SINGLE THERMO-REGULATED BLOCK

this device is used to inject into several points in the mould; it consists in a steel block where are placed injection runners, which are manteined at a safety temperature of 60-90 C°, thanks to the crossing of a thermoregulated fluid in a special circuit placed in the platen. The device is equiped by a set of regulators to check the amount injected by every nozzle. Injection nozzles are selfadaptable in height, as to fit better in the moulds. The special nozzles conformation allows to make up for possible skews of injection holes. The device, besides to inject into several points of the same plate, allows to inject in two work plate at the same time, too.

THERMOREGULATED RUNNERS USE ADVANTAGES:

- Reduce injection runners.
- Reduce the compound scorch danger during its crossing through the runners (so, it's possible to use quicker compounds).
- This devices eliminate the trend of opening press (mould) due to the underdimension of runners section.
- Reduce injection time, in that the injection point is near the moulds, so it's possible increase the injection speed.
- Best regulation of rubber flow in the hollows, so to fill up every item at the same time and conform the physicalchemical features of the items of the same cycle, besides a better control of flashes.
- Reduce the scraps due to the filling up difficulties of external hollows.
- Because of the absence of prevulcanization danger during the injection stage, it's possible to increase the planes' temperature and reduce the vulcanization time.
- Increase the number of hollows.
- It's possible to use new work technologies, as the "premoulding injection" , excluding runners and injection points in the item.
- It's possible to mould on a double plate, increasing every press' productivity about 95%.

1 General description of the block with thermo-regulated channels

The block with thermo-regulated channels can be composed of:

- A plate with distribution channels for the material to be injected
- Two thermo-regulation circuits for the plate
- A central bush with a supporting seat for the press nozzle
- Two or more nozzle-holders complete with thermo-regulation jacket
- Two or more injection nozzles
- Two or more flow regulators for the material channels
- A heating table

2 Operation principle of the block with thermo-regulated channels

The thermo-regulated channels block is fixed through constrained pistons on the fixed head of the press.
At the end of the mould closing phase the press approaches the injector to the central point of the block and injects the material into the special channels that have been obtained in the block.
The internal channels distribute the injected material to the eight points where special nozzle holders have been placed.
The material flows into the nozzle holders through orifices that can be adjusted by the obturating valves that are controlled by threaded locking rings placed on the external sides of the block.
The nozzle holders have the function to cross the heating table and penetrate into the mould in order to feed the injection nozzles placed at the end of the nozzle holders in contact with the mould in the closest point possible to the figure to be filled up through relatively wide channels. The material coming from the nozzle holders goes through the calibrated hole of each nozzle and feeds the filling channel and the figure.
The block is crossed by two circuits, where the thermo-regulating liquid circulates coming from a special thermo-conditioner.
Also the nozzle holders are thermo-regulated by an independent circuit, which can be anyway connected to the first one.
The thermo-regulation of the block and nozzle holders allows to maintain a safe temperature for the material that circulates in them or remains inside the distribution channels and in the nozzle holders.
The die that is in contact with the injection nozzles is heated by a special heating plate.

3 Thermo-regulated plate group

The group consists of a steel plate.
In one of the surfaces two or more seats have been obtained for the nozzle-holder slot.
In the plate two or more holes have been obtained, which converge to the centre. At the outside end of the two or more holes some threaded seats have been obtained, in which the ring nuts that move the flow regulators are located.

4 Nozzle-holder group

The nozzle-holders have been obtained from a steel bar and their surface is casehardened. The nozzle-holders with the mobile table side part are screwed down into the block, while on their external diameter a steel jacket is applied so as to create an interspace after the coupling, which allows the thermoregulation liquid to go through. In the part on the fixed table side of the nozzle-holder a seat has been obtained where Belleville washers and the injection nozzle are fitted.
A special ring nut screwed onto the nozzle-holder prevents the nozzle to exit.

5 Heating tables group

The heating group is composed of a steel plate, in which holes have been obtained for the nozzle-holders.
Inside the plate a series of holes and grooves have been obtained, which allow the positioning of the resistances with the pertaining insulating pipe. To the heating plate towards the thermo-regulated block a plate made of insulating material is applied, which prevents or reduces the thermical conduction between the heating plate and the plate with thermo-regulated channels.

6 Flow regulators group

The flow regulators are composed of a steel rod with a threaded ring nut placed at one end, which allows the movement inside the channel of the thermo-regulated block. During the movement the other end of the rod opens or closes the material injection channel totally or partially to control its flow.

7 Thermo-regulation group

Inside the plate with thermo-regulated channels three circuits have been obtained to allow the thermo-regulating fluid to go through. Two circuits obtained with a series of crossed holes in the part on the side of the fixed table and on the mobile table side of the plate are communicating in series with each other so that the fluid can go in and flow into the first series of holes and be then addressed to the second series of holes and go out from the opposite end.

The two circuits above described have the function to thermo-regulate the plate, while two different circuits that are independent from one another have been obtained through a series of holes, which intersect with the nozzle-holders seats and consent the fluid to go through the interspaces creates through the coupling of the nozzle-holders with the cooling jackets and to go out from the opposite side.

8 Thermo-conditioners (optional)

It is recommended to apply a thermo-conditioner for the thermo-regulation circuit of the plate with channels and a thermo-conditioner for each nozzles thermoregulation circuit so as to obtain different work temperatures. The thermo-conditioners can work with water or oil and pump fluid at a controlled temperature. They are portable gearcases and consist in a tank containing fluid, a pump for fluid recycling, a double intervention electronic thermo-regulator. The first one controls the fitting of a stainless steel resistance, the second governs a solenoid valve for water feeding from the network to the heat exchanger.

9 TECHNICAL CHARACTERISTICS OF THE SINGLE THERMO-REGULATED BLOCK

BlocK	
Max. pressure of the material to be injected	bar 2000
Max. pressure in the thermo-regulation circuits	bar 3
Necessary water consumption for the thermo-conditioner	l/h 1000
Minimum diameter of the thermo-regulation feeding pipe	mm. 12,7
Diameter of the pipe fitting connecting thermo-regulation circuits	diam.1/2" CONICAL GAS
Thermo-regulation liquid	water or oil
Max. work temperature of the block	°C 140
Total weight	Kg. 130
Heating table	
Voltage of the three-phase heating table	V 380
Power of the heating table	Kw 1,8
Max. absorbency	A 2.7
Max temperature of the heating table	°C 240
Room temperature limits	°C 0/40
(Optional) thermo-conditioner	
Cooling capacity of the heat-exchanger with fluid at 60 °C	Kcal 7000
Water consumption with water at 15 °C	l/' 16.6
Heating power	Kw 3
Max pump capacity	l/h 1400
Pump pressure	bar 3