0 Introduction

These instructions are intended to assist users of BRAY elastomer-lined butterfly valves, series <30/31>, <32/33> and <35/36> in fitting, operating and servicing valves.

Caution	Risks may arise and the manufacturer's warranty may become ineffective **should the following cautions and warnings not be respected.** The manufacturer is available for any queries; see Section 8 for addresses.

1 Intended use

Once fitted between flanges of a piping system and after connecting the actuator to the control system, **elastomer-lined BRAY butterfly valves, series <30/31>, <32/33> and <35/36>** are solely intended for the purposes of shutting off fluids within the safe pressure and temperature limits, allowing and regulating flow. These butterfly valves may only be used for fluids with high proportion of (abrading) solids after consultation with the manufacturer **BRAY ARMATUREN & ANTRIEBE**.

These valves must be fitted between flanges in accordance with EN 1092-1 or EN 1759-1 and with seal faces in accordance with B1 or Form B2, which must be processed in a co-planar manner and aligned. Only with clearance by **BRAY ARMATUREN & ANTRIEBE** may other flanges and/or other seal face forms be used.

Danger to life	Valves with safe pressure/temperature ranges which do not satisfy the operating purpose may not be used. This permissible range is stated in the **BRAY planning document <B1002>** – see Section 8 <Information>. It is absolutely vital that the manufacturer clears pressures and temperatures which are not specified in the above planning document. **Ignoring this directive may put lives at risk and may also cause damage in the piping system.**
Caution	Under no circumstances is cavitation to be tolerated should a valve in continuous operations be used for control purposes. The manufacturer's clearance is needed if valves at negative pressures $<10^{-2}$ bar abs. are used for controlling purposes.

2 Safety instructions

2.1 General safety instructions

The safety regulations for valves are the same as those for the piping system in which they are fitted and for the control system to which the actuator is linked. This instruction only contains those safety references which are also to be noted for valves.

Additional safety instructions for actuator sub-assemblies are contained in the associated instructions.

2.2 Safety instructions for the operator

It is not the responsibility of the manufacturer and thus, when using the valve, it is to be ensured that

⇒ the valve is only used in conformity with the purpose as described in Section 1.

Danger to life	It must be ensured that the selected materials of the valve parts in contact with the fluids are suitable for the fluids used. The manufacturer assumes no liability for damage arising from the action of corroding fluids. **Ignoring this directive may put lives at risk and may also cause damage in the piping system.**

⇒ An actuator unit subsequently installed on the valve is adapted to the valve and correctly adjusted in both limit positions of the valve - particularly in the closing position

⇒ the piping system has been professionally laid and is regularly checked. The wall thickness of the valve body is to be dimensioned to the extent that the usual piping additional forces and torques in these kinds of professionally laid pipes are allowed for

- ⇒ the actuator for the control system has been appropriately designed.
- ⇒ the valve is professionally attached to this system
- ⇒ the actuating time of the valve/pneumatic actuator unit is adapted to the requirements of the piping system
- ⇒ in this piping system the usual flow rates (e.g. 5m/s for liquids and 70 m/s for gases at approx. 1 bar) are not undercut in continuous operations and that abnormal operating conditions such as oscillations, water shocks, cavitation and large proportions of solids in the fluid -particularly abrading ones – are clarified with the manufacturer
- ⇒ valves operating at temperatures of >50°C or <–10°C, together with the piping connections, are protected against contact
- ⇒ Where piping is subject to pressure, only qualified staff should operate and service the valve.

2.3 Specific types of risks

⚠ **Danger to life**	Before dismantling the valve from the pipe, the pressure in the pipe on both sides of the valve must be lowered to stop the fluid leaking uncontrollably. The bolting of both the body halves may only be slackened once the valve has been dismantled.
⚠ **Danger**	*For valves to be used as end valves:* Under normal operations and particularly for gaseous, hot and/or hazardous fluids, **a blank flange** is to be mounted **at the exposed connection end**. Butterfly valves can also be used as end valves when the valve is securely locked in the "CLOSE" position and the safe operating pressure (see nameplate) **is reduced to 50%** for safety purposes.
⚠ **Danger**	A valve acting as an end valve in a line subject to pressure must always be opened with extreme care to prevent the **spraying fluid** from causing damage. Care is needed when closing the end valve: Please note that there is a risk of crushing between the valve disc and body!
⚠ **Danger**	Dismantling a valve from a pipe may involve fluid seeping from the pipe or valve. A pipe transporting hazardous fluids and those injurious to health must be completely drained before the valve is dismantled. Caution in required in the case of **residues which continue to flow from pockets**.

2.4 Designation of the butterfly valve

The following data is marked on the body or nameplate of every butterfly valve:

for	Designation	Comment
Manufacturer	**Bray**	For address see Section 8 <Information>
Series	**e.g.: 31**	See BRAY ident. sheets <30 to 36>
Material	**e.g.: GGG 40**	Designation for the body material
DN	**DN (and numerical value)**	Numerical value in mm, e.g. DN200 or inches, e.g. 8“
PN	**PN** (and numerical value)	Numerical value in bar: dimensional standard for flange connection
Works No.:	**e.g. 113009**	
Year of manufacture:	**e.g. S2234**	The year of manufacture is encoded in the batch No.: The first digit is the end number of the year of manufacture S**2**234 **= 2002**
T max.	Numerical value in °C	= upper limit of the application
Conformity	**CE**	The manufacturer is to separately endorse conformity
Code	**0038**	"Quoted site" acc. to EU directive = Lloyds Register

Designations on body and nameplate must not be removed so that the valve can be identified.

3 Transport and storage

Valves must be handled, transported and stored with all due care:

- ⇒ The valve is to be transported and stored in its protective packing up to fitting.
- ⇒ Only put separate lifting accessories (ropes, belts) on the body of the butterfly valve – not on the actuator.

Caution	*To protect the ELASTOMER lining of the valve:* only secure ropes or belts at the nozzle between valve and gear operator!

⇒ Before fitting, the valve and the actuator are to be stored indoors and protected from damaging effects such as dirt or moisture.

⇒ It is essential for the elastomer lining to be protected from bright daylight and UV radiation: elastomers age rapidly under such conditions and become brittle.

⇒ On no account is the elastomer lining of the flange seal to be damaged during transport or in storage.

⇒ Valves with elastomer linings are delivered slightly opened and must be stored as such. On no account is the actuator to be operated.

Danger	*Valves delivered without actuators:* The valve disc is not secured against adjustment. Outside influences (e.g. jolting) must not cause it to open from the closed position.
Caution	*Only valves with pneumatic actuator "spring opening":* In the delivered state, both sides of the valve disc protrude from the body. Protection from damage to the valve disc is provided by the protruding edge packing. No damage is to be inflicted on the precision-finished seal face at the disc edge.

4 Fitting in the pipe

4.1. General

The instructions for connecting pipes and similar pipe elements also apply to fitting valves in a pipe. The following instructions also apply to valves. Section 3 (above) is to be noted when transporting to the place of installation.

Danger	*Risk of crushing with non-installed butterfly valves complete with actuator:* **The actuator must not be connected and operated before the butterfly valve is connected to the pipe.** Given that the valve is envisaged as an end valve in a piping section, then either a cover plate is to be mounted at the outlet or the valve is to be securely locked against unauthorised operation. This is to remove the risk of crushing.
Note	*The butterfly valve body is lined with elastomer. This lining is designed at the front as a flange seal.* The counter flange is to have a seal face in accordance with Form B1 or Form B2 in accordance with Standard EN 1092 or Stock Finish in accordance with ANSI B 16.5. An agreement with the manufacturer is to be reached on other flange forms. On no account are additional flange seals to be used.
Danger	*The actuator is set for the operating data stated in the order.* The position of the "OPEN" and "CLOSED" end stops must not be changed without the manufacturer's consent.
Note	*Closing/opening times for pneumatic/hydraulic piston actuators:* The control medium supply/disposal is to be adjusted to the valve to the extent that - given that no other specification is to be observed – the t closing time of the butterfly valve does not undercut the following reference value: t [sec] = DN [mm] / 50.
Danger to life	If, as an exception, a valve has to be fitted without actuator, then do ensure that this kind of valve is not pressurized. Retrofitting an actuator unit calls for torque, rotational direction, actuating angle and the position of the "OPEN" and "CLOSED " final stops to be adjusted to the valve. **Ignoring this directive could put lives at risk and also cause damage in the piping system.**
	Only for butterfly valves with electrical actuators: It is to be ensured that **the travel-dependent limit switch signal** shuts down the

Caution	actuator in the end positions. Given that the **torque switch signal** is used for shutdown, then it is to be additionally used for notice of malfunction. *See the electrical actuator instructions for more information.*

4.2 Preparation for fitting

⇒ Ensure that only butterfly valves are fitted where the pressure class, coupling type and dimensions correspond to operative conditions. See valve designation.

Danger to life	Valves with safe pressure/temperature ranges which do not satisfy the operating purpose may not be used. The PS and T_{max} deployment limits are specified on the nameplate of the butterfly valve. The permissible range is also described in the **BRAY planning document <B-1023>** – see Section 8 <Information>. **Ignoring this directive could put lives at risk and also cause damage in the piping system.** If in doubt, then contact the manufacturer **BRAY ARMATUREN & ANTRIEBE.**
Caution	*The elastomer lining on the faces of the body is not to be damaged when the valve is fitted:* The valve must be transported in its protective packing up to the place of installation and only there is it to be unpacked. The flange covers must only ever be removed just before the valve is fitted.

⇒ Check valve and actuator for any transportation damage. Any damaged valves are not to be fitted.

⇒ The counter flange of the pipe must be aligned and co-planar.

Note	Parallel coupling flanges are an important requirement for a seal-tight flange connection.
Danger	The clear width of the counter flange must provide enough room for the opened valve disc. This prevents damage when swinging out. See Table 1.

DN	**50**	**65**	**80**	**100**	**125**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**600**
NPS	**2“**	**2,5”**	**3”**	**4”**	**5”**	**6”**	**8”**	**10”**	**12”**	**14”**	**16”**	**18”**	**20”**	**24”**
Ø D_i[mm]	35	52	72	96	122	146	197	248	298	332	378	434	485	586

DN	**700**	**750**	**800**	**900**	**1000**	**1200**								
NPS	**28“**	**30”**	**32”**	**36”**	**40”**	**48”**								
Ø D_i[mm]	675	738	770	890	970	1180								

Table 1: Minimum requisite inside diameter D_i of the counter flange

⇒ Before fitting, both the valve and the attaching pipe must be cleaned of contaminants and other foreign matter with all due care.

4.3 Fitting

Caution	The valve must not be fitted with the disc fully closed; it must be slightly open. On no account is the valve disc to protrude over the overall length of the valve – otherwise it could be damaged and the valve could leak.

Caution	*Only butterfly valves with pneumatic actuator "spring opening":* For the installation - the actuator must be dismantled in the open position, - then the valve disc must be practically closed by hand – as described above, - then the disc must be fitted into the tube, - followed by manually opening the valve disc, - and then the actuator must be set up again.

⇒ Any flow direction is possible. The preferred installation position is one with a horizontal valve stem. If possible, the actuator should not be positioned directly underneath the valve: Leakage at the operating shaft might damage the actuator.

⇒ On fitting the valve into an already mounted pipe, the spacing between the piping ends must be dimensioned to the extent that the elastomer seal beading on the faces of the body lining is not damaged.

⇒ Flange bolts are to be used to carefully centre the butterfly valve when being fitted.

⇒ The tightening torque of the flange bolts is to be such that the butterfly valve and counter flange are drawn "on block": Only in this way can it be ensured that the elastomer lining properly seals at the body flanges.

Note	Additional flange seals must not be used and especially not in order to offset errors with non-parallel counter flanges!

⇒ The actuator unit is to be connected to the control system as specified in the associated instructions.

Note	The valve is to be dismantled when welding is being carried out on the attaching pipe flanges and is to remain so until the pipe flange ends have cooled.
Caution	Subsequently mounted actuators need to be supported if their size and fitting position result in the installation set between valve and actuator being subjected to non-planned bending stresses.

⇒ On completing the fitting, a functional test with the control system signals is to be carried out: the valve is to close and open in keeping with the control commands. It is imperative that any identifiable malfunction is corrected before commissioning. See Section 7 <Troubleshooting>.

Danger	Incorrectly carried out control commands may result in **risks and/or damage in the piping system.**

5 Testing the pressure of the pipe section

The valves have already been tested for their pressure levels by the manufacturer. Please note the following for pressure testing a pipe section with fitted valves:

⇒ Newly installed pipe systems are to be carefully flushed in order to wash out all foreign matter.

⇒ **Valve opened:** The test pressure is not to exceed the **1.5 value x (PN or PS)** (acc. to nameplate). *(PS = maximum permissible operating pressure)*

⇒ **Valve closed:** The test pressure is not to exceed the **1.1 value x (PN or PS)** (acc. to nameplate).

Section 7 < Troubleshooting> is to be consulted should a valve leak.

Caution	*When a flange connection to the pipe is not seal-tight:* Check to see if the flange connection is drawn "on block". If not, tighten the flange bolts. *If this is not possible and/or the flange connection is still not seal-tight:* Slacken the flange connection. Check on the co-planarity of the flange connection and, if not adequate, correct accordingly. Examine elastomer lining on both faces of the butterfly valve: **Any replaceable lining of the valve must be replaced if damaged.** See Section 7 < Troubleshooting >.

6 Normal operations and maintenance

The control system signals are to be used to operate the valves. Valves supplied ex-works with actuators are precisely set and are only to be adjusted should a valve not operate satisfactorily.

Normal manual strength is adequate for manual operation on the actuator (if present); the use of extensions to raise the actuating torque is not permitted.

Regular maintenance on these valves is not necessary. There must be no leakage in evidence on a valve when examining the piping section. If there is, then please refer to Section 7 <Troubleshooting>.

It is recommended that actuating valves remain permanently in the same position 3 to 4 times a year.

Danger	*A butterfly valve is not self-locking* The actuator is not to be dismantled **when the butterfly valve is pressurized.**
Danger	*A piston-actuator is not self-locking* Piston actuators need to be **constantly supplied with control pressure** for all positions that are started under control pressure.

7 Troubleshooting

Section 2 <Safety instructions> must be consulted when troubleshooting.

Danger	*When a valve is to be set up with piping containing hazardous fluids and has to be taken out of the system:* Those valve parts in contact with the fluids must be professionally decontaminated before repair.

Problem	Action	Comment
Leakage at a flange connection to the pipe	Tighten flange bolts *If the leakage still persists:* Repair needed: Replace elastomer lining of the body. Please note Section 2.3 <Particular risks> and request maintenance parts and requisite instructions from **BRAY ARMATUREN & ANTRIEBE**.	***Pointer 1:*** *Maintenance parts are to be ordered incorporating all nameplate details. Only BRAY original parts are to be fitted.*
Leakage in the seat seal	Check whether the actuator closes the valve 100%. *If the butterfly valve was closed under full torque:* Open and close valve a number of times under differential pressure. *If despite this the valve is still not seal-tight:* Repair needed: Replace elastomer lining of the body and/or valve disc. Please note Section 2.3 <Particular risks> and request maintenance parts and requisite instructions from **BRAY ARMATUREN & ANTRIEBE**.	***Pointer 2:*** *If after dismantling it is found that the product-contact parts as against the fluid are not resistant enough, then parts made of a suitable material are to be chosen.*

Leakage at the operating shaft	Repair needed: Replace elastomer lining of the body. Please note Section 2.3 <Particular risks> and request maintenance parts and requisite instructions from **BRAY ARMATUREN & ANTRIEBE**.	
Malfunction	Check on actuator unit and control commands. *If actuator and control system are in order:* Dismantle valve (refer to references in Section 2.3 <Particular risks>) and inspect. *If parts of the valve are damaged:* Repair needed: Request maintenance parts and requisite instructions from **BRAY ARMATUREN & ANTRIEBE**.	
If a pneumatic actuator with spring is to be dismantled	 **Caution: Risk of injury** Connection to the control pressure must be severed before the actuator is dismantled from the valve.	

See the related instructions in the event of problems with the actuator unit.

8 Additional information

This instruction, the **<BRAY ident. sheets>** and more information can be obtained – also in other languages – from the following address:

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