Data Sheet

Self regulating heating tapes

RS **stock numbers 379-312**

The information contained within this sheet regarding applications and installation of RS WinterGard® heating tape is for guidance only. The user must satisfy himself that the tape is suitable for the intended application and does not contravene any safety requirements. If in doubt consult BS6351 or other appropriate specification.

General

RS WinterGard® heating tapes are intended to provide freeze protection for metal pipework, heating tape (RS stock no. 379-312) is intended for metal and plastic pipes. Unlike conventional heating tapes they are self regulating and do not always need a thermostat control, however, to keep power consumption to a minimum, the use of a suitable thermostat is recommended.

The principle of operation is that the tape senses any change in temperature and automatically varies its heat input. The polymeric heating element senses the temperature at every point along its length and can vary the heat output accordingly, thereby providing localised heat precisely where required. As it is self regulating, overheating, or the production of hot spots which can cause conventional heating tape to burn out, will not occur. It can be cut to any length without affecting its operation.

Technical specification

Applications: Metal or plastic pipework - dependent on type of tape

Locations: Non-hazardous areas only.

240V types

Braided RS stock no. 379-312

Supply voltage_____240Vac 50Hz

Heat output at 5°C _____10W/m

Maintained temperature _____5°C

Minimum ambient

temperature _____-10°C to maintain 5°C

(using fibre-glass insulation with a thermal conductivity of 0.036W/m @ 10°C)

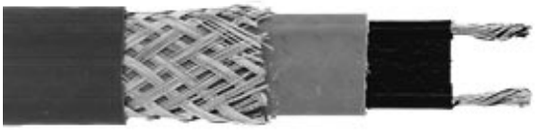
Fuse rating

Maximum heater length (m) if started at 0°C or above	50	75	110	150
Fuse or circuit breaker protection rating (A)	4	6	10	16

WinterGard® is a trade name of Tyco Electronics Raychem Corporation

Typical applications

- Sprinkler systems
- Safety showers
- Fire hose mains
- Chilled waterlines for air conditioning units
- Water supplies
- Fuel lines
- Condensation prevention.



Braided

In most situations a single straight length of WinterGard® is sufficient to meet most requirements. When used on larger pipe diameters spiralling may be necessary for the 240V types. Table 1 shows the lengths of WinterGard® required for various pipe dimensions and insulation thicknesses.

Table 1a 240V types

Insulation thickness	Pipe size mm (in)	75 or less 3 or less	100 4	150 6	200 8	250 10
mm	Length of WinterGard® (m) per metre run of pipe					
20		1.0	1.0	1.5	1.9	
25		1.0	1.0	1.3	1.6	1.9
30		1.0	1.0	1.1	1.4	1.7
40		1.0	1.0	1.0	1.1	1.3
50		1.0	1.0	1.0	1.0	1.1

Installation

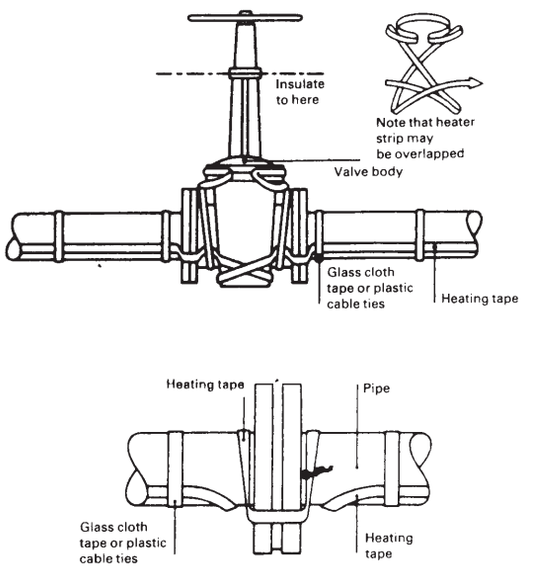
Generally a single length of WinterGard® tape, run horizontally along the lower section of a pipe is sufficient when two tapes are required they should be positioned approximately 90° apart. Should spiralling of the tape be necessary, care must be taken to ensure that the tape remains flat on the pipework. Reference to Table 2 will indicate the required pitch for 240V type tapes. Before fitting it is suggested that the pitch is marked on the pipework (eg. with chalk).

Table 2 Pitch length (mm) -240V types

Pipe (mm)	Metres of WinterGard® per metre of pipe 1.2	1.4
100	560	370
150	810	550
200	1050	710
250	1310	880

WinterGard® may be fixed in position using either glass cloth tape or plastic cable ties at intervals of 300mm and where necessary when on, or near; valves, flanges, elbows, bends, supports etc. When fitting the heating tape to a removable valve body, leave a loop in the tape to allow the valve to be removed without cutting the tape, (Figure 1).

Figure 1 Applying the heating tape around valves



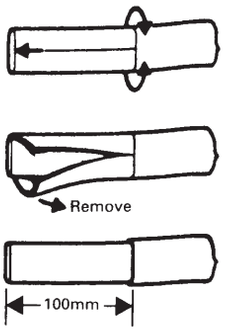
Connection

Preparation of tape end

Prepare each connection end which requires connecting to another tape, mains supply, etc. as detailed below:

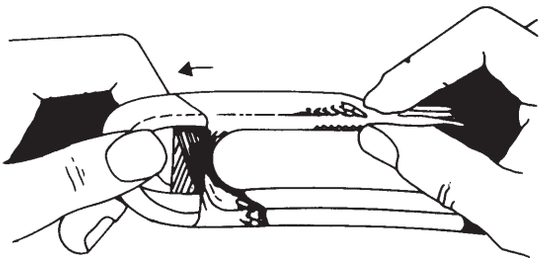
1. Remove the blue outer sheath for a length of 100mm by carefully cutting round the tape, and centrally between the conductors, with a sharp knife. Peel outer sheath away and remove to expose the black inner sheath. When using the braided heating tape the braid will now be exposed and the blue inner sheath must be removed from within the braid as detailed in step 2.

Figure 2 Outer sheath stripping



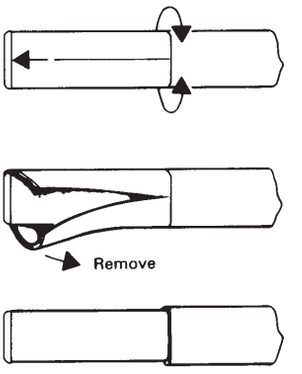
2. Open the braid on one flat face adjacent to the sheath with a small screwdriver, or similar. Bend the end of the heater into a 'U' with the braid opening on the outside of the bend. Withdraw the insulated heater through the opening as shown. Do not damage the braid. Twist the free braid.

Figure 3 Removing the inner sheath from braid



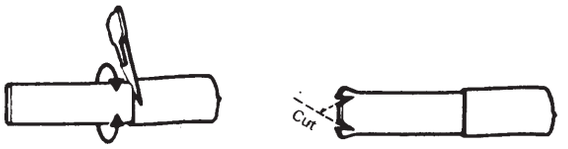
3. Using a trimming knife, score the periphery of the inner sheath at position required. Additionally score the sheath longitudinally. Remove the sheath by prising open the end.

Figure 4



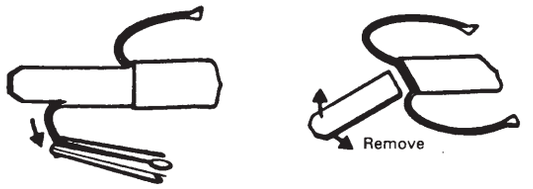
4. Carefully score completely round the inner sheath with a knife taking care damage is not caused to the conductors. Make a small cut diagonally for a length of 5mm towards each conductor using a pair of wire cutters, as shown in Figure 5.

Figure 5 Inner sheath preparation



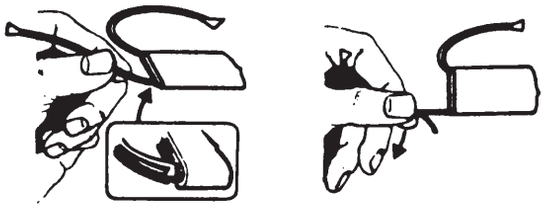
5. Hold one of the conductors with a pair of pliers and pull the conductor sideways away from the central section. Repeat for the other conductor. Remove all the remaining central section back to the outer sheath.

Figure 6



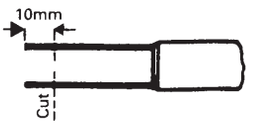
6. Bend the conductors towards each other and separate the remaining inner sheath material.

Figure 7



7. Check that the conductors are free of all remaining black inner sheath, then trim the conductors 10mm from the free ends and if necessary gather together the conductor strands and straighten.

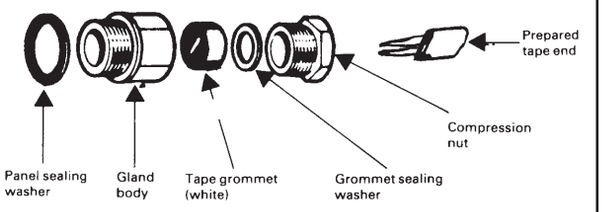
Figure 8



Making the joints

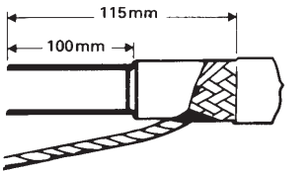
1. Separate the components of the supplied cable gland, remove and discard the black circular sealing grommets. Fit these items following the sequence shown in Figure 9 into the prepared tape end. Replace the discarded grommet with the white tape grommet. Additional termination kits may be ordered (RS stock no. 379-788) see current RS catalogue for details.

Figure 9



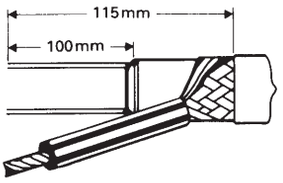
2. Prepare the end of the tape as described in the preparation instructions (steps 1 to 7 described previously) to the dimensions shown.

Figure 10



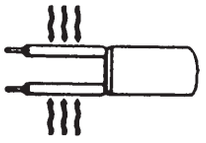
3. Slip the green/yellow heat-shrinkable sleeve over the twisted braid and slide up to the heater strip. Heat the sleeve until it shrinks tightly around the braid.

Figure 11



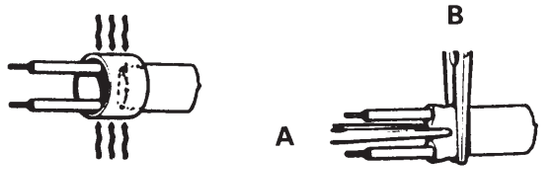
4. Place one piece of the smaller diameter heat shrink sleeving onto each prepared conductor. Heat with a suitable heat source (eg. hot air gun or gas torch) to shrink the sleeving onto the conductors, this will leave 10mm of bare conductor on each prepared end.

Figure 12



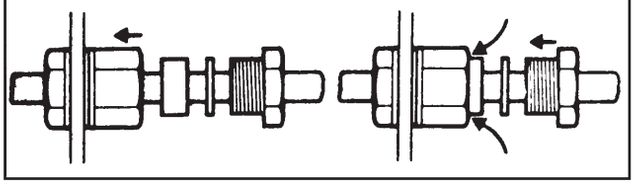
5. Place the larger diameter sleeving equally over the tape and conductors and shrink into place. Squeeze the heated sleeving in positions 'A' and 'B' with a pair of pliers to ensure a good joint. A good seal is indicated by a bead of adhesive appearing around the sleeving edges. If this is not evident reheat and repeat the above procedure.

Figure 13



6. Feed the prepared tape end through an M20 clearance hole in the required control/junction box and insert threaded portion of gland body through the hole, ensuring that the sealing washer is between the box outer face and the gland shoulder. Fit the gland nut and tighten to retain and seal. Position tape grommet and grommet sealing washer into gland body. Tighten compression nut to retain tape and seal joint.

Figure 14



7. Test tape to ensure electrical insulation resistance is satisfactory, see Testing.

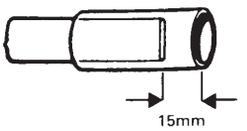
   Make electrical connections as necessary.

End sealing unbraided heating tape

The unconnected end of the heating tape must be sealed in the following manner.

1. Once the tape has been cut to the required length place the longer (40mm) large diameter heat shrink sleeving over the tape end, with approximately 15mm projecting beyond.

Figure 15



2. Heat with a suitable heat source (eg. hot air gun or gas torch) to shrink the sleeving onto the tape. Squeeze the heated sleeving in positions 'A' and 'B' with a pair of pliers to make a good joint. Check that a good seal has been made, this is indicated by a bead of adhesive around the edges.

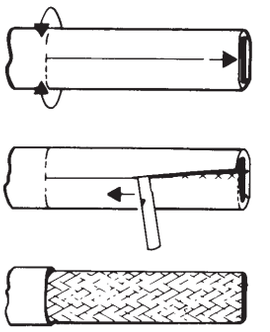
Figure 16

3. Secure the sealed end in the required position using glass cloth tape or a plastic cable tie.

End sealing braided heating tape

1. Cut the tape 40mm beyond the required length. Score the periphery of the sheath 80mm from the end. Additionally, score the sheath longitudinally. Do not cut the braid. Carefully prise open the end of the sheath. Remove. This will expose the braid.

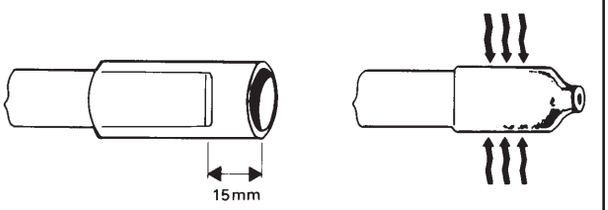
Figure 17



Push back the braid and cut off 40mm of the exposed heater.

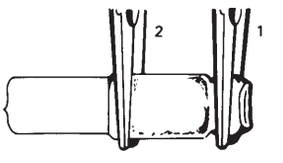
2. Slip the short sleeve over the tape so that about 15mm projects beyond the cut end. Heat the sleeve until it shrinks tightly around the tape.

Figure 18



3. Using the pair of pliers, squeeze the warm sleeve at positions 1 and 2 in that order, for 5-10 seconds so that adhesive appears at the edges. Check that seals have been made. If not, reheat and repeat operation.

Figure 19

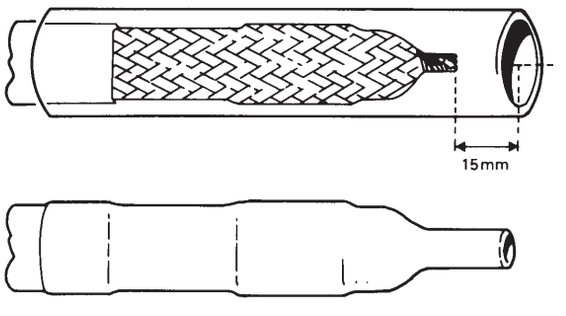


4. Bring the braid back over the capped end and twist the strands together. Trim the end of the braid so that a length of 5mm of braid remains twisted.

Figure 20

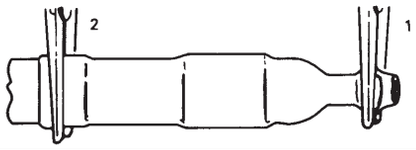
5. Slip the long heat-shrinkable sleeve over the heater so that about 15mm projects beyond the end. Starting at the end on the heater, heat the sleeve until it shrinks tightly round the heater, and adhesive appears at the edges.

Figure 21



6. Using a pair of pliers, squeeze the warm sleeve at the points 1 and 2 in that order to 5-10 seconds so that adhesive appears at the edges. Check that seals have been made. If not, reheat and repeat operation.

Figure 22



Fix the capped end of the heater to the pipe with glass cloth tape or a plastic cable tie. When the installation is complete the strip should be tested as detailed later.

Joining unbraided tape

Should it be necessary to join the heating tape it may be done in the following manner, using the items listed below. The total combined length must not exceed 150m for 240V type.

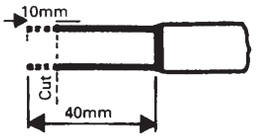
Items required per joint:

Adhesive lined heat shrinkable sleeving

4	16mm	lengths of 3mm diameter (RS stock no. 157-3789)
2	16mm	length of 12mm diameter (RS stock no. 157-3818)
1	120mm	length of 12mm diameter (RS stock no. 157-3818)
2	1.5mm^2	red butt crimps (RS stock no. 534-288)
		or
2	18awg	red sealed splices (RS stock no. 533-673)

1. Prepare tape in a similar manner as shown in preparation of tape connection end steps 1, 4-7, but only baring 40mm of conductor.

Figure 23



2. Fix the sleeving as detailed in preparation of tape connection end - (2 of 3).
3. Repeat steps 1 and 2 for the other tape.
4. Place the 120mm long sleeving on one tape, away from the area of work.

Figure 24

5. Attach the crimps/splices to the conductor ends by the appropriate method.

Figure 25

6. Position the 120mm long sleeving centrally about the joint, heat the sleeving starting in the centre and working outwards. Squeeze the heated ends with a pair of pliers to make a good joint. Check seal as described in end sealing.

Joining braided tape

Should it be necessary to join the heating tape it may be done in the following manner, using the items listed below. The total combined length must not exceed 150m.

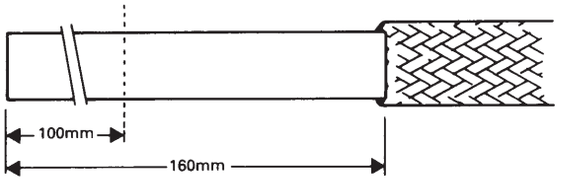
Items required per joint:

Adhesive lined heat shrinkable sleeving

4	16mm	lengths of 3mm diameter (RS stock no. 157-3789)
2	16mm	length of 12mm diameter (RS stock no. 157-3818)
1	120mm	length of 12mm diameter (RS stock no. 157-3818)
1	180mm	length of 19mm diameter (RS stock no. 157-3824)
2	1.5mm^2	red butt crimps (RS stock no. 534-288)
		or
2	18awg	red sealed splices (RS stock no. 533-673)
1	2.5mm^2	yellow butt crimp (RS stock no. 534-519)

1. Remove 160mm of outer sheath on one strip as described in step 1 of the preparation for connection. Push back the braid over the sheath and remove 100mm of heater. Do not cut the braid.

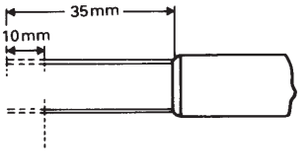
Figure 26



On the other strip remove 80mm of the outer sheath as described in step 1 of the preparation for connection. Cut off 45mm of the braid. Do not separate the braid from the heater.

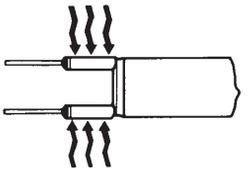
2. Prepare the ends of both strips as described in steps 4-7 of the preparation for connection to the dimensions shown. Do not separate the braid from the heater.

Figure 27



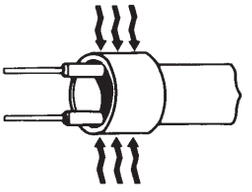
3. Slip the conductor insulation sleeve over the conductors of one strip. Heat the sleeves with a hot air gun until they shrink tightly around the conductors.

Figure 28



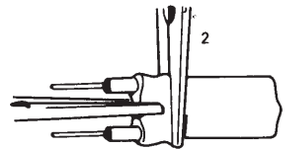
4. Position the core seal heat-shrinkable sleeve half over the tape as shown and shrink into place.

Figure 29



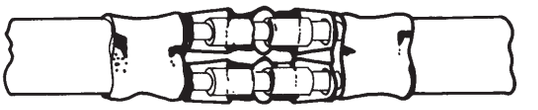
5. Using a pair of pliers, squeeze the warm sleeve at the positions 1 and 2 in that order for 5-10 seconds so that the adhesive appears at the edges. Check that a seal has been made. A bead of adhesive should be visible around the edges. If not, reheat and repeat the operation.

Figure 30



6. Repeat steps 3 to 5 for the other tape.
7. Slide a 120mm length of sleeving onto both prepared ends.
8. Position the crimp sleeves over the conductors and crimp the barrels firmly into place.

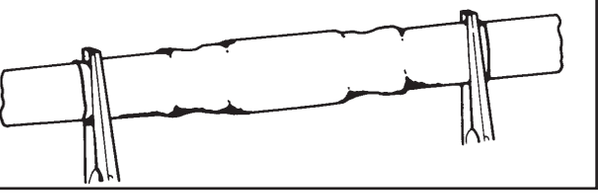
Figure 31



9. Position the splice sleeve centrally over the connection.

   Starting from the middle shrink firmly into place, until adhesive appears at the edges. Squeeze the ends of the warm sleeve with a pair of pliers for 5-10 seconds. Check that a seal has been made. If not, reheat and repeat operation.

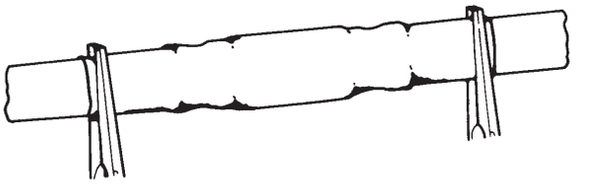
Figure 32



10. Pigtail the braids together and connect using the 2.5mm butt sleeves.
11. Position the 180mm long sleeve centrally over the splice connection.

    Starting from the middle shrink firmly into place, until adhesive appears at the edges. Squeeze the ends of the warm sleeve with a pair of pliers for 5-10 seconds. Check that a seal has been made. If not, reheat and repeat operation. The connection is now complete. All unconnected ends must be sealed as described previously, and once complete the installation should be tested.

Figure 33



Testing

Before final connection and application of thermal insulation each circuit should be electrically tested in the following manner. Using a 500-2500V dc insulation tester eg. a Megger®. The minimum insulation resistance reading between either conductor and earth should be 10mΩ, regardless of length of run.

This figure should be recorded for future reference.

WARNINGS:

1. Do not twist the conductors of a heating tape together.
2. All unconnected ends must be sealed as described previously.
3. The length of any one circuit must not exceed 150m.
4. Do not use unbraided types on plastic pipework.
5. When applying to painted surfaces ensure they are fully dry, some types of paint formulation can degrade the installation in their wet state.
6. Do not expose the tape to temperatures in excess of 55°C or the performance of the tape will be impaired.
7. Damaged sections of the tape must be replaced, not repaired.
8. Heating tape which may become damaged and wet should be protected by a 30mA sensitivity residual current device.

Thermostat

To reduce the operating cost a thermostat may be used, suitable item is (RS stock number 380-9736) which is an air sensing device and only operates at temperatures below +5°C.

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