

Fits all AVK butterfly valves up to and including DN 350
 3 lengths available according to DIN 3230
 With 10 position notchplate

Use:

For butterfly valves DN 40 - 350,
 for actuation and performance of
 control functions

Optional extras:

Interlocking options
 Limit switches

Materials:

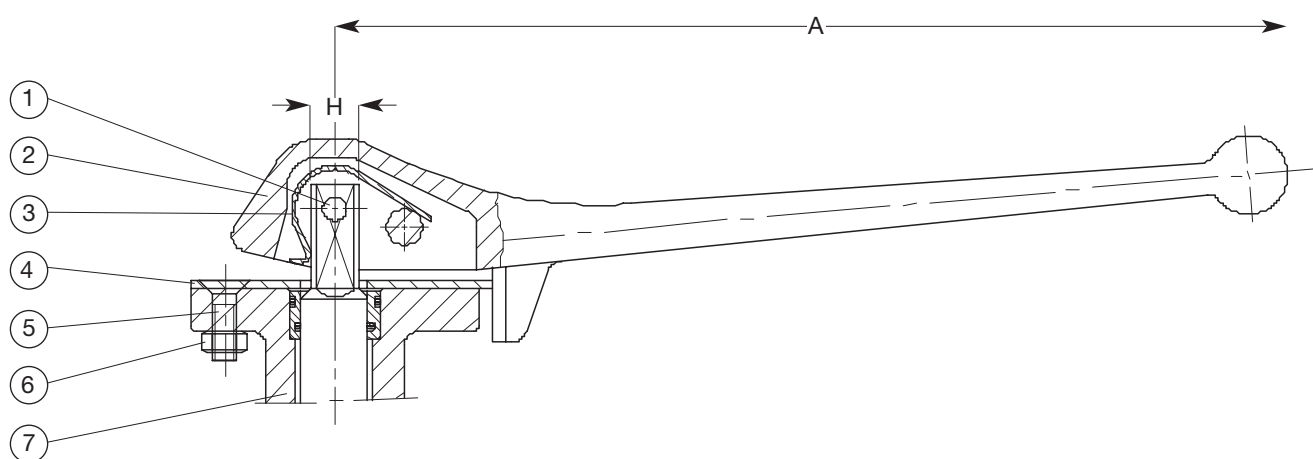
Lever	Malleable cast iron
Notchplate	Carbon steel/Zn5C
Hinge pin	Hardened steel
Spring	Springsteel Cd5C
Countersunk screw, hexagon nut	Galvanized steel 8.8



Fits all AVK butterfly valves up to and including DN 350
 3 lengths available according to DIN 3230
 With 10 position notchplate

Component list

- | | | |
|--------------|----------------------|---------------|
| 1. Hinge pin | 4. Notchplate | 7. Valve Body |
| 2. Lever | 5. Countersunk screw | |
| 3. Spring | 6. Hexagon nut | |



Valve DN	Max. ΔP Bar	A mm	H mm	Weight kilos
40 - 80	16.0	250	10	1.0
100 - 125	16.0	250	12	1.0
150 - 200	16.0	315	16	1.4
250 - 350	2.5	500	24	3.2

Fits all AVK butterfly valves, mounting in any position
 Weatherproof construction to DIN 40050/BS 5420/IP64
 Output torque 250 to 500 Nm, travel 90° ± 5% at both ends
 Top flange connection to ISO 5211

Use:

For AVK butterfly valves DN 40 - 350

For control service and reduction of operating torques

Optional extras:

Chain wheel

Materials:

Gearcase	Steel to DIN 1623
Worm, wormshaft, handwheel	Carbon steel C45
Indicator cap, protection cap	Polypropylene
Quadrant	Ductile iron GGG-40
Set screw	Steel 8.8
Set screw plate	Steel
Bushing	Nylon
Rollpin	Spring steel DIN 1481
Rivets	Stainless steel



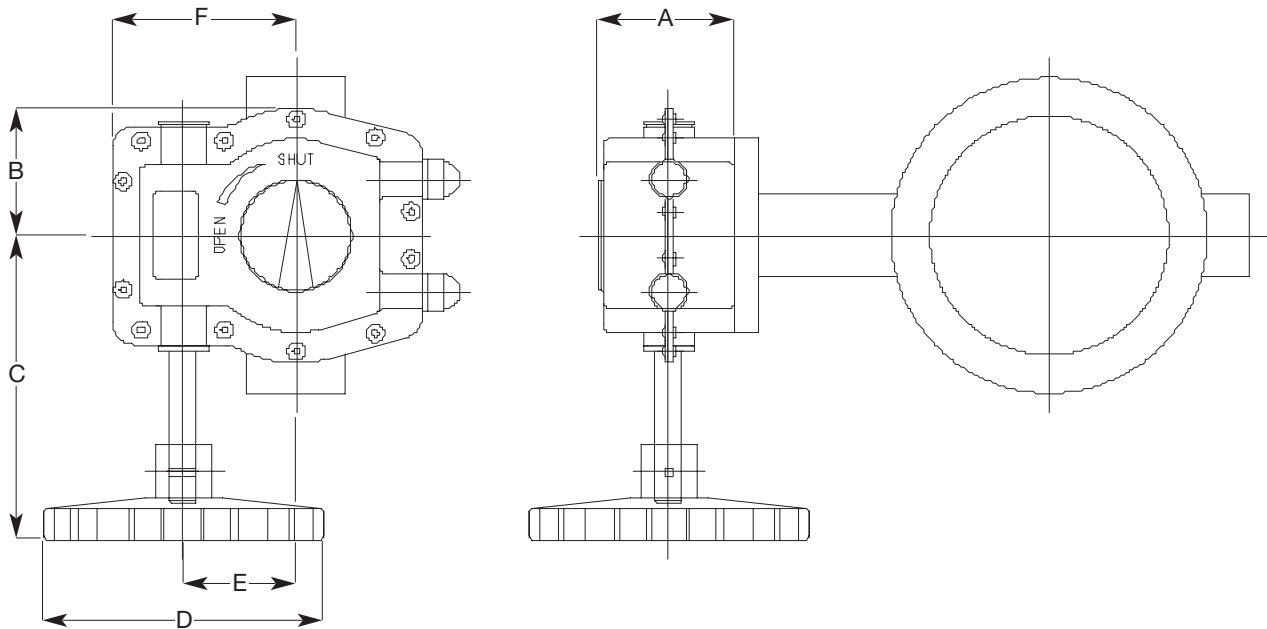
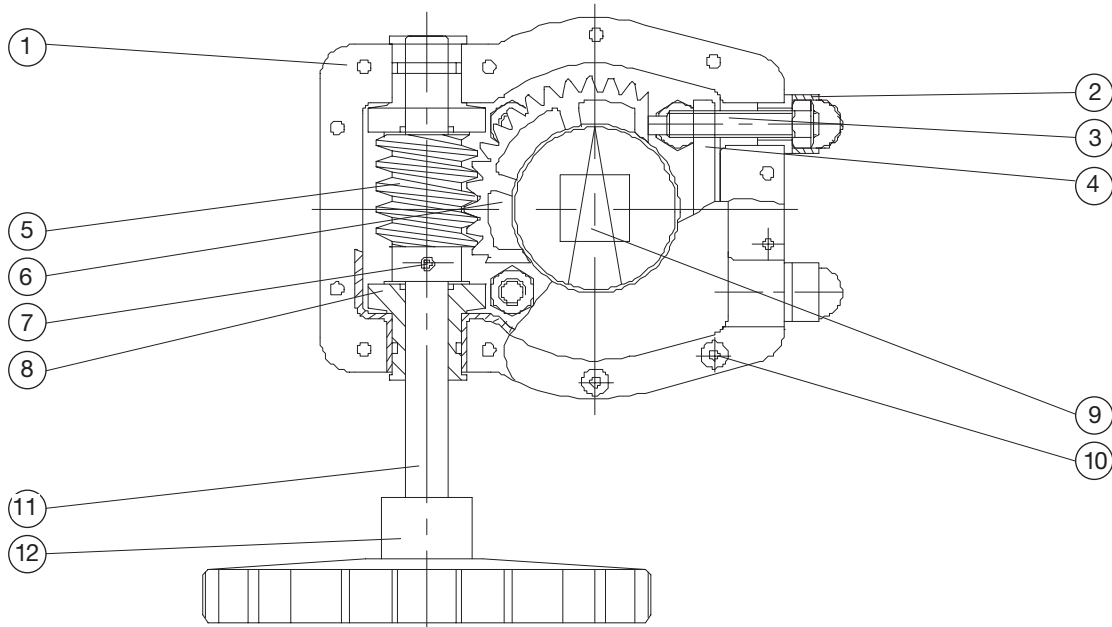
For further specification, see section "Technical information".
 The designs, materials and specifications shown are subject to change without notice due to our continuing programme of product development.



Fits all AVK butterfly valves, mounting in any position
 Weatherproof construction to DIN 40050/BS 5420/IP64
 Output torque 250 to 500 Nm, travel 90° ± 5% at both ends
 Top flange connection to ISO 5211

Component list

- | | | |
|--------------------|-------------|------------------|
| 1. Gearcase | 5. Worm | 9. Indicator cap |
| 2. Protection cap | 6. Quadrant | 10. Rivet |
| 3. Set screw | 7. Rollpin | 11. Wormshaft |
| 4. Set screw plate | 8. Bushing | 12. Handwheel |



Type nos.	Valve DN	Top flange ISO 5211	A mm	B mm	C mm	D mm	E mm	F mm	Turns to close	Torque output Nm	Torque input Nm	Weight kilos
WK 307	40 - 200	F07	58	57	135	125	50	82	9.25	250	21	1.3
WK 310	250 - 350	F10	76	75	228	300	62	95	11.25	500	39	2.8

Fits all AVK butterfly valves, mounting in any position
 Weatherproof construction to DIN 40050/BS 5420/IP65
 Output torque 1970 to 35000 Nm, travel 90° ± 5% at both ends
 Top flange connection to ISO 5211

Use:

For AVK butterfly valves DN 400 -1600
 For control service and reduction of operating torques

Optional extras:

Execution for underground installation
 Locking device
 Chain wheel

Materials:

Gearcase, cover, indicator cap	Cast iron, GG-25
Worm, worm-shaft, handwheel	Carbon steel C45
Quadrant	Ductile iron, GGG-40
Bearing	Bronze
O-ring	NBR



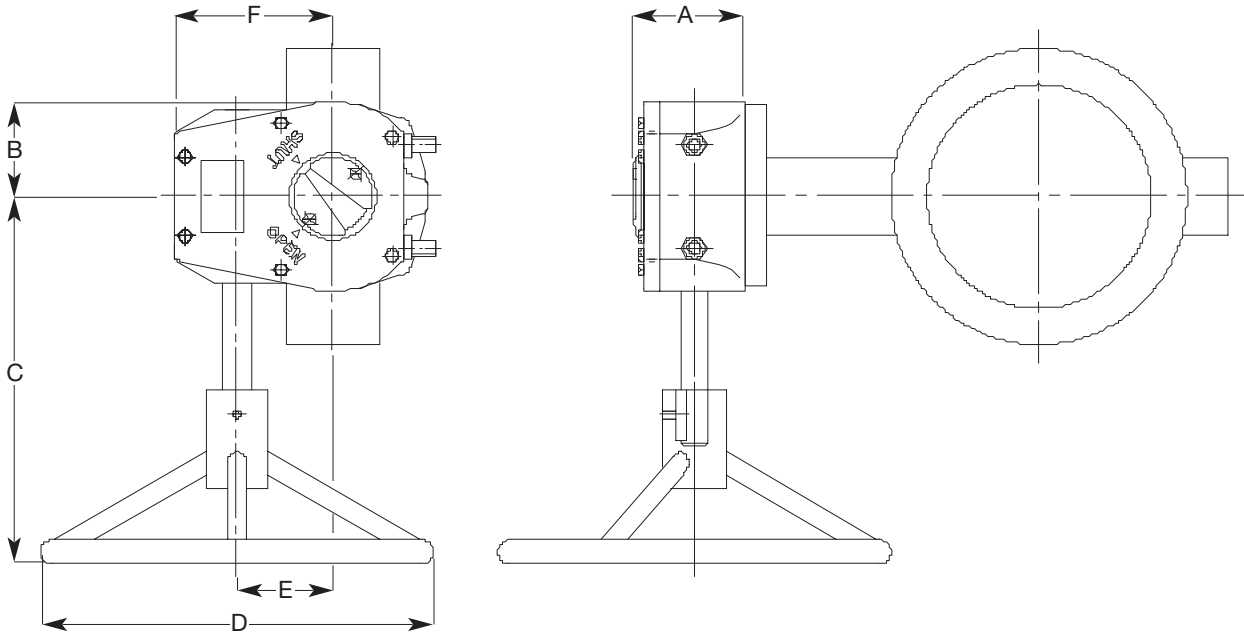
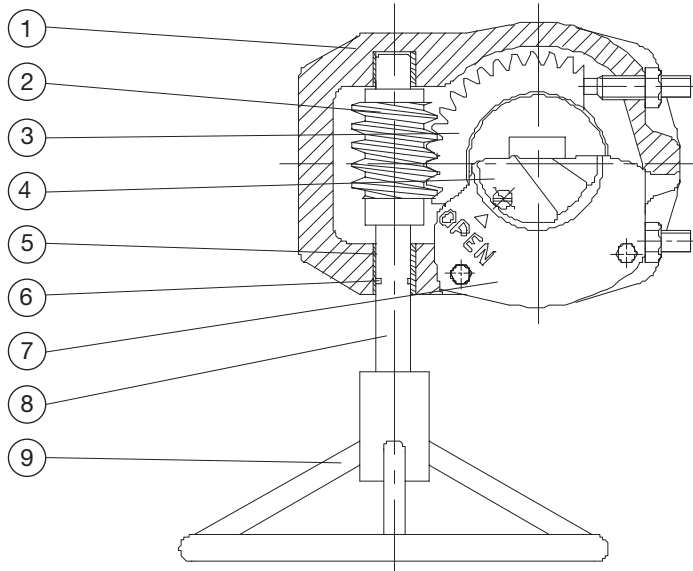
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Fits all AVK butterfly valves, mounting in any position
 Weatherproof construction to DIN 40050/BS 5420/IP65
 Output torque 1970 to 35000 Nm, travel 90° ± 5% at both ends
 Top flange connection to ISO 5211

Component list

- | | | |
|-------------|------------------|--------------|
| 1. Gearcase | 4. Indicator cap | 7. Cover |
| 2. Worm | 5. Bearing | 8. Wormshaft |
| 3. Quadrant | 6. O-ring | 9. Handwheel |



Type nos.	Valve DN	Topflange ISO 5211	A mm	B mm	C mm	D mm	E mm	F mm	Turns to close	Torque output Nm	Torque input Nm	Weight kilos
WK 125	400 - 600	F14	94	89	340	400	86	136	11.50	1970	146	20
WK 240	700 - 800	F16	105	138	486	500	137	194	18.00	4300	175	40
WK 650	900 -1000	F25	137	155	625	500	61	195	45.00	11700	152	65
WK 750	1100 -1200	F30	149	153	640	500	75	213	63.50	13000	130	85
WK 2000	1400 -1600	F35	163	232	740	500	237	326	180.00	35000	152	186

NB: For valves DN 600, 700, 1000, 1200 and 1600 for use at a pressure of 16 bar, a larger size of wormgear is necessary, e.g. WK 240 for a DN 600 used at PN 16
 Valve dimensions based on Δ P 10 bar

Fits all AVK butterfly valves, movement 90°, limit stop in end caps
 Double acting (range ED and PD). Single acting (range ES and PE)
 Top flange connection to ISO 5211

Use:

Up to 10 bar supply pressure
 Ambient temperature -20°C to +80°C
 (dry and non-lubricated)

Optional extras:

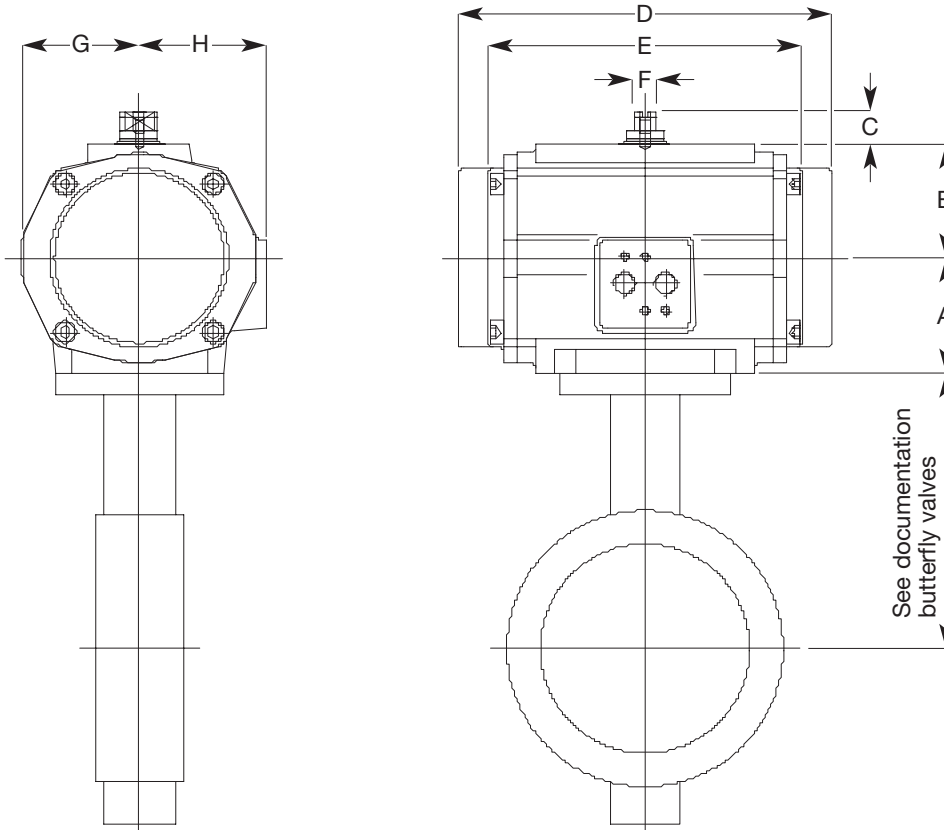
Steel housing
 Three position actuator
 Hydraulic speed control
 Limit stop plate
 Light/heavy duty switch box
 Manual override

Materials:

Body	Aluminium alloy to DIN 1725 coated with polyurethane
Endcover, piston	Aluminium alloy to DIN 1725
O-rings	NBR
Endcover bolts	Galvanized steel 8.8 coated with polyurethane



Fits all AVK butterfly valves, movement 90°, limit stop in end caps
 Double acting (range ED and PD). Single acting (range ES and PE)
 Top flange connection to ISO 5211



Actuator type	A mm	B mm	C mm	Single D mm	Double E mm	F mm	G mm	H mm	Top flange ISO 5211	Weight kilos
PD/PE 35	43	43	20	133	133	8	41	49	F07	1.5 / 1.6
PD/PE 60	51	51	20	182	161	10	51	58	F07	2.6 / 3.0
PD/PE 150	68	68	20	218	184	14	68	74	F07, F10	5.3 / 6.4
PD/PE 280	80	80	20	302	236	14	86	89	F07, F10	9.2 / 11.6
PD/PE 500	95	95	30	352	270	19	96	109	F10	14.0 / 19.2
PD/PE 750	116	116	30	380	282	19	120	134	F10	22.4 / 33.4
PD/PE 1100	123	123	30	475	340	30	125	135	F14	30.8 / 41.5
PD/PE 2500	177	177	30	570	378	36	175	186	F16	64.7 / 97.9
PD/PE 4000	190	190	30	834	502	36	190	200	F16, F25	97.8 / 143.0
ED/ES 12	30	30	20	118	87	8	30	35	F04	0.6 / 0.7
ED/ES 25	40	40	20	172	129	8	37	46	F07	1.3 / 1.4
ED/ES 40	47	47	20	204	144	10	43	53	F07	1.8 / 2.0
ED/ES 100	60	60	20	267	176	14	54	63	F07	3.7 / 4.3
ED/ES 200	72	72	20	356	238	14	64	73	F07	6.1 / 7.6

Actuator selection table:

Actuator type	Valve DN	Actuator type	Valve DN	Actuator type	Valve DN	Actuator type	Valve DN
ED 12	40 - 50	ES 40	40 - 65	PD 280	250	PE 750	200
ED 25	65 - 80	ES 100	80 - 100	PD 500	300 - 350	PE 1100	250
ED 40	100	ES 200	150	PD 750	400	PE 2500	300 - 400
ED 100	125 - 150			PD 1100	450	PE 4000	500
ED 200	200			PD 2500	500 - 600		
				PD 4000	700		

NB: Based on 5 bar supply air and ΔP of 10 bar across the valve. For higher supply air pressure or below 4 bar, please contact AVK.
 Actuators for larger dimensions on request.

Mounting and operating instructions for butterfly valves

General:

AVK butterfly valves are suitable for installation between almost any type of pipe flange. The flanges may be flat or raised face. They should be without burrs, weld spatters or sharp edges and free from oil. (EPDM is not oil resistant).

Flange gaskets are **not** necessary since the rubber lining extends onto the faces and therefore acts as a gasket.

During installation of the butterfly valve the direction of flow is irrelevant because the valves provide 100% bi-directional tight shut off.

Important

For flared flanges to DIN 2642 Reihe 1/Table 2, carefully centre the shut-off valve using a gasket.

With plastic flanges it is advisable to use flat flanges or to fill up the space between the short double flanged valve and the raised face.

It is advisable to mount butterfly valves having bores larger than 300 mm with the valve shaft positioned horizontally for the following reasons:

- self-cleaning action is ensured; consequently no settling nor any deposits on the lining (see sketch 1).
- the weight of the valve disc is evenly distributed over the bearings.
- by centring the valve disc no disproportionate pressure can be exerted on the lining.

Note: If it is only possible to install vertically, consult AVK.

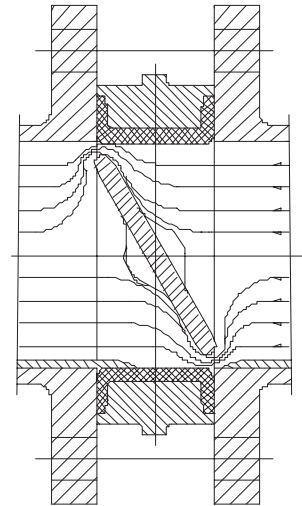
Centring during installation

Wafer type:

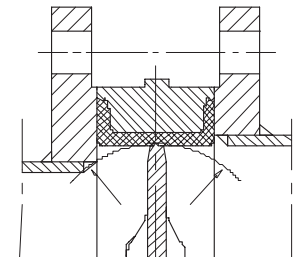
- For wafer types smaller than 350 mm centre by means of bolts placed around the butterfly valve body.
- From 350 to 600 mm 4 centring holes are provided.
- For bores above 600 mm drilled or tapped holes are provided.

For the other types, centre by means of the bolt holes in the integrally cast flanges of the valve body.

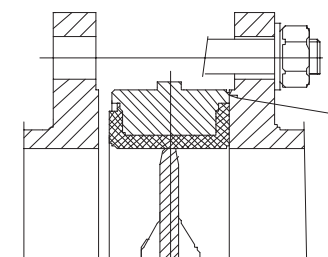
1)



2)



3)



Mounting and operating instructions for butterfly valves**General aspects in installation**

- The pipings must be perfectly aligned with their flanges parallel to avoid deformation and material stresses in the valve and the bolts.
- Concentric installation in the pipeline.
- The bore of the connecting flange must not be smaller than the bore of the butterfly valve, the disc must be able to turn freely in the pipe (see sketch 2).
- If the bore of the connecting flange is large it must have sufficient sealing surface in contact with the rubber lining to obtain perfect sealing.
- The flange bolts must be tightened in a diagonal sequence, until the butterfly valve body touches the flange and an even all round contact is obtained (see sketch 3).
- Clean and pressure test the piping before start-up **with the valve in the open position**. (max. test pressure: $1.5 \times P_N$). Ensure that cleaning chemicals are compatible with the valve materials.
- **Avoid heating** the rubber lining. Do not weld a flange to a pipe with the butterfly valve installed.

Storage

- Store in dry, dark, and cool conditions.
- Open the valve disc approx. 10° .

Maintenance

Routine maintenance is not necessary under normal conditions. Periodically re-tighten the (flange) bolts after a long operating time.

Spare parts

The AVK butterfly valve is designed for a long maintenance free service life, and if the right materials are chosen, no spare parts are needed. If abrasive media are used or in case of accidents, a rubber-lined body and a valve disc can be delivered as spare parts for sizes up to 300 mm.

For larger dimensions the whole valve must be replaced.

Note: For aggressive media and where abrasive wear occurs, the flow rate in the piping should be as low as possible. Avoid mounting the butterfly valve in or near bends. Lining wear almost certainly means disc wear and repair is rarely an economic option.

Retrofitting or replacement of actuators such as worm-gears, pneumatic, hydraulic or electric actuators

If a drive must be installed on the free shaft of the butterfly valve, the following points are important:

- The drive must fit smoothly onto the square of the butterfly valve, a forced assembly causes leakage at the upper shaft and increased rubber wear on the lower shaft.
- When aligning the drive (using the set bolts for example), the valve disc must be replaced exactly on the body centreline. This can be controlled with a depth gauge.
- The clearance of the valve shaft and the shaft of the drive shall not exceed 0.1 mm.

Material options

Material selection for butterfly valves, metals and elastomers:

The choice of materials for butterfly valves depends on many factors. The most important are the following, which are to be stated on inquiry:

- Working pressure / pressure class / test pressure
- Medium
- Temperature
- Requirements with regard to corrosion and erosion resistance

The correct choice of the rubber is dependant on the duty, i.e. the medium and its temperature.

NBR / NBR-DVGW
 Has good resistance to aliphatic hydrocarbons, animal oils and fat, water and watery media. NBR is excellent for gas applications. Its resistance to ozone and weather influences is however moderate and NBR is not resistant to aromatic and chlorine hydrocarbons. NBR has good mechanical as well as elastic properties and can, depending on the medium, be used within the temperature range of 0°C up to 90°C.

EPDM
 Is extremely resistant to ozone, weather influences and chemicals such as acids, ketones and alcohol. EPDM is not resistant to aliphatic, aromatic and chloride hydrocarbons. EPDM has good mechanical as well as elastic properties and can, dependant on the medium be used within the temperature range of -40°C up to +120°C.

FPM (Viton® , available in B50 and GF quality)
 Has excellent resistance to aliphatic, aromatic and halogen hydrocarbons as well as oxydating acids. Also good resistance to ozone and weather influences. FPM has reasonable mechanical and elastic properties and can, depending on the medium, be used from 0°C up to 200°C, however standard FPM should not be used with hot water.

Vulcanizing
 AVK butterfly valves are vulcanized using the "transfer injection moulding method"
 Inspection, via quality assurance, include the following points:

- "peel off" test
- homogeneity (via ultrasonic test)
- compression (amount of elasticity after impression)
- hardness (shore)

Material combinations

The standard material combination is stated in the data sheets.
 Below examples of other material combinations available for AVK butterfly valves.

Body	GG-25	GG-25	GG-25	GG-25	GG25	GG-25
Lining	NBR	NBR	NBR	NBR	EPDM	EPDM
Disc	431	316L	4462	316L	431	304L
Shaft	431	431	4462	4462	431	431
Pin	431	4462	4462	4462	431	431
Body	GG-25	GG-25	GG-25	GGG-40	GG-25	GG-25
Lining	EPDM	EPDM	NBR	NBR	NBR	EPDM
Disc	4462	316L	Alubr	Alubr	GGG-40	Alubr
Shaft	4462	4462	Alubr	Alubr	431	431
Pin	4462	4462	Alubr	Alubr	431	Alubr

Note: Other combinations on request.



Coating systems

Standard application

Code system	Specification	Thickness in μ	Colour	Ral no.
T14/148	1 x Sigmarite Sealer	50	Grey/ Green	6003
	1 x Sigmacover TCP	100	Black	8022
	1 X HB-finish epoxy *	50	Blue	5017
	Total	200		

* Any colour available

Main characteristics

As CC-1, but furthermore:

- Excellent resistance to water and crude oil
- Excellent rust-inhibiting characteristics
- Good resistance to chemically contaminated water
- Good resistance to wear
- Resistance to high temperature, acid and alkaline

Application

Suitable for underground installation.

Additional protection (optional)

An extra layer of 150 μ Sigmacover TCP coating gives a total of 350 μ (with characteristics as the standard coating).

Application

Suited for valves immersed in (sea) water and crude oil.

Special applications

Basic coating:

Code system	Specification	Thickness in μ	Colour	Ral no.
CC-1	1 X Tornol primer	20		
	1 x Sigmadur Chassis coating *	40	Blue	5017
	Total	60		

* Any colour available

Main characteristic

- Durable in a lightly chemically contaminated atmosphere
- Good impact strength and elasticity characteristics
- Immune to spilling and splashing of moderately aggressive chemicals
- Good resistance to aliphatic hydrocarbons, diesel and lubricating oils
- Can easily be repainted with alkyd, polyurethane and epoxy paints, following adequate preparations

The standard coating CC-1 can be provided with an additional protective coating of Sigmadur HB Finish. It is a high-build two-pack polyurethane coating based on acrylic resins and an aliphatic isocyanate hardener.

Code system	Specification	Thickness in μ	Colour	Ral no.
CC-2	CC-1	60	Blue	5017
	An additional protective coating: 1 x Sigmadur HB-finish *	60	Blue	5017
	Total	120		

* Any colour available

Main characteristic

As CC-1, but furthermore:

- Resistant to mineral- and vegetable oils, white spirit, paraffin and petroleum

HB-2 coating

Coating for valve discs

The HB-2 coating is a three-pack epoxy coating. It is adopted as standard for cast iron and spheroidal graphite cast iron valve discs and provides almost perfect preservation of the

Code system	Specification	Thickness in μ	Colour	Ral no.
HP-2	1 x Redox EP 3225	40	White	
	1 x Redox EP 3315	150	Grey	7038
	1 X Redox EP 3315	150	Grey	7038
	Total	340		

casting.

Main characteristics

As CC-1, but furthermore:

- Good resistance to chemicals
- Waterproof
- High gloss and easy cleaning characteristics
- Tasteless and odour free
- Approval KIWA: V GB15
BAM Berlin (potable water and food)

Application

This system finds its application when it comes to handling drinking water, sewage and seawater, and in the food industry.

Standard painting system for lever and actuators

Levers:

Polyester epoxy powder coating.

AVK apply as standard a high grade polyester epoxy powder coating with a film thickness of 60 μ .

Main characteristics

- Durable in a moderate chemically contaminated atmosphere
- Good impact strength and elasticity characteristics
- Immune to spilling and splashing of moderately aggressive chemicals
- Good resistance to aliphatic hydrocarbons, diesel and lubricating oils
- Can easily be repainted with alkyd, polyurethane and epoxy paints following adequate preparations

Actuators and components

Actuators and components issued to AVK (such as drivers, valve positioners, ect.) are not coated by AVK. The manufacturer's standard coating remains, unless specified otherwise.



Operating torques

Butterfly valves operating torques

The operating torque of a centric rubberlined butterfly valve is in general the result of four partial torques.

(Un)-seating torque (Ts)

Torque to overcome the rubberseat friction.

Bearing friction torque (Tb)

Required torque to overcome the friction between shaft and bearings:

Max. operating torques in Nm (Ts + Tb)

DN	Top flange	Spindle square	Maximum working pressure (bar)			
			2.5 Nm	6 Nm	10 Nm	16 Nm
40	F07	10	6	6	7	7
50	F07	10	9	10	10	11
65	F07	10	13	13	14	15
80	F07	10	17	18	19	21
100	F07	12	28	30	32	36
125	F07	12	39	42	46	52
150	F07	16	60	67	75	86
200	F07	16	120	130	140	160
250	F10	24	190	220	250	400
300	F10	24	270	310	350	560

Bigger sizes on request

These torques are valid under following conditions:

- fluids (without chemicals)
- if gaseous: ± 10%
- one operation cycle per month
- temperature between 0°C and 80°C

Dynamic torque (Td)

Torque, developed by the pressure differential across the disc faces as a result of flow. The dynamic torque acts in the closing direction and reaches a maximum at about 70-80 degrees open.

$$T_d = C_t \times D^3 \times \Delta p$$

D = Disc diameter (mm)

ΔP = Pressure drop across the valve

The maximum value of Ct, at 75° open is 0.32. Provided the liquid flow velocity does not exceed 4 m/sec., this torque Td needs not be considered for rubberlined valves.

Hydrostatic torque (Th)

This is the torque, caused by the difference in static head of liquid on the valve disc above and below the valve-shaft, when the valve is in a horizontal pipeline with the shaft also horizontal.

$$T_h = 4.81 \times 10^{-7} \times D^4$$

This torque becomes of practical importance only for valves larger than DN 1000.

Operating AVK butterfly valves

To meet the stated operating torques, AVK offers a wide range of high quality devices:

- Lever
- Wormgear with handwheel
- Wormgear with chainwheel
- Pneumatic rotary actuators, single or double acting
- Electric actuators, for different voltages
- Pneumatic actuator, single cylinder
- Pneumatic actuator, double cylinder
- Pneumatic actuator, 4-double cylinder
- Hydraulic actuator
- Extension spindle
- Extension spindle with wormgear and handwheel
- Extension spindle with headstock

AVK also offers a wide range of accessories for the actuators, all in accordance with present international standards:

- Solenoid valve
- Speed control
- Position indicator
- Feedback
- Travel limitation
- Local control
- Emergency manual override



Flow characteristics

Flow velocity

Liquids: Max. 4 m/s
Gases: Max. 30 m/s

Kv value table

DN: Valve diameter nominal
 α : Valve opening angle
Definition of Kv: Volume in m³/h water (specific gravity = 1) flowing through the valve at $\Delta P = 1$ bar.

DN \ α	20°	30°	40°	50°	60°	70°	80°	90°
50	6	16	32	58	96	134	154	160
65	10	25	50	90	150	210	240	250
80	14	35	70	126	210	294	336	350
100	24	60	120	216	360	504	576	600
125	36	90	180	324	540	756	864	900
150	52	130	260	468	780	1092	1248	1300
200	88	220	440	792	1320	1848	2112	2200
250	136	340	680	1224	2040	2856	3264	3400
300	200	500	1000	1800	3000	4200	4800	5000
350	240	600	1200	2160	3600	5040	5760	6000
400	308	770	1540	2772	4620	6468	7392	7700
450	400	1000	2000	3600	6000	8400	9600	10000
500	520	1300	2600	4680	7800	10920	12480	13000
600	720	1800	3600	6480	10800	15120	17280	18000
700	1000	2500	5000	9000	15000	21000	24000	25000
800	1280	3200	6400	11520	19200	26880	30720	32000
900	1640	4100	8200	14760	24600	34440	39360	41000
1000	2040	5100	10200	18360	30600	42840	48960	51000
1200	3000	7500	15000	27000	45000	63000	72000	75000
1400	4400	11000	22000	39600	66000	92400	105600	110000
1600	5600	14000	28000	50400	84000	117600	134400	140000

