

CLAIMS

1. A stopper (1) configured to be positioned inside a barrel (101) of an injection
5 device (100) for injecting at least one composition, said stopper (1) comprising:
- a gasket (10) comprising a proximal end (11), a distal end (12), a lateral wall (13),
and a through hole (14, 71) extending from the proximal end to the distal end,
 - an insert (50) inserted in the through hole (14, 71),
- wherein the stopper is adapted to deform between:
- 10 - a closed configuration wherein the gasket (10) cooperates with the insert to
hermetically close the through hole (14, 71), for preventing flow of the composition
between the proximal end (11) and the distal end (12) of the gasket (10), and
- an open configuration wherein the gasket (10) cooperates with the insert to open a
fluidic pathway in the through hole (14, 71) between the proximal end (11) and the
15 distal end (12) of the gasket (10) for allowing flow of the composition
- wherein:
- the proximal end (11) of the gasket (10) comprises a membrane (16),
 - the insert (50) comprises an inner chamber (51) having a distal opening (52) and at
least one lateral opening (53),
 - 20 - the gasket comprises a cavity (15) extending around each lateral opening (53) of
the insert,
- and wherein:
- in the closed configuration, the membrane (16) cooperates with the insert (50) to
close the cavity (15), for preventing flow of the composition between the proximal
25 end (11) and the distal end (12) of the gasket, and
 - in the open configuration, the membrane (16) deforms toward the cavity (15) under
a positive difference of pressure between the composition situated proximally from
the proximal end (11) of the gasket (10) and a fluid present distally from the distal
end (12) of the gasket exerted onto said membrane to open the fluidic pathway
30 between the proximal end (11) of the gasket, the cavity (15), the inner chamber (51)
and the distal end (12) of the gasket (10).
2. Stopper according to claim 1, wherein the gasket (10) comprises an inner
groove (19), and the insert (50) comprises a flange (54) extending from its lateral wall (55)
35 and inserted in the inner groove (19) of the gasket for retaining axially the insert (50) relative
to the gasket (10).

3. Stopper according to claim 1 or claim 2, wherein the insert (50) is in the form of a pin having an elongated cylindrical or frustoconical body.
4. Stopper according to any of the preceding claims, wherein the lateral wall (13) of the gasket comprises one or more ribs (18) extending from thereon, said ribs being adapted to contact an inner surface (102) of the barrel (101).
5. Medical injection device (100) for injecting at least one composition, comprising:
- a barrel (101) extending from a proximal end to a distal end,
 - a plunger rod adapted to be translationally movable inside the barrel,
 - a stopper (1) according to any one of claims 1 to 4, arranged between the distal end of the barrel and the plunger rod, adapted to be translationally movable inside the barrel, wherein the lateral wall of the stopper (1) sealingly engages an inner surface of the barrel.
6. Medical injection device according to claim 5, said medical injection device being adapted to sequentially inject two compositions, wherein the stopper (1) separates two chambers of the barrel including a first chamber between the stopper (1) and the distal end of the barrel containing a first composition, and a second chamber between the stopper (1) and the plunger rod containing a second composition.