

The present invention concerns a universal type butterfly valve, that is a butterfly valve that can be assembled between any of the types of flanges manufactured in compliance with
05 currently existing international standards, namely AFNOR, DIN, ISO, ANSI, AWWA, MSS, BS, JIS standards.

Generally, a butterfly valve comprises:

- a body manufactured in one or several parts and including a
10 central bore, two parallel radial faces in the middle of which the said bore opens and a transversal drilling at a right angle to the centerline of the said bore,
- a butterfly assembled so as to rotate inside the said body by means of at least one operating shaft inserted in the said
15 drilling, and
- a sealing lining that cooperates with the said body and the said butterfly to ensure upstream/downstream tightness when the valve is in the closed position.

The invention more specifically concerns a butterfly valve in
20 which the sealing lining consists in an elastomer flexible ring or sleeve, with a basically U-shaped section, the core of which lines the body bore and the lateral cheeks of which turn up against the radial faces of the body and ensure external sealing at the point where the valve is joined to the piping.

In this respect it should be noted that this type of valve is usually joined to the piping by means of two connecting flanges, each one of which features a radial face designed to be assembled tightly against a matching radial face on the valve body. To this effect, each one of these flanges displays a series of evenly laid out axial holes, through which pins or screws are inserted. Each pin or screw is threaded through a couple of matching coaxial holes on both flanges and is bolted at each end, in order to ensure both:

- external sealing through the compression of the part of the flexible ring that turns up on the radial faces of the valve, and
- mechanical coupling between the two pipe sections and the valve.

Moreover, in many types of valves, the cheeks of the sleeve partially fit into a circular recess provided in the matching faces of the body. In some valves and in particular the one described in FR A 2 151 470, these recesses comprise, outwards from the body bore, a radial surface axially offset from the said face, then an annular groove. In this case, at the radial surface of the recess, the sleeve cheeks are slightly thicker than the depth of the recess and at their ends they are shaped as a tenon that fits into the said annular groove. This pattern ensures that the sleeve is properly anchored to the body and at the same time restricts the compression exerted on the cheeks to suit the level of sealing desired, in the understanding that this sealing is obtained when, owing to the stress induced by bolting the pins, the radial face of the flanges is pressed against the radial faces of the valve body.

In this type of assembly, the valve body is centered on the flanges by means of the pins or screws. To this effect, a central rib (or two lateral ribs if applicable) may be provided on the perimeter of the valve body, in which axial holes or notches are drilled, through which the pins or screws are threaded.

However, the present situation is that for the same type of valve, the inner diameter of the flanges, the angular position of the holes provided in the flanges for the pins or screws, the distance of these holes to the flange centerline and the
05 diameter of the holes are all different according to the various standards currently in force.

These differences in flange shapes require specific ranges of valves designed to match each type of flanges, and this particularly relates to the position and size of the holes or
10 notches through which the pins or screws must be inserted.

In addition, it appears that in butterfly valves of the type described above, the compression of the sleeve cheeks by the radial faces of the flange causes a displacement of the elastomer which results in a corresponding variation of the
15 thickness of the core of the sleeve on which the butterfly bears. The quality of the upstream/downstream tightness of the valve, as well as the operating torque are therefore affected by this creep effect.

As a result, the use of flanges complying with different
20 standards, and therefore with different inner diameters, results in a variation of the tightness and operating torque features of the valve, owing to the volume variation induced by the compression of the elastomer.

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The primary purpose of the present invention is to overcome these drawbacks. It proposes a butterfly valve similar to the one described above, except for the fact that the body of this valve has a particular perimeter configuration such that it can
30 be assembled and centered between different types of flanges with variable inner diameter, and can be provided with holes for inserting pins with different diameters laid out in different locations, to comply with any one of the standards mentioned

above. Moreover, the circular recesses provided in the radial faces of the body of this valve, as well as the sleeve cheeks designed to fit into these recesses, are given a particular shape designed to suppress the influence of the inner diameter of the flange on the valve's tightness and torque characteristics.

In order to achieve this result, the invention proposes a butterfly valve comprising, in a manner similar to that of the valve described in the above mentioned patent

FR A 2 151 470.:

- a body having a central bore, a transversal drilling perpendicular to the axis of said bore, two radial faces at the center of which said bore opens and each comprising a coaxial circular recess extending radially outwardly from said bore, and comprising an annular groove having a rectangular bottom, extending axially in the body and one side wall of which ends at the level of said radial face ;
- a closing device assembled so as to rotate inside said body by means of at least an operating shaft inserted in said drilling and
- an elastomer sleeve with a substantially U-shaped cross-section, the core of which lines the bore of the body and the lateral cheeks of which engage partially into said circular recesses and whose inner shape substantially matches that of the respective circular recesses, with however, an outer diameter smaller than that of said side wall of the annular groove, so that, between said cheek and said side wall, there remains an annular volume v which is empty at rest, and an outer shape comprising at least a flat face substantially located in the plane of the matching radial face and, opposite said groove, a shape projecting outwards with respect to the plane of said radial face, this valve using, for its assembly on a pipe, at least one flange comprising a collar provided with a radial face designed against one of said radial faces and comprising on its perimeter, a series of axial

holes through which pins can be assembled.

According to the invention, this valve is more particularly characterized in that :

- the annular groove is separated from the central bore by a receding section substantially conical in shape and by a flared section,
- the above-mentioned flat face of the outer shape of the cheeks extends opposite said flared section,
- said projecting shape is a bulge tangent to a radial plane axially offset outwards with respect to said plane and further extends opposite said conical section.

Thus, when the pins are tightly assembled, the bulges on the sleeve cheeks are compressed by the radial faces of the flanges until the latter abut against the valve faces. These bulges are then flattened against the radial faces of the flanges, and therefore in the plane of the valve's radial faces. In the course of this action, the compression of the bulge causes the displacement of the elastomer of the cheeks, which is channelled by the receding section of the recess towards the annular groove, and tends to fill the spare volume, while the restriction occurring at the tip of the flared section precludes any creep of the elastomer towards the sleeve core.

Some developments of a valve according to the invention are characterized by claims 2 to 5.

It should be pointed out that the diameter at the junction between the receding section and the flared section of the circular recesses is designed greater than the maximum inner diameter of the different types of flanges, in order to ensure proper compression of the bulges on the cheeks.

On the other hand, the diameter of the above mentioned side wall of the circular groove is designed smaller than

the minimum outer diameter of the parts of the radial faces of the flanges that compress the said cheeks, so that these parts always abut against the radial face of the valve body.

Regarding the problem raised by the centering of the valve between flanges and dismounting downstream piping at operating pressure, the invention is based on the observation that there is a measure of correspondence between the position of the holes provided for pins or screws on the different types of flanges as per the aforementioned standards, and therefore it is possible to classify them in sets of insertion hole locations. On the other hand, it appears that the projections, on a radial plane, of the drillings of each set of holes are clustered together in well-defined zones, distinct from the cluster zones of other sets.

Consequently the invention according to claim 6 and 7 proposes a valve of the type described above, the body of which is designed so that it can be assembled between anyone of all the types of flanges mentioned above, and so that downstream piping can be dismounted under maximum operating pressure at all unions, all with minimum size and weight.

According to the invention, the butterfly valve comprises a body having, on its periphery, at least two bosses protruding into the passage area of a set of corresponding pins or screws of different types of flanges, the cross-section of these bosses in a

radial plane of the valve being such that it contains exclusively the zone for the passage of the said set of pins or screws, so that it is possible to drill a hole in these bosses in the passage volume of a pin or a screw belonging to this set, corresponding to a flange of a predetermined type, the number of the said bosses being defined on the basis of the nominal diameter of the valve and maximum permissible pressure.

The method of manufacturing a valve according to the invention is characterized by claim 8.

An implementation of the invention will be described hereunder, as a non restrictive example, with reference to the attached drawings, wherein :

Figure 1 shows a butterfly valve designed according to the invention, with a partial axial cut-away (right-hand side of picture) and a partial front view (left-hand side of picture) ;

Figure 2 is a full front view of the valve shown in Figure 1 ;

Figure 3 is a cross-section through A-A of the valve shown in Figure 1 ;

Figure 4 is an axial cross-section at a larger scale of a detail of Figure 1, illustrating the principle of the seal at the butterfly valve flanges ;

Figures 5 to 8 are front views of different valves, the body of which is shaped so as to offer a number of bosses which is just sufficient for the valve's nominal diameter and maximum permissible pressure ;

Figure 9 is a schematic axial cross-section showing an example of assembly between flanges of a valve on piping, and the method for in-service dismounting of the downstream piping.

As shown in figures 1 and 2, the butterfly valve is conventionally composed of:

- a body 1 with a cylindrical central bore 2, two parallel radial faces 3, in the center of which opens the said bore 2, and a transversal drilling 4 at a right angle to centerline XX' of the said bore 2 and prolonged, at one end, inside radial neck 5 which is of a block with said body 1,
- a closing device 6, assembled to be able to rotate inside bore 2 by means of at least an operating shaft 7, which is inserted in said drilling 4, and
- a sealing lining consisting in an elastomer flexible ring or sleeve 8 with a basically U-shaped section, the core 9 of which lines the bore 2 of body 1 (figure 3) and the lateral cheeks 11, 12 of which turn up in the circular recesses 13, 14 respectively provided for in the radial faces 3 of the body 1.

The general operating principle of this type of valve is well known and therefore the present description will not go into any details thereof. However, it should simply be pointed out that this valve is operated by a quarter-turn rotation of the closing device 6 under the effect of an action exerted on the end 15 of the operating shaft 7 protruding beyond neck 5.

Likewise, the general principle of the assembly of this type of valve between flanges is well known and will not be discussed either.

Let it simply be pointed out in this connection that these flanges comprise at least one radial face designed to be applied against the radial faces 3 of the valve and axial holes drilled around their perimeter with a view to ensuring a mechanical bond between the flanges by means of bolted pins or screws. The valve is assembled on a pipe by placing the valve between the two flanges assembled on the matching ends of the pipes, inserting

the pins or screws on the matching pairs of coaxial holes in both flanges, then screwing the nuts or screws so that the radial faces of both flanges are applied to the matching radial faces 3 of the valve, compressing the cheeks 11, 12 of the sleeve 8 and, as a result, ensuring tightness at both connections.

In this respect it should be noted that the radial face of the flanges may be flat or even be stepped, with a raised face designed to come into contact with the face of the valve.

As mentioned above, in the first place the invention proposes a series of arrangements related to the shape of the circular recesses 13, 14 provided on the radial faces 3 of the valve, and of the cheeks 11, 12 of sleeve 8, designed to enable the use of different types of flanges with the same valve, without any impairment of the tightness and torque characteristics of the valve.

This series of arrangements, more specifically illustrated in figure 4, provides for a recess 13, 14 on each radial face 3 of the valve, which comprises successively:

- a first section 18 with an incurved profile that is the continuation of the bore 2 of body 1 as from a first radial plane P_1, P'_1 which passes inside the body at a distance l_1 from face 3 of the valve (plane P_0, P'_0), until (point B) a second radial plane P_2, P'_2 located at a distance l_2 , smaller than distance l_1 , the diameter D_1 of the end of this first section 18 being greater than the diameter D of bore 2 of body 1,
- a second section 19, basically conical, receding towards the body 1 and ending at a third radial plane P_3, P'_3 located at a distance l_3 from radial face 3 (plane P_0, P'_0) greater than distance l_2 , and
- a third section forming an annular groove 20, extending axially towards the inside of the body, this groove 20 featuring successively: a first cylindrical side wall 21 which

is a continuation of the second section 19, a bottom 22 axially closer to the center of the body 1 and a second cylindrical side wall 23 with a diameter D_2 greater than diameter D_1 .

- 05 This series of arrangements also involves a sleeve 8 the cheeks of which 11, 12 each feature an inner shape basically matching that of the recess 13, 14 in which it is partially housed, and an external diameter D_3 basically smaller than diameter D_2 of the side wall 23 of groove 20, such that at rest, 10 between the said side wall 23 of groove 20 and the outer edge 25 of cheek 11, 12, there remains a spare annular volume 26 with volume v .

Moreover, these cheeks 11, 12 both feature an outer shape comprising, as from the inside surface of the sleeve:

- 15 - a radial face 27 located in the plane P_0, P'_0 of radial face 3 and extending from the inner surface 28 of the core 9 of sleeve 8 until diameter D_1 whereas the junction of this radial face 27 and the inner surface 28 of sleeve 8 is ensured by a portion with an incurved profile 30 with curve center C_1 ;
- 20 - a bulge 32 located opposite the second section 19 and the groove 20 in the recess 13, 14, and ending at the outer edge 25 of cheek 11, 12.

- More specifically, this bulge 32 protrudes axially outwards beyond plane P_0, P'_0 of radial face 3 and as from the said plane P_0, P'_0 a 25 volume v' , basically equal to the spare volume v . As a result, when the flanges are tightened against the valve body, radial faces 37 flatten the bulge 32 towards matching planes P_0, P'_0 and cause a transfer of the cheek elastomer which creeps to fill the spare volume v . Therefore, the shape of the recesses 13, 14 30 and of the cheeks 11, 12 of sleeve 8 has been more specifically designed to channel the creep of the elastomer from volume v' into volume v , and to preclude any transfer of matter into the body of the valve (particularly towards core 9 of sleeve 8) such

as might interfere with the tightness and the torque of the valve.

To this effect, the slope of the second (basically conical) section 19 of recess 13, 14 with respect to the centerline of the
05 bore is best comprised between 10° and 40° .

Diameter D_1 of the base of this second section 19, where the bulge 32 on cheek 11, 12 begins, is preferably designed at least equal to the greatest inner diameter D'_1 of the flanges that are liable to be used for the same valve.

10 On the other hand, the part of cheeks 11, 12 of sleeve 8 that fits into the annular grooves 20 acts as a tenon to anchor the sleeve 8 on the body 1 of the valve, in order to oppose any internal depression in the valve, e.g. due to operation at a pressure below atmospheric pressure and/or a depression generated by the
15 flow of the fluid conveyed inside the valve.

The rounded shape 18 provided for at the junction between the recess 13, 14 and the bore 2 is designed to prevent any tear due to strain in sleeve 8 (traction, compression).

In the example shown in figure 4, the flange 36, of which only
20 the part cooperating with the matching radial face 3 of the valve has been shown, has a raised radial face 37.

Obviously when the flange is tightly assembled, this raised face 37 must be applied on the radial face 3 of the valve, inducing a predefined compression ratio on cheek 11, 12 of
25 sleeve 8. Therefore, to allow for different outer diameters of this raised face 37, diameter D_2 of the side of the groove is chosen smaller than any maximum outer diameter D'_2 of the raised surfaces 37 of the flanges liable to be used with the valve.

Of course, excepting the shape of cheeks 11, 12, the invention
30 is not restricted to a particular shape of sleeve. For instance, as shown in figure 3, the core of the sleeve can also feature circular ribs 42 designed to fit in radial grooves 43 provided in bore 2 of body 1.

In addition to the measures described above, the outer shape of the valve body had to be reviewed in order to enable its assembly between all the types of flanges usually encountered internationally, while optimising the weight of the same body, and to allow downstream piping to be dismantled under maximum operating pressure at all connections (AFNOR, DIN, ISO, ANSI, JIS, BS).

It is a known fact that the number of flange/valve fastening points is a direct function of the stress imposed on the valve by the dismantling of the piping downstream, the stress being induced by:

- the pressure of the fluid bearing on the closed stopper;
- the compression of the sleeve cheek against the upstream flange,
- the weight of the valve and of its actuator.

The addition of these forces at maximum operating pressure yields the maximum stress which conditions the number and the size of these fixation points.

Following this procedure, maximum stress and the resulting minimum number of pins or screws required to maintain the valve on its upstream flange in full safety is defined for each valve diameter.

In fact, on a radial plane of the valve, the areas where pins or screws used for the different types of flanges applicable to this valve are located are all clustered together in well-defined areas, distinct from one another.

The invention therefore intends to take advantage of this feature with a view to defining flange/body fixation points.

To this effect bosses are provided on the perimeter of the valve body, of a block with the latter, designed to be drilled with the holes for pins or screws and with the following properties:

- the number of bosses matches the minimum number of pins or screws required for the maximum stress as mentioned above,
 - the position of these bosses matches the position of the predefined fixation points,
- 05 - each one of these bosses is large enough to encompass, in a radial plane of the valve, an area corresponding to a cluster of passage areas of the pins or screws used for the different types of flanges.

As an illustration, in figures 1 and 2, only two cluster areas
10 38, 39 have been indicated, in the understanding that the other cluster areas are evenly laid out around the body 1 of the valve.

In both these figures, only two bosses have been shown, i.e.: one boss 40 next to the neck 5 of body 1 of the valve, and one boss 41 diametrically opposite.

15 Thereafter, to assemble the valve between two flanges of a specific type, all that remains to do is to drill a plain or tapped hole as required through the two bosses for the pins or screws, in suitable locations and sizes for the type of flanges involved.

20 More generally, the manufacture of valve bodies according to the invention involves the following phases:

- The cluster areas of the projections on a radial plane of the holes of the different flanges liable to be used with the particular valve, superimposed coaxially, are defined for
25 each range of valves, as defined by the valve nominal diameter.
- The required and sufficient number of bosses - that will enable the downstream piping to be dismantled under maximum operating pressure are defined by strength calculation
30 applying conventional computing procedures.
- On the basis of this calculated number and of the cluster areas, the shape and the location of the bosses to be provided

on the body perimeter are assessed.

- body 1 of the valve is manufactured, e.g. by casting, including the bosses defined above, and
- holes are drilled or tapped in these bosses to insert the pins or screws in appropriate locations and dimensions to match the flanges specified in each case.

It is obvious that thanks to this procedure, only one valve body 1 shape need be provided for each valve range (nominal diameter), since this single valve body 1 can there be used with any type of flanges applicable to the valve range, as described above.

As for the definition of the number of holes to be provided on the body 1 of the valve, and consequently the number of bosses, this definition can be done conveniently by means of the following Table, which gives the minimum number of bosses required to ensure mechanical withstand capability and upstream external tightness during downstream piping removal at maximum operating pressure as a function of the nominal diameter ND (in mm) of the valve.

20

TABLE

ND	32 to 125	150 to 250	300 to 450	500 to 600
Minimum required bosses	2	4	6	8

The numbers indicated in this table are given as an example for a maximum permissible pressure of 20 bars and for the standard screw sizes required by appropriate connection standards.

It should be noted that the layout of the fastening bosses must be designed carefully so that they will be able to withstand the considerable strain induced by the pressure in the upstream piping and transmitted to body 1 through operating shaft 7.

The number of bosses is always even, and they are evenly laid out about the operating axis, with the main bosses always next to the latter, i.e. joined to the neck 5 and to the bottom 56.

Figures 5 to 8 provide examples of valve body shapes for the
05 previously indicated nominal diameters.

Figure 5 shows a valve body with a nominal diameter within the 32 to 125 mm range. This body is provided with two bosses 50-51, diametrically opposed and located practically at 45° from the axis YY' of the butterfly operating shaft. One of these bosses
10 50 is extended to join the neck 5 of the valve whereas the other boss is extended, symetrically with respect to the center O of the valve, to the bottom 56.

In the example illustrated in figure 6, which is rated in the 150 to 250 mm range, the valve has four bosses of which two, i.e. 52, 53 are attached to neck 5 and the other two, 54, 55 which are
15 53 are attached to neck 5 and the other two, 54, 55 which are diametrically opposite 52, 53, are at either side of axis YY'. These two bosses 52, 53 are joined to the valve bottom 56.

The valve shown in figure 7, belonging to the 300 to 450 mm range, has six bosses, i.e. four bosses 57 to 60 laid out
20 similarly to bosses 52 to 55 in figure 6, and two bosses 61, 62 diametrically opposite each other near a ZZ' axis perpendicular to axis YY'. These two bosses are extended by a piece 63, 64, designed as a handle.

In the 500 to 600 mm range, as shown in figure 8, the valve can
25 feature eight bosses, i.e.: six bosses 65 to 70 similar to bosses 57 to 62 in figure 7, and two bosses 71, 71' diametrically opposite each other, located symetrically to bosses 69, 70 about an axis ZZ' perpendicular to axis YY' and passing through the center O.

30 It should be noted that the bosses implemented following the invention may be plain and form a median rib. Or else they may be double and U-shaped, with both wings spreading in two lateral radial planes of the valve.

Of course, methods for removing downstream piping under operating pressure differ depending on the type of bosses used and on whether the holes required in the bosses are to be drilled or tapped.

- 05 Figure 9 illustrates a method for dismantling the downstream piping 72 from a valve 73, the body of which has at least two bosses 74, 75, each with a tapped hole 77, 78.

In this example, each of these holes 77, 78, houses two screws 79, 80, retaining upstream and downstream flanges 81, 82
10 respectively.

In this case, downstream piping is dismantled under operating pressure simply by unscrewing screws 80 of the downstream flange, with the closing device 82' in the closed position and keeping the body of valve 73 fastened tightly to upstream
15 flange 81.

In the case where the bosses are double with smooth holes, flanges are attached to the body by means of pins, each of which passes successively through a hole in the upstream flange, a matching hole drilled in the two wings of the boss, and a hole in
20 the downstream flange. The seal is then ensured by means of two nuts screwed on the ends of the pin protruding from the upstream and downstream flanges.

In this case, dismantling the downstream piping under operating pressure may require successively for each pin:

- 25 - removal of the downstream nut,
- displacement upstream of the pin, and
- screwing again of the downstream nut in the gap between the two wings of the boss.

Of course, other arrangements can be devised if necessary,
30 particularly when downstream dismantling is liable to be frequent; these solutions may for instance use special flanges featuring tapped holes for pins and smooth holes for screws.



Claims

1. Butterfly valve of the type involving :

- a body (1) with a central bore (2), a transversal drilling (4) at a right angle to the axis of said bore (2), two parallel radial faces (3) in the center of which the said bore (2) opens, each of which features a coaxial circular recess (13, 14) extending radially outward from the said bore (2), an annular groove (20) having a rectangular bottom and extending axially in the body (1), one lateral wall (23) ending at the level of said radial face (3) ;

- a closing device (6) assembled so as to rotate inside the said body by means of at least an operating shaft (7), inserted in the said drilling (4) and

- an elastomer sleeve (8) with a basically U-shaped cross-section, the core (9) of which lines the bore (2) of the body (1) and the lateral cheeks (11, 12) of which partially fit into the said circular recesses (13, 14) and which has an inner shape substantially matching the shape of the respective circular recesses (13, 14) with, however, an outer diameter smaller than that of said side wall (23) of the annular groove (20), so that, between said cheek (11, 12) and said side wall (23), there remains an annular volume $v(26)$, empty at rest and an outer shape comprising at least a flat face (27) substantially lying in the plane of the matching radial face (3) and, opposite said groove (20), a shape protruding outwards with respect to the plane (P_0, P'_0) of said radial face (3),
this valve using, for its assembly on a pipe, at least one flange comprising a collar with a radial face designed to be applied against one of said radial faces (3) and comprising, on its perimeter, a series of axial holes, through which pins can be mounted, characterized in that :

- the annular groove (20) is separated from the central bore (2) by a receding section (19) substantially conical in shape and by a flared section (18) ;



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- said flat face (27) of the outer shape of the cheeks extends opposite said flared section (18),

- said protruding shape consists of a bulge (32) tangent to a radial plane axially offset outwards with respect to said plane (P_0 , P'_0) and further extending opposite said conical section (19).

2. Valve according to claim 1, characterized in that the volume v' of the bulge (32) limited by the above mentioned plane (P_0 , P'_0) is substantially equal to the free volume v comprised between the outer side wall (23) of the groove (20) and the outer edge (25) of the cheek.

3. Valve according to one of the preceding claims, adapted to be mounted between different types of flanges manufactured to different standards, characterized in that the diameter at the junction between the receding section (19) and the flared section (18) of the circular recesses is designed greater than the maximum inner diameter of said different types of flanges.

4. Valve according to one of the preceding claims, adapted to be mounted between different types of flanges manufactured to different standards, characterized in that the diameter of the side wall (23) of the annular groove (20) is designed smaller than the minimum outer diameter of the parts of the radial faces of the flanges that compress the said cheeks (11, 12), so as to make sure that these parts always abut against the radial face (3) of the body (1) of the valve.

5. Valve according to claim 1, characterized in that the slope of the aforementioned receding section of the recess (13, 14) with respect to a plane orthogonal to the axis of the bore (2) is comprised between 10° and 40° .

6. Butterfly according to one of the preceding claims, which can be assembled between different types of flanges manufactured to different standards and featuring, around their perimeter, various holes through which axial pins or screws can be assembled, these different flanges having at least two matching holes, such that, in a radial



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plane of the valve, the passage areas of the pins assembled through said two holes of the different types of flanges may be clustered in at least two respective distinct areas (38, 39) at the perimeter of the body (1) of the valve, characterized in that at least two bosses (40, 41) are arranged on the perimeter of the said body, each boss spreading over one of the said cluster areas, but not overlapping the passage areas of the pins assembled in the other holes of the same flanges.

7. Butterfly valve according to claim 6, characterized in that the number of bosses matches the minimum required number of pins to contain the stress withstood by the valve in the case of the removal of the downstream piping at maximum operating pressure.

8. Manufacturing method for a butterfly valve complying with one of the preceding claims, characterized in that the body of this valve is manufactured in the following phases :

- for each range of valves, as defined by the valve nominal diameter, an assessment of the areas covered by the clusters of the projections on a radial plane of the holes of the different flanges liable to be used for the same valve, superimposed coaxially,

- obtaining by strength calculations, a definition of the minimum required number of bosses to allow the removal of the downstream piping at maximum operating pressure,

- on the basis of this number, a definition of the shape and location of the bosses to be provided around the body,

- the manufacture, for instance by casting, of the body (1) of the valve complete with the bosses defined hereinabove, and

- the drilling of holes, in these bosses, to house the pins or screws at the proper locations and with the sizes required to match the flanges to be used.