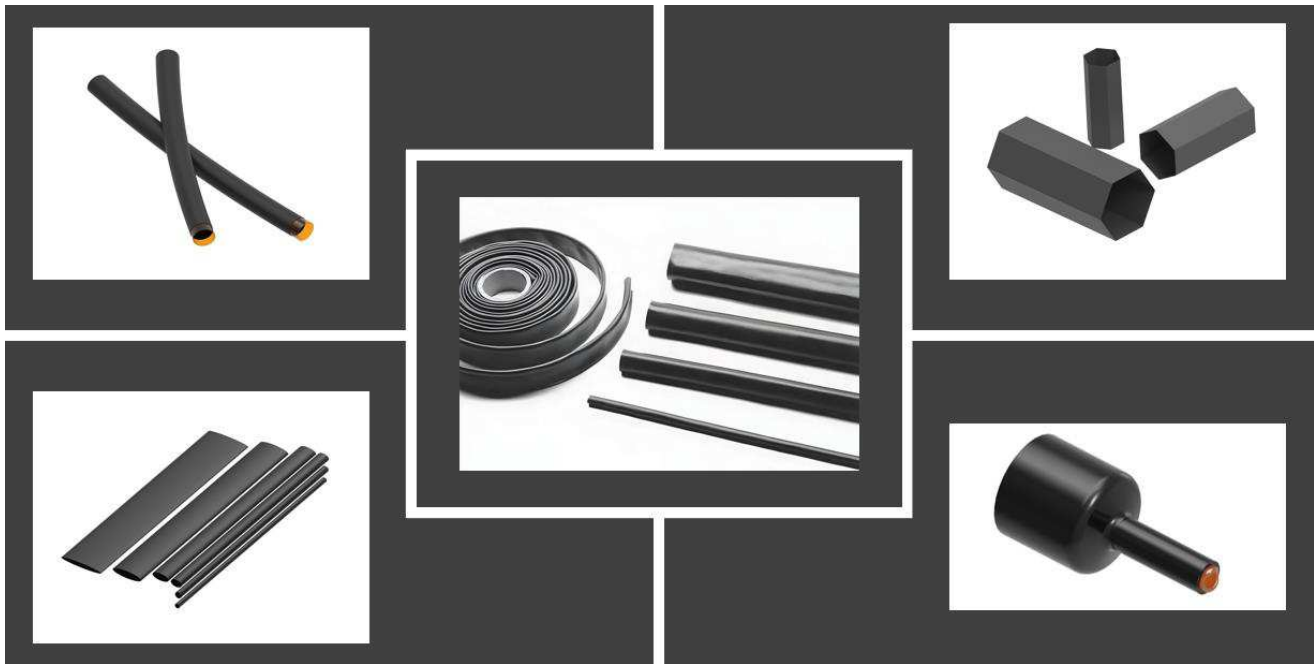


Class 1 – Public

Size Selection & Installation of Heavy-Duty Heat Shrink Tubing



NB: The recommendations presented here are based on general industry information.

Since TE Connectivity does not have knowledge of the specific application and the end use conditions of all users, each user should determine the correct size of tubing together with the installation conditions for their own application and evaluate against their individual requirements.

Note: The size and colour of the product may be different from the images in this document. The images mentioned in this document are for representation purpose only.

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1. SCOPE

This document outlines the general guidelines for selection and installation of heavy-duty heat shrink tubing from TE Connectivity.

2. REVISION HISTORY / REASON FOR CHANGE / RELATED DOCUMENTS

Rev	Date	Prepared By	Approved By	Remarks
A	November 2023	Kamalaravanan	Richard Kewell	New document

2.1. Applicable product family

BSTS, BSTS-FR, HF, HRHF, HRNF, HRSR, RHW, RMW, SST, SST-FR, XFFR

2.2. Customer Assistance

Reference Product Base Part Number and Product Code are representative. Use of these numbers will identify the product line and help you to obtain product and tooling information when visiting www.te.com or calling the number at the bottom of page 1.

2.3. Drawings

Customer drawings for product part numbers are available from www.te.com. The information contained in Customer Drawings takes priority if there is a conflict with this specification.

2.4. Specifications

Product Specification for product part numbers available from www.te.com provides product performance and test results.

2.5. Shelf Life

Refer document Global Dimensional Life for Heat Shrink Tubing Standard Size Products 408-32191 for details regarding the shelf life.

2.6. Safety

Appropriate Personal Protective Equipment (PPE) should be worn, and installation should take place with fume extraction or in a well-ventilated area.

3. TUBING SIZE SELECTION AND INSTALLATION GUIDELINES

3.1. Tube Size Selection

Heavy duty heat shrink tubing is for optimizing insulation and protection while providing mechanical abuse reliability and resistance to chemicals, moisture, and oils. Tubing is supplied in an expanded form. When heated above 125°C they attempt to shrink back to their original dimensions, conforming to the objects they cover. Due to their thick wall, use a propane (preferred) or butane gas torch is recommended. For thin wall tubing (wall thickness up to 1 mm), use a hot air gun and follow the General Instructions as appropriate. Assuming the correct size of the tubing is selected, the tube should easily fit over the article on which it is being installed. The tube should be at least 10% bigger than the article before installation. The tube must be cut to the required length considering some provision for longitudinal shrinkage.

- a. Always select the largest size of the tube that will snugly fit onto the substrate. This will maximise the installed wall thickness and provide better protection. Ensure not to force fit the size for the application.

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- b. Carefully cut the tubing to the required length using sharp knife or other suitable cutting equipment ensuring that it is a clear cut having the cut edges clean and free from burrs and jagged edges. An improper cut may result in a possibility of a split at the tubing end.
- c. Longitudinal shrink depends on the amount of radial shrink happened while shrinkage. Within the specification limits the longitudinal change will be different depending on the amount of recovery.

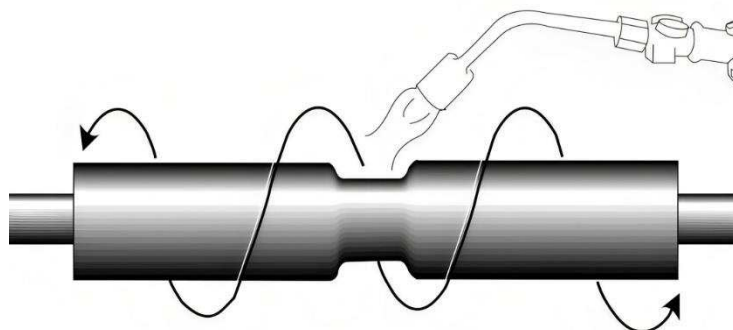
3.2. Installation Guidelines

It is recommended that local safety regulations are adhered too, and that installations are carried out in a well-ventilated area with adequate fume extraction. It is further recommended that operators wear heat resistant gloves when installing and handling hot heat shrink products, and that contact with molten material be avoided. Wash hands before eating, drinking, or contacting the face with the hands.

Installation of the heavy-duty product can be achieved via a heated air circulating oven, flame torch, or belt heater, dependent on specific application circumstances. For industrial scale production using uncoated tubing, it is recommended to use a forced circulation hot air oven. In general, the length of time and the precise temperature required to fully shrink the product will be dependent on the associated thermal masses, thermodynamics and on tubing family. A piece of tubing will require more heating to achieve full recovery if it is associated with a large thermal mass, such as a large metal conductor. Depending on the shape and material of the article, correct installation equipment and process should be determined.

- a. Ensure that the substrate is clean before application of the tubing. Clean and degrease cable and parts that will come in contact with the tubing.
- b. When installing multiple tubing, make sure that the surface of the last tube is still warm before positioning and shrinking the next tube. If installed tube has cooled, reheat the entire surface.
- c. Slide the heat shrink tube over the article that must be covered. Based on the shape of the article, position of the tubing, possibility of air trap, the place to start the heating should be determined. Ensure not to stretch the tube while placement.
- d. While using a propane (preferred) or butane gas torch, adjust the torch to obtain a soft blue flame with a yellow tip. Pencil-like blue flames should be avoided.
- e. For vertical installation, place tubing over the relevant area and start shrinking at the lower end working towards the top. For horizontal installation, start shrinking in the centre working towards the ends.
- f. Keep the torch aimed in the shrink direction to preheat the material. The heat should be applied in a controlled way by directing the heat onto the tube for the whole length of the tube. Keep the flame moving continuously to avoid scorching the material. This can be achieved by either rotating the assembly or the heat gun. See figure 1.

Figure 1.



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- g. Rotate the heat around the tube and evenly to ensure even installed wall thickness of the tube. Whilst the tube is recovering to its position, the flame can be directed along the longitude to continue the shrinking process. Considering the temperature profile of flame, maintain appropriate distance between flame torch and the tubing.
- h. Direct the heat evenly around the width and length of the tube such that it shrinks evenly and fits snugly over the article. Ensure to rotate and direct heat such that the air is not trapped inside the tube.
- i. Avoid overheating the product after shrinkage has occurred. Stop heating immediately if the product blisters, chars or shows other signs of degradation. As a warning, tubing will start to turn glossier or matt on overheating. Avoid inhaling fumes which may be released and ventilate the area thoroughly before resuming work.
- j. In coated tubing, it is important to provide enough heat to melt the liner and allow the adhesive liner to adhere to the substrate surface. If sufficient heat is applied on the tube, it is usually possible to see a small quantity of the liner flowing from the end of the tube. During this process, ensure not to overheat the product as that will make it charred or brittle.
- k. Properly installed tubing should be smooth and conform to the inner components. On coated tubing adhesive should be visible at both ends. See figure 2. Allow to cool before applying mechanical strain.

Figure 2.**Note:**

- Nature of the substrate dictates the installation time. For example, metal substrate will take away a part of heat supplied due to their thermal conductivity and hence will take longer time compared to a plastic substrate.
- Similar philosophies should be used when using ovens or belt heaters.
- For air circulating ovens the heating is more uniform and should not require mechanical manipulation of the product. Ensure that the product is appropriately positioned within the oven, which should be pre-heated. The temperature and time required within the oven will be dependent on the characteristics of the substrate, as is the case for operation within a belt heater.
- For installations with other types of equipment, please consult your TE Connectivity representative.