NAF-Trimball Control Ball Valves Fk 41.65(6)GB

Size DN 50 - 400, PN 10 — 40, ANSI Class 150 and 300 **03.03**

Primary characteristics

The NAF-Trimball represents an entirely new approach for addressing the problem of cavitation, erosion and high noise level in control valves. The patented designs, which is based on our well-established NAF-Duball ball valve, combines the benefits of an advanced control valve with the simplicity of a ball valve.

The valve has

- a ball with many zigzag channels which offers major control benefits.
- Z-trim makes pressure drops in 5 steps
- an easy-to-service arrangement, due to the off-centre joint face of the body, which allows for easy replacement of the ball and seals, without the need for removing the stem and actuator.
- a floating ball, which means that no vibrations are transmitted to the stem and actuator, even at high differential pressures.

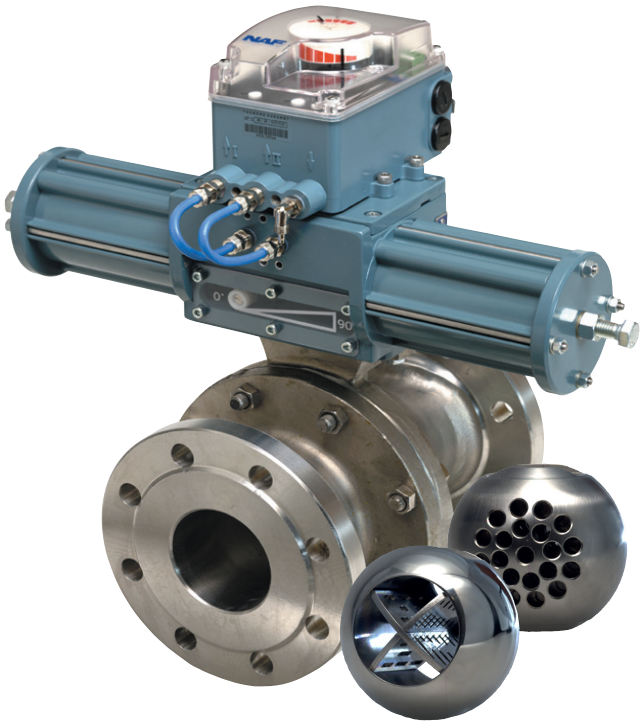
CE-marked according to Pressure Equipment Directive (PED 97/23/EG) module H, category III.
For module H1, category IV contact NAF

Design A-trim

As opposed to the large flow path through the ball of a conventional ball valve, the NAF-Trimball has a ball with a large number of small zigzag channels. When the flow is controlled from the closed position, the channels will be opened one by one. Up to the half-open position, the media will be recirculated between the ball and the valve body (see Fig. 1). As a result, the media will be forced to flow through two channels lengths, which results in very gradual opening of the valve.
After the ball has been opened through an angle of 45°, the channels will be gradually exposed, so that the media will flow through the channels only once (see Fig. 2). As a result, the valve capacity will increase appreciably.
Every channel comprises a large number of deflections, which enables the pressure drop to take place in many small steps. In addition, the area of each channel can easily be varied. These properties are necessary for effectively solving the problems of cavitation, erosion and noise during flow control.

Design Z-trim

NAF-Trimball with Z-trim (see fig. 2) has a less sophisticated trim design compared to A-trim. The Z-trim is however quite sufficient for many control applications. The design of the Z-trim allows the use of media with some particles like fibres without risk of clogging.



Technical specification

Material:	Stainless steel	
Size range:	DN 50 - 250	A-trim
	DN 50 - 400	Z-trim
Pressure classes:	PN 10 — 40	
	ANSI Class 150 and 300	
Face-to-face lengths:	PN 10:	IEN 558-1, series 12 (SSG 1042)
	ANSI 150:	ANSI B16.10, Class 150 Long
	PN 25-40:	EN 558-1, series 4 (SSG 1043)
	ANSI 300:	ANSI B16.10, Class 300 Short
Connections:	Flanges to DIN or ANSI B16.5	
Temperature range:	-30 - 350°C	
	see diagram on page 3	
Test pressure:	1.5xPN with valve open	
	1.1xPN with valve closed	
Sealing class:	PTFE seats:	
	SS-ISO 5208-2, Rate A	
	DIN 3230 BN, Leackrate 1	
	Metal seats:	
	SS-IEC 534-4, Class V	
	ANSI B16-104-V	

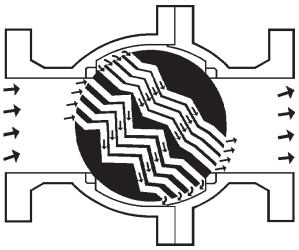


Fig. 1. The NAF-Trimball design-A in half-open position

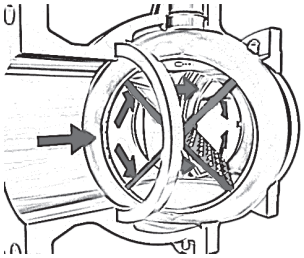


Fig. 2. The NAF-Trimball in fully open position

Applications

The NAF-Trimball is a control valve which is specifically intended for exacting operating cases in which demanding media and difficult pressure conditions give rise to cavitation, noise and erosion. The valve represents a concrete results of our product philosopy which is focused on functionality, high quality and low life cycle costs, and is based on concentrating our range to a limited number of valve types, but all of them suitable for a wide variety of applications.

Cavitation and noise in liquids

If the static pressure of liquid should drop below the vapour pressure, vapour bubbles will form and the liquid will flash. If the pressure should rise again, the vapour bubbles will collapse - implode - which will give rise to energy conversion. This energy conversion results in noise, vibration and, above all, erosion damage to materials. This process is known as cavitation and often occurs in control valves. Fig. 3 shows the pressure drop in an ordinary control valve and that in a NAF-Trimball, where P_1 is the pressure before the valve, P_{VC} the lowest pressure in an ordinary control valve and P_2 the pressure after the valve. In NAF-Trimball the zigzag channels cause the pressure to drop in many small stages. The lowest pressure never drops below the vapour pressure P_V, and cavitation is thus avoided.

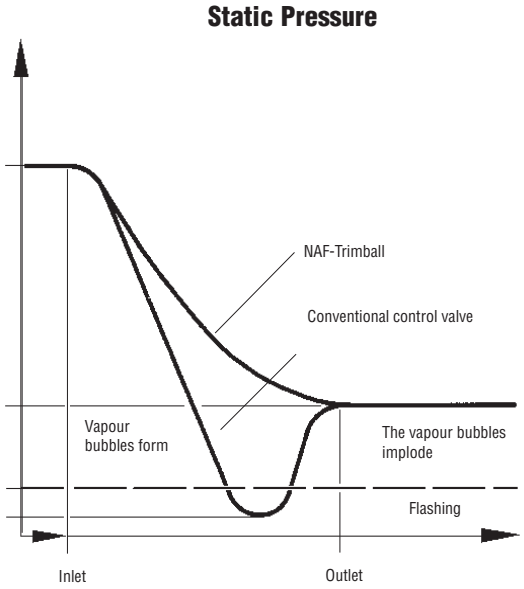


Fig. 3. Static pressure drop in conventional control valves and in the NAF-Trimball

Noise in compressible media

Noise is a serious problem in the control of compressible media, such as air, gas and steam. When the pressure is throttled in a conventional control valve, potential energy will be converted into kinetic energy, i. e. the velocity will increase. When a compressible medium is controlled, the velocity increase will be particulary high, since the medium expands appreciably as a results of the drop in pressure. Velocities approaching the speed of sound are not uncommon. As a result, very high sound levels occur in conventinal control valves.

In the NAF-Trimball, the velocity is constantly low. This is achieved by the area of the passage increasing in pace with the expansion of the medium. As a result, the sound level is radically reduced (see Fig. 4, where v_{max} is maximum velocity in the valve).

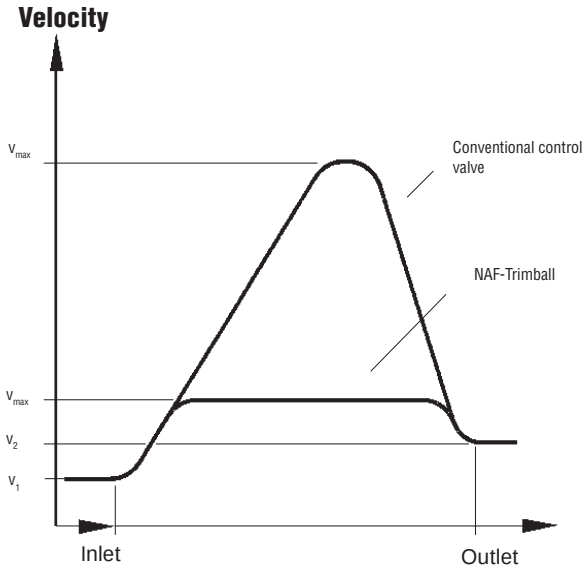


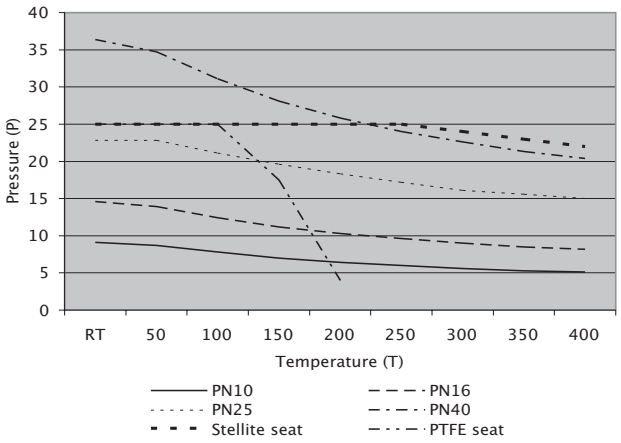
Fig. 4. Velocity through a conventional control valve and through the NAF-Trimball.

Material specification

In its standard design, the NAF-Trimball is made of exactly the same materials as the NAF-Duball (see catalogue sheet Fk 41.61). Consult NAF for further particulars.

Operating pressure, differential pressure and temperature

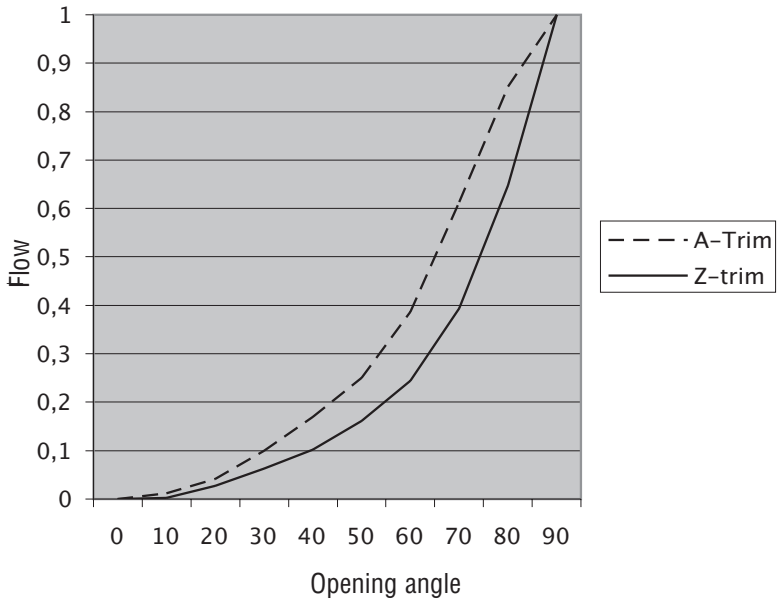
The differential pressure across a closed valve is maximum 25 bar and dependence on temperature according to following diagram. A stem sealing with O-ring of EPDM may be used up to max. 200 °C. A stem sealing with stuffing box, seals of graphite and stem bushings of Stellite may be used up to max. 350°C. Consult NAF for higher temperatures.



Flow capacity

NAF-Trimball is available with two different standard trim designs. A-trim is the most complicated design matching high pressure drops without cavitation and noise, but also with the lowest K_V - value. Z-trim is the simpliest design, but gives in many cases sufficient noise reduction with a higher K_V - value.

Control characteristic



Flow capacity (Table 1)

DN	K_v at fully open valve	
	A-trim	Z-trim
50	24	120
65	36	180
80	55	280
100	88	520
150	194	1225
200	317	2200
250	547	3600
300	-	5145
350	-	1)
400	-	1)

1) Contact NAF

Torque and selection of actuator

Specified by NAF for each individual application.

Dimension and mass*

See catalogue sheet Fk 41.61 for the NAF-Duball.

* Due to the special design of the ball, the weight of the NAF-Trimball with A-trim, excluding the actuator, is 10-20% higher than that of corresponding NAF-Duball. For Z-trim it is 3-5% higher.

Accessories

NAF´s pneumatic actuators, see data sheet Fk74.59 can be equipped with a large number of accessories.
The following are included in NAF´s standard programme and are suitable for direct mounting to NAF pneumatic actuators.

Valve positioner

Pneumatic and electro-pneumatic valve positioner, see data sheet Fk41.82.
Intelligent valve positioner, see data sheet Fk41.85.
Intelligent On/Off controler, see data sheet Fk41.86.

Solenoid valves

See data sheet Fk79.17.

Electrical position indication

See data sheet Fk79.10.

Terminal box

The actuator can be equipped with a junction box (part No. 349 20 930) of cast aluminium containing terminal blocks for connecting the solenoid valve and position sensors.

Product Code NAF-Trimball

Example:

		8	**A**	**8**	**6**	**9**	**5**	**- 0150**
Code	1	2	3	4	5	6		7

1. Valve type

8 Ball valve

2. Type of Trim A or Z . See Flow capacity, page 3.

3. Material (Hus)

8 EN1.4408/CF8M

4. Pressure rating

Pressure class	A-trim	Z-trim
2 PN 10	(DN 65—250)[1]	(DN 50—400)[1]
4 ANSI Class 150	(Size 2"—10")	(Size 2"—16")
5 PN 25	(DN 200—250)[1]	(DN 200—400)[1]
6 PN 40	(DN 50—250)	(DN 50—400)
7 ANSI Class 300	(Size 2"—10")	(Size 2"—16")

5. Stem sealing

2 Stuffing box Graphite, max 350°C[2]
9 O-ring EPDM, max 200°C

6. Sealing

	Ball	Seat ring
5	EN1.4408/CF8M hard chromium plated	Stellite
6	EN1.4408/CF8M	PTFE, carbon reinforced

7. Size

DIN-design		ANSI-design	
	DN		**Size**
0050	50	**0002**	2"
0065[3]	65	**-**	-
0080	80	**0003**	3"
0100	100	**0004**	4"
0150	150	**0006**	6"
0200	200	**0008**	8"
0250	250	**0010**	10"
0300	300	**0012**	12"
0350	350	**0014**	14"
0400	400	**0016**	16"

1) DN 50 has the same flange sizes in PN 10, 16, 25 and 40.
Choose PN 40 for these sizes.
DN 50—150 has the same sizes in PN 25 och 40.
Choose PN 40 for these sizes.
2) Stem extension and actuator yoke are included for design with stuffing box
3) Consult NAF

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