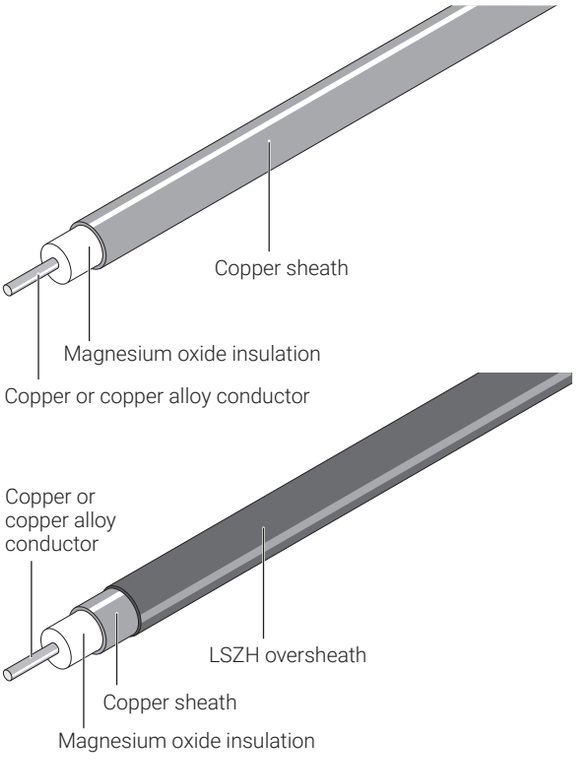
Mineral insulated (MI) copper sheathed heating cable

PRODUCT OVERVIEW



nVent RAYCHEM HCH/HCC mineral insulated (MI) Copper series heating cables are suited for use in hazardous areas. They are extensively used in a wide variety of industrial heat-tracing applications, such as long line heating or condensation prevention at low temperatures, and domestic applications, such as under floor or road and ramp heating applications. The copper heating cables with copper conductors (HCC) are available in very low resistances to allow for long line applications with a limited amount of supply points when the maximum operating sheath temperature does not exceed 200°C. The typical maximum power output goes up to 50 W/m. Cables are available with an optional LSZH (Low Smoke Zero Halogen) over-sheath for enhanced corrosion protection up to 80°C, usually applied when buried in concrete. The heating cables are offered as bulk cable as well as factory-terminated heating units to ensure optimum quality of the connections. The offering is completed with a full range of components for installation, connection and splicing of the heating cables.

PRODUCT SPECIFICATIONS

Technical details

Cable sheath material	Copper	
Conductor material	Copper (HCC) or Copper Alloy (HCH)	
Max. exposure temperature	200°C**	
Min. installation temperature	–60°C	
Min. bending radius	6 x outer diameter at –60°C	
Max. supply voltage and power	Voltage (U0/U) 300/500 Vac	Max. power output* 50 W/m *typical value, depending on application
Earth leakage	3 mA/100 m (nominal at 20°C, 230 Vac, 50 - 60Hz)	
Min. cable spacing	25 mm for hazardous areas	

**** Note:** Cables available with optional additional oversheath for corrosion protection:
– LSZH (Max Sheath temp 80°C) – add R to the ref. (HCHR...)
For LSZH add 1.8 mm to cable OD.

RAYCHEM-DS-EU1388-HCHHCC-EN-2401

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MI series heating cables HCH/HCC

Order Reference	Nominal resistance (Ω/km @ 20°C)	Outer diameter (mm)	Temp. coefficient (x 10^{-3}/K)	Max. coil length [m]	Nom.weight (kg/km)
HCH1L2000(1)	2000	2.8	0.4	1200	31
HCH1L1250(1)	1250	2.8	0.4	1200	32
HCH1M800	800	3.5	0.4	900	50
HCH1M630	630	4	0.4	1100	65
HCH1M450	450	4	0.4	1000	67
HCH1M315	315	4.3	0.4	1000	77
HCH1M220	220	4.5	0.4	1000	85
HCH1M140	140	4.9	0.4	1000	102
HCH1M100	100	5.2	0.4	800	125
HCC1M63	63	3.2	3.9	2000	41
HCC1M40	40	3.4	3.9	2000	46
HCC1M25	25	3.7	3.9	1600	56
HCC1M17	17	4.6	3.9	500	85
HCC1M11	11	4.9	3.9	500	98
HCC1M7	7	5.3	3.9	400	118
HCC1M4	4	5.9	3.9	800	150
HCC1M2.87	2.87	6.4	3.9	650	170
HCC1M1.72	1.72	7.3	3.9	500	235
HCC1M1.08	1.08	8.3	3.9	400	326

(1) Not approved for hazardous areas, maximum 300 Vac.

Recommended cold leads for HCH/HCC MI series heating cables

Cold Lead Code	Sheath Material	Current Rating (A)	Voltage Rating (Vac)	No of Conductors	Design*	Cable O.D. (mm)	Pigtail Size (mm²)	Gland Size
C31A	Copper	31	600	1	B	5.8	2.1	M25
C41A	Copper	41	600	1	B	7	3.3	M25
C54A	Copper	54	600	1	B	6.2	5.3	M25
C70A	Copper	70	600	1	B	7.6	8.4	M25
C94A	Copper	94	600	1	B	8.6	13.3	M25
C127A	Copper	127	600	1	B	10.2	21.1	M25

* For details on the different heating unit designs, refer to chapter MI heating Systems - MI heating Cables in the Databook (reference DOC-2210)

Nickel plated brass glands are standard on all copper sheathed heating units. Other materials are possible, contact nVent for more information. If a cold lead has an LSZH oversheath, the C in the order reference becomes an R. (example : C31A becomes R31A)

Delivery length of bulk cable on coil depends on type of resistance and is limited by max. coil length as indicated in the table on top. Factory terminated elements are limited by a max. weight of 50 kg, however to ensure practical and safe on-site handling, it is strongly recommended to limit element lengths to 25 - 30 kg. Not all resistances are standard items and as such may not be in stock.

Contact nVent to confirm lead time. nVent requires the use of a 30 mA residual current device to provide maximum safety and protection from fire.

Where design results in higher leakage current, the preferred trip level for adjustable devices is 30 mA above any inherent capacitive leakage characteristic of the heater as specified by the trace heater supplier or alternatively, the next common available trip level for non adjustable devices, with a maximum of 300 mA. All safety aspects need to be proven.

Also refer to the components section for more details on heating units, accessories and nomenclatures.

Chemical resistance

Sheath Material	Maximum Cable Sheath Temp (°C)	Description	Sulphuric Acid	Hydro-chloric Acid	Hydro-fluoric Acid	Alkalis	Phosphoric Acid	Sea Water	Nitric Acid	Chloride	Organic Acid
Copper-LSZH	80	Copper with Low Smoke Zero Halogen oversheath	GE	GE	A	A	A	NR	A	A	
Copper	200	Copper	NR	NR	A	A	NR	A	A	NR	X

Note: NR Not recommended, A acceptable, GE Good to excellent, X Check for specific data.
Corrosion resistance data is dependent on temperature and concentration.

APPROVALS

For use in ordinary and hazardous* area Zone 1 and Zone 2 (Gas), Zone 21 and Zone 22 (Dust)
*Cable types HCH1L2000 and HCH1L1250 can only be used in ordinary areas

Temperature classification
T6...T2
nVent RAYCHEM heat-tracing products are approved for the listed temperature classifications by using the principles of stabilized design. Use TraceCalc design software or contact nVent.

Product certification

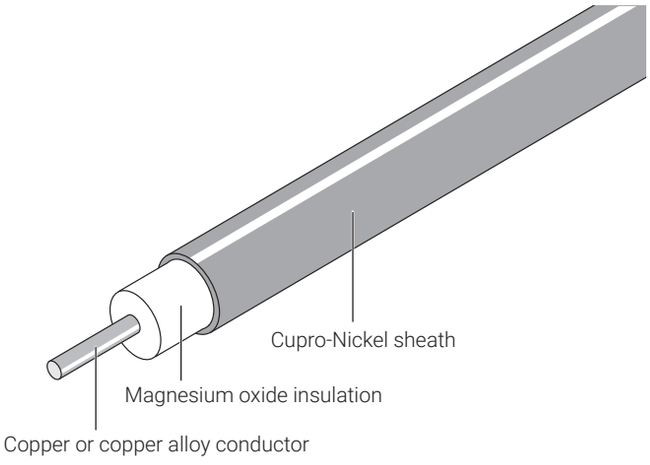
More details about product certification, approvals and conditions of safe use are available in the installation manual at www.nVent.com/RAYCHEM.

ORDERING INFORMATION

- Due to the sensitivity & craftsmanship required to assemble an MI heating unit, they are usually purchased as factory terminated units. Refer to the "MI Heating Systems Nomenclature" datasheet for more information on the ordering references for complete units or contact your local nVent representative.
  It is strongly recommended to use nVent design software such as TraceCalc Pro to validate the design and ordering string.
- To purchase MI heating cables in bulk, refer to the tables with the cable references on p. 2 of this document.

Mineral insulated Cupro-Nickel sheathed heating cable

PRODUCT OVERVIEW



nVent RAYCHEM HDC/HDF mineral insulated (MI) Cupro-Nickel series heating cables are suited for use in hazardous areas. They are extensively used for a wide variety of industries, such as oil and gas, chemical and petrochemical, power generation, gas storage and many other industrial applications. Cupro-Nickel heating cables with copper conductors (HDC) are available in very low resistances to allow for long line applications with a limited amount of supply points, in particular for applications exceeding the capabilities of Polymer Insulated (PI) series heating cables. The heating cables can be used for exposure temperatures up to 400°C and a typical power output up to 70 W/m. The heating cables are offered as bulk cable as well as factory-terminated heating units to ensure optimum quality of the connections. The offering is completed with a full range of components for installation, connection and splicing of the heating cables.

PRODUCT SPECIFICATIONS

Cable sheath material	70/30 Cupro-Nickel	
Conductor material	Copper (HDC) or Copper Alloy (HDF)	
Max. exposure temperature	400°C	
Min. installation temperature	–60°C	
Min. bending radius	6 x outer diameter at –60°C	
Max. supply voltage and power	Voltage (U_0/U) 300/500 Vac	Max. power output* 70 W/m *typical value, depending on application
Earth leakage	3 mA/100 m (nominal at 20°C, 230 Vac, 50 - 60 Hz)	
Min. cable spacing	25 mm for hazardous areas	

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MI series heating cables HDF/HDC

Order reference	Nominal resistance (Ω/km @ 20°C)	Outer diameter (mm)	Temp. coefficient (x 10^{-3}/K)	Max. coil length [m]	Nom.weight (kg/km)
HDF1M1600	1600	3.2	0.04	625	40
HDF1M1000	1000	3.4	0.04	550	45
HDF1M630	630	3.7	0.04	465	55
HDF1M400	400	4	0.04	400	67
HDF1M250	250	4.4	0.04	330	84
HDF1M160	160	4.9	0.04	265	108
HDC1M63	63	3.2	3.9	620	39
HDC1M40	40	3.4	3.9	550	44
HDC1M25	25	3.7	3.9	440	55
HDC1M17	17	4.6	3.9	300	84
HDC1M11	11	4.9	3.9	265	98
HDC1M7	7	5.3	3.9	225	119
HDC1M4	4	5.9	3.9	180	155

Recommended cold leads for HDF/HDC MI series heating cables

Cold lead code	Sheath material	Current rating (A)	Voltage rating (Vac)	No of conductors	Design*	Cable O.D. (mm)	Pigtail size (mm²)	Gland size
S33A	Alloy 825	33	600	1	B	5.5	3.3	M25
S55A	Alloy 825	55	600	1	B	6.4	8.4	M25
S76A	Alloy 825	76	600	1	B	8.1	13.3	M25
S123A	Alloy 825	123	600	1	B	10.2	21.1	M25

* For details on the different heating unit designs, refer to chapter MI heating Systems - MI heating Cables in the Databook (reference DOC2210)

Nickel plated brass glands are standard on all heating units. Other materials are possible, contact nVent for more information. Cold leads attached to cupro nickel sheathed heating cables are provided with an Alloy 825 outer sheath. As the cold lead is an exposed component, not protected by insulation, it can be subject to extremely variable corrosive environments. The Alloy 825 sheath provides enhanced life expectancy with a superior level of corrosion protection against a wide range of exposure conditions.

By default, all cold leads are supplied with M25 glands intended for use with a standardized range of nVent RAYCHEM MI junction boxes which include an integral earth plate.

Delivery length of bulk cable on coil depends on type of resistance and is limited by max. coil length as indicated in the table on top. Factory terminated elements are limited by a max. weight of 50 kg, however to ensure practical and safe on-site handling, it is strongly recommended to limit element lengths to 25 - 30 kg. Not all resistances are standard items and as such may not be in stock. Contact nVent to confirm lead time. nVent requires the use of a 30 mA residual current device to provide maximum safety and protection from fire.

Where design results in higher leakage current, the preferred trip level for adjustable devices is 30 mA above any inherent capacitive leakage characteristic of the heater as specified by the trace heater supplier or alternatively, the next common available trip level for non adjustable devices, with a maximum of 300 mA. All safety aspects need to be proven.

Also refer to the components section for more details on heating units, accessories and nomenclatures.

Chemical resistance

Sheath material	Maximum cable sheath temp (°C)	Description	Sulphuric acid	Hydrochloric acid	Hydrofluoric acid	Phosphoric acid	Nitric acid	Organic acid	Alkalis	Sea water	Chloride
Cupro-Nickel	400	Cupro-Nickel alloy 70% copper 30% nickel	NR	X	X	X	X	X	X	GE	GE

Note: NR Not recommended, A acceptable, GE Good to excellent, X Check for specific data
Corrosion resistance data is dependent on temperature and concentration.

APPROVALS

For use in ordinary and hazardous area Zone 1 and Zone 2 (Gas), Zone 21 and Zone 22 (Dust)

Temperature classification

T6 ... T1

nVent RAYCHEM heat-tracing products are approved for the listed temperature classifications by using the principles of stabilized design. Use TraceCalc design software or contact nVent.

Product certification

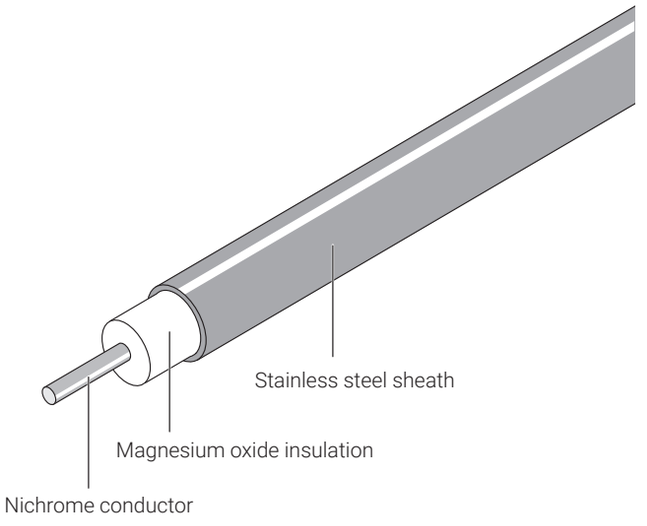
More details about product certification, approvals and conditions of safe use are available in the installation manual for Mineral Insulated (MI) series heating systems at www.nVent.com/RAYCHEM.

ORDERING INFORMATION

- Due to the sensitivity & required craftsmanship to assemble an MI heating unit, they are usually purchased as factory terminated units. Refer to the "MI Heating Systems Nomenclature" datasheet for more information on the ordering references for complete units or contact your local nVent representative.
  It is strongly recommended to use nVent design software such as TraceCalc Pro to validate the design and ordering string.
- To purchase MI heating cables in bulk, refer to the tables with the cable references on page 2 of this document.

Mineral insulated (MI) stainless steel sheathed heating cable

PRODUCT OVERVIEW



nVent RAYCHEM HSQ mineral insulated (MI) Stainless steel series heating cables are suited for use in hazardous areas. The Stainless steel sheath offers excellent corrosive properties against a wide range of organic acids and alkalis in combination with a high temperature withstand capability. HSQ cables are typically used in bitumen plants, gas plants, oil refineries, reactors and vessels, sodium loops and a wide variety of other heat-tracing applications where temperature resistance, power output and durability are paramount. The heating cables can be used for exposure temperatures up to 680°C and a typical power output up to 150 W/m. Higher temperatures and power outputs can be achieved, contact nVent for assistance. The heating cables are offered as bulk cables as well as factory-terminated heating units employing brazing or laser welding techniques to ensure optimum quality of the connections. The offering is completed with a full range of components for installation, connection and splicing of the heating cables.

PRODUCT SPECIFICATIONS

Technical details

Cable sheath material	321 Stainless steel	
Conductor material	Nichrome	
Max. exposure temperature	550°C (brazed heating units) 680°C* (laser welded heating units) *Higher temperatures can be realized, contact nVent	
Min. installation temperature	–60°C	
Min. bending radius	6 x outer diameter at –60°C	
Max. supply voltage and power	Voltage (Uo/U) 300/500 Vac 460/600 Vac (laser welded heating units)	Max. power output* 150 W/m *typical value, depending on application
Earth leakage	3 mA/100 m (nominal at 20°C, 230 Vac, 50 - 60 Hz)	
Min. cable spacing	25 mm for hazardous areas	

RAYCHEM-DS-EU1390-HSQ-EN-2401

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MI series heating cables HSQ

Order Reference	Nominal Resistance (Ω/km @ 20°C)	Outer Diameter (mm)	Temp. Coefficient (x 10^{-3}/K)	Max. Coil Length [m]	Nom. Weight (kg/km)
HSQ1M10K	10000	3.2	0.09	740	39
HSQ1M6300	6300	3.2	0.09	741	39
HSQ1M4000	4000	3.2	0.09	743	39
HSQ1M2500	2500	3.4	0.09	660	46
HSQ1M1600	1600	3.6	0.09	591	52
HSQ1M1000	1000	3.9	0.09	506	62
HSQ1M630	630	4.3	0.09	419	78
HSQ1M400	400	4.7	0.09	354	96
HSQ1M250	250	5.3	0.09	280	127
HSQ1M160	160	6.5	0.09	187	191

Recommended cold leads for HSQ MI series heating cables

Cold Lead Code	Sheath Material	Current Rating (A)	Voltage Rating (Vac)	No. of Conductors	Design*	Cable O.D. (mm)	Pigtail Size (mm²)	Gland Size
S33A	Alloy 825	33	600	1	B	5.5	3.3	M25
S55A	Alloy 825	55	600	1	B	6.4	8.4	M25
SC33A	Stainless steel	33	600	1	B	5.5	3.3	M25
SC55A	Stainless steel	55	600	1	B	6.4	8.4	M25

* For details on the different heating unit designs, refer to chapter MI heating Systems - MI heating Cables in the Databook (reference DOC2210)

Nickle plated brass glands are standard on all heating units. Other materials are possible, contact nVent for more information.

Cold leads attached to HSQ heating cables are provided with an Alloy 825 outer sheath when the joint connection method is brazed or SS321 sheath when the connection method is laser welded. As the cold lead is an exposed component, not protected by insulation, it can be subject to extremely variable corrosive environments. The Alloy 825 sheath provides enhanced life expectancy with a superior level of corrosion protection against a wide range of exposure conditions.

By default, all cold leads are supplied with M25 glands intended for use with a standardized range of nVent RAYCHEM MI junction boxes which include an integral earth plate. Delivery length of bulk cable on coil depends on type of resistance and is limited by max. coil length as indicated in the table on top. Factory terminated elements are limited by a max. weight of 50 kg, however to ensure practical and safe on-site handling, it is strongly recommended to limit element lengths to 25 - 30 kg. Not all resistances are standard items and as such may not be in stock. Contact nVent to confirm lead time. nVent requires the use of a 30 mA residual current device to provide maximum safety and protection from fire.

Where design results in higher leakage current, the preferred trip level for adjustable devices is 30 mA above any inherent capacitive leakage characteristic of the heater as specified by the trace heater supplier or alternatively, the next common available trip level for non adjustable devices, with a maximum of 300 mA. All safety aspects need to be proven.

Also refer to the components section for more details on heating units, accessories and nomenclatures.

Table 3 Chemical resistance

Sheath Material	Description	Sulphuric Acid	Hydrochloric Acid	Hydrofluoric Acid	Phosphoric Acid	Nitric Acid	Organic Acid	Alkalis	Sea Water	Chloride
Stainless Steel 321 DIN 1.4541	18/8 austenitic stainless steel with added titanium	NR	NR	NR	NR	X	GE	A	NR	NR

Note: NR - Not recommended, A - Acceptable, GE - Good to excellent, X - Check for specific data
Temperature limitation based on construction of heating element.
Corrosion resistance data is dependent on temperature and concentration.

APPROVALS

For use in ordinary and hazardous area Zone 1 and Zone 2 (Gas), Zone 21 and Zone 22 (Dust)

Temperature Classification

T6 ... T1

nVent RAYCHEM heat-tracing products are approved for the listed temperature classifications by using the principles of stabilized design. Use TraceCalc design software or contact nVent.

Product certification

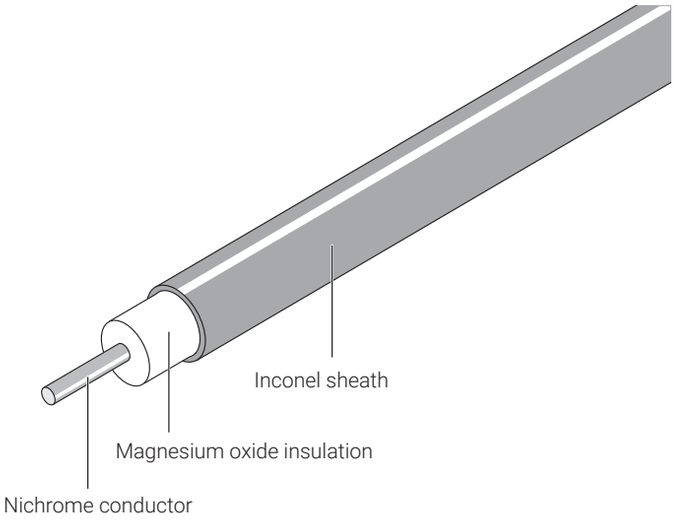
More details about product certification, approvals and conditions of safe use are available in the installation manual at www.nVent.com/RAYCHEM.

ORDERING INFORMATION

- Due to the sensitivity & craftsmanship required to assemble an MI heating unit, they are usually purchased as factory terminated units. Refer to the "MI Heating Systems Nomenclature" datasheet for more information on the ordering references for complete units or contact your local nVent representative.
  It is strongly recommended to use nVent design software such as TraceCalc Pro to validate the design and ordering string.
- To purchase MI heating cables in bulk, refer to the tables with the cable references on page 2 in this document.

Mineral insulated (MI) Inconel sheathed heating cable

PRODUCT OVERVIEW



nVent RAYCHEM HIQ mineral insulated (MI) Inconel 600 series heating cables are suited for use in hazardous areas. The Inconel 600 sheath offers excellent corrosive properties against a wide range of organic acids and alkalis, as well as chloride stress-corrosion cracking, in combination with a high temperature withstand capability. HIQ cables are typically used in bitumen plants, gas plants, oil refineries, reactors and vessels, sodium loops and a wide variety of other heat-tracing applications where temperature resistance, power output and durability are required and exceed the limitations of stainless steel sheathed MI heating cables. The heating cables can be used for exposure temperatures up to 680°C and a typical power output up to 300 W/m. Higher temperatures and power outputs can be achieved, contact nVent for assistance. The heating cables are offered as bulk cables as well as factory-terminated heating units employing brazing or laser welding techniques to ensure optimum quality of the connections. The offering is completed with a full range of components for installation, connection and splicing of the heating cables.

PRODUCT SPECIFICATIONS

Technical details

Cable sheath material	Inconel 600	
Conductor material	Nichrome	
Max. exposure temperature	550°C (brazed heating units) 680°C* (laser welded heating units) *Higher temperatures can be realized, contact nVent	
Min. installation temperature	–60°C	
Min. bending radius	6 x outer diameter at –60°C	
Max. supply voltage and power	Voltage (U0/U)	Max. power output*
	300/500 Vac	300 W/m
	460/600 Vac (laser welded heating units)	*typical value, depending on application
Earth leakage	3 mA/100 m (nominal at 20°C)	
Min. cable spacing	25 mm for hazardous areas	

MI series heating cables HIQ

Order Reference	Nominal Resistance (Ω/Km @ 20°C)	Outer Diameter (mm)	Temp. Coefficient (x 10^{-3}/K)	Max. Coil Length [m]	Nom.Weight (kg/km)
HIQ1M10K	10000	3.2	0.09	772	39
HIQ1M6300	6300	3.2	0.09	774	39
HIQ1M4000	4000	3.2	0.09	776	39
HIQ1M2500	2500	3.4	0.09	689	46
HIQ1M1600	1600	3.6	0.09	617	52
HIQ1M1000	1000	3.9	0.09	528	62
HIQ1M630	630	4.3	0.09	437	78
HIQ1M400	400	4.7	0.09	368	96
HIQ1M250	250	5.3	0.09	292	127
HIQ1M160	160	6.5	0.09	194	191

Recommended cold leads for HIQ MI series heating cables

Cold Lead Code	Sheath Material	Current Rating (A)	Voltage Rating (Vac)	No of Conductors	Design*	Cable O.D. (mm)	Pigtail Size (mm²)	Gland Size
S33A	Alloy 825	33	600	1	B	5.5	3.3	M25
S55A	Alloy 825	55	600	1	B	6.4	8.4	M25

* For details on the different heating unit designs, refer to chapter MI heating Systems - MI heating Cables in the Databook (reference DOC2210)

Nickel plated brass glands are standard on all heating units. Other materials are possible, contact nVent for more information.

Delivery length of bulk cable on coil depends on type of resistance and is limited by max. coil length as indicated in the table on top. Factory terminated elements are limited by a max. weight of 50 kg, however to ensure practical and safe on-site handling, it is strongly recommended to limit element lengths to 25 - 30 kg. Not all resistances are standard items and as such may not be in stock. Contact nVent to confirm lead time. nVent requires the use of a 30 mA residual current device to provide maximum safety and protection from fire.

Where design results in higher leakage current, the preferred trip level for adjustable devices is 30 mA above any inherent capacitive leakage characteristic of the heater as specified by the trace heater supplier or alternatively, the next common available trip level for non adjustable devices, with a maximum of 300 mA. All safety aspects need to be proven.

Also refer to the components section for more details on heating units, accessories and nomenclatures.

MI heating cable sheath corrosion resistance and temperature data

Sheath Material	Description	Sulphuric Acid	Hydrochloric Acid	Hydrofluoric Acid	Phosphoric Acid	Nitric Acid	Organic Acid	Alkalis	Sea Water	Chloride
Inconel 600 DIN 2.4816	High nickel, high chromium content inconel alloy 600	X	X	A	X	X	GE	GE	A	GE

Note: NR - Not recommended, A - Acceptable, GE - Good to excellent, X - Check for specific data
Temperature limitation based on construction of heating element.
Corrosion resistance data is dependent on temperature and concentration.

APPROVALS

For use in ordinary and hazardous area Zone 1 and Zone 2 (Gas), Zone 21 and Zone 22 (Dust)

Temperature classification

T6 ... T1

nVent RAYCHEM heat-tracing products are approved for the listed temperature classifications by using the principles of stabilized design. Use TraceCalc design software or contact nVent.

Product certification

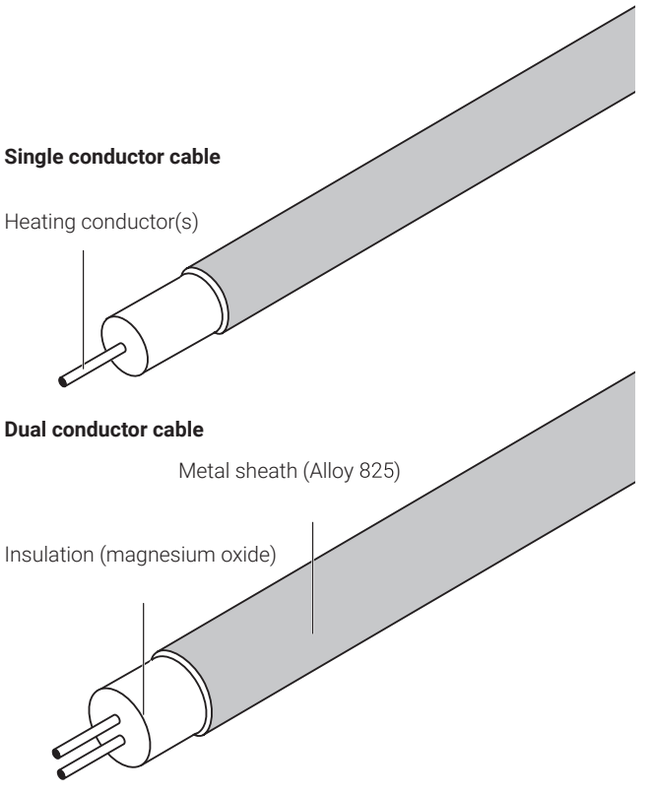
More details about product certification, approvals and conditions of safe use are available in the Mineral Insulated (MI) series heating systems installation manual at www.nVent.com/RAYCHEM.

ORDERING INFORMATION

- Due to the sensitivity & craftsmanship required to assemble an MI heating unit, they are usually purchased as factory terminated units. Refer to the "MI Heating Systems Nomenclature" datasheet for more information on the ordering references for complete units or contact your local nVent representative.
  It is strongly recommended to use nVent design software such as TraceCalc Pro to validate the design and ordering string.
- To purchase MI heating cables in bulk, refer to the tables with the cable references on page 52 in this document.

Mineral insulated (MI) Alloy 825 heating cable

PRODUCT OVERVIEW



nVent RAYCHEM HAx mineral insulated (MI) Alloy 825 series heating cables are suitable for use in hazardous areas. They have been designed for use in freeze protection and temperature maintenance applications of pipes, tanks and other equipment.

MI heating cables of the HAx-series offer an ideal combination of ruggedness, high temperature withstand capability and corrosion resistance and can therefore be used for a wide variety of heat-tracing applications, in particular for applications with high power requirements and for temperatures exceeding the capabilities of polymer insulated (PI) series heating cables.

The heating cables can be used for exposure temperatures of up to 600°C and a typical power output of up to 270 W/m. Higher temperatures and power outputs can be achieved, contact nVent for assistance.

HAx mineral insulated (MI) heating cables are available as single and dual conductor construction and in a very wide range of resistances. The use of dual conductor heating cables can significantly reduce total installed cost and simplifies installation, in particular for small pipes and instrument tubing.

The heating cables are offered as bulk cable as well as factory terminated heating units employing brazing and laser welding technology. The offering is completed with a full range of components for installation, connection and splicing of the heating cables.

PRODUCT SPECIFICATIONS

Technical Details

Cable sheath material	Alloy 825		
Conductor material	Various alloys and copper		
Max. exposure temperature	550°C (brazed heating units) 600°C* (laser welded heating units) *Higher temperatures can be realized, contact nVent		
Min. installation temperature	–60°C		
Min. bending radius	6 x OD (cable diameter) at –60°C		
Max. supply voltage and power	Voltage (U_0/U)	Max. power output*	Heating cable type
	600/600 Vac	210 W/m	HAx1N Single conductor cable, 600 V
	300/300 Vac	200 W/m	HAx2M Dual conductor cable, 300 V
	600/600 Vac	270 W/m	HAx2N Dual conductor cable, 600 V
		*typical value, depending on application	
Earth leakage	3 mA /100 m (nominal at 20°C, 230 Vac, 50 - 60 Hz)		
Min. cable spacing	25 mm for hazardous areas		

RAYCHEM-DS-EU1391-HAX-EN-2401

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Table 1 MI series heating cables HAx2M (Dual conductor cable, 300 V)

Order Reference	Nominal Resistance (Ω/km @ 20°C)	Outer Diameter (mm)	Temp. Coefficient (x 10^{-3}/K)	Max. Coil Length [m]	Nom. Weight (kg/km)	Part Number PN
HAF2M59K	59000	4.4	0.09	387	73	32SF1180
HAF2M36K	36000	4	0.09	483	60	32SF1110
HAF2M29.5K	29500	4.1	0.09	459	63	32SF2900
HAF2M24.5K	24500	4	0.09	477	61	32SF2750
HAA2M19.7K	19700	4.1	0.09	459	63	32SA2600
HAA2M13.2K	13200	3.7	0.09	554	54	32SA2400
HAA2M10.4K	10400	4.4	0.09	389	74	32SA2318
HAA2M9000	9000	3.9	0.09	505	60	32SA2275
HAA2M6600	6600	4.3	0.09	414	73	32SA2200
HAA2M5600	5600	4.2	0.09	425	72	32SA2170
HAB2M3750	3750	4.4	0.04	390	76	32SB2114
HAB2M3000	3000	4.1	0.04	451	67	32SB3914
HAB2M2300	2300	4.3	0.04	411	74	32SB3700
HAQ2M1560	1560	4.5	0.5	376	78	32SQ3472
HAQ2M1240	1240	4.6	0.5	352	82	32SQ3374
HAQ2M965	965	4.5	0.5	368	79	32SQ3293
HAQ2M660	660	4.1	0.5	457	66	32SQ3200
HAQ2M495	495	4.3	0.5	420	73	32SQ3150
HAQ2M330	330	4.7	0.5	348	89	32SQ3100
HAP2M240	240	4.4	1.3	391	78	32SP4734
HAP2M190	190	4.5	1.3	375	82	32SP4583
HAP2M150	150	4.8	1.3	337	62	32SP4458
HAC2M105	105	4.7	3.9	349	85	32SC4324

Table 2 MI series heating cables HAx2N (Dual conductor cable, 600 V)

Order Reference	Nominal Resistance (Ω/km @ 20°C)	Outer Diameter (mm)	Temp. Coefficient (x 10^{-3}/K)	Max. Coil Length [m]	Nom. Weight (kg/km)	Part Number PN
HAF2N36K	36000	4.9	0.09	312	91	62SF1110
HAF2N29.5K	29500	4.9	0.09	312	91	62SF2900
HAF2N24.5K	24500	5.2	0.09	279	103	62SF2750
HAF2N19.7K	19700	5.8	0.09	222	128	62SF2600
HAA2N13.6K	13600	6.1	0.09	204	140	62SA2414
HAA2N9000	9000	5.7	0.09	232	125	62SA2275
HAF2N6600	6600	6.2	0.09	196	149	62SF2200
HAA2N5600	5600	6.1	0.09	205	143	62SA2170
HAT2N3750	3750	5.5	0.18	254	113	62ST2115
HAB2N3000	3000	5.9	0.04	219	132	62SB3914
HAB2N2300	2300	6.7	0.04	168	174	62SB3700
HAT2N1670	1670	5.5	0.18	255	115	62ST3505
HAQ2N1240	1240	5.5	0.5	254	113	62SQ3374
HAQ2N940	940	5.6	0.5	239	121	62SQ3286
HAQ2N660	660	5.8	0.5	229	128	62SQ3200
HAQ2N495	495	5.8	0.5	229	128	62SQ3150
HAQ2N330	330	6.5	0.5	179	165	62SQ3100
HAP2N255	255	6.4	1.3	188	155	62SP4775
HAP2N185	185	6.7	1.3	171	173	62SP4561
HAP2N130	130	7	1.3	154	194	62SP4402
HAP2N92	92	7.4	1.3	139	219	62SP4281
HAC2N66	66	7.2	3.9	145	201	62SC4200

Order Reference	Nominal Resistance (Ω/km @ 20°C)	Outer Diameter (mm)	Temp. Coefficient (x 10^{-3}/K)	Max. Coil Length [m]	Nom. Weight (kg/km)	Part Number PN
HAC2N43	43	7.7	3.9	128	233	62SC4130
HAC2N27	27	8.4	3.9	100	279	62SC5818
HAC2N17	17	9.2	3.9	90	343	62SC5516
HAC2N10.5	10.5	10.2	3.9	74	432	62SC5324
HAC2N6.6	6.6	12.6	3.9	48	653	62SC5204
HAC2N4.3	4.3	13.8	3.9	143	769	62SC5128

Table 3 MI series heating cables HAx1N (Single conductor cable, 600 V)

Order Reference	Nominal Resistance (Ω/km @ 20°C)	Outer Diameter (mm)	Temp. Coefficient (x 10^{-3}/K)	Max. Coil Length [m]	Nom. Weight (kg/km)	Part Number PN
HAA1N6565	6565	4.3	0.085	406	75	61SA2200
HAA1N5250	5250	4.1	0.085	443	66	61SA2160
HAA1N4300	4300	4.1	0.085	460	63	61SA2130
HAA1N3300	3300	4.1	0.085	460	64	61SA2100
HAA1N2800	2800	4.3	0.085	408	72	61SA3850
HAA1N2300	2300	4.1	0.085	462	64	61SA3700
HAA1N1640	1640	4.3	0.085	410	73	61SA3500
HAT1N920	920	4.3	0.18	408	72	61ST3280
HAB1N660	660	4.6	0.04	365	82	61SB3200
HAB1N500	500	4.3	0.04	412	76	61SB3150
HAQ1N390	390	4.4	0.5	384	75	61SQ3118
HAQ1N240	240	4.3	0.5	410	72	61SQ4732
HAQ1N190	190	4.4	0.5	399	75	61SQ4581
HAP1N155	155	4.3	1.3	408	72	61SP4467
HAP1N120	120	4.4	1.3	394	75	61SP4366
HAP1N95	95	4.5	1.3	377	79	61SP4290
HAP1N76	76	4.4	1.3	391	78	61SP4231
HAP1N60	60	4.3	1.3	411	75	61SP4183
HAP1N48	48	4.3	1.3	412	76	61SP4145
HAP1N37	37	4.7	1.3	345	91	61SP4113
HAC1N21.3	21.3	4.7	3.9	338	89	61SC5651
HAC1N13.5	13.5	4.9	3.9	326	95	61SC5409
HAC1N8.5	8.5	5.5	3.9	259	124	61SC5258
HAC1N5.3	5.3	6.8	3.9	166	192	61SC5162
HAC1N3.3	3.3	6.4	3.9	171	185	61SC5102
HAC1N2	2	8.1	3.9	119	294	61SC6640

Table 4 Recommended cold lead cables for HAx MI series heating cables

Cold Lead Code	Sheath Material	Current Rating (A)	Voltage Rating (Vac)	No of Conductors	Design*	Cable O.D. (mm)	Pigtail Size (mm²)	Gland Size
S33A	Alloy 825	33	600	1	B	5.5	3.3	M25
S55A	Alloy 825	55	600	1	B	6.4	8.4	M25
S76A	Alloy 825	76	600	1	B	8.1	13.3	M25
S123A	Alloy 825	123	600	1	B	10.2	21.1	M25
LS28A	Alloy 825	28	300	2	D or E	8.1	2.1	M25
S28A	Alloy 825	28	600	2	D or E	9	2.1	M25
S41A	Alloy 825	41	600	2	D or E	10.2	5.3	M25
S57A	Alloy 825	57	600	2	D or E	12.6	8.4	M25
S77A	Alloy 825	77	600	2	D or E	13.8	13.3	M25

* For details on the different heating unit designs, refer to the chapter MI Heating Systems - MI Heating Cables in the Databook.

Cold leads attached to HAx heating cables are provided with an Alloy 825 outer sheath. As the cold lead is an exposed component, not protected by insulation, it can be subject to extremely variable corrosive environments. The Alloy 825 sheath provides enhanced life expectancy with a superior level of corrosion protection against a wide range of exposure conditions.

By default, all cold leads are supplied with nickel plated brass M25 glands intended for use with a standardized range of nVent RAYCHEM MI junction boxes which include an integral earth plate.Other gland materials are possible, contact nVent for more information. Delivery length of bulk cable on coil depends on type of resistance and is limited by max. coil length as indicated in the table on top. Factory terminated elements are limited by a max. weight of 50 kg, however to ensure practical and safe on-site handling, it is strongly recommended to limit element lengths to 25 - 30 kg. Not all resistances are standard items and as such may not be in stock. Contact nVent to confirm lead time. nVent requires the use of a 30 mA residual current device to provide maximum safety and protection from fire.

Where design results in higher leakage current, the preferred trip level for adjustable devices is 30 mA above any inherent capacitive leakage characteristic of the heater as specified by the trace heater supplier or alternatively, the next common available trip level for non adjustable devices, with a maximum of 300 mA. All safety aspects need to be proven.

Table 5 Chemical resistance

Alloy	Maximum Cable Sheath Temp (°C)	Description	Nominal chemical composition, % (major elements)				High temperature resistance (+540°C)		Corrosion resistance									
			Nickel (+Cobalt)	Iron	Chromium	Other	Oxidation	Carburization	Sulfuric acid	Hydrochloric acid	Hydrofluoric acid	Phosphoric acid	Nitric acid	Organic acid	Alkalis	Salts	Seawater	Chloride cracking
INCOLOY Alloy 825 nickel-iron-chromium	550°C*	Excellent resistance to a wide variety of corrosives. Resists pitting and intergranular type corrosion, reducing acids and oxidizing chemicals	42	30	21.5	Mo 3.0 Cu 2.2	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E	G-E

From Huntington Alloys Publication 78-348-2

Note: NR - Not recommended, A - Acceptable, GE - Good to excellent, X - Check for specific data

* Temperature limitation based on construction of heating element.
Corrosion resistance data is dependent on temperature and concentration.

APPROVALS

For use in ordinary and hazardous area Zone 1 and Zone 2 (Gas), Zone 21 and Zone 22 (Dust)

Temperature classification

T6 ... T1

nVent RAYCHEM heat-tracing products are approved for the listed temperature classifications by using the principles of stabilized design. Use TraceCalc design software or contact nVent.

Product certification

More details about product certification, approvals and conditions of safe use are available in the Mineral Insulated (MI) series heating systems installation manual at www.nVent.com/RAYCHEM.

ORDERING INFORMATION

- Due to the sensitivity & craftsmanship required to assemble an MI heating unit, they are usually purchased as factory terminated units. Refer to the "MI Heating Systems Nomenclature" Datasheet for more information on the ordering references for complete units or contact your local nVent representative.
  It is strongly recommended to use nVent design software such as TraceCalc Pro to validate the design and ordering string.
- To purchase MI heating cables in bulk, refer to the tables with the cable references on page 2-3 in this document.