

DESCRIPTION OF THE MACHINE AND TECHNICAL SPECIFICATIONS	I
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DOUBLE THERMOREGULATED 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 maintained 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 equipped 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%.

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1 General description of the double thermo-regulated channels block

The double thermo-regulated block can be composed of:

- A plate with channels distributing the material to be injected in the mould on the fixed table side and in the mould on the mobile table side.
- Two thermo-regulation circuits for the plate
- A cap to close the central nozzle on the mobile table side
- A central bush with a seating for the press nozzle to work only with the table on the mobile table side
- Eight nozzle holders complete with thermo-regulation jacket
- Eight injection nozzles
- Eight flow regulators for the material channels
- A central nozzle holder
- A central nozzle
- A long, central bush to work with a single injection nozzle
- A heating table
- A key for the press nozzle seating
- A key for nozzle holders

Fittings to work with a double mould

To be able to work with a double mould, one on the fixed table side and one on the mobile table side the thermo-regulated block must be integrated with:

- A short central bush with a press nozzle seating
- Eight nozzle holders complete with thermo-regulation jacket
- Eight injection nozzles
- Eight flow regulators
- A heating table.

2 Operation principle of the block with thermo-regulated channels injecting in several points of the same table

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.

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3 Operation principle of the block with thermo-regulated channels injecting simultaneously on two work tables

The thermo-regulated channel block is fixed to the frame of the intermediate frame of the press by means of two pistons placed on the two sides of the block.

In the closing phase the press closes the mould on the mobile table side placed between the mobile table and the thermo-regulated block; then it closes the mould on the fixed table side placed between the thermo-regulated block and 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 special channels that have been obtained in the block.

The internal channels distribute the injected material to the eight points of the table on the fixed table side and to the eight points of the table on the mobile table side where special nozzle holders have been placed.

The material flows into the nozzle holders through orifices that can be adjusted through 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 tables on the fixed table side and on the mobile table side of the block 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.

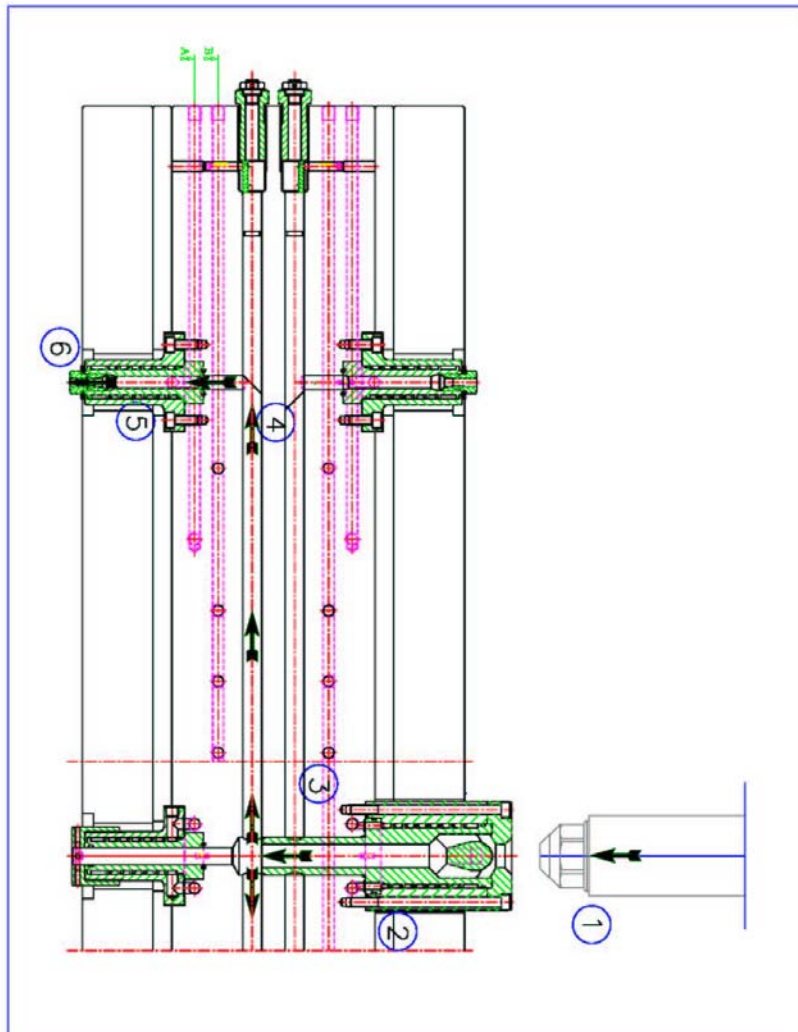
The material coming from the nozzle holders goes through the calibrated hole of each nozzle and feeds the filling channel and the figure.

The block is crossed by two circuits, where the thermo-regulating liquid circulates coming from a special thermo-conditioner.

Also the upper and bottom nozzle holders are thermo-regulated by two independent circuits, which can be anyway connected to the first one.

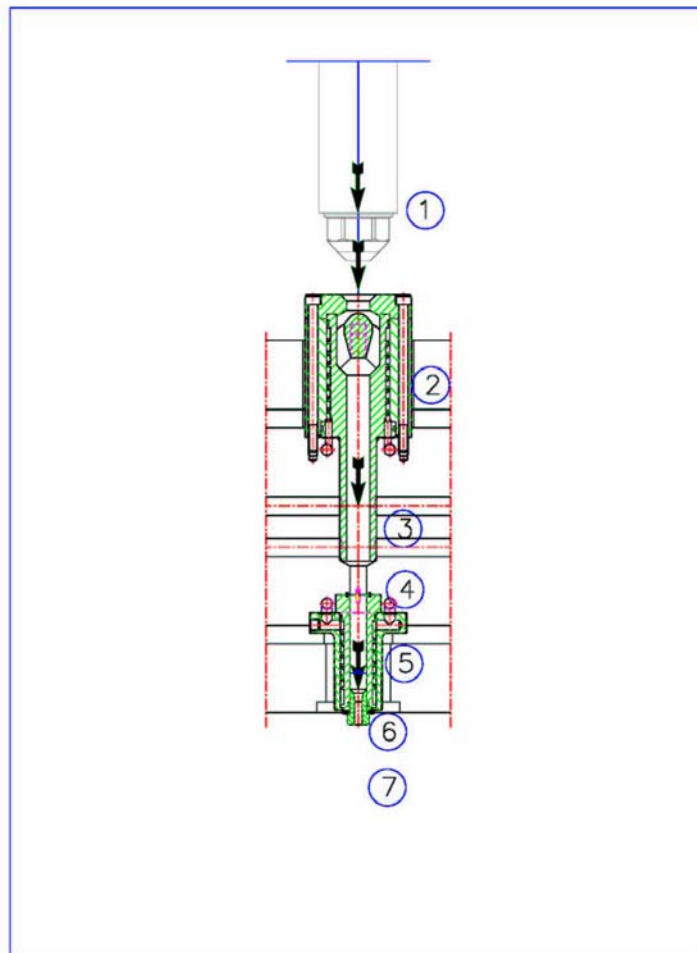
The thermo-regulation of the block and nozzle holders allows to maintain a safe temperature for the material that circulates in them or that remains inside the distribution channels and in the nozzle holders.

The die that is in contact with the injection nozzles is heated by a special heating plate.



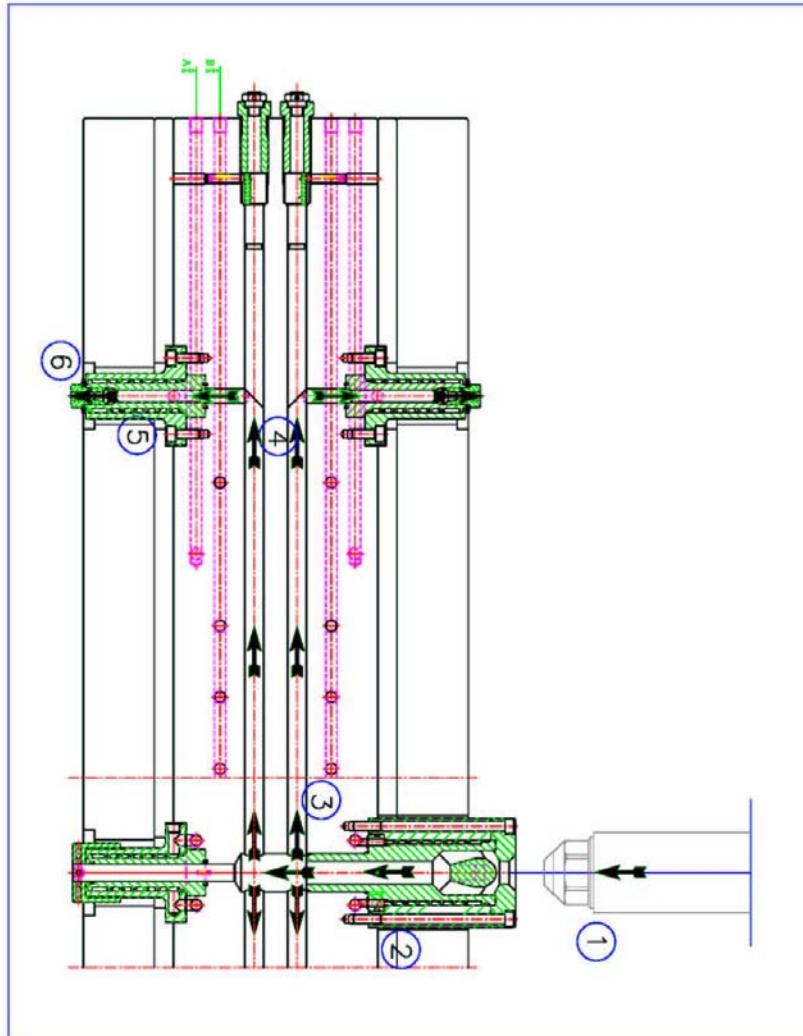
1. Approach of the injectors
2. Material injection
3. Material distribution
4. Material flow regulation
5. Flow through the nozzle holder
6. Flow through the nozzle
7. Filling of the feeding channel or figure

FIG. 1.1 – OPERATION PRINCIPLE OF THE BASIC BLOCK WITH THERMO-REGULATED CHANNELS ONLY WITH THE OPENING ON THE MOBILE TABLE SIDE WITH EIGHT NOZZLES ON THE MOBILE TABLE SIDE



1. Approach of the injectors
2. Material injection
3. Material distribution
4. Material flow regulation
5. Flow through the nozzle holder
6. Flow through the nozzle
7. Filling of the feeding channel or figure

FIG. 1.1.1 - OPERATION PRINCIPLE OF THE BASIC BLOCK WITH THERMO-REGULATED CHANNELS WITH ONLY THE CENTRAL NOZZLE OF THE OPENING ON THE MOBILE TABLE SIDE



1. Approach of the injectors
2. Material injection
3. Material distribution
4. Material flow regulation
5. Flow through the nozzle holder
6. Flow through the nozzle
7. Filling of the feeding channel or figure

FIG. 1.1.2 - OPERATION PRINCIPLE OF THE BASIC BLOCK WITH THERMO-REGULATED CHANNELS WITH EIGHT-NOZZLE WORK OPENINGS ON THE FIXED TABLE SIDE AND EIGHT-NOZZLE WORK OPENINGS ON THE MOBILE TABLE SIDE

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3 TECHNICAL FEATRES OF THE DOUBLE THERMO-REGULATED BLOCK

BLOCK

Max pressure of the material to be injected	bar	2000
Max pressure in the thermo-regulation circuits	bar	3
Water consumption necessary for each thermo-conditioner	l/h	-----
Minimum diameter of the thermoregulation feeding pipe	mm.	12,7
Diameter of the pipe fitting for the connection of the thermo-regulation circuits Thermoregulation liquid	diam. 1/2" GAS water or oil	
Max. work temperature of the block	°C	140
Total weight without heating tables	Kg.	3800

HEATING TABLES

Three-phase supply voltage of the heating table	V	400
Power of a heating table	Kw	34,2+5,4+5,4
Max. absorbency	A --	
Max. temperature of the heating table	°C	240
Environment temperature limits	°C	0-40
Total weight of a heating table	Kg.	1500

(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. rate of flow of the pump	l/h	1400
Pump pressure	bar	3

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4 Thermo-regulated channel plate group

The group consists of a steel plate.

On two of the surfaces eight + eight seats have been obtained on a circumference and a central seat has been obtained on the table on the mobile table side for the nozzle-holders slots.

Inside the plate eight holes have been obtained starting from outside and converging to the centre. At the outside end of the eight holes some threaded seats have been obtained, in which the ring nuts moving the flow regulators are fitted in slots.

5 Nozzle-holders 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.

6 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 thermal conduction between the heating plate and the plate with thermo-regulated channels.

7 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.

8 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 created through the coupling of the nozzle-holders with the cooling jackets and to go out from the opposite side.

9 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.

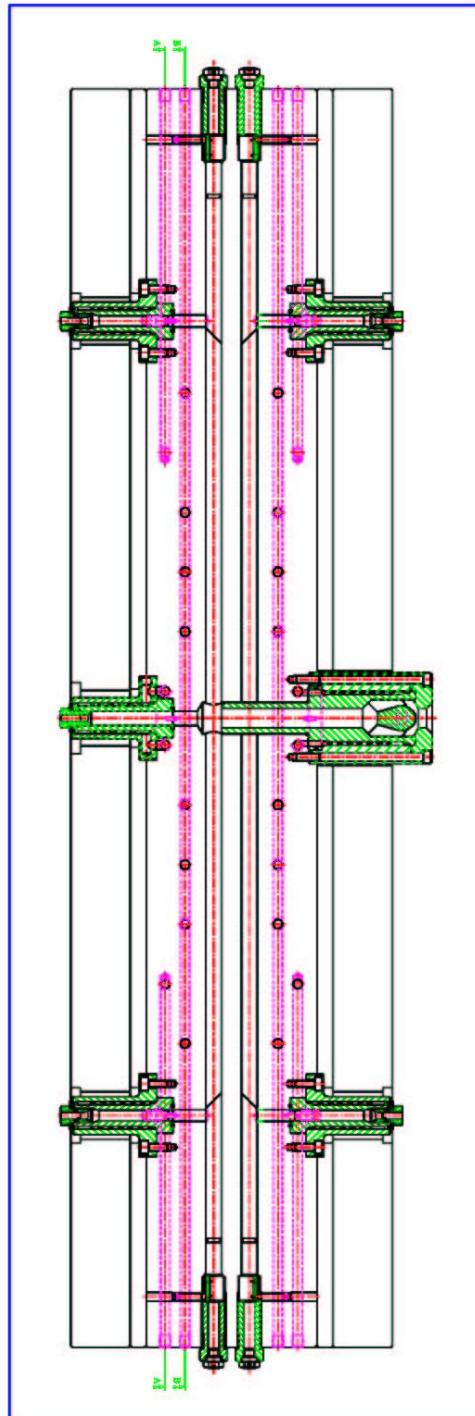


FIG. 2.2 – TOPOGRAPHICAL DRAWING OF THE COMPONENTS' POSITION