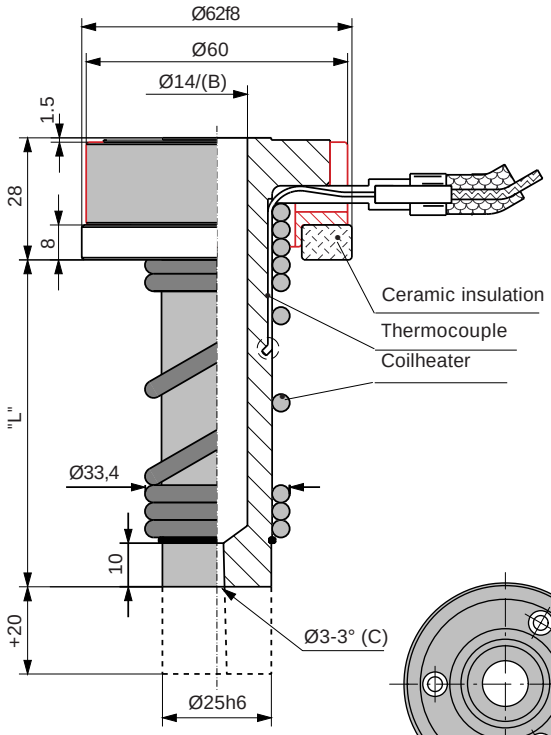
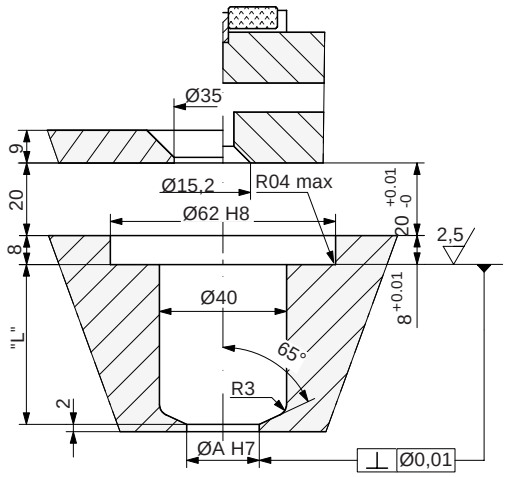
HEATLOCK® ESB4..., ELECTRIC SPRUE BUSH

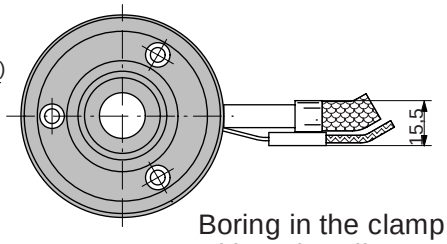
Instructions for instsallation

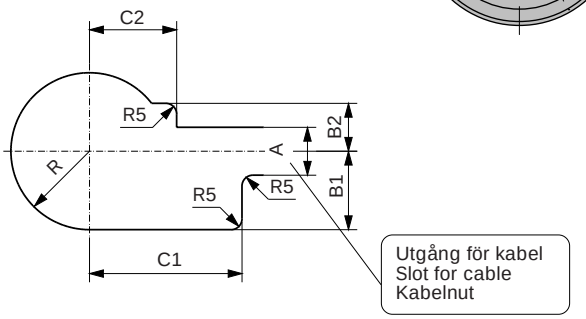
Max permitted contact force from machine nozzle: 8 Mp..



Boring dimensions







Boring in the clamp plate for the bush with or without bandheater:

Art. nr.	R	A	B1	B2	C1	C2
Bushing	34	20	-	-	-	-
B060020180	42	22	42	22	85	45

When designing the bushing heaters we took every possible step to make the heat distribution along the bushing as even as possible. We have thus concentrated the wattage at both ends in order to compensate for heat losses which are the result of metallic contact between bushing and mould. The ceramic insulation is of course also highly important for uniform temperature distribution in the bushing.

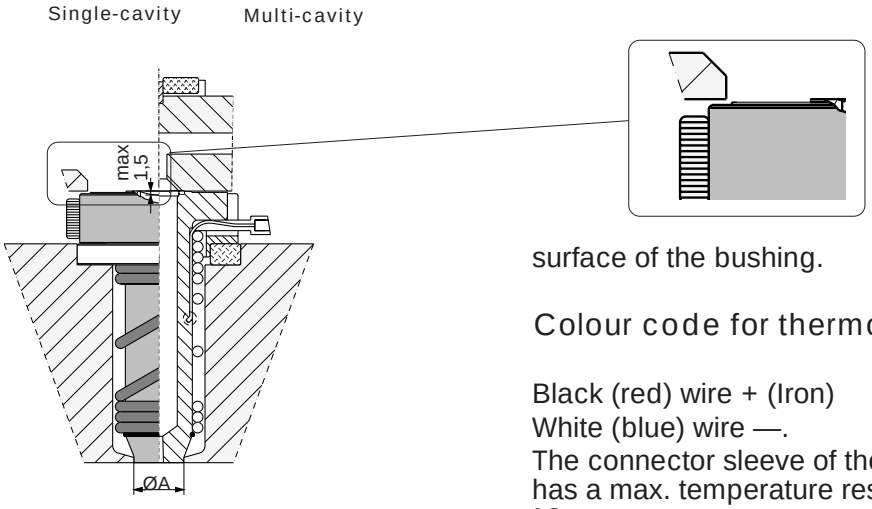
When temperatures of 250–260 °C and above are needed it may be advantageous to install a heater band at the back end. This is also the case when shearsensitive materials are to be moulded.

Note: This element must be connected to its own special manual controller and must not be connected in parallel with the spiral element and its thermocouple.

If the bushing is installed as shown in the diagram, all cables will be protected from plastic.

If possible there shall be no contact between the back end of the bushing and the guide ring of the mould. Such contact will cause a heavy drop in temperature at the back end of the bushing. If the force at which the machine nozzle is pressed against the sprue bushing is greater then that caused by the injection force on the front area of the bushing, nothing is needed to keep bushing in place axially. The bushing can then be installed as shown in the diagram on the next page.

Max permitted contact force from machine nozzle: 8 Mp.
If a support is needed to fix the bushing axially the contact area must be as small as possible. The support area should preferably be as far as possible from the centre of the bushing. (Not on the flange.) Preferably an insulation ring part No. KE06003908 shall be placed between the back support and the



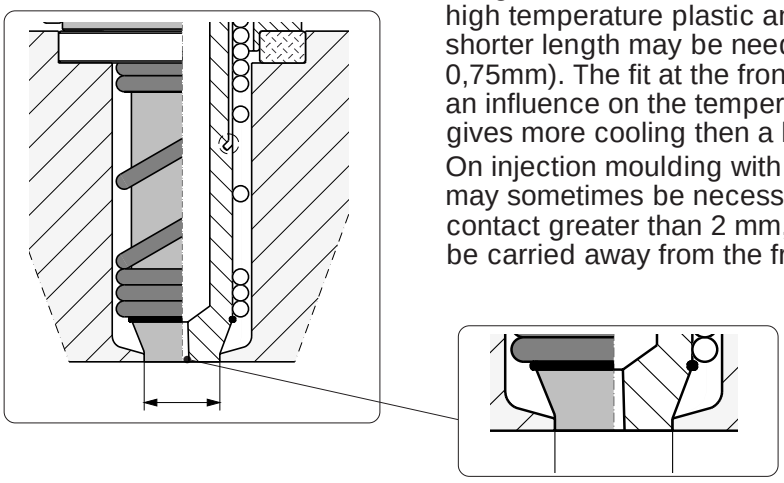
surface of the bushing.

Colour code for thermocouple wires.

Black (red) wire + (Iron)
White (blue) wire —.
The connector sleeve of the thermocouple has a max. temperature resistance of 240 °C.

Fitting of the front end of the bushing.

A certain amount of cooling is needed at front end. It must remain at a temperature low enough to make the plastic solidify. Too much cooling will however cause the plastic in the flow channel to be highly viscous further into the bushing.
The contact surface at the front end may therefore have to be trimmed depending on, for example, temperature wanted and cycle time.



Length of contact at front end can usually be 2mm. For high temperature plastic and for long cycle time a shorter length may be needed (down to about 0,75mm). The fit at the front end in the mould also has an influence on the temperature at that area. A hard fit gives more cooling then a loose one.
On injection moulding with fast-injecting materials it may sometimes be necessary to have a length of contact greater than 2 mm, so that sufficient heat can be carried away from the front face. This may mean increasing the temperature of the bushing during startup and reducing it in continuous operation.
Front diameter of the bushing (A) may be reduced to be as small as possible considering size of the gate. The wall thickness at the front end shall not be less then 2,5 mm.
A small front diameter of the sprue bushing gives:

- less contact area between bushing and mould with a more even temperature along the bushing as a result.
- the force that will push the bushing out of the mould will be reduced.

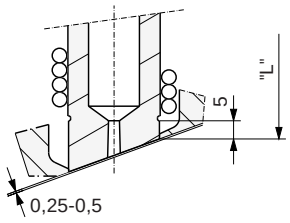
Length of the bushing.

When fitting the bushing into the mould it is essential to bear in mind that its length increases when it gets hot. Approx. elongation of bushing at 200 °C

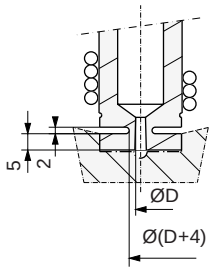
L=75 approx 0,19 mm
L=100approx 0,24 mm
L=125approx 0,30 mm
L=150approx 0,35 mm

Bushings with extra stock must be used when any kind of contour is needed at the front end. This is how it should be done.

Do not go below the L-dimension of the bushing when machining.
The front surface of the bushing must not come into contact with the moving mould half.



Gate on surface not perpendicular to bush

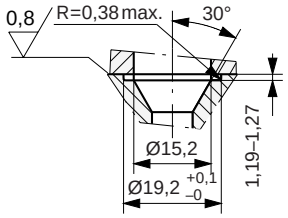


Gate on runner

Bushings for multi-cavity version

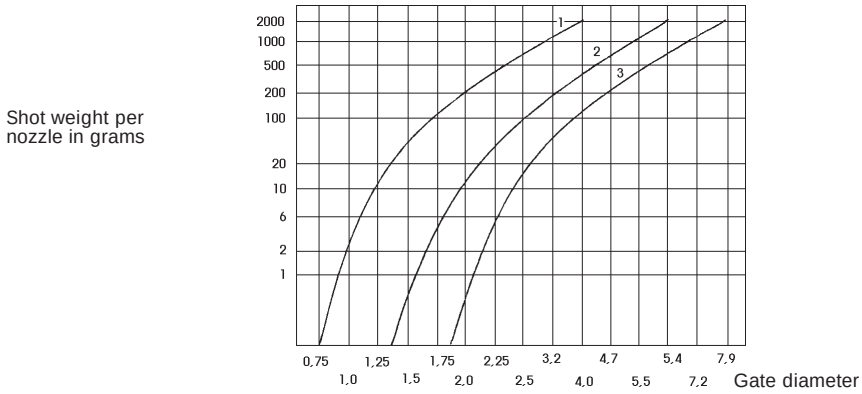
If the rear end of the bushing is to be in contact with a manifold, machine an O-ring groove in that part, as shown on the right.

Art. number ORING00615



Size of gate.

On delivery the gate is 3 mm. Outward cone is 1,5° per side. It may be reamed out to 10 mm if necessary.



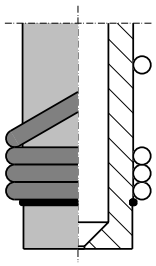
1. Low viscosity (PS, PE, PP).
2. Medium viscosity (ABS, SAN, PA, POM).
3. High viscosity (PC, PMMA, Noryl, PUR, reinforced plastics).

The diagram on the next page gives a guideline figure for the gate diameter needed for different plastics and shot weights. Note: If the gate diameter is too small, an unnecessarily high bushing temperature will have to be set for the gate not to freeze between shots.

The suggested figures are approximate. Gate dimensions may be influenced by the shape of the article and the design of the mould etc.
The balance between shot weight, injection rate, tool temperature, temperature pattern opposite gate, cooling around gate and injection pressure are all factors that affect gate size.
If the sprue bushing is feeding a runner which has a gate into a cavity, it may be suitable to make bushing gate larger than actually necessary. This way pressure drop and shear will be reduced.
If an electric sprue bushing is used to feeding a runner this means that length of flow in cold steel has been reduced equivalent to bushing length. Due to this cross section of the runner can be made smaller than usually. This may be important in order to get shortest possible cycle time.
Begin with a smaller gate than indicated by the table.

Modification of large sprue bush for pin point gating.

1.Machine main body at front end to a total length of 99 resp. 124, 149 and 174 mm. The complete, modified bushing will have the following L=lengths:



Part.no	ESB4075201	71mm
	ESB4100201	96 mm
	ESB4125201	121 mm
	ESB4150201	146 mm

2. Spark erode the centre hole as shown above, until 0,6mm is left to the front end.

3.After spark erosion, the tube should be stress-annealed at about 300 °C.

4. Because of the hole that already exists in the sprue bushing, the gate hole of the modified version will be about 3.3 mm, which is a suitable size for approximately the following shot weights:

low-viscosity plastics 1000 g, medium-viscosity 200g, high-viscosity 40 g

If a larger shot capacity is needed, increase the gate hole to a suitable diameter.

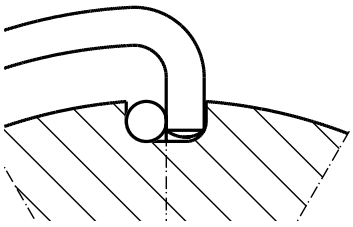
Instructions for changing the coilheater or thermocouple.

Disassembly

1. Unscrew the screws at the rear end.
2. Remove the flange.
3. Take off the lock ring at the front end
4. Take off the spring that keeps thermocouple in place.
5. Take off the tape that keeps heater and thermocouple extensions together.
6. Depending on how hard spiral heater fits the pipe it can either be pulled off or ”unscrewed”. Unscrewing works easily if you push on the spiral heater extension which will open the spiral while at the same time opening the spiral at the other end with a suitable tool. The thermocouple must not follow if the spiral element is rotated or pulled off, since it may break.
   Treat thermocouple with great care. The tube is only 1 mm diameter.

Assembly.

To be done in opposite order to disassembly.
If a new thermocouple is to be fitted it must be bent to fit the bushing. The tip of the thermocouple must be located where the groove ends, i.e. about half-way along the tube. Min. bending radius 3 mm.



Tighten the element so that the heating spiral makes contact with the tube.

If you have any questions about installing the bushing, please get in touch with us.

HEATLOCK®
Box 236 S–532 23 Skara
e-mail: hot.runner@heatlock.se
Homepage: http://www.heatlock.se
Phone: +46 511-13200
Fax: +46 511-17285

Heatlock AB 97.06 / ESB4.mont