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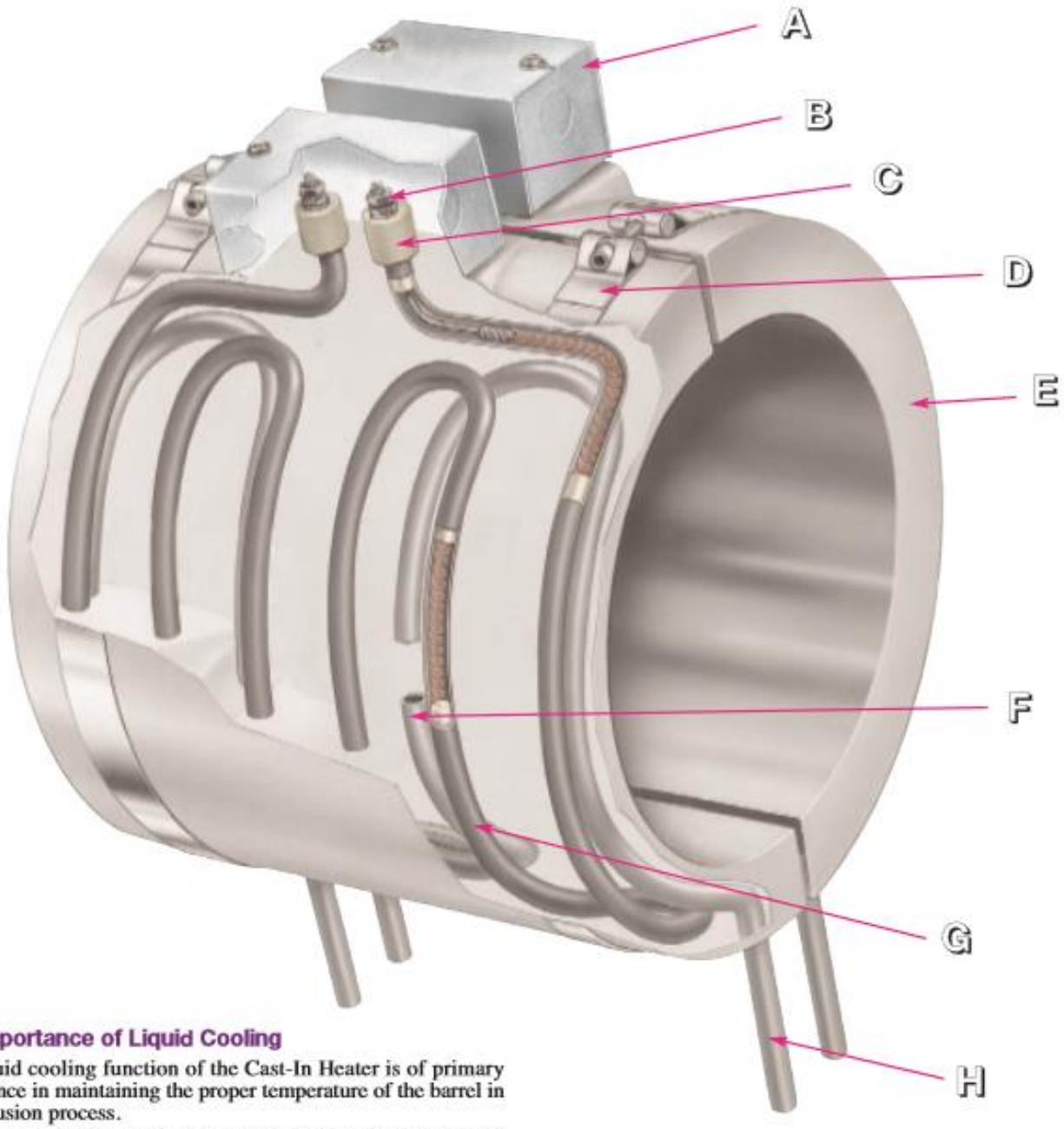
Liquid-Cooled Cast-in Heaters



The Importance of Liquid Cooling

The liquid cooling function of the Cast-In Heater is of primary importance in maintaining the proper temperature of the barrel in the extrusion process.

Tempco offers many different liquid cooling variations, styles and terminations. The following pages will assist you in selecting the liquid cooling system best suited to your application. See page 3-63 for complete details on how to order.

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Cast-in Heaters

Liquid-Cooled Clamping Methods

The single set cooling tube design features 1/4", 3/8" or 1/2" diameter tubing precisely formed into a serpentine or any other suitable shape and cast into the body of the Cast-In Heater. This is the most widely used method for providing a means of cooling in liquid-cooled Cast-In Heaters.

From this basic design, the user can choose to factory equip the cooling tubes with any of the cooling tube termination options shown on page 3-52. Electrical termination options are shown on pages 3-54 and 3-55. The two most common clamping variations are shown below.

Type CW—Single Cooling Tube with Strap Clamping

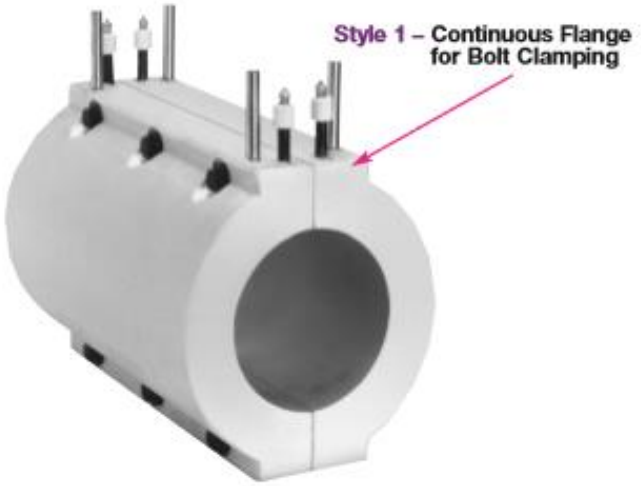
Type CW Cast-In Band Heaters consist of liquid cooled and/or heating functions, and are secured to the extruder barrel with 3/4" or 1-1/4" wide low expansion stainless steel clamping straps with 1/4"-20 socket head cap screws and barrel nuts.

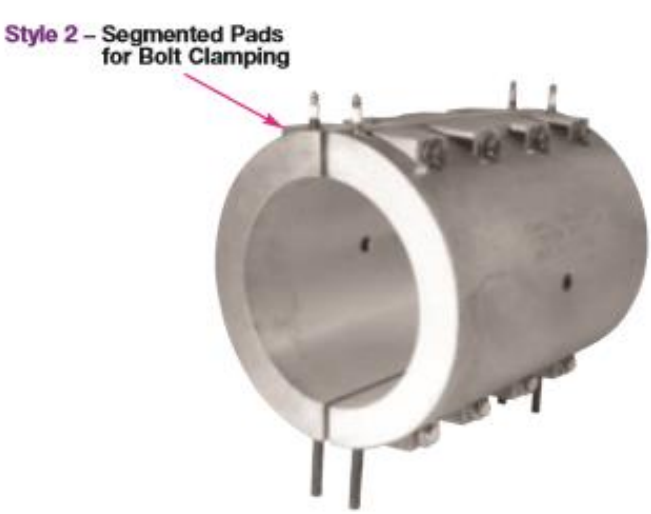
If not otherwise specified, supplied with Type S electrical screw termination, 3" long cooling tube extensions and straps for clamping. For a wide selection of electrical and cooling tube termination options, see pages 3-52 through 3-55. See page 3-63 for complete details on how to order.

Type CWB—Single Cooling Tube with Bolt Clamping

Type CWB Cast-In Band Heaters consist of liquid cooled and/or heating functions, and are secured to the barrel by bolts clamping the two halves together around the barrel. A variety of bolt clamping designs and hardware is available. Consult Tempco with your specific requirements.

If not otherwise specified, cast-in band heaters are supplied with Type S electrical screw termination and 3" long cooling tube extensions. For a wide selection of electrical and cooling tube termination options, see pages 3-52 through 3-55. See page 3-63 for complete details on how to order.





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Cast-in Heaters

Type CWW — Dual Set of Cooling Tubes within the Same Cast-In Heater

The Dual cooling tube design incorporates two sets of 3/8" or 1/2" diameter tubing formed into a serpentine or any other suitable shape within the same Cast-In Heater. Dual cooling tubes will actually double the operating life of a Cast-In Heater with liquid-cool function, since cooling tube failures usually occur before heating element failures.

There are two main causes for failure on liquid-cooled Cast-In Heaters: Stress corrosion cracking at the exiting point of the tube extensions and clogged lines due to scale build-up that reduces flow, decreasing cooling capacity and finally completely blocking the tube. Once the first set of cooling tubes has failed, reconnect to the spare set and you are back in operation, thus eliminating costly downtime and additional labor for heater replacement. Dual cooling tubes are also used when additional cooling capacity is required.

Cooling tube extensions can be factory equipped with your choice of fittings. Clamping styles are low thermal expansion alloy straps or bolt clamping. If not otherwise specified, supplied with Type S electrical screw termination, 3" long cooling tube extensions and straps for clamping. For a wide selection of electrical and cooling tube termination options, see pages 3-52 through 3-55. See page 3-63 for complete details on how to order.

Design Features

- *Double operating life*
- *Greater reliability*
- *Reduces costly downtime*
- *Better cooling capacity*
- *Reduces heater replacement inventory*
- *Various heater terminations*
- *Available in Bolt Clamping and Strap Clamping*
- *Made to customer specifications*

Type RC — Non-Exposed Cooling Tubes Recessed NPT Fittings

The recessed cooling tube design incorporates 3/8" or 1/2" diameter tubing formed into a serpentine or any other suitable shape with specially designed stainless steel NPT fittings that are welded to the tube ends and cast below the surface of the Cast-In Heater, thus eliminating the troublesome, commonly used tube extensions as they exit the casting for connection to the coolant lines.

Non-exposed fittings will drastically increase the operating life of a Cast-In Heater with liquid cool function, as this feature eliminates broken and/or damaged cooling tube extensions which are a major factor in premature heater failure. Type RC fittings are available in two female NPT thread sizes, 3/8"-18 and 1/2"-14. Standard clamping styles for Cast-In Band Heater sets are low thermal expansion alloy straps or bolt clamping. Specify fitting thread size and clamping style when ordering. If not otherwise specified, supplied with Type S electrical screw termination and straps for clamping. For fittings with special thread size, consult Tempco with your requirements. See page 3-63 for complete details on how to order.

Design Features

- *Quick and easy installation*
- *Exceptionally longer Cast-In Heater life*
- *Reduces costly downtime*
- *Greater reliability*
- *Rugged, durable construction*
- *Available on all cooling tube sizes*
- *Available in Bolt Clamping and Strap Clamping*
- *Made to customer specifications*

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Cast-in Heaters

Cooling Tube Options

Type FF Flared Seal Fittings

Brass flared seal fittings are well adapted for low to medium pressure and resistant to mechanical pullout. Available for 3/8" and 1/2" diameter tubing with SAE 45° flare.

Diameter Tubing	Thread	Part Number
3/8"	5/8"-18	FTG-124-101
1/2"	3/4"-16	FTG-124-104

Type HS Hi-Seal Fittings

Hi-seal brass fittings are highly dependable under the most adverse conditions. For reliable and trouble-free service with ease of installation, we strongly recommend hi-seal fittings. Available for 3/8" and 1/2" diameter tubing. Male thread is 1/2" NPT for 1/2" tube and 3/8" tube.

Diameter Tubing	Part Number
3/8"	FTG-118-124
1/2"	FTG-118-116

Type RA 90° Copper Elbow

90° copper elbow is brazed to the Cast-In Heater cooling tube extension with additional tube extension for connecting cooling lines with compression and/or flared fittings. Available for 3/8" and 1/2" diameter tubing. If required, specify.

Diameter Tubing	Part Number
3/8"	FTG-127-102
1/2"	FTG-127-103

Type RT Cast Brass 90° Threaded Elbow

90° threaded elbow is brazed to the cooling tube extension, providing an easy and quick method for connecting cooling lines. Recommended to be factory installed to assure good braze seals. Available for 3/8" and 1/2" NPT internal threads. If required, specify.

Diameter Tubing	NPT	Part Number
1/2"	3/8"	FTG-125-101
1/2"	1/2"	FTG-125-102

Type R3 Straight Threaded Copper Fitting

Straight threaded fitting is brazed to the cooling tube extensions, providing an easy and quick method for connecting cooling lines. Recommended to be factory installed to assure good braze seals. Available for 3/8" and 1/2" diameter tubing with internal threads. If required, specify.

Diameter Tubing	NPT	Part Number
3/8"	3/8"	FTG-131-103
1/2"	3/8"	FTG-131-102
1/2"	1/2"	FTG-131-101

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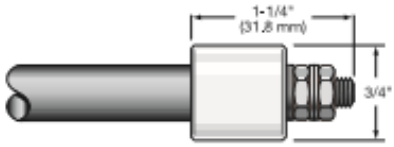
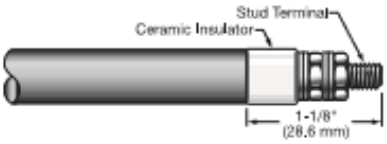
Cast-in Heaters

Electrical Termmination Options



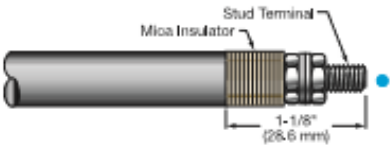
Type S Standard Unless Otherwise Specified

Heavy Duty Ceramic Insulators.
.315" diameter heater has 8-32 screw terminals.
.430" diameter heater has 10-32 screw terminals.



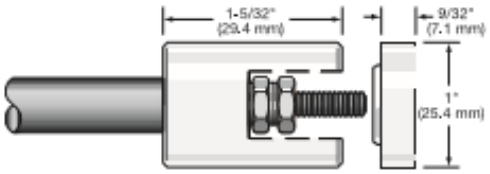
Type T7

Ceramic insulator is the same diameter as the heating element.
.260" diameter heater has 6-32 screw terminals.
.315" diameter heater has 8-32 screw terminals.
.430" diameter heater has 10-32 screw terminals.



Type T

Mica insulator is the same diameter as the heating element.
.260" diameter heater has 6-32 screw terminals.
.315" diameter heater has 8-32 screw terminals.
.430" diameter heater has 10-32 screw terminals.



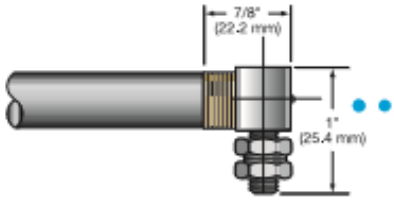
Type C4

Heavy duty ceramic insulator with terminal cover.
.315" diameter heater has 10-32 screw terminals.
.430" diameter heater has 10-32 screw terminals.

TYPE P—Plain Pin

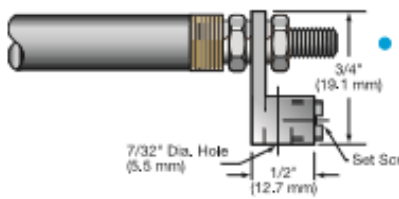
Plain terminal pin. Specify Length "L." Standard 1/2" (12.7 mm) pin length.

Element Diameter		Nominal Pin Diameter	
in	mm	in	mm
.260	6.6	.091	2.3
.315	8.0	.100	2.5
.430	10.9	.120	3.0



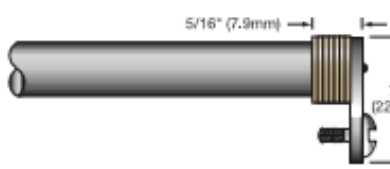
Type R

Mica washers with 90° blockhead screw terminal with 10-32 screw threads. Available for .315" and .430" diameter heaters.



Type R2

Mica washers with blockhead and through hole for lead wire connection. Eliminates the use of ring terminals. Available for .315" and .430" diameter heaters. Accepts 6-14 gauge wire.



Type E

Right-angle lug welded to pin with mica washer insulators and 10-32 binding head screw. Available for .260", .315" and .430" diameter heaters.

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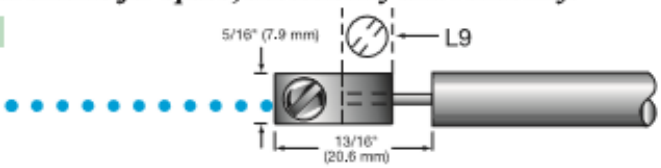
Cast-in Heaters

Electrical Termmination Options

Select the termination style that meets your requirements for space, accessibility and reliability.

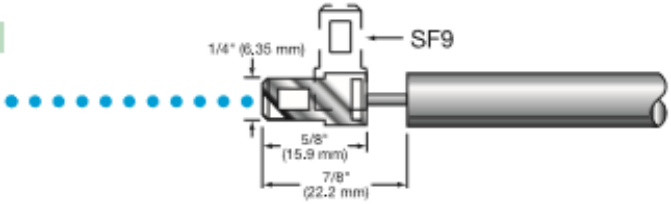
Type L & L9

Terminal lug spot welded to pin with 10-32 binding head screw. Available for .260", .315" and .430" diameter heaters. Type L represents straight; Type L9 represents 90° to pin. Specify lug orientation.



Type SF & SF9

Quick-disconnect spade tabs spot welded to pin. Available for .260", .315" and .430" diameter heaters. Type SF represents straight. Type SF9 represents 90° to pin. Specify tab orientation.



Type F

Flexible lead: insulated stranded wire crimped to cold pin. Crimp connection is insulated with fiberglass sleeving. Available for .260", .315" and .430" diameter heaters. Wire insulation rated to 250°C, 450°C optional. Specify lead length.

Type R1

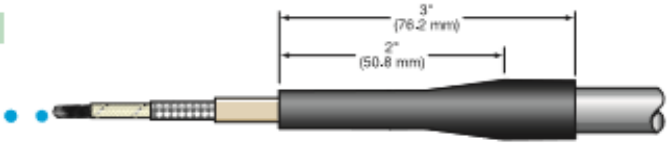
Flexible Armor Cable provides excellent protection to lead wires against abrasion and contaminants. Available for .260", .315" and .430" diameter heaters. Specify cable length and lead length. Style may vary from depiction depending on heater diameter and cable diameter used.

Type R1A

Stainless Steel Wire Overbraid provides flexibility and excellent protection to lead wires against abrasion. Available for .260", .315" and .430" diameter heaters. Specify stainless steel wire overbraid length and lead length. Style may vary from depiction depending on heater diameter and braid diameter used.

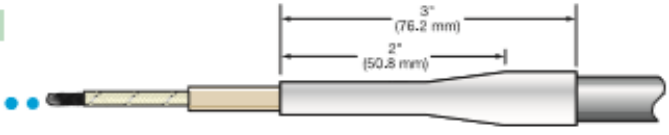
Type MR

Moisture resistant shrink strain relief and lead wire with or without stainless steel overbraid. Available for .260", .315" and .430" diameter heaters. Specify lead wire and overbraid length. Maximum operating temperature is 350°F (177°C).



Type TS

Contamination seal shrink-down Teflon® sleeving over the heater and lead wire splice. Provides a good moisture resistant seal. Maximum operating temperature 500°F (260°C). Available for .260", .315" and .430" and diameter heaters. Specify lead length.



Type P1

Quick -disconnect plug, either mounted directly on casting or on elements ends offset a specified distance from casting. Rating: 16A-250VAC.

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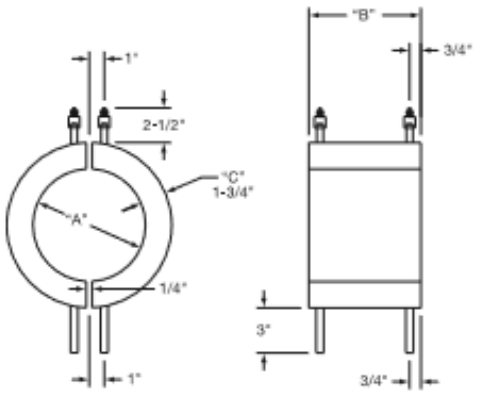
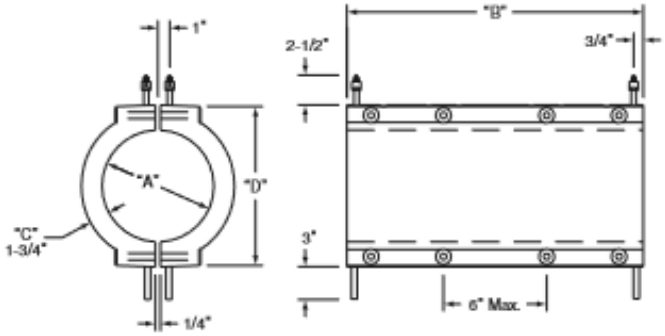
Cast-in Heaters

Ordering Information

Cast-In Band Heater Strap Clamping



Cast-In Band Heater Bolt Clamping



Recommended dimensions shown.

Ordering Information

To process your order or quotation, please specify the following information.

Variable Dimensions Inside Diameter "A"_____ Length "B"_____ Thickness "C"_____ "D"_____

Material Specifications ☐ Aluminum ☐ Bronze ☐ Brass

Electrical Specifications Watts each half _____ Volts each half _____ Phase _____

Terminal Style

☐ "S" Post Terminals ☐ "C4" Ceramic Cover ☐ "F" Plain Leads
☐ "R" 90° Blockhead ☐ "T7" Post Terminals ☐ "MR" Moisture Resistant
☐ "E" Right-Angle Lugs ☐ "T" Post Terminals ☐ "TS" Leads and Shrink Sleeve
☐ "R1" Armor Cable Leads ☐ "R1A" SS Wire Overbraid
☐ "R2" Blockhead and Through Hole ☐ See Pages 3-54 and 3-55 for additional Terminations

Terminal Protection Box

☐ None ☐ "C2" Standard ☐ "C7" 1 Box for both halves ☐ "EP" Explosion Resistant
☐ "P2" High Temperature Quick-Disconnect ☐ "MPR" Moisture Resistant Box
☐ "MR1" Rigid Moisture Resistant Box ☐ "CB1" Cast Aluminum Box

Clamping Style ☐ Straps ☐ Bolt Clamp

Cooling Tube Specifications

☐ 1/4" O.D. SS ☐ 3/8" O.D. SS ☐ 1/2" O.D. SS
☐ 3/8" O.D. Incoloy® ☐ 1/2" O.D. Incoloy® ☐ Dual Cooling Tubes
☐ Standard Wall Thickness ☐ Other Wall Thickness, Specify _____
(See page 3-5 for Standard Wall Thickness Information)

Cooling Tube Fittings

☐ Non-exposed 3/8" NPTF ☐ "HS" Hi-Seal Fitting ☐ "RA" 90° Copper Elbow
☐ Non-exposed 1/2" NPTF ☐ "RT" 90° Threaded Elbow
☐ "FF" Flared Seal ☐ "R3" Straight Threaded

Surface Finish 125 RMS Standard or to Customer Specifications

Special Cast-In Features Holes, Cutouts, Slots, Bevels, Mounting Studs, Stand-Offs and Taper Angles
For special features a detailed drawing is required.