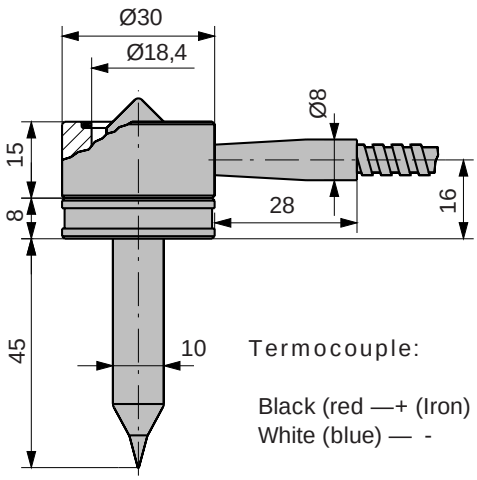
HEATLOCK® TOP2..., TORPEDO TIP

Instructions for installations.

The HEATLOCK TOP2..., torpedo tip offers you an easy way to build a tool with a direct gate. Since the gate is made directly in the mould plate, material can be injected at places where it is normally awkward to position a gate. Gate residue is minimal.

By choosing a design in which the torpedo body is centred in the mould plate and the material flows along the longitudinal axis of the torpedo, the torpedo tip is always centred in the gate and pockets of stationary material are avoided. The replaceable internal heater cartridge has its sensor at the tip, so that the gate temperature can be checked as accurately as possible in order to minimise gate residue. The position of the sensor means that it measures the internal temperature of the heater cartridge; this means that a temperature slightly higher than the prescribed working temperature must be set on the temperature controller.

The torpedo tip is available with a special surface treatment, TIN, for injecting glass-fibre-filled plastics.

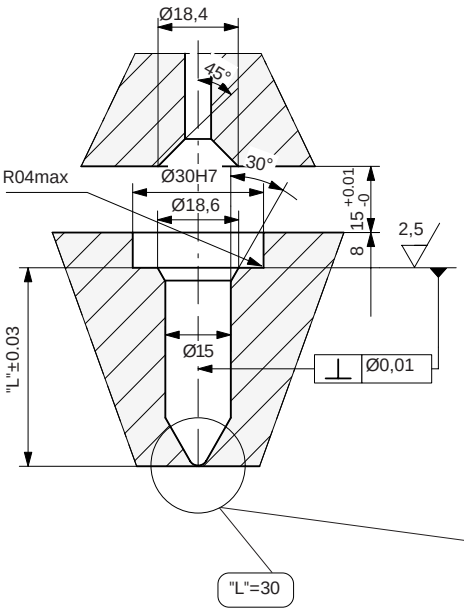


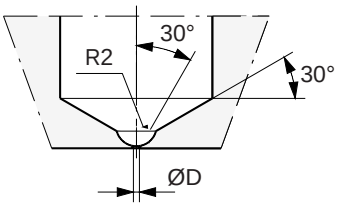
Boring.

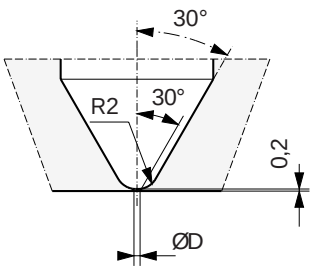
The depth of the hole for the torpedo tip itself must be made equal to the installation dimension ”L” of the torpedo. When hot, the tip will then project into the gate hole and be aproximately in line with the moulding surface. This results in minimum gate residue.

The rear end of the torpedo must be countersunk at least 8 mm in the steel of the mould so that the insulating ring is supported over its entire height. If the countersunk must be deeper than 8 mm, the rest of the hole must be made with a diameter larger than 30 mm, so that there is no metal-to-metal contact between the rear of the torpedo and cold mould.

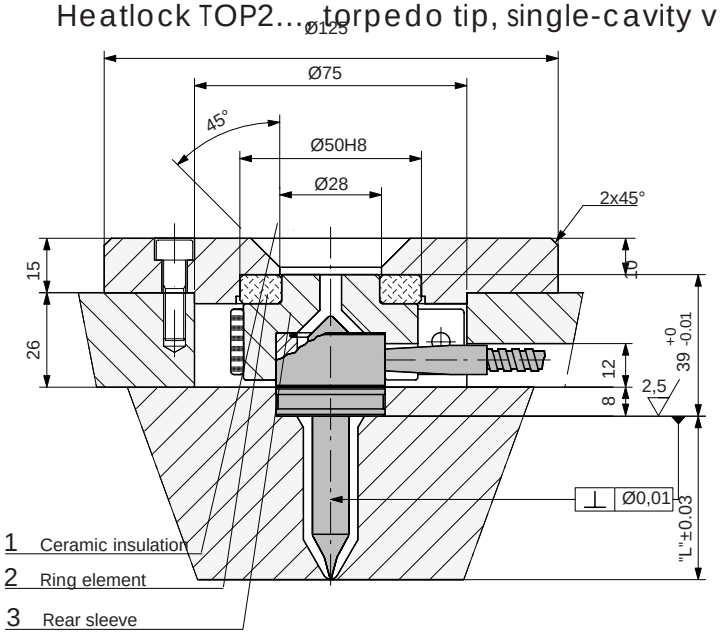
It is important that the length of the gate is 0.2 mm as shown adjacent. If the length is greater, the gate residue will be longer than necessary. At the same time, the pressure losses will be greater, and this will result in excessive frictional heating in the region of the gate.







Heatlock TOP2... torpedo tip, single-cavity version



A simple way of constructing a single-cavity tool with direct gate.

The rear sleeve makes it possible to use our proven torpedo in a single-cavity version as well.

This allows you to construct single-cavity direct gate tools on surfaces that used to be tricky, such as inclined planes.

The sleeve is made of a Swedish hot-working steel that has been hardened to withstand long, arduous use without deforming. Heat supply to the rear body is handled and controlled by an external ring element.

Where the material requires accurate temperature control, a separate sensor, which measures the temperature in the middle of the material of the rear sleeve is used.

Our ceramic insulation, which has a thermal conductivity only 7% that of steel, is used to insulate the rear body from the tool.

Insulating sleeve for torpedo

The insulating sleeve insulates the flow channel around the torpedo tip from the mould plate. This reduces cooling of the flow channel, so that the flow gap around the torpedo increases.

This makes it possible to inject materials that require a high mass temperature, and filled materials.

The insulating sleeve is made of a hot-working steel hardened to Hrc 46-48.

The insulating sleeve is supplied as shown in Fig. 1, and fits torpedoes with L=30-70 mm.

Machine the sleeve as shown in Fig. 2. Cut the sleeve to the required length, which is a function of the L-dimension of the torpedo and of how far forward the sleeve can be positioned in the mould. Since the sleeve will expand slightly when the torpedo reaches its working temperature, it should not reach the bottom plane when cold. A suitable air gap is 0.02-0.04 mm, depending on torpedo length.

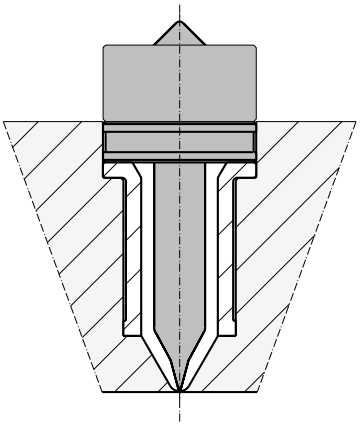


fig. 1

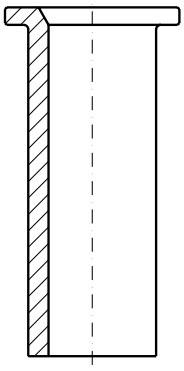
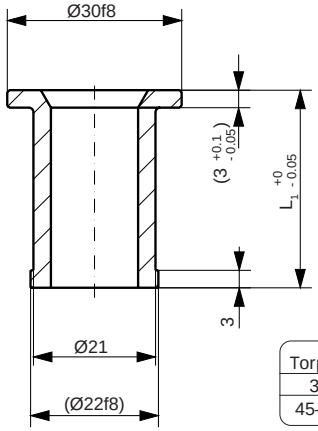


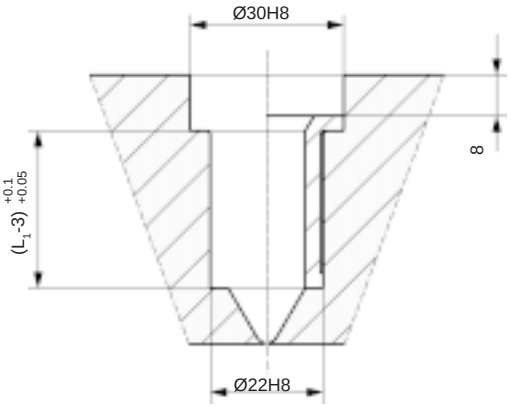
fig. 2



Torpedo L=	L_1
30 mm	(L-4.9)
45–83 mm	(L-11.2)

Boring hole and fitting the insulating sleeve for the torpedo.

Make the hole for the sleeve in accordance with the instructions above. Insert the sleeve and check the L-dimension of the torpedo to ensure that the tolerances are maintained. This is to ensure that the torpedo tip is not too far back at the gate in its final installed position.



Gate diameter

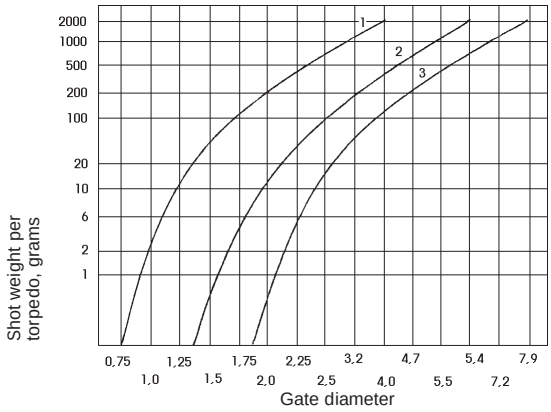
The diagram adjacent gives a guideline figure for the gate diameter needed of different plastics and shot weights.

NOTE: If the gate diameter is too small, an unnecessarily high torpedo temperature will have to be set for the gate not to freeze between shots.

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.

A small gate freezes quicker than a large gate.

The suggested figures are approximate. Gate dimensioning may be influenced by the shape of the article and the design of the tool etc.



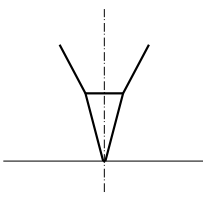
1. Low viscosity (PS, PE, PP)
2. Medium viscosity (ABS, SAN, PA, POM)
3. High viscosity (PC, PMMA, Noryl, filled and reinforced materials)

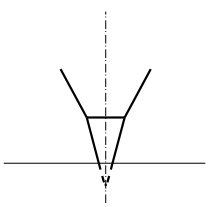
Flow area in the gate when moving the Heatlock Torpedo series 6000 forward.

Adjacent can you see how the flow area in the gate is affected when the torpedo tip is moved forward further into the gate, shortening the "L"-measurment.

When moving the tip forward do the cross section of the tip at the parting line increase resulting in an higher temperature at the gate. It will also allow the flow area to be larger without increasing the residue on the part a lot.

Torpedo tip positioned in the partingline

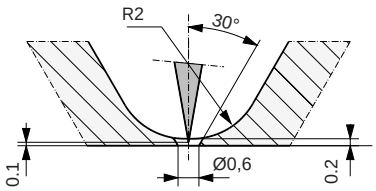




Torpedo tip positioned in the partingline, moved forward and shortened

Before you start to move the tip forward you must determine exact position of the tip in the gate, the torpedo must be in the production temperature when this is done. For best result and nicest residue it is important that the tip is located in the same level as the parting line.
When the torpedo is moved forward shorten the tip so it will be in the parting line when heated.

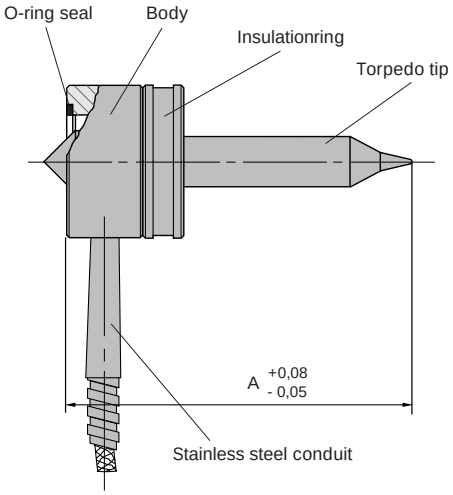
L-dim.	Gate diameter mm			
	0,8	1,0	1,2	1,4
L	0,47(0,47)	0,75(0,75)	1,10(1,10)	1,51(1,51)
L-0,1	0,45(0,44)	0,74(0,72)	1,08(1,07)	1,49(1,48)
L-0,2	0,42(0,40)	0,71(0,68)	1,05(1,03)	1,46(1,44)
L–0,3	0,40(0,35)	0,68(0,64)	1,03(0,98)	1,44(1,39)
L–0,4	0,37(0,30)	0,65(0,58)	1,00(0,93)	1,40(1,33)
	Gate area mm^2 for "L"=45–83 / ("L"=30)			



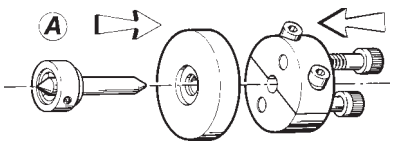
Minimum gate residue

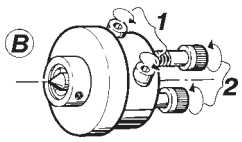
On injection moulding with very short cycle time and short injection times, it may be necessary to design gate cooling so that it does not overheat.
Since, when warm, the torpedo tip enters the gate hole, the gate itself will be ring-shaped. The diameter of the torpedo tip at the end is 0.2 mm. If a gate diameter of 1.0 mm is chosen, the gap at the ring gate will thus be 0,47 mm^2.
If a minimal gate is required, a gate diameter of as little as 0.6-0.7 mm can be obtained by making the needle as pointed as possible. On installation, the tip when warm must be 0.1 mm behind the parting line. This arrangement is suitable up to a shot volume of about 25 g PP or equivalent.

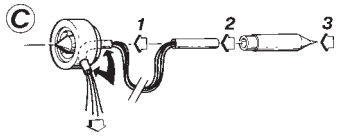
Instruction to recondition TOP2-series.



1. Remove insulation ring, O-ring and stainless conduit from the torpedo.
2. Remove and clean the torpedo from plastic.
3. Cut the wire from the heater where it exits the body.
4. The tip has a drive fit into the body, which can be parted with a tool like shown in fig. A. Part the tip from the body carefully by first tightening screws 1. Pull the tip out by thightening screws 2, prevent the tip from slanting while parting in order not to damage the seat in the body.
5. Check the heater and then feed the heater wires through the head, just enough for the ends to exit the body, as shown in fig. C1. Then pull the conduit through the hole as shown in fig. C1, continue to feed the wires through completely using the conduit to protect the wires from getting damaged.
   Insert a new tip fig. C2 and press the tip into the seat of the body like in fig. C3. Press in a new stainlessconduit.







6. Check tip is concentric to the head, should be within 0,05mm. Measure dim. A and check measurement are within table below.
7. Check the heater with a resistance meter and ensure you get the approximate readings according to the table below.

— Measure resistance between the heater wires and t/c should be infinitive.
— The thermocouple should have a very low reading, ensure you have contact between the two t/c leads so the circuit isn't broken.
— With a mega meter set on 1000V should you get a reading bigger than 2M between a heaterwire and the shell of the TOP.

"L"	A	W	
30	52,9	80	720
45	67,9	120	480
57	79,8	160	360
70	92,8	200	288
83	105,8	250	230

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

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