Certificate of Compliance

Certificate: 70016751 **Master Contract:** 263979

Project: 70016751 **Date Issued:** April 22, 2016

Issued to: **Masterwatt S.r.l.**
Via Collegno 31
10044 Pianezza
ITALY

Attention: **Mr. Burgio**

The products listed below are eligible to bear the CSA Mark shown

Issued by: ***E.Giusti***
E.Giusti

PRODUCTS

CLASS 2878-02 - Heaters - Miscellaneous - For Hazardous Locations
CLASS 2878-82 - Heaters - Miscellaneous - For Hazardous Locations - Certified to US Standards

Ex d IIC T1, T2, T3, T4, T5 or T6 Gb
Class I, Zone 1, AEx d IIC T1, T2, T3, T4, T5 or T6 Gb
Class I, Division 1, Groups A, B, C and D

Class II, Division 1, Groups E, F and G
Ex tb IIIC T165°C-T85°C ; Zone 21, AEx tb IIIC T165°C-T85°C

Flanged Electrical Heaters models NT 80/450 and HP 250/700. Electrical ratings of the heaters are specified as 1.5 A/mm^2 maximum, 600 VAC maximum, 50/60 Hz, IP68 (1 hour submersed at 1meter).

Electrical specifications:
- Maximum current 18 kA (i.e. maximum current value for a single heating element : 32A, 44A and 60A respectively)
- Maximum Power 5000 kW
- Maximum number of heating elements (HP Contact box 700): 300
- Maximum cross section of a single heating element connection stud: 40 mm² (M8 stud)

Enclosure Type 4X (for stainless steel 304 or better enclosures).

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Ambient temperature range: -60°C to +70°C

Temperature class of heaters is defined according to the maximum ambient, pin current, process operating temperature and length of the 'neutral' section (i.e. out of process pipe) as per table below:

Table 1: maximum ambient temperature equal to 40 °C and pin current equal to 1.5 A/mm²

Stilted length	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	97	T6	98	T4	99	T3	110	T3	129	T2	128	T2	137	T1	149	T1	143
250	T6	98	T6	100	T4	102	T3	119	T3	137	T2	140	T2	148	T1	161	T1	165
200	T6	99	T6	102	T4	105	T3	124	T3	150	T2	147	T2	157	T1	171	T1	180
150	T6	101	T6	105	T4	109	T3	129	T3	150	T2	157	T2	166	T1	180	T1	190
100	T6	103	T6	109	T4	114	T3	137	T3	158	T2	167						
0	T6	108	T6	116	T4	124	T3	144										
Process Temperature	60 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

Table 2: maximum ambient temperature equal to 60 °C and pin current equal to 1.5 A/mm²

Stilted length	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	133	T6	134	T4	135	T3	151	T3	149	T2	148	T2	157	T1	169	T1	163
250	T6	134	T6	136	T4	138	T3	160	T3	157	T2	160	T2	168	T1	181	T1	185
200	T6	135	T6	138	T4	141	T3	165	T3	170	T2	167	T2	177	T1	191	T1	200
150	T6	137	T6	141	T4	145	T3	170	T3	170	T2	177	T2	186	T1	200	T1	210
100	T6	139	T6	145	T4	150	T3	178	T3	178	T2	187						
0	T6	137	T6	140	T4	150	T3	175										
Process Temperature	60 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

Table 3: maximum ambient temperature equal to 70 °C and pin current equal to 1.5 A/mm²

Stilted length	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	144	T6	145	T4	146	T3	160	T3	159	T2	158	T2	167	T1	179	T1	173
250	T6	145	T6	147	T4	149	T3	169	T3	167	T2	170	T2	178	T1	191	T1	195
200	T6	146	T6	149	T4	152	T3	174	T3	180	T2	177	T2	187	T1	201	T1	210
150	T6	148	T6	152	T4	156	T3	179	T3	180	T2	187	T2	196	T1	210	T1	220
100	T6	150	T6	156	T4	161	T3	187	T3	188	T2	197						
0	T6	156	T6	161	T4	170	T3	193										
Process Temperature	70 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

Table 4: maximum ambient temperature equal to 40 °C and pin current equal to 1.1 A/mm²

Stilted length	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	67	T6	68	T4	69	T3	80	T3	78	T2	77	T2	86	T1	98	T1	92
250	T6	68	T6	70	T4	72	T3	89	T3	86	T2	89	T2	97	T1	110	T1	114
200	T6	69	T6	72	T4	75	T3	94	T3	99	T2	96	T2	106	T1	120	T1	129
150	T6	71	T6	75	T4	79	T3	99	T3	99	T2	106	T2	115	T1	124	T1	134
100	T6	73	T6	79	T4	84	T3	107	T3	107	T2	116						
0	T6	78	T6	86	T4	94	T3	114										
Process Temperature	60 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

Table 5: maximum ambient temperature equal to 60 °C and pin current equal to 1.1 A/mm²

Stilted Length	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	103	T6	104	T4	105	T3	121	T3	119	T2	118	T2	127	T1	139	T1	133
250	T6	104	T6	106	T4	108	T3	130	T3	127	T2	130	T2	138	T1	151	T1	155
200	T6	105	T6	108	T4	111	T3	135	T3	140	T2	137	T2	147	T1	161	T1	170
150	T6	107	T6	111	T4	115	T3	140	T3	140	T2	147	T2	156	T1	165	T1	175
100	T6	109	T6	115	T4	120	T3	148	T3	148	T2	157						
0	T6	99	T6	110	T4	120	T3	145										
Process Temperature	60 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

Table 5: maximum ambient temperature equal to 60 °C and pin current equal to 1.1 A/mm²

Stilted length	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	103	T6	104	T4	105	T3	121	T3	119	T2	118	T2	127	T1	139	T1	133
250	T6	104	T6	106	T4	108	T3	130	T3	127	T2	130	T2	138	T1	151	T1	155
200	T6	105	T6	108	T4	111	T3	135	T3	140	T2	137	T2	147	T1	161	T1	170
150	T6	107	T6	111	T4	115	T3	140	T3	140	T2	147	T2	156	T1	165	T1	175
100	T6	109	T6	115	T4	120	T3	148	T3	148	T2	157						
0	T6	99	T6	110	T4	120	T3	145										
Process Temperature	60 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

Table 6: maximum ambient temperature equal to 70 °C and pin current equal to 1.1 A/mm²

Stilted	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	114	T6	115	T4	116	T3	130	T3	129	T2	128	T2	137	T1	149	T1	143
250	T6	115	T6	117	T4	119	T3	139	T3	137	T2	140	T2	148	T1	161	T1	165
200	T6	116	T6	119	T4	122	T3	144	T3	150	T2	147	T2	157	T1	171	T1	180
150	T6	118	T6	122	T4	126	T3	149	T3	150	T2	157	T2	166	T1	175	T1	185
100	T6	120	T6	126	T4	131	T3	157	T3	158	T2	167						
0	T6	118	T6	131	T4	140	T3	163										
Process Temperature	70 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

Table 7: maximum ambient temperature equal to 40 °C and pin current equal to 0.8 A/mm²

Stilted length	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	48	T6	49	T4	50	T3	61	T3	59	T2	58	T2	67	T1	79	T1	73
250	T6	49	T6	51	T4	53	T3	70	T3	67	T2	70	T2	78	T1	91	T1	95
200	T6	50	T6	53	T4	56	T3	75	T3	80	T2	77	T2	87	T1	101	T1	110
150	T6	52	T6	56	T4	60	T3	80	T3	80	T2	87	T2	96	T1	105	T1	115
100	T6	54	T6	60	T4	65	T3	88	T3	88	T2	97						
0	T6	66	T6	67	T4	75	T3	95										
Process Temperature	60 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

Table 8: maximum ambient temperature equal to 60 °C and pin current equal to 0.8 A/mm²

Stilted length	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	84	T6	85	T4	86	T3	102	T3	100	T2	99	T2	108	T1	120	T1	114
250	T6	85	T6	87	T4	89	T3	111	T3	108	T2	111	T2	119	T1	132	T1	136
200	T6	86	T6	89	T4	92	T3	116	T3	121	T2	118	T2	128	T1	142	T1	151
150	T6	88	T6	92	T4	96	T3	121	T3	121	T2	128	T2	137	T1	146	T1	156
100	T6	90	T6	96	T4	101	T3	129	T3	129	T2	138						
0	T6	87	T6	91	T4	101	T3	126										
Process Temperature	60 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

Table 9: maximum ambient temperature equal to 70 °C and pin current equal to 0.8 A/mm²

Stilted length	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B
300	T6	95	T6	96	T4	97	T3	111	T3	110	T2	109	T2	118	T1	130	T1	124
250	T6	96	T6	98	T4	100	T3	120	T3	118	T2	121	T2	129	T1	142	T1	146
200	T6	97	T6	100	T4	103	T3	125	T3	131	T2	128	T2	138	T1	152	T1	161
150	T6	99	T6	103	T4	107	T3	130	T3	131	T2	138	T2	147	T1	156	T1	166
100	T6	101	T6	107	T4	112	T3	138	T3	139	T2	148						
0	T6	106	T6	112	T4	121	T3	144										
Process Temperature	70 °C		80 °C		100 °C		150 °C		200 °C		250 °C		300 °C		350 °C		400 °C	

A: Temperature Class B: Cable temperature

Notes:
- The supply cable shall be suitable for the operating temperature equal or greater than the temperature indicated on the marking plate. The information for the temperature selection are indicated in the manufacturer's document n. 2.04.09.74000. The current density of the cable shall not exceed 2 A/mm2 (1 A/mm2 for temperature class T5 and T6).

In order to avoid excessive temperature of the heated fluid, each heating unit shall be operated in conjunction with one or more safety devices. This/these device(s), with non-automatic resetting, shall be in addition to the service thermal switch. If the safety devices is not provided by the manufacturer, they must be installed by the user according to manufacturer's instructions, they shall be certified for function and reliability regarding electrical

codes (NEC for the US and CEC for Canada).

- Heating of solids: the heater must be mechanically connected to the solid to be heated so that a conductive heat exchange is always ensured. The heater shall be operated with at least a safety device for the control of the maximum temperature of the heated solid (temperature of the solid surface exposed to the explosive atmosphere).

- Heating of liquids: The heater shall be operated with at least a safety device for the control of the maximum operating temperature of the process plant (internal part of the coupling device to the plant – process side). In addition adequate measures shall be taken, by the user, (e.g. by means of a level switch) in order to guarantee that the heater is operating only when the fluid is at least 50mm above the highest heating part of the heater.

- Heating of gases: The heater shall be operated with at least a safety device for the control of the maximum operating temperature of the process plant (internal part of the coupling device to the plant – process side). For the combustible gases, a further safety device for the control of the maximum operating temperature of the heating elements shall be foreseen too.

- Heating of dynamic fluids: special case hot-head execution with low inlet temperature of the fluid to be heated: In addition to the safety devices described in the above, these heaters shall be operated with a safety device that monitors the fluid temperature in the area close to the heater coupling device to the plant, and acts when this temperature exceeds the value considered in the design. The design temperature represents the basis for the definition of the cable design temperature inside the heater terminal box while the heater temperature class is defined on the basis of the plant operating temperature which corresponds to the maximum temperature reached by the fluid at the exit of the heater.

The activation of the above listed safety devices must be followed by the shutdown of the heater.

APPLICABLE REQUIREMENTS

CSA C22.2 No. 0-M91	General Requirements - Canadian Electrical Code, Part II
CSA C22.2 No. 88-1958 (R2004)	Industrial heating equipment
CSA C22.2 No. 30- M1986 (R2012)	Explosion-Proof Enclosures for Use in Class I Hazardous Locations
CSA C22.2 No 60079-0:11	Explosive atmospheres - Part 0: Equipment - General requirements
CSA C22.2 No 60079-1:11	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
CSA C22.2 No 60529:05 (R2010)	Degrees of Protection Provided by Enclosures (IP Code)
CSA C22.2 No 25:1966	Enclosures for Use in Class II Groups E, F, and G Hazardous Locations
CSA C22.2 No 94.2:15	Enclosures for electrical equipment, environmental considerations
ISA 60079-0 (12.00.01): 2009 (IEC ed.4 2009 mod.)	Electrical Apparatus for Use in Class I, Zone 0, 1 & 2 Hazardous (Classified) Locations: General requirements
ISA-60079-1 (12.22.01): 2009	Electrical Apparatus for Use in Class I, Zone 1 Hazardous (Classified) Locations: Type of Protection Flameproof “d”
UL1203: 2013	Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations
UL1030: 2010	Sheated heating elements
UL50E: 2015	Enclosures for electrical equipment, environmental considerations
ANSI/IEC 60529: 2004	Degrees of Protection Provided by Enclosures (IP Code)

MARKINGS

The manufacturer is required to apply the following markings:

- Products shall be marked with the markings specified by the particular product standard.
- Products certified for Canada shall have all Caution and Warning markings in both English and French.

Additional bilingual markings not covered by the product standard(s) may be required by the Authorities Having Jurisdiction. It is the responsibility of the manufacturer to provide and apply these additional markings, where applicable, in accordance with the requirements of those authorities.

The products listed are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US (indicating that products have been manufactured to the requirements of both Canadian and U.S. Standards) or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Markings etched on metallic nameplates (0.5mm minimum, secured to the enclosure by means of rivets) attached to the product.

1. Submittor's identification (company name and/or file number and/or registered tradename);
2. Model designation;
3. Date of manufacture (or traceable serial number);
4. The $_{C}CSA_{US}$ Monogram
5. Hazardous area;
6. Ambient temperature range;
7. Electrical ratings;
8. CSA Certificate number CSA.15. 70016751
9. Warning: ‘DO NOT OPEN WHILE ENERGIZED/NE PAS OUVRIR SOUS TENSION’
10. “Supply cable shall be suitable for __°C”, refer to column B of above tables for temperature of cable.
11. Warning: “A seal shall be installed within 50mm of the enclosure” and “Un scellement doit être installé à moins de 50mm du boitier”

See markings documents 7657252 00 dated 27.03.2015 and 7657251 00 dated 27.03.2015

Supplement to Certificate of Compliance

Certificate: 70016751 **Master Contract:** 263979

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
70016751	April 22, 2016	Original Certification.