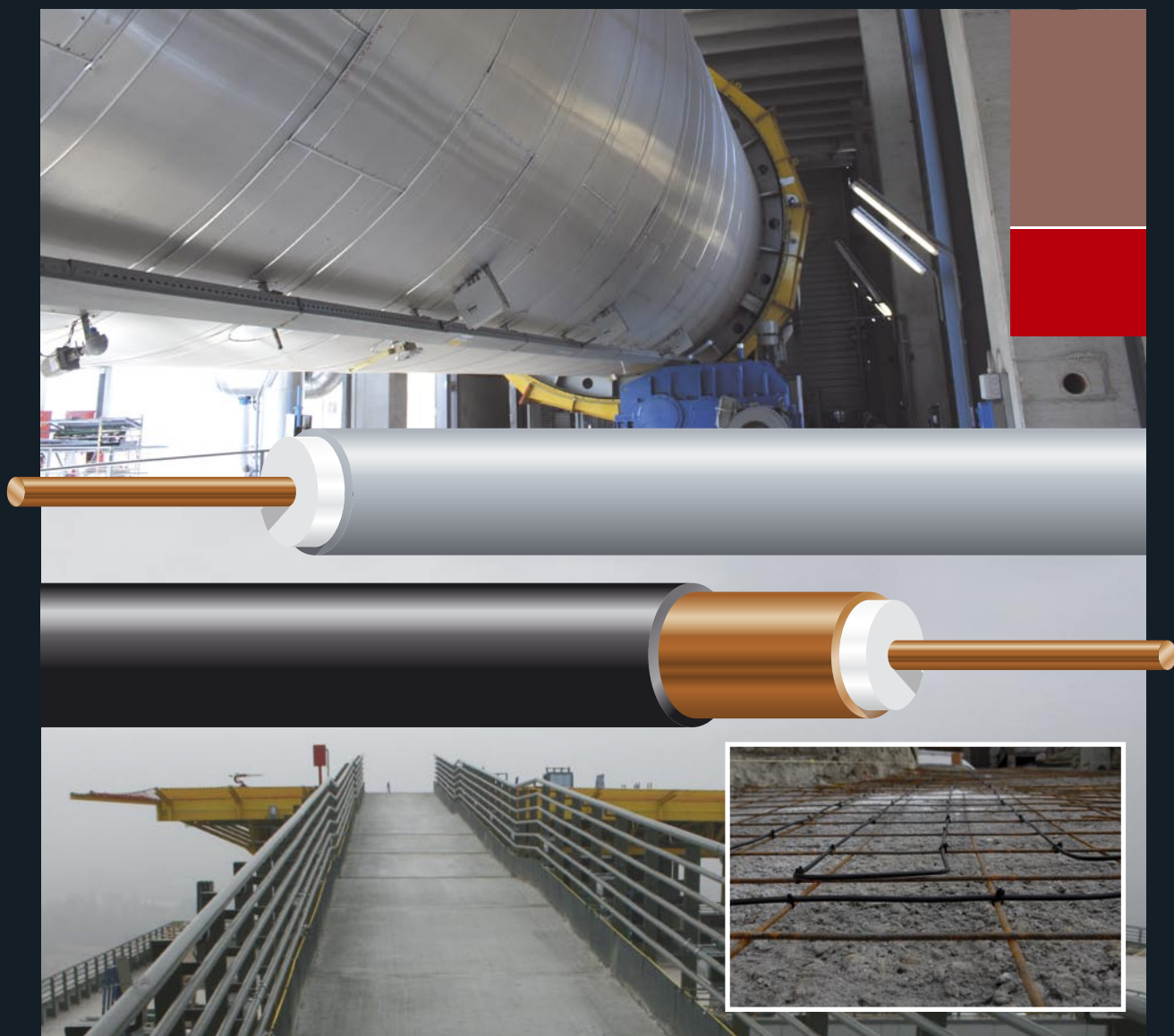


Mineral Insulated Heating Cables

KME Italy S.p.A.
[1]



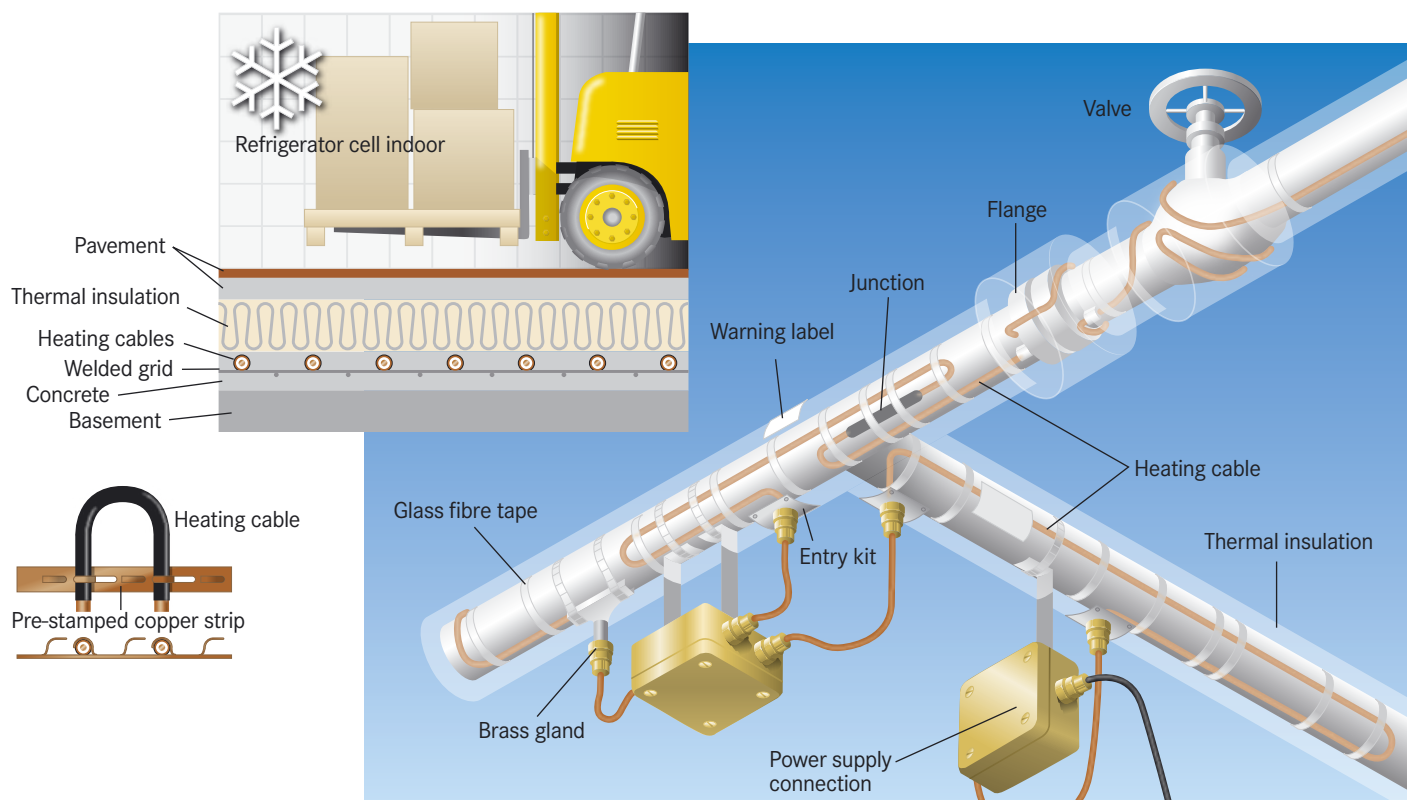
INDUSTRIAL APPLICATIONS

Frost protection or heating of an industrial process can be easily achieved by electric heat tracing. Mineral insulated heating cables becomes the best choice when:

- required specific power and/or process temperature is high
- metal cable systems are preferred due to environmental characteristics of installation site
- specific installation method requires circular or small diameter cables
- long cuts are required.

KME Italy, starting from usual project data, is able to offer power calculation, select the right cable type and, if required, supply complete heating units, ready to be connected to power supply.

Low temperatures inside refrigerator cells can slowly destroy basement of the building: to avoid this, it's extremely important to foresee an efficient and everlasting heating system, to compensate thermal losses through the insulation. Characteristics of Mineral insulated heating systems match exactly with over described specifics.

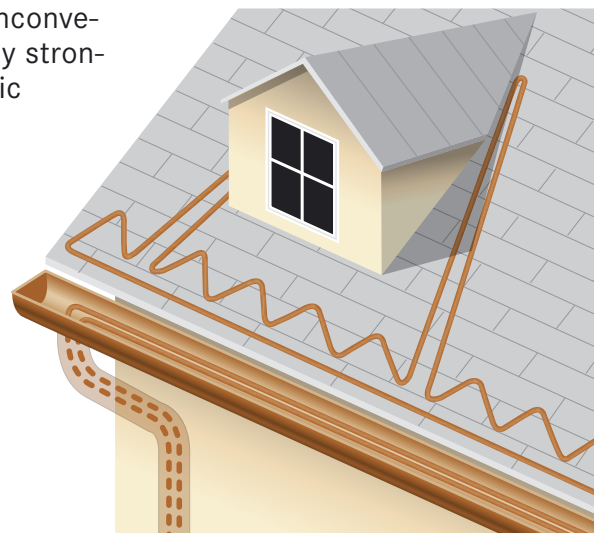
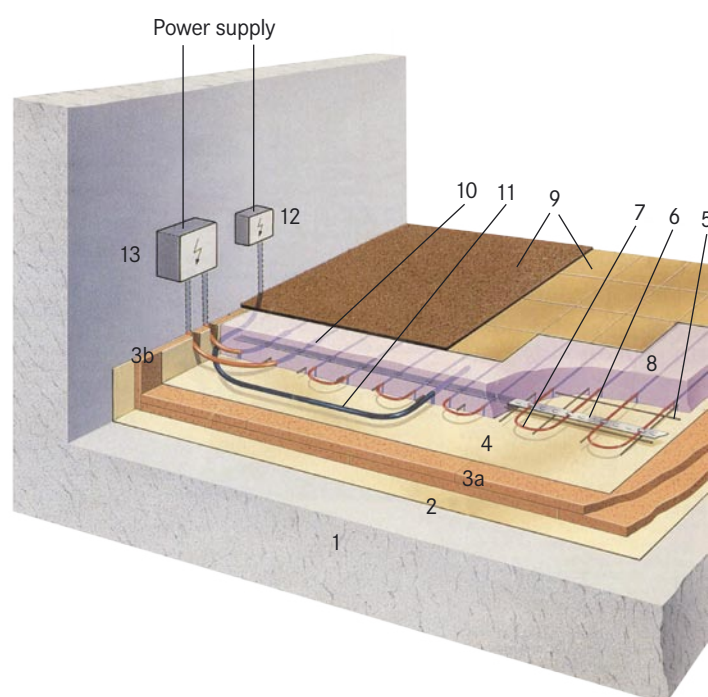


| OUTER SHEATH IN COPPER NICKEL AND CORE IN KUMAL (K) OR COPPER (C) | | | |
|--|--|-------------------|-----------|
| Cable type | Resistance Ω/km at 20° C | Ø outer sheath mm | Ø core mm |
| KN 1600 | 1.600 | 3,2 | 0,57 |
| KN 1000 | 1.000 | 3,4 | 0,72 |
| KN 630 | 630 | 3,7 | 0,91 |
| KN 400 | 400 | 4,0 | 1,14 |
| KN 250 | 250 | 4,4 | 1,45 |
| KN 160 | 160 | 4,9 | 1,81 |
| | | | |
| CN 63 | 63 | 3,2 | 0,59 |
| CN 40 | 40 | 3,4 | 0,74 |
| CN 25 | 25 | 3,7 | 0,94 |
| CN 17 | 17 | 4,6 | 1,13 |
| CN 11 | 11 | 4,9 | 1,38 |
| CN 7 | 7 | 5,3 | 1,78 |
| CN 4 | 4 | 5,9 | 2,25 |

| OUTER SHEATH IN INCONEL 600 OR SS, NICKEL-CHROME CORE | | | | |
|--|------------|--|-------------------|-----------|
| Cable type | Cable type | Resistance Ω/km at 20° C | Ø outer sheath mm | Ø core mm |
| TINC 10K | TI 10K | 10.000 | 3,2 | 0,38 |
| TINC 6300 | TI 6300 | 6.300 | 3,2 | 0,48 |
| TINC 4000 | TI 4000 | 4.000 | 3,2 | 0,61 |
| TINC 2500 | TI 2500 | 2.500 | 3,4 | 0,77 |
| TINC 1600 | TI 1600 | 1.600 | 3,6 | 0,96 |
| TINC 1000 | TI 1000 | 1.000 | 3,9 | 1,21 |
| TINC 630 | TI 630 | 630 | 4,3 | 1,49 |
| TINC 400 | TI 400 | 400 | 4,7 | 1,87 |
| TINC 250 | TI 250 | 250 | 5,3 | 2,37 |
| TINC 160 | TI 160 | 160 | 6,5 | 3,03 |

BUILDING APPLICATIONS

Road ramps, both for vehicles or persons, outdoor surfaces, helicopters landing areas, hothouses and football grounds: heating in these areas are made by mineral insulated units, buried in concrete or deep in the ground (5 - 10 cm depth, step 15 - 20 cm) in order to achieve an homogeneous thermal distribution. If the system is workmanlike installed, it's safe, eternal, easy to be managed and controlled; nevertheless, in case of breaking, it cannot create anyway same big damages like traditional hot water systems. Underfloor heating of the buildings guarantees excellent comfort, due high quality in heat distribution. These systems, sometimes inconvenient due to high cost of domestic electric power, are recently strongly developed with alternative power sources, like photovoltaic energy production



- 1) Concrete
- 2) Moisture barrier
- 3a) Thermal insulation
- 3b) Edge thermal insulation
- 4) Protective barrier
- 5) Welded grid
- 6) Copper strip for cable fixing
- 7) Mineral insulated heating cable
- 8) Concrete protection
- 9) Final pavement
- 10) Cold joint of heating cable
- 11) Probe of temperature controller
- 12) Temperature controller junction box
- 13) Power supply junction box for heating cable

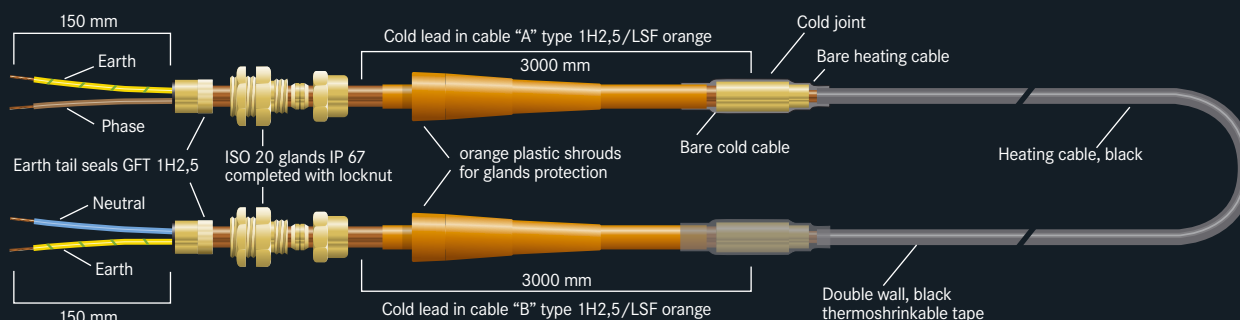
| OUTER SHEATH IN COPPER | | | |
|------------------------|---|-------------------------------|-----------------------|
| Cable type | Resistance $\Omega/\text{km at } 20^\circ \text{C}$ | \varnothing outer sheath mm | \varnothing core mm |
| KC 2700 | 2.700 | 2,7 | 0,44 |
| KC 2000 | 2.000 | 2,8 | 0,51 |
| KC 1600 | 1.600 | 3,5 | 0,57 |
| KC 1250 | 1.250 | 2,8 | 0,65 |
| KC 800 | 800 | 3,5 | 0,81 |
| KC 630 | 630 | 4,0 | 0,91 |
| KC 450 | 450 | 4,0 | 1,08 |
| KC 315 | 315 | 4,3 | 1,29 |
| KC 220 | 220 | 4,5 | 1,54 |
| KC 140 | 140 | 4,9 | 1,93 |
| KC 100 | 100 | 5,2 | 2,28 |
| | | | |
| CC 88 | 88 | 2,7 | 0,5 |
| CC 63 | 63 | 3,2 | 0,59 |
| CC 40 | 40 | 3,4 | 0,74 |
| CC 25 | 25 | 3,7 | 0,94 |
| CC 17 | 17 | 4,6 | 1,13 |
| CC 11 | 11 | 4,9 | 1,38 |
| CC 7 | 7 | 5,3 | 1,78 |
| CC 4 | 4 | 5,9 | 2,26 |

| OUTER SHEATH IN COPPER AND HDPE | | | |
|---------------------------------|--|-------------------------------|-----------------------|
| Tipo cavo | Resistance $\Omega/\text{km a } 20^\circ \text{C}$ | \varnothing outer sheath mm | \varnothing core mm |
| KC 2700/HDPE | 2.700 | 4,3 | 0,44 |
| KC 2000/HDPE | 2.000 | 4,4 | 0,51 |
| KC 1600/HDPE | 1.600 | 5,1 | 0,57 |
| KC 1250/HDPE | 1.250 | 4,4 | 0,65 |
| KC 800/HDPE | 800 | 5,1 | 0,81 |
| KC 630/HDPE | 630 | 5,6 | 0,91 |
| KC 450/HDPE | 450 | 5,6 | 1,08 |
| KC 315/HDPE | 315 | 5,9 | 1,29 |
| KC 220/HDPE | 220 | 6,1 | 1,54 |
| KC 140/HDPE | 140 | 6,5 | 1,93 |
| KC 100/HDPE | 100 | 6,8 | 2,28 |
| | | | |
| CC 88/HDPE | 88 | 4,3 | 0,5 |
| CC 63/HDPE | 63 | 4,8 | 0,59 |
| CC 40/HDPE | 40 | 5,0 | 0,74 |
| CC 25/HDPE | 25 | 5,3 | 0,94 |
| CC 17/HDPE | 17 | 6,2 | 1,13 |
| CC 11/HDPE | 11 | 6,5 | 1,38 |
| CC 7/HDPE | 7 | 6,9 | 1,78 |
| CC 4/HDPE | 4 | 7,5 | 2,26 |

| CORE TYPE | SHEATH TYPE | MAX OPERATING TEMPERATURE | CABLE CODE |
|-------------------------|----------------------------------|---------------------------|------------|
| Copper (C) | Copper (C) + Polyethylene (HDPE) | 110° C | CC / HDPE |
| Kumanal (K) | Copper (C) + Polyethylene (HDPE) | 110° C | KC / HDPE |
| Copper (C) | Copper (C) | 250° C | CC |
| Kumanal (K) | Copper (C) | 250° C | KC |
| Copper (C) | Copper Nickel (CN) | 400° C | CN |
| Kumanal (K) | Copper Nickel (CN) | 400° C | KN |
| Nickel/Chrome 80/20 (T) | AISI 321 (I) | 600° C | TI |
| Nickel/Chrome 80/20 (T) | Inconel 600 (INC) | 800° C | TINC |

COLD LEAD IN FOR POWER SUPPLY CONNECTION

| Cold cable type | | | | Cross section size mm ² | Ø copper outer sheath mm | Ø HDPE outer sheath mm | Ø core mm |
|-----------------|---------------|---------------|----------|---------------------------------------|-----------------------------|---------------------------|--------------|
| COPPER | COPPER + HDPE | COPPER NICKEL | AISI 321 | | | | |
| 1H2,5 | 1H2,5/ HDPE | 1H2,5 CN | 1H2,5 CI | 2,5 | 5,30 | 6,60 | 1,78 |
| 1H6 | 1H6/ HDPE | 1H6 CN | 1H6 CI | 6 | 6,40 | 7,70 | 2,76 |
| 1H10 | 1H10/ HDPE | 1H10 CN | | 10 | 7,30 | 8,80 | 3,57 |
| 1H16 | 1H16/ HDPE | 1H16 CN | | 16 | 8,30 | 9,80 | 4,51 |
| 1H25 | 1H25/ HDPE | 1H25 CN | | 25 | 9,60 | 11,10 | 5,64 |



| HEATING CABLE | | COLD CABLE "A" and "B" | | | | V | W | Sheath temperature (°C) | Snow melting (3 cm/hour) | | | Frost protection or de-icing | | |
|---------------|-----|------------------------|---|------|---------|-----|--------------------|-------------------------|--------------------------|------------------|-------|------------------------------|------------------|-------|
| Type | m | Type | m | Seal | Gland | | Permanent Start up | Permanent Start up | Surface size | W/m ² | Step | Surface size | W/m ² | Step |
| CC40/HDPE | 215 | 1H2,5/LSFA | 3 | GFT | RN 1/2" | 229 | 5.830 6.540 | 35 37 | 32 m ² | 180 | 15 cm | 41 m ² | 142 | 19 cm |
| 2CC17/HDPE | 200 | 2H2,5/LSFA | 3 | GFT | RN 1/2" | 230 | 7.200 8.150 | 32 35 | 36 m ² | 200 | 18 cm | 51 m ² | 140 | 25 cm |
| CC63/HDPE | 163 | 1H2,5/LSFA | 3 | GFT | RN 1/2" | 230 | 4.800 5.480 | 39 42 | 25 m ² | 192 | 14 cm | 35 m ² | 137 | 20 cm |
| CC88/HDPE | 142 | 1H2,5/LSFA | 3 | GFT | RN 1/2" | 230 | 3.900 4.500 | 42 46 | 20 m ² | 195 | 15 cm | 28 m ² | 139 | 20 cm |
| CC88/HDPE | 125 | 1H2,5/LSFA | 3 | GFT | RN 1/2" | 230 | 4.300 5.100 | 47 52 | 25 m ² | 175 | 20 cm | 31 m ² | 138 | 25 cm |
| KC220/HDPE | 80 | 1H2,5/LSFA | 3 | GFT | RN 1/2" | 230 | 3.000 3.000 | 36 36 | 15 m ² | 200 | 19 cm | 21 m ² | 142 | 26 cm |
| KC450/HDPE | 60 | 1H2,5/LSFA | 3 | GFT | RN 1/2" | 230 | 1.950 1.950 | 35 35 | 10 m ² | 195 | 17 cm | 14 m ² | 139 | 23 cm |
| KC630/HDPE | 45 | 1H2,5/LSFA | 3 | GFT | RN 1/2" | 230 | 1.870 1.870 | 42 42 | 9 m ² | 205 | 20 cm | 12 m ² | 155 | 27 cm |
| KC1600/HDPE | 33 | 1H2,5/LSFA | 3 | GFT | RN 1/2" | 230 | 1.000 1.000 | 38 38 | 5 m ² | 200 | 15 cm | 7 m ² | 142 | 20 cm |

NOTES: 1) brass glands RAD ISO 20 are IP67 waterproof and dust protected and are completed by suitable locknut
2) cold lead in cold cables are completed by protection shrouds type CO1, orange coloured
3) start up powers were calculated basing upon a start up temperature of +5°C

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