) Explosive atmospheres - Part 0: Equipment - General requirements
Edition:7.0

[IEC 60079-1:2014-06](#) Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
Edition:7.0

[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:

[IT/EUT/ExTR14.0004/04](#)

Quality Assessment Report:

[IT/EUT/QAR14.0002/08](#)



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EQUIPMENT:

Equipment and systems covered by this Certificate are as follows:

The electrical heaters, Types NT 80+450 and HP 250+700, are composed of a heating unit (increased safety construction) and a terminal box (flameproof and/or dust tight construction). The heating unit can be made of one or more heating elements and it is attached to the heated vessel through a coupling flange or a plate.

The heating elements are made of a resistive wire insulated by means of MgO from the external metallic sheet that is in direct contact with the fluid to heat. The explosion proof enclosure can be directly connected to the connection flange/plate or separated through a neutral extension. The heating elements can be permanently secured to the coupling flange/plate or can be dismountable (bite coupling elements).

The maximum number of elements that may be fitted in is 300, while the external diameter of the elements can be from 8 mm to 16 mm. The elements can be connected internally by means of brass / copper bars or through cable lugs.

The heaters are supplied with one or more thermowells for the insertion of one or more temperature control sensing probes whose terminals are located in the terminal box.

The heaters can be used for the heating of solids, liquids or gases and are intended to be installed in the boundary wall between the process (EPL Gb or no EPL required) and the external atmosphere (EPL Gb and/or EPL Db). They are suitable for gas group IIC and dust group IIIC.

A more detailed description is given in the annex

SPECIFIC CONDITIONS OF USE: YES as shown below:

- Flameproof joints shall not be repaired
- The user has to periodically clean the enclosure in order to avoid a dust deposit higher than 5 mm
- The supply cable shall be suitable for an operating temperature equal or greater than the temperature indicated on the label.
- The user shall adopt the following additional safety measures:
 - Heating of liquids: the user shall take adequate measures (e.g. by means of a level switch) to guarantee that the heater is operating only when the fluid level is at least 50 mm above the highest heated part of the heater
 - Heating of static gases in processes with EPL required: the user shall guarantee that the temperature of the volume where the heater is used is maintained below the limits specified on the heater nameplate by the manufacturer. The user shall further protect the equipment with a residual current device according to clause 5.8.6 of IEC 60079-7
 - Heating of forced flow gases in processes with Gb EPL required: the user shall take appropriate measures to:
 - protect the equipment with a residual current device according to clause 5.8.6 of IEC 60079-7
 - stop the power supply to the heater in case the fluid flow rate drops below the minimum value specified by the manufacturer.
 - connect the safety sensor, installed by the manufacturer in one heating element for surveillance of the maximum skin temperature, to a suitable control system. Make sure that no single failure in the equipment or in the supply (here including also the open circuit of a single heating element) can cause a local reduction of temperature in the controlled element while the other elements normally work (see instructions for the details)
 - make sure that, in case the heater consists of several independent power supply stages, the stage in which the safety sensor is located is always "on" or is the first one to be switched "on" and the last one to be switched "off". If this is not possible, the user shall request to the manufacturer to supply a heater with one safety device for each power supply stage
 - Heating of dynamic fluids: special case hothead execution (low inlet temperature of the fluid to be heated): in addition to the safety devices described in the above, these heaters shall be equipped with a safety device that monitors the fluid temperature, in the area close to the heater coupling device to the plant, and intervenes when this temperature exceeds the safety value specified in the manufacturer's documents and representing the basis for the definition of the maximum temperature inside the heater contact box.

All the safety functions above mentioned must be in addition to the normal process control functions and shall:

- produce the shutdown of the heater and realize the transition to a safe state of the plant in case of activation of any of the safety devices; the activation cannot have an automatic reset
- operate in a reliable way



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DETAILS OF CERTIFICATE CHANGES (for issues 1 and above)

The equipment NT 80/450 has now been assessed as suitable for IP 66 degree in compliance with IEC 60079-0 and IEC 60529 in addition to IP 68 already assessed

Annex:

[Annex to CoC EUT 14.0005X_4.pdf](#)

Annex to certificate: IECEx EUT 14.0005X Issue N. 4

Electrical characteristics

Maximum voltage: 750 V
 Maximum current: 18 kA
 Rated Frequency: 50/60 Hz (operation with Continuous Current with the same values in respect to Vac rms value is allowed too)
 Degree of protection:
 - HP 250÷700 IP68 (1h submersed at a depth of 1m)
 - NT 80÷450 IP 66/68 (1h submersed at a depth of 1m)

Minimum ambient temperature: -60°C
 Maximum ambient temperature: +40 °C or +60 °C or +70 °C

Surface temperature

The temperature class / maximum surface temperature (in case of dusts) of the equipment **T6...T1 / T85°C...T450°C** is specified and affixed on the nameplate by the manufacturer on the basis of the tables below reported. The maximum surface temperature for equipment suitable to be used with flammable dust is selected as the highest temperature value for the corresponding Tclass. The cable design temperature is specified in the manufacturer's documents and affixed on the nameplate based on the maximum temperature of the elements terminal studs and on the type of cable connection arranged inside the heater.

The following tables provide the temperature class and indirectly the max surface temperature for applications with combustible dusts (see above) with reference to the ambient temperature range, process temperature, length of the neutral section and current density in the heating element

Table 1: Tamb: from -60 °C to + 40 °C; Is = 1.5 A/mm²

Neutral section length (mm)	Temperature class								
	300	T4	T4	T4	T3	T3	T2	T2	T1
250	T4	T4	T4	T3	T3	T2	T2	T1	T1
200	T4	T4	T4	T3	T3	T2	T2	T1	T1
150	T4	T4	T4	T3	T3	T2	T2	T1	T1
100	T4	T4	T4	T3	T3	T2			
0	T4	T4	T4	T3					
Distance	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE								

Table 2: Tamb: from -60 °C to + 60 °C; Is = 1.5 A/mm²

Neutral section length	Temperature class								
	300	T4	T4	T3	T3	T3	T2	T2	T1
250	T4	T4	T3	T3	T3	T2	T2	T1	T1
200	T4	T4	T3	T3	T3	T2	T2	T1	T1
150	T4	T4	T3	T3	T3	T2	T2	T1	T1
100	T4	T4	T3	T3	T3	T2			
0	T4	T4	T3	T3					
Distance	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE								

Table 3: Tamb: from -60 °C to + 70 °C; Is = 1.5 A/mm²

Neutral section length	Temperature class								
	300	T4	T3	T3	T3	T2	T2	T2	T1
250	T4	T3	T3	T3	T2	T2	T2	T1	T1
200	T4	T3	T3	T3	T2	T2	T2	T1	T1
150	T4	T3	T3	T3	T2	T2	T2	T1	T1
100	T4	T3	T3	T3	T2	T2			
0	T4	T3	T3	T3					
Distance	70 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE								

Table 4: Tamb: -60 °C ÷ + 40 °C; Is = 1.1 A/mm²

Neutral section length	Temperature class								
	300	T6	T5	T4	T3	T3	T2	T2	T1
250	T6	T5	T4	T3	T3	T2	T2	T1	T1
200	T6	T5	T4	T3	T3	T2	T2	T1	T1
150	T6	T5	T4	T3	T3	T2	T2	T1	T1
100	T6	T5	T4	T3	T3	T2			
0	T6	T5	T4	T3					
Distance	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE								

Table 5: Tamb: -60 °C ÷ + 60 °C; Is = 1.1 A/mm²

Neutral section length	Temperature class								
	300	T5	T4	T4	T3	T3	T2	T2	T1
250	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T5	T4	T4	T3	T3	T2	T2	T1	T1
150	T5	T4	T4	T3	T3	T2	T2	T1	T1
100	T5	T4	T4	T3	T3	T2			
0	T5	T4	T4	T3					
Distance	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE								

Table 6: Tamb: -60 °C ÷ + 70 °C; Is = 1.1 A/mm²

Neutral section length	Temperature class								
	300	T4	T4	T4	T3	T3	T2	T2	T1
250	T4	T4	T4	T3	T3	T2	T2	T1	T1
200	T4	T4	T4	T3	T3	T2	T2	T1	T1
150	T4	T4	T4	T3	T3	T2	T2	T1	T1
100	T4	T4	T4	T3	T3	T2			
0	T4	T4	T4	T3					
Distance	70 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
	PROCESS TEMPERATURE								

Table 7: Tamb: -60 °C ÷ + 40 °C; Is = 0.8 A/mm²

Neutral section length	Temperature class								
	300	T6	T5	T4	T3	T3	T2	T2	T1
250	T6	T5	T4	T3	T3	T2	T2	T1	T1
200	T6	T5	T4	T3	T3	T2	T2	T1	T1
150	T6	T5	T4	T3	T3	T2	T2	T1	T1
100	T6	T5	T4	T3	T3	T2			
0	T6	T5	T4	T3					
Distance	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									

Table 8: Tamb: -60 °C ÷ + 60 °C; Is = 0.8 A/mm²

Neutral section length	Temperature class								
	300	T6	T5	T4	T3	T3	T2	T2	T1
250	T6	T5	T4	T3	T3	T2	T2	T1	T1
200	T6	T5	T4	T3	T3	T2	T2	T1	T1
150	T6	T5	T4	T3	T3	T2	T2	T1	T1
100	T6	T5	T4	T3	T3	T2			
0	T6	T5	T4	T3					
Distance	60 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									

Table 9: Tamb: -60 °C ÷ + 70 °C; Is = 0.8 A/mm²

Neutral section length	Temperature class								
	300	T5	T4	T4	T3	T3	T2	T2	T1
250	T5	T4	T4	T3	T3	T2	T2	T1	T1
200	T5	T4	T4	T3	T3	T2	T2	T1	T1
150	T5	T4	T4	T3	T3	T2	T2	T1	T1
100	T5	T4	T4	T3	T3	T2			
0	T5	T4	T4	T3					
Distance	70 °C	80 °C	100 °C	150 °C	195 °C	250 °C	290 °C	350 °C	400 °C
PROCESS TEMPERATURE									

Cable entries

The cable entry devices used on the enclosure have to be suitably IECEx certified. They have to be chosen according to the type of protection, the operating temperature indicated in the manufacturer's instructions, the type of thread and the degree of protection of the equipment.

Warning label

- “Do not open when energized”
- “Before opening wait until the terminal box has cooled down”

Routine tests

In compliance with clause 16 of IEC 60079-1, the manufacturer has to perform the individual pressure test on each terminal enclosure with a minimum pressure of :

- 20.4 bar for 10s for NT 80÷450 series;



- 17.1 bar for 10s for HP 250÷700 series.

In addition, if the heater marking is “Ex db eb IIC T6...T1 Gb/Gb”, the manufacturer has to perform the dielectric strength test (in compliance with clause 7.1 of IEC 60079-7) between galvanically isolated parts with a minimum voltage of $(2*U+1000)$ V r.m.s. for 60 s, where “U” is the working voltage. As an alternative, the test can also be conducted at $(2*U+1000)*1.2$ V r.m.s. for $t>0.1s$;