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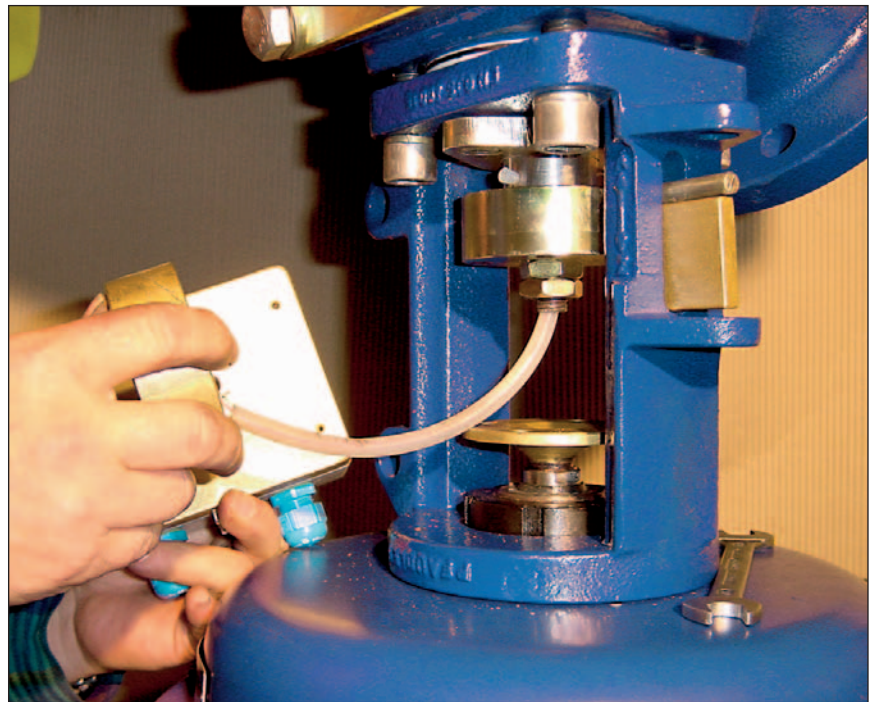
Pfaudler bottom outlet valves – Details improved again

New: Quick removal of temperature sensor

The calibration of PT 100 sensors in bottom outlet valves, which has to be performed in the course of re-validating process equipment, used to be a problem in many cases. The valve had to be removed from the reactor and taken to the workshop where it had to be largely disassembled in order to remove the PT 100 from inside the valve tappet.

Pfaudler valves of the AMA/APA-BT series provide for a much easier removal of the PT 100. The PT 100 can now be removed from the side and without any additional tools due to the new design of the connection between the pneumatic elements or the handwheel and the valve tappet. The valve need not be removed from the reactor or disassembled for this purpose. All components have been designed to avoid the need of additional adjustment work after the reinstallation of the PT 100. Of course, the valve is still absolutely tight.

It was especially important to the Pfaudler developers to keep the space required for removing the PT 100 as small as possible. This is to ensure that the PT 100 can also be easily removed under the normal conditions prevailing under a reactor, namely, where room is extremely scarce.



Removal of the integrated temperature sensor (2xPT 100) with assembled valve. The sensor can be calibrated quickly and easily. The removal and installation takes no more than 20 minutes.

A conversion kit comprising only a few parts is available to retrofit existing valves with the option to remove the PT 100 sensor from the side. Again, the bottom outlet valve need not be removed from the reactor for this purpose. Thus, Pfaudler offers not only the most com-

pact and light-weight glassteel bottom outlet valve available on the market, but thanks to this innovation also one of the most maintenance-friendly ones.



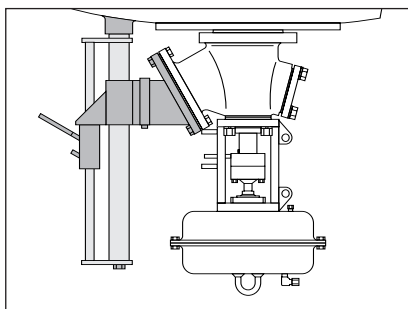


The proven Pfaudler bottom outlet valve type APA-BT, attached to a reactor

Innovative valve installation technology

Fitting bottom outlet valves is often a difficult task because the space below a reactor is in many cases quite limited, and because existing pipes disturb the assembly considerably. In close cooperation with our customers, Pfaudler has developed and improved a solution where the valve can be inserted to and removed from the reactor outlet nozzle through a lifting column attached to the reactor in a manner similar to an autolifter.

Since the solution is very simple, many customers already order their reactors from Pfaudler including the preparations for attaching the valve mounting device. Even this technical solution could still be improved in some details which now made the handling even easier and safer.



Device for removal and installation of the bottom outlet valve

Disturbing the flow means stirring better

The duration and quality of an agitating process is determined not only by the agitators used, but also by the fittings installed inside the apparatus, namely, the baffles or baffle plates. An "optimally disturbed" condition is reached if the agitator is equipped with four side-wall baffles whose width amounts to approx. 10% of the reactor diameter. This boundary condition is relatively easy to achieve in stainless steel reactor construction, the attachment of side-wall baffles normally poses no problems.

But with glasslined apparatuses, things are not that easy: As it is not possible for reason of safe production and operational reliability to attach side-wall baffles to the reactor wall, the disturbing elements have so far been introduced through the reactor nozzles. Depending on the apparatus size, one or two reactor nozzles are occupied which are no longer available for process applications.



■ Pfaudler Quatro-Pipe

Many years ago, Pfaudler already implemented the concept of linking the function of a baffle with that of a dip pipe in order to keep reactor nozzles free for process purposes. The proven Pfaudler Quatro-Pipe is the result of this development. This unit is a dip pipe with the outer shape of a classic paddle-type baffle. Thus, the Quatro-Pipe acts like a baffle, but offers the added value of introducing or removing a fluid into/out of the reactor through an additional nozzle.

Of course, the Quatro-Pipe may be equipped with fully glassed sensors for temperature measurement (TW) or glass monitoring (P probe).

■ Pfaudler C baffles

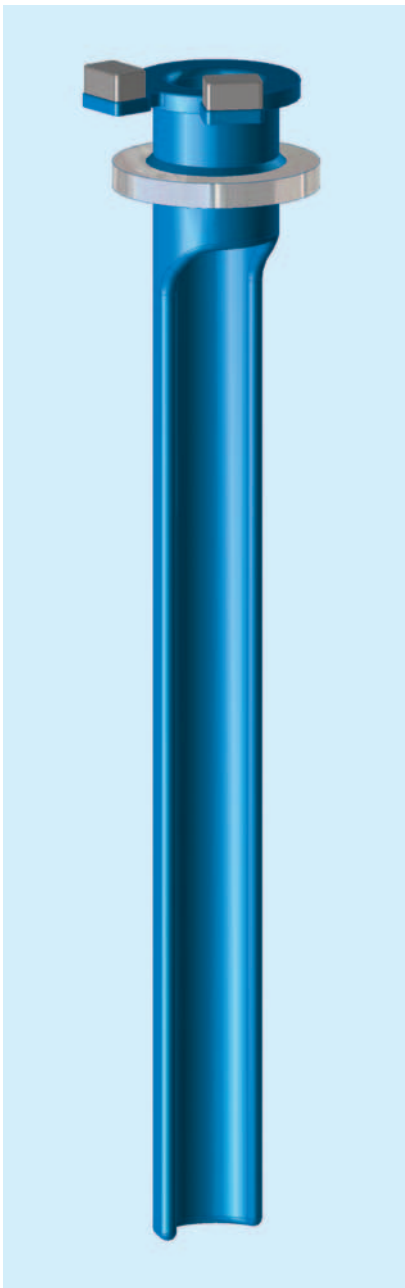
A clear improvement of the disturbing effect can be achieved by using a C baffle. The cw value of a C section is significantly higher compared to the profile of a classical paddle-type baffle. No other geometry has a higher power number! The cw value is a characteristic quantity that describes the flow resistance of a body. Higher cw values indicate a higher resistance to flow, and a better disturbing effect in agitating applications.

Pfaudler put this basic concept into practice by developing the C baffle. This baffle is shaped like an open C whose opening is directed against the direction of flow of the fluid moved by the agitator. The geometry was optimized with respect to minimized bending stress using the Finite Element Method (FEM).

On its flange, the C baffle has an additional nozzle whose nominal diameter is one to two steps smaller than the diameter of the baffle flange in question. Therefore, the nozzle used for the baffle is still available as a full process port. It may be used, for example, to introduce fluids or solids right into the high-turbulence zone around the baffle, or to connect the vapor pipe to discharge gases and steam from the reactor.

The C baffle is also optimally suited for being installed in the vapor nozzle of reactors of the old "E" design. An optimum disturbing effect in connection with a flange-sealed C baffle provides for entirely new process optimization approaches.

Table 1: Allocation of the individual C baffles to standard reactors



Reactor size	Reactor nozzle DN	C baffle nozzle DN	Width of C section [mm]	Immersion depth [mm]
AE 630 BE 630 E 1.200	150	100	120	1035
BE 800	150	100	120	1400
AE 1.000 BE 1.000 E 2.000	200	100	120	1250
BE 1.000 Ø 1400	200	150	120	1170
BE 1.600 E 3.000	200	150	120	1550
BE 2.500	200	150	120	1750
E 4.000	250	150	180	1900
BE 4000 E 6.000	250	150	180	2100
BE 6.300 E 8.000 BE 8.000 Ø 2000	250	150	180	2660
BE 8.000 Ø 2000 E 2.500 BE 10.000	300	250	270	2600
BE 12.500 E 16.000 BE 16.000 Ø 2800	300	250	270	3300
BE 16.000 Ø 2600	300	250	270	3600
BE 20.000 E 20.000 ¹⁾	300	250	270	3700

1) Reducing flange size DN 400/300 required

■ Pfaunder BaffleRing

Small, two-piece apparatuses with a volume of up to 1000 l have hardly any room for nozzles with a larger diameter on the apparatus lid, which may become a real problem. In addition, one of the nozzles is “used up” by the necessary baffle and is no longer available as a process port.



Table 2: Allocation of standard Baffle-Rings to standard reactors and technical data


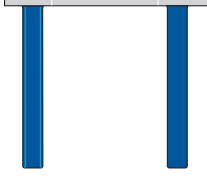


Reactor size	Diameter [mm]	Immersion depth [mm]
AE 63	508	295
AE 100	508	495
AE 160	600	575
AE 250	700	655
AE 400	800	835
AE 630	1000	800
AE 1.000	1200	960

For this reason, Pfaunder developed the “BaffleRing” and filed a patent application for it. The BaffleRing is an elegant solution to this problem: a ring-shaped component with two C baffles attached to it, which is directly inserted between the lid and the lower reactor body and fixed by the reactor clamps. Thus, all reactor nozzles are available as process ports. Furthermore, a so far unknown level of flow disturbance can be reached inside the reactor which reduces the mixing times by up to 60%.

Of course, the BaffleRing is also available with temperature sensors and glass monitoring (P probe).

Table 3 presents a summary of all baffle shapes available from Pfaunder. The paddle-type baffle is shown as a reference in the table, although it no longer represents the state of the art.

Table 3: Overview of the baffle types available for glassed reactors

	Paddle-type baffle	BaffleRing	C baffle	Quatro-Pipe
				
Apparatus sizes	AE 63 ... 1.000 BE 630 ... 40.000	AE 63 ... 1.000	AE 630 ... 1.000 BE 630 ... 20.000 E 1.000 ... 20.000	AE 160... 1.000 BE 630 ... 40.000
Immersion depths	matching the apparatus size	pursuant to Table 2	pursuant to Table 1	matching the apparatus size
Available measuring probes	TW, TMI	T/T, T/P	T/T, T/P	TW, TW/P
Port DN	n.a.	n.a.	DN 150 to DN 300, depending on nominal size as per Table 1	DN 50
Glass lining	WWG blue, WWG white, PPG	PPG	PPG	WWG blue, WWG white, PPG
Disturbance level (S)¹⁾	1 pce. 0,55 2 pce. 0,75	0,91	0,79 0,91	0,55 0,75
Mixing time	1 pce. 100% 2 pce.	40%	65% 40%	100%
Port design	Flange	Main flange	Flange	Flange
Development status	Former state of the art	Patent pending	Patent pending	State of the art
Reactor nozzle can be used for other purposes	–	●	● ²⁾	● ³⁾
Introducing fluids	–	● ⁴⁾	●	●
Removal of fluids	–	–	–	●
Introducing gases	–	Gas introduction to surfaces	Gas introduction to surfaces	Gas introduction below surface
Discharge of gas and vapor	–	● ⁴⁾	●	–

¹⁾ 4 side-wall baffles have a disturbance level of 1 ²⁾ One nominal size smaller than the apparatus nozzle ³⁾ DN50 as introduction/dip pipe ⁴⁾ through free reactor nozzle

S E M I N A R T E R M I N E

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17.-18. November, Nr. 437 808

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Anmeldung und Zimmerreservierung

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Anmeldung und Zimmerreservierung bitte

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