



Operating and maintenance manual for ball valves series of A20D and AF20D

	
<p>grey or blue handle = standard version, A20D series</p>	<p>red handle = FireSafe version = AF20D series</p>

General

This operating and maintenance manual is valid for soft sealing ball valves from the A20D and AF20D series. If they are assembled, used and maintained correctly, we guarantee trouble-free operation. The manufacturer assumes no responsibility for the efficiency and safety of the valves if the instructions contained in this operating and maintenance manual are not properly followed.

The ball valves may not be used above the application limits of the operating regulations described in all documents (e.g. operating regulations, order documents and data sheets). Operation outside of the application limits can damage the valves and make them unusable. The descriptions and regulations in this operating manual relate to the standard and FireSafe versions and also apply to special versions and other related constructions.


However, this operating manual does **not** cover:

- Possible accidents and disruptions that could be caused by improper assembly, operation and commissioning.
- Breaches of the safety regulations connected with the place in which the ball valve is installed. The operator is responsible for ensuring compliance with local safety regulations – also by the installation personnel in the facility.

The operating and installation instructions for all other devices connected with the valves must also be observed and followed, but they do not form part of this operating and maintenance manual.

This operating and maintenance manual contains important information for the professional assembly, operation, maintenance and commissioning of the described valves.

The information must be read and taken into consideration by specialist personnel prior to assembly and commissioning in the facility. They must comply not only with the general safety regulations but also all other rules and regulations in the following sections.

	<p>Failure to comply with these warnings can result in injury to people and malfunctions or even the destruction of the valve and other devices and machines; injuries can be caused by leaking medium (e.g. cold/heat, poisonous medium characteristics...);</p> <p>Improper use can result in the long-term destruction of the product characteristics during operation or even make the valve unusable.</p>
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Information about this operating manual

The purpose of the safety instructions in this operating manual is to prevent accidents or injuries to people.

Dangers that could arise if safety instructions are not followed

Failure to follow the safety instructions can result in damage to people, the environment and the valve itself. This may result in the loss of claims under third-party liability insurance.

Failure to follow the safety instructions can cause the following dangers:

- Failure of important device functions
- Failure of the prescribed procedure for commissioning the valve
- Danger to people through electrical, mechanical and chemical influences
- Environmental damage through leakages
- Injury through release of pressure
- Risk of burning on hot or cold surfaces


Working with safety awareness

The safety regulations contained in this manual comply with Swiss accident prevention regulations. The operator must observe and enforce further rules and regulations for preventing accidents during operation and comply with safety at work guidelines in the relevant country.

Safety instructions for the operator

There is a risk of danger whenever hot or cold valve parts can be touched. It must be ensured that such parts cannot be touched without protection.


- The protection against contact for movable valve parts (e.g. couplers) may not be removed while the machinery and/or valves are in operation!
- Leakages (e.g. in stem or seals) of dangerous fluids (explosive, poisonous, hot) must be removed in such a way that there is no danger to life. Troubleshooting should be initiated and the error rectified.
- Injuries from electrical energy must be ruled out (please see the details on this point in the local utility company regulations).

	<p>Valves for high or low temperatures (>50°C or < 0°C) are to be protected against accidental contact (e.g. insulation) or at least clearly labelled with a warning sign.</p>
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Safety instructions for assembly, commissioning and maintenance

It must be ensured that the assembly, commissioning and maintenance of the valves is fundamentally performed by specialist trained personnel, taking into consideration these operating and maintenance regulations.

Work may fundamentally only be performed on the valve when the machinery is at a standstill and once it has cooled down and is not under pressure. The ball must be at a 45° angle.

	<p>Opening the valve under pressure can be fatal!</p>
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Valves that have been in contact with products/media that are dangerous to health must be decontaminated before starting work. All safety and protection measures must be reactivated immediately after finishing the work. The regulations from the “commissioning” section must be observed prior to commissioning the valve.

Reassembly and procurement of replacement parts

Conversions or modifications to valves are fundamentally only permissible after discussion with the manufacturer. The use of original replacement parts and accessories approved by the manufacturer guarantees the functionality and safety of the valve. If damage is caused through the use of other non-original parts, the third-party liability insurance may deny performance.

Construction, operating parameters, scope

The A20D und AF20D ball valves described in this manual cover the following versions:

Construction:	complies with DIN EN 1983
Leak test:	per DIN EN 12266
Nominal sizes:	DN 08 – DN 25 with nominal pressure PN125 DN 32 – DN 40 with nominal pressure PN100 per DGRL/PED/CE 0036 DN 65 – DN 100 with nominal pressure PN64 per DGRL/PED/CE 0036
Housing material:	1.4408/CF8M, 1.0619/A216 WCB
Ball seat:	PTFE (pure), RPTFE (glass fibre reinforced), C-PTFE (PTFE carbon), other seat sealing materials (e.g. TFM®-1600 or PEEK®) on request.

The operating parameters are dependent on the flowing medium and installation surroundings; these can be found in the technical data sheet or comparable technical descriptions.

Operating description

Ball valves are devices with a ball-shaped closure unit that makes it possible to regulate flow through an on/off function. The closure unit (ball inside) has a passage hole in the middle that is turned at 90° to open/close the flow channel and either lets the medium through or blocks it. The A20D and AF20D series are two-way ball valves, which have a linear flow characteristic from the inlet to outlet.

Depending on the version, the ball can be operated manually, pneumatically or electrically. Pneumatic and electrical operation require corresponding drive motors, which do not form part of this operating manual.

Intended use

Ball valves are isolation valves for “on/off” operation. The correct use and design of the valves (e.g. housing material, type of seat sealing etc.) depend on the process conditions. These are to be clarified with the provider/manufacturer prior to ordering and incorporation into a facility. Changes to the process conditions may result in another construction/design of the ball valve. For the A20D / AF20D ball valve, the installation direction can generally be disregarded.

Impermissible operating modes

Safe operation is only guaranteed if the valve is laid out, assembled, installed and used as per the general provisions of these operating regulations. The technical limits can be seen in the technical documentation and must not be exceeded. The application limits are also stated below.

Areas of application

Material, pressure, temperature

Housing material from DIN 1.0619/A216 WCB -30°C to max. +250°C
 Housing material from DIN 1.4408/CF8M -40°C to max. +250°C

The areas of application generally depend on the seat material used

Housing strength -196°C (-270°C) to max. +250°C

Note: The low temperature value stated in brackets is the minimum permissible temperature at which the valve can be used without the risk of brittle fracture. We expressly note that is a statement on the material strength and NOT a functional guarantee! Furthermore, the operator must also observe the security measures for operating these valves when used at low temperature (see safety instructions – “Low temperature applications”).

Pressure-temperature allocation of the body strength (PS/TS)

Operating temperature TS	Nominal pressure stage	PS DIN 1.0619/A216 WCB	PS DIN 1.4408/CF8M
(-270°C) -40°C to +50°C	PN125	PS= 125 barg (from -30°C to +87°C)	PS= 125 barg (from -270°C to +78°C)
	PN100	PS= 100 barg (from -30°C to +63°C)	PS= 100 barg (from -270°C to +60°C)
	PN64	PS= 64 barg (from -30°C to +78°C)	PS= 64 barg (from -270°C to +70°C)
at +100°	PN125	PS= 121 barg	PS= 115 barg
	PN100	PS= 91 barg	PS= 86 barg
	PN64	PS= 60 barg	PS= 57 barg
at +150°C	PN125	PS= 111 barg	PS= 100 barg
	PN100	PS= 83 barg	PS= 75 barg
	PN64	PS= 55 barg	PS= 50 barg
at +200°C	PN125	PS= 100 barg	PS= 89 barg
	PN100	PS= 75 barg	PS= 66 barg
	PN64	PS= 50 barg	PS= 44 barg
at +250°C	PN125	PS= 92 barg	PS= 82 barg
	PN100	PS= 69 barg	PS= 61 barg
	PN64	PS= 46 barg	PS= 41 barg

TS: maximum permissible temperature

PS: maximum permissible pressure

(interpolate interim values)




Note: The bracketed low temperature value (-270 ° C) is the minimum allowable temperature at which the valve can be loaded without risk of brittle fracture. We expressly point out that this is a statement about material resistance and NOT a functional guarantee! In addition, the safety measures for operating these valves at low temperature use by the operator must be observed (see safety information "cryogenic applications").

The areas of application for the valve also depend on the seat material used!


(See pressure – temperature diagram in the brochure)

It is to be ensured that the ball valves with a housing of 1.0619 / WCB are **not** used with aggressive and corrosive media. Use at below -30°C is not recommended. The brittleness (strength values) of the material is critical and must be taken into consideration. The operator is solely responsible for selecting the right material.


Low temperature applications

  	<p>The ball valve with stainless steel housing is for use in low temperature applications (-270°C) but without any functional guarantee. The valves may only be operated by people wearing personal protective equipment (gloves suitable for low temperatures and protective glasses). Separate operating instructions and handling measures are to be observed by the operator and its assembly company.</p>
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Potentially explosive atmospheres

	<p>The ball valve does not have its own effective ignition source. However, to prevent an electrostatic charge in general, the ball valve must be connected in an electroconductive manner with other system components (potential equalisation). See also “ATEX declaration of conformity.”</p>
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Use in oxygen applications

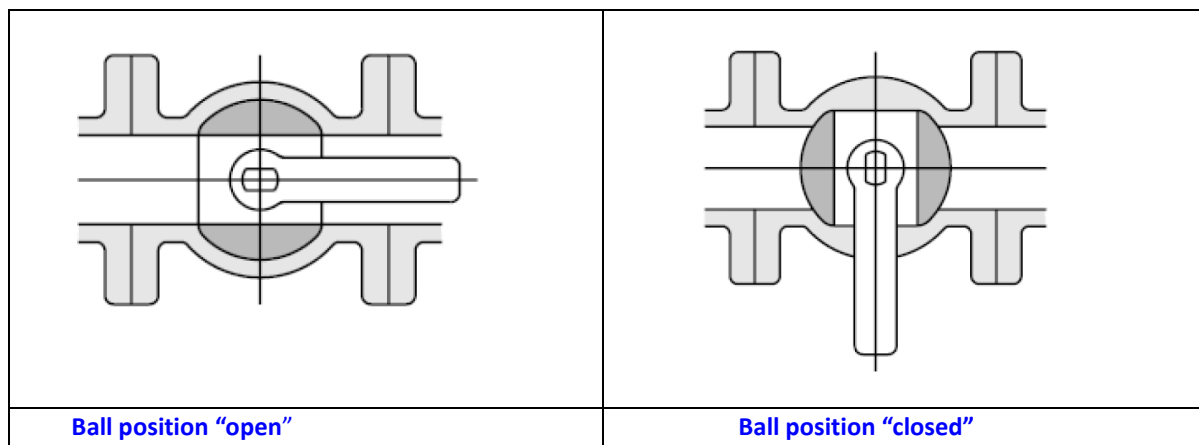
	<p>Valves for use with oxygen are fundamentally to be packaged in specially designated transport bags and labelled with a “free from oil and grease” sticker. Use in oxygen applications requires special assembly measures, which must be observed by the operator and its plant constructors.</p>
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Transport

The ball valves are to be transported in shock-resistant and water-resistant packaging, ideally the packaging used by the factory. To protect them against corrosion, the valves are delivered with caps on the inlet and outlet that should be kept on until installation.

Storage

The connections should remain covered to prevent the penetration of dirt and dust. The ball valves are to be stored in a dry and well-ventilated place. If the valves are stored for a long time they must be periodically inspected and cleaned. Suitable means should be used to protect machined surfaces (for Material 1.0619/ A216 WCB) against corrosion. During storage, the valves must be protected against weather influences and in the open ball position.




C-steel valves, corrosion protection


The standard version of the unalloyed or low-alloy cast steel valves (1.0619 / A216 WCB) are coated in a protective layer (burnished, blackened, phosphated) inside and outside. All other stainless steel parts have no additional surface protection. The connections are to be protected against mechanical damage and dirt through suitable means (e.g. protective caps).

Stainless steel valves

Stainless steel valves are delivered in the standard version without any additional corrosion protection.

Assembly and maintenance

	<p>Turn off all devices/machines/equipment affected by the assembly/repair! If necessary, disconnect the devices/machines/equipment from the network, air and power supplies. Check that they have been switched off before starting to work!</p>
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	<p>The permissible pressure may not be exceeded! All pipes must always be extensively flushed and cleaned for a new installation and after repair work. Dirt residues, welding beads and the like result in malfunctions and, at the least, a loss of performance by the valve!</p>
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General installation regulations

To protect the ball and seat rings, pipes are to be flushed and cleaned of any impurities, welding residues etc. before installing the valve. The operator is responsible for selecting the valve. Dimensions, materials, replacement parts and area of application of the ball valve can be found in the "Ball valve A20D series" brochure.

The flow direction and mounting position of the ball valve can be freely selected (exception: ball valve with relief bore and directional arrow). It must be assembled in line with generally accepted rules for the technology. If the ball valves have welded ends, the connection at the welding point should be free from scale and grease (bare metal). The sealing surface of other connection types (e.g. clamps) must not be damaged.



Installation of the ball valve in the open position

To prevent damage to the ball, we recommend installing it in the open position. For automated valves, the "fail-safe position" must be observed and, if applicable, the drive should be dismantled in advance.

Installation of the ball valve in the closed position

The ball, seat and supporting ring can easily fall out. In DN 65 - DN 100 valves, the ball projects over the middle part. To prevent damage to the ball with welded connection ends, it should be possible to press the pipe apart slightly.

1. Assembly and maintenance of the ball valve in the standard version of the A20D series

		<p>The valve must be cooled, cleaned/decontaminated and not under pressure! Opening the valve under pressure can be fatal! A helmet, protective glasses and safety shoes must be worn!</p>
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The A20D ball valve can be recognised by its blue or grey handle. The ball valves are **delivered tightly screwed**. During installation, we recommend removing the welded connections and welding them separately into the pipe. The middle part should be replaced by a welding gauge to define the installation measurement A1 (see diagram). At the end, the housing seals must be inspected for leakage and, if necessary, replaced.

Cleanliness must be ensured while welding. After welding and cooling, the middle part can be integrated and screwed with the welded connections free of any tension, whereby the tightening torques for the housing screws must be observed (see "Tightening torques" table). No further settings are required.

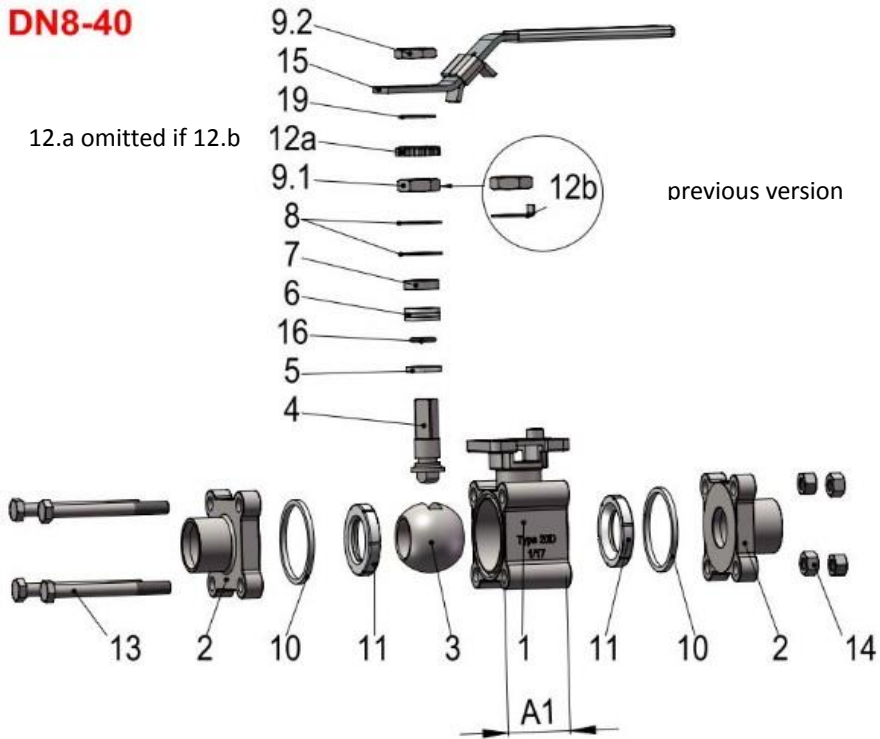
Replacement of the ball seats and seals – disassembly of the standard ball valve A20D

It must be ensured that the ball valve has cooled down and is under no pressure prior to removal. The ball valve should be opened and closed once to relieve internal pressure. Only original replacement parts may be used.

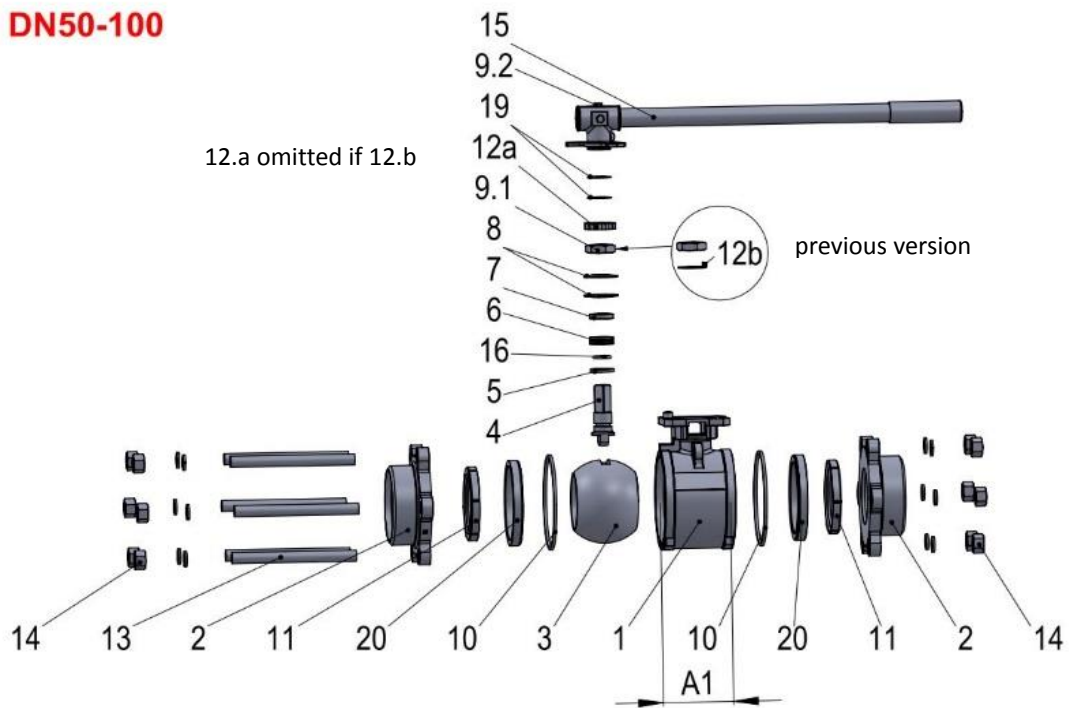
Loosen nuts (14), remove hexagon screws (13), remove the ball valve middle section (1) in the open position and then rotate to the closed position. Take out the body seals (10), seat rings (11) with supporting ring (20) (for DN 65-DN 100 only) and ball (3). Remove spacer ring (19) and the protection plate (12a/12b), remove nut (9.2) and spring washers (8) and pressure ring (7). Move the stem (4) inwards with a nylon hammer and take out. Remove the O-ring (16) and seal ring (5) from stem. Take off the packing (6) from the centre section (1). Clean up the centre section (1) and stem (4) from any residues.

Pos.	Description	Material	Spare Part
1	Body / centre section	1.4408/1.0619	
2	Connection (Bw, Sw, Screwed...)	1.4408/1.4409/1.0619	
3	Ball	1.4401	
4	Stem	1.4401	
5	sealing	RPTFE	X
6	Stuffing/Packing box	RPTFE/CPTFE	X
7	Pressure ring	1.4401	
8	Bellville spring washer	1.4310	
9.1	Nut	A2-70	
9.2	Nut / Adapter	A2-70 / 1.4408	
10	Body sealing	RPTFE	X
11	Seat ring	RPTFE, CPTFE etc.	X
12a	Protection cap	1.4301	
12b	Protection plate	1.4301	
13	Screw / Bolt	A2-70	
14	Nut	A2-70	
15	Hand lever	1.4301/PVC	
16	O-Ring	FKM	
19	Distance ring	1.4301	
20	Supporting ring	1.4401	

DN8-40



DN50-100



DN50 without supporting ring (20)

Assembly of the standard A20D ball valve

Push the seal ring (5) onto the stem (4) then tighten the O-ring (16). Lightly lubricate the stem (4) with allowed grease (recommendation: Fin Food Grease 2) and insert it in the centre section (1) from the inside. Insert PTFE packing (6) in the centre section (1). Apply the pressure ring (7) and Belleville spring washers (8), screw on the nut (9.1) and secure it with the protection plate (12a/12b), screw on the nut (9.1) and tighten with the torques below; secure the nut (9.1) with the protection plate (12a/12b). Apply the hand lever (15), screw on the nut (for DN65-100 adaptor only) (9.2) and tighten. Open the ball valve using the hand lever (15) and check its functionality. Insert the ball (3), cleaned supporting ring (20) (for DN65 - DN100 only), seat rings (11) and body seals (10) into the centre section (1). Lightly lubricate the body screws (13) with approved grease (recommendation: Fin Food Grease 2) (prevents settling); assemble the centre section (1) and connections (2) with screws (13) and nuts (14) and use a torque wrench to tighten the body screws with the tightening torques given below (see table).



Tightening torques of the body screws (13/14) with lubricated threads

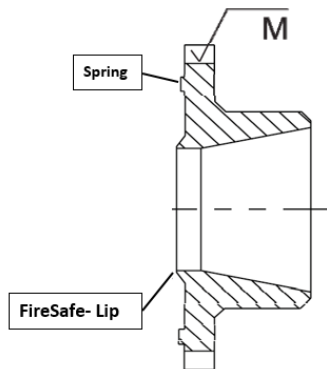
DN	8/10	15	20	25	32	40	50	65	80	100
Screw/nut (13/14)	M	M6	M8	M8	M10	M10	M12	M14	M16	M16
Tightening torque Nm	11	11	26	26	40	41	80	90	180	180

Tightening torques for the stem nut (9.1)

DN	8/10	15	20	25	32	40	50	65	80	100
Tightening torque Nm	10	10	13	13	16	16	22	22	25	25

2. Assembly and maintenance of the FireSafe ball valve AF20D series

		<p>The valve must be cooled, cleaned/decontaminated and not under pressure! Opening the valve under pressure can be fatal! A helmet, protective glasses and safety shoes must be worn!</p>
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The AF20D FireSafe ball valve can be distinguished by its **red** handle or the inscription "AF20D" on the body. The ball valve is equipped with graphite Body seals and packing. FireSafe ball valves are delivered **tightly screwed** (see table of tightening torque moments for the body screws). They can be welded into the pipe in the open ball position without being disassembled if low heat supply and fast heat dissipation (forming) are ensured while welding to protect the ball seat. In doing so, a maximum temperature of 130°C may not be exceeded at the measurement point "M".

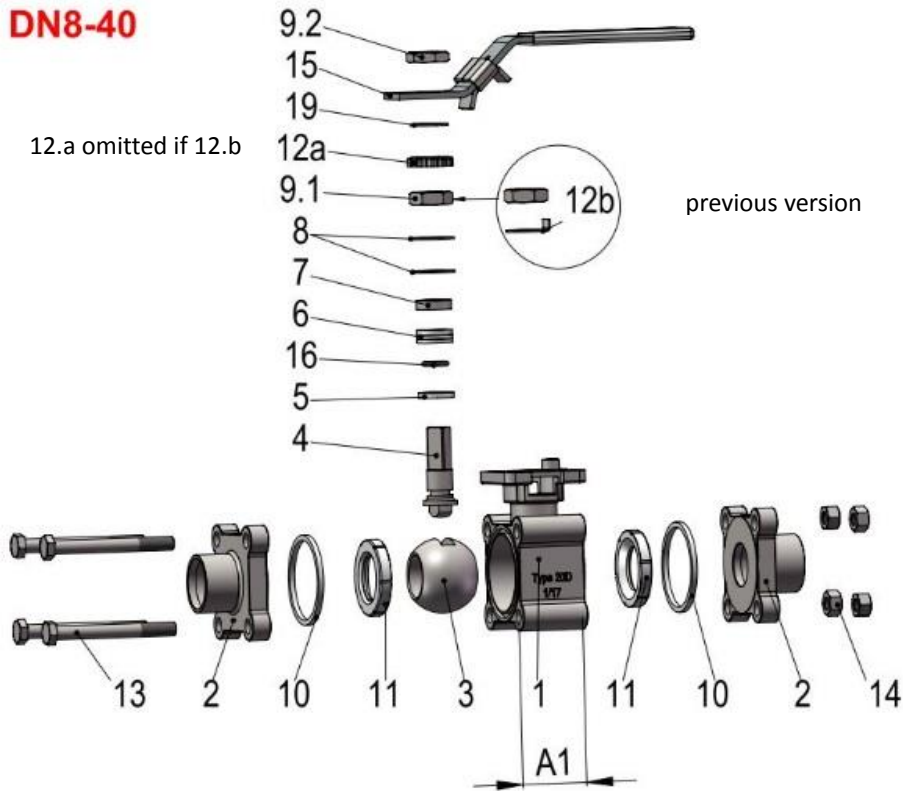
Replacement of the seats and seals for Fire Safe – version of AF20D

Loosen nuts (14), remove hexagon screws (13), remove the ball valve middle section (1) in the open position and then rotate to the closed position. Take out the body seals (10), seat rings (11) with supporting ring (20) (for DN 65-DN 100 only) and ball (3). Remove nut, adapter (for DN 65- DN 100 only) (9.2) and hand lever (15) or motor, open the protection plate (12), remove the nut (9.1), Belleville spring washers (8), pressure ring (7) and spacer ring (19). Move the selector shaft (4) inwards with a nylon hammer and take out. Remove the O-ring (16) and take off the packing (6) and seal ring (5). Clear any residues from the stem (4) and body (1).

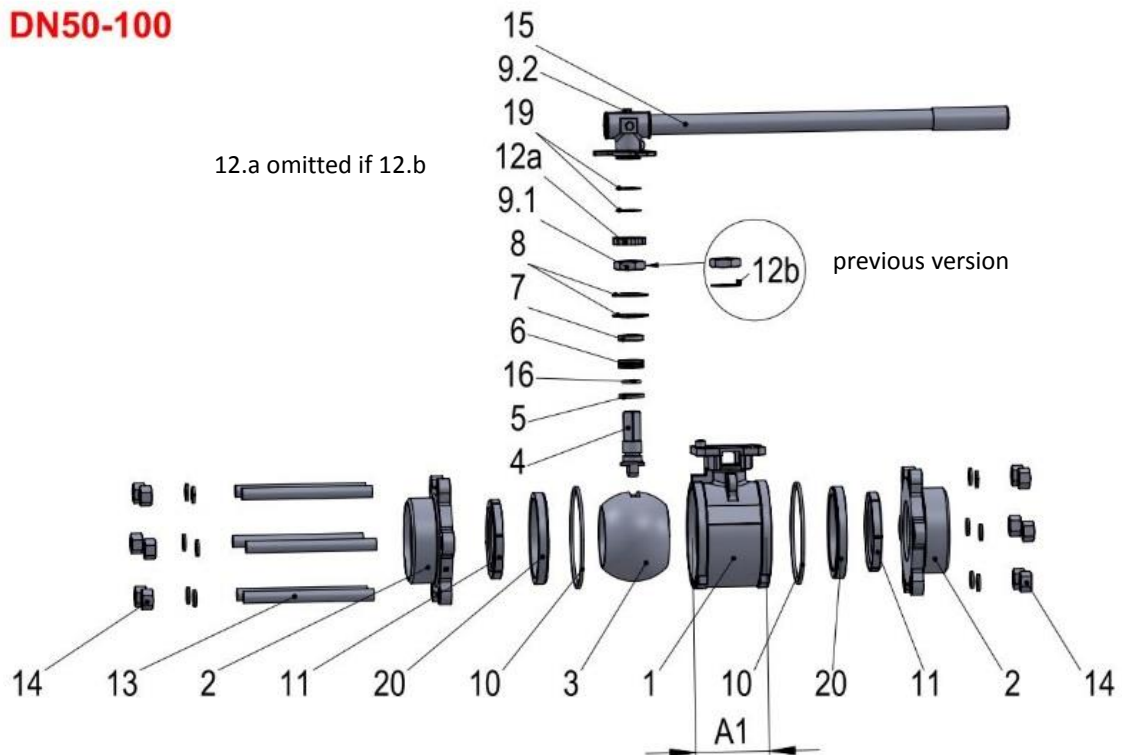
Part list for Fire Safe Version

Pos.	Description	Material	Spare Part
1	Body	1.4408/1.0619	
2	Connection (BW, SW, Screwed...)	1.4408/1.4409/1.0619	
3	Ball	1.4401	
4	Stem	1.4401	
5	sealing	Graphite	X
6	Stuffing/Packing box	Graphite/PTFE	X
7	Pressure ring	1.4401	
8	Bellville spring washer	1.4310	
9.1	Nut	A2-70	
9.2	Nut / Adapter	A2-70 / 1.4408	
10	Body sealing	Graphite	X
11	Seat ring	RPTFE, CPTFE etc.	X
12a	Protection cap	1.4301	
12b	Protection plate	1.4301	
13	Screw / Bolt	A2-70	
14	Nut	A2-70	
15	Hand lever	1.4301/PVC	
16	O-Ring	FKM	
19	Distance ring	1.4301	
20	Supporting ring	1.4401	

DN8-40



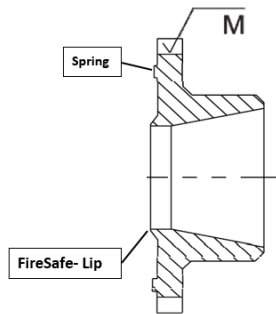
DN50-100



DN50 without supporting ring (20)

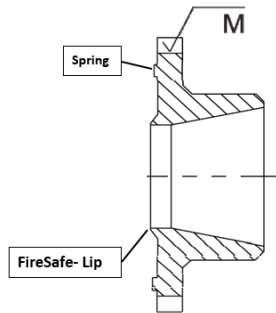
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Installation in the pipe in assembled condition for **FireSafe ball valve AF20D**



The ball valve type AF20D **Firesafe** version can be identify by the red hand lever or at the inscription on the body with "AF20D". The ball valve is equipped with graphite body seals and packing. Firesafe ball valves are supplied bolted (see table of tightening torques of the body screws). These can be welded without dismantling in open ball position in the pipeline, if to protect the ball seats in the welding on low heat input and rapid heat dissipation (forming) is respected. At the measuring point "M" a maximum temperature of 130 ° C must not be exceeded.

Installation in the pipe in a loose state for **FireSafe ball valve AF20D**



However, if the ball valves are disassembled and the connections welded separately, new graphite body seals are to be inserted (pre-compressed body seals must be cleanly removed beforehand). The middle part should initially be replaced by a welding gauge to define the installation measurement A1 (see diagram). Due to the fire-safe construction with nut and spring connection, attention must be paid to the protruding (1.3 mm) and fire-safe lip at the welded end when inserting the middle part. To prevent damage during installation, the pipe must be able to move axially at least 3 mm.

Assembly of the **FireSafe ball valve AF20D**

Push the sealing ring (5) onto the stem (4) then tighten the O-ring (16). Lightly lubricate the stem (4) with approved grease (recommendation: Fin Food Grease 2) and insert it in the body (1) from the inside. Insert the **graphite** packing (6) and additionally pre-compress with a fitting sleeve. Apply the pressure ring (7) and Belleville spring washers (8), put on the protection cap/-plate (12a/12b), screw on the nut (9.1) and tighten with the torques below; secure the nut (9.1) with the protection cap/-plate (12a/12b). Apply the hand lever (15), screw on the nut (for DN65-100 adaptor only) (9.2) and tighten. Open the ball valve using the hand lever (15) and check its functionality.

Insert the ball (3), cleaned supporting ring (20) (for DN65 - DN100 only), seat rings (11) and housing seals (10) into the body (1). Lightly lubricate the body screws (13) with grease (recommendation: Fin Food Grease 2) (prevents settling); assemble the housing and connections with screws (13) and nuts (14) and use a torque wrench to tighten the housing screws with the tightening torques given below (see table), taking section 2 into consideration.

Tightening torques of the body screws (13/14) with lubricated threads

DN	8/10	15	20	25	32	40	50	65	80	100
Screw/nut (13/14)	M6	M6	M8	M8	M10	M10	M12	M14	M16	M16
Torque Nm	11	11	26	26	40	41	80	90	180	180

Tightening torques for the stem nut (9.1)

DN	8/10	15	20	25	32	40	50	65	80	100
Torque Nm	10	10	13	13	16	16	22	22	25	25

Maintenance and repair

The ball valves should be inspected for tightness and damage at regular intervals (depending on the operating parameters). The seals are particularly subject to aging processes and must be visually inspected. In the event of damage or leakage, they are to be replaced by with original replacement parts and dismantled and installed as explained in the “assembly” section.

The entire ball valve must be replaced if there is damage to the metallic components.

Inspections and recurring inspections

The ball valves were subjected to a pressure and leakage test for seat and housing tightness in accordance with the regulations prior to delivery (see factory certificates). Correct assembly was established by inspecting the construction type of the individual ball valve components and performing a functionality test.

Depending on the application, these inspections should be repeated at regular intervals.

The operator shall determine the intervals between these inspections depending on the installation position. It is recommended to perform the following inspections **every two years**:

- Visual inspection of the exterior
- Pressure test of the housing (a pneumatic test should be performed for low temperature applications)
- Leakage test

If the inspections all reveal no defects, the valves can continue to be used and operated across the recommended operating life.

Zuercher Technik recommends replacing the entire valve when it comes to the end of its service life at the latest to prevent unforeseen failure.

Disposal and recycling

It is safe to dispose of and recycle the materials used in the ball valve. However, it must be strictly ensured that the components are disposed of separately and professionally. The smallest residues from the original application must also be removed. There are therefore no essential requirements for disposing of and recycling the valves. The operator must dispose of them in accordance with the legal regulations in the country of disposal/installation and contamination by the process medium.

Declaration of conformity

Zuercher Technik AG declares that the delivered versions of the products described above comply with pressure equipment directive 2014/68/EU (previously 97/23/EG). The conformity procedure used complies with the A2 module.

The institution responsible for compliance and monitoring of the provisions under this directive is:



TÜV Süd Industrie Service GmbH
Westendstrasse 199
DE-80686 Munich
Germany



Any form of certificates and attestations are generally not valid without a company stamp and signature and may generally only be passed on to third parties in an unchanged form. Amendments require prior written authorisation from Zuercher Technik AG at all times.

Guarantee

The guarantee and warranty conditions of the purchase contract and the general terms and conditions of Zuercher Technik AG shall apply. If these are not available, they can be requested from Zuercher Technik or downloaded from **www.zuercher.com**.

Contact details

Zuercher Technik AG
Neumattstrasse 6
CH-4450 Sissach
Switzerland

Tel.: +41 61 975 10 10
Fax: +41 61 975 10 50
info@zuercher.com
www.zuercher.com

