



# *USER INSTRUCTIONS*

## *NAF Setball SF Ball Sector Valves*

*Installation  
Operation  
Maintenance*

FCD NFENIM4156-00 A4 09/16



*Experience In Motion*

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## SAFETY

- Assess all risks to eliminate the possibility of personal injury and material damage. Read these instructions thoroughly.
- Always use the necessary protective equipment and comply with applicable safety directives when working with hazardous or hot/cold media.
- Never operate a valve without first ensuring there is no risk of crush injuries. The risk is highest with automated valves. Take necessary safety precautions to avoid unintentional stroking of the actuator / valve.
- Never dismantle a valve or part of a valve without ensuring the line is free of pressure and media.
- Always check that the valve type and material is suitable for its intended use. This applies especially to highly oxidizing and corrosive media. Observe also the risk of erosion or explosion, as well as decaying medium. If in doubt, always request a written recommendation from Flowserve.

## 1 General

This instruction provides necessary information for the correct handling of the NAF Setball SF ball sector valve. For additional equipment used together with the valve, please refer to their corresponding instructions.

Although this instruction is made to cover a broad range of varieties of the NAF Setball SF, there will inevitably be versions not covered in detail. If you have any doubt about the correct use and handling of a specific version of NAF Setball SF, please contact your Flowserve representative.



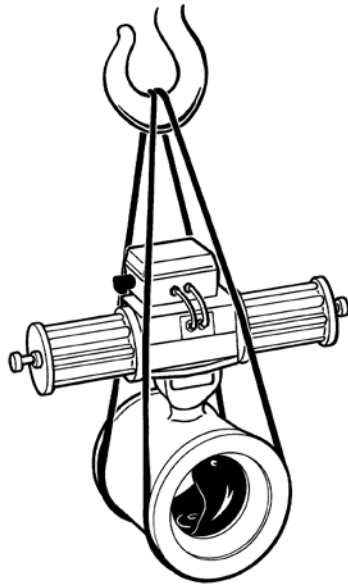
**Valves intended for use on highly oxidizing media are often delivered in a degreased version. Any valve marked with “Degreased for oxygen service” must be handled with the greatest care and be protected from being contaminated with grease, dust or anything else that can jeopardize its safe use.**

The instructions and list of spare parts in this document are applicable to NAF Setball SF ball sector valves ball valves in accordance with our Technical Bulletin.

## 2 Lifting

All lifting must be carried out on the valve itself and not on the actuator. The mounting connection between the valve and the actuator is designed principally for carrying the operating torque and the deadweight of the actuator and is not designed to support the weight of the valve. See Figure 1.

Figure 1 – Lifting of the valve



## 3 Receiving Inspection

All valves leaving our facility are inspected and tested in accordance with the relevant requirements or in accordance with the special provisions specified by the purchaser. Valves equipped with actuators are subjected to functional testing and are adjusted in such a manner that every unit is ready for direct installation in the pipework. However, because damage may have occurred during transport, it is advisable that receiving inspection be carried out.

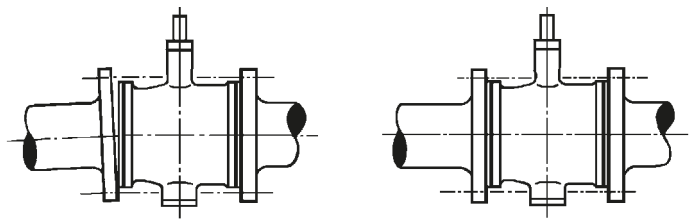
We suggest the following inspection procedure:

- Check that the valve delivered is correct in terms of type, size, equipment, etc.
- Examine the valve, actuator and valve positioner for possible damage.

## 4 Installation

Before installing the valve, ensure the pipework is free from impurities, that the pipe end connectors between which the valve is to be installed are parallel and are correctly aligned, and that the distance between the pipe ends correspond to the valve length, including gaskets. The valve must not be used for drawing together or aligning incorrectly run pipes as this will cause improper loads on the valve and pipe which could lead to problems during operation. See Figure 2.

Figure 2 – Ensure that the pipe ends align and have the correct gap



Incorrect installation

Correct installation

Maximum allowed torque for the flange bolts can be found in the table below.

Bolt	Torque Nm	Bolt	Torque Nm
M12	50	UNC 1/2"	50
M16	125	UNC 5/8"	85
M20	130	UNC 3/4"	155
M24	230	UNC 7/8"	271
M27	300	UNC 1"	395
M30	800		

**NAF Setball SF valves should be installed in the direction of flow shown by the arrow on the valve body.**

**NAF Setball SF valves can be installed in any orientation.**

However, we recommend that if installed in a horizontal run of pipe, the valve should be mounted with the stem pointing vertically upwards.

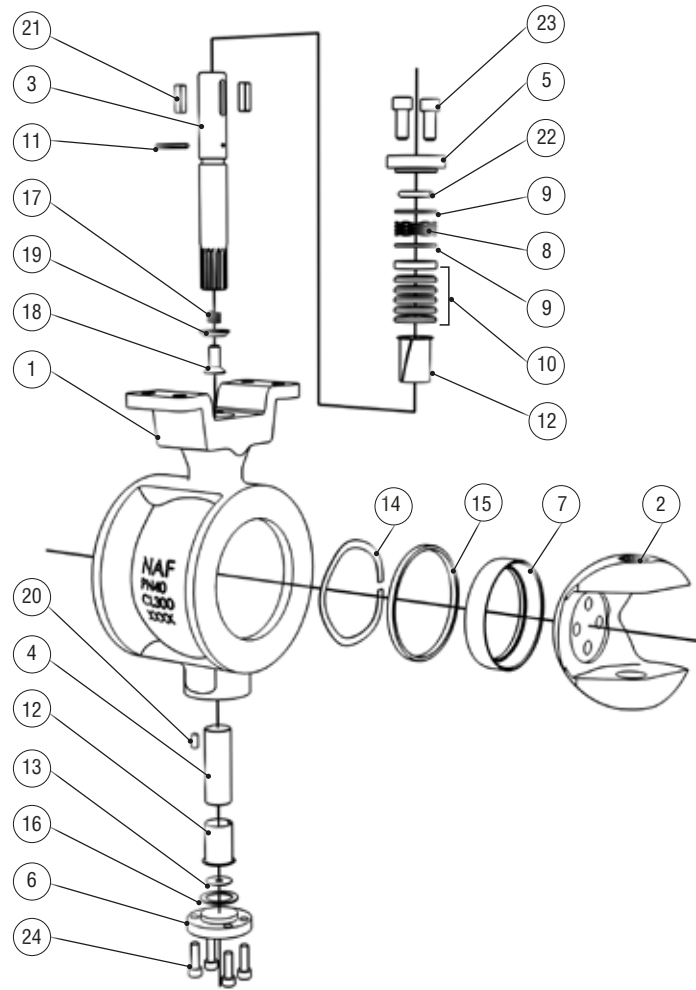
**The pipes should be supported on each side of the valve** in order to relieve the valve of unnecessary loads and avoid vibrations.

**Locate the valve so it will be easily accessible** for inspection and service, particularly if the valve is equipped with an actuator and a valve positioner.

## 5 Commissioning

Before starting up, flush the pipework with all valves in the open position so that any impurities that may damage the sealing surfaces of the valve or impede its operation will be flushed away.

Figure 3



## 6 Materials and Recommended Spare Parts Kits

Item	Qty.	Part	Kit A Stem sealing kit	Kit B Seat ring kit (soft seated)	Kit C Seat ring kit (metal seated)
1	1	Body			
2	1	Ball sector			
3	1	Stem, upper			
4	1	Stem, lower			
5	1	Gland cover	x		
6	1	Bottom cover			
7	1	Seat ring		x	x
8	1	Spring	x		
9	2	Washer	x		
10	1	Stem packing	x		
11	1	Indicating pin			
12	2	Bushing	x		
13	1	Bearing washer	x		
14	1	Wave spring		x	x
15	1	Seat seal		x	x
16	1	Gasket	x		
17	1	Thread insert			
18	1	Screw	x		
19	1	Washer	x		
20	1	Pin			
21	2	Key			
22	2	Locking segment	x		
23	2	Screw			
24	4	Screw			

\* Small sizes have the washer integrated as a part of the screw (18).  
Material and design of the parts vary depending on the version of the valve. Version is determined by NAF No. on the identification plate of the valve.

## 7 Ordering of Spare Parts

When placing an order for spare parts, specify:

- NAF-No: specified on the identification plate of the valve.
- Recommended spare part kit according to Section 6.
- Quantity required.

Ordering example:

NAF-No:	8580ES-0100-BABAEA
Spare part kit:	A
Quantity:	1pc

## 8 Maintenance

Many valves are installed in locations where their performance is of critical importance to the entire process. Such valves should be inspected regularly and any issues should immediately be corrected.

**⚠ Valves intended for use on highly oxidizing media require special handling, such as cleanliness and use of special grease, to avoid safety hazards. Applicable regulations must be followed and the following maintenance instructions can therefore only serve as general guidance.**

### 8.1 Removing the valve from the pipework

The procedure for inspection and maintenance requires no special tools.

**⚠ Ensure the process line is shut off, free of pressure and drained of media.**

- 1 Ensure that the recommended spare parts and gaskets for the pipe flanges are available.
- 2 Before removing the valve from the pipeline, operate it several times between the open and closed position to ensure that any trapped media / pressure is released.
- 3 Shut off all compressed air connections and isolate all electrical connections to the actuator.
- 4 Disconnect all compressed air lines and electric cables connected to the actuator.

**⚠ Caution. Liquid in the valve may be harmful.**

- 5 *Release the flanged joint between the valve and the pipework. Then lift out the valve. Don't use the actuator for lifting. **Apply all lifting forces to the valve itself and not to the actuator.** See Figure 1.*

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### 8.2 Replacing the stem packing and primary blow-out protection.

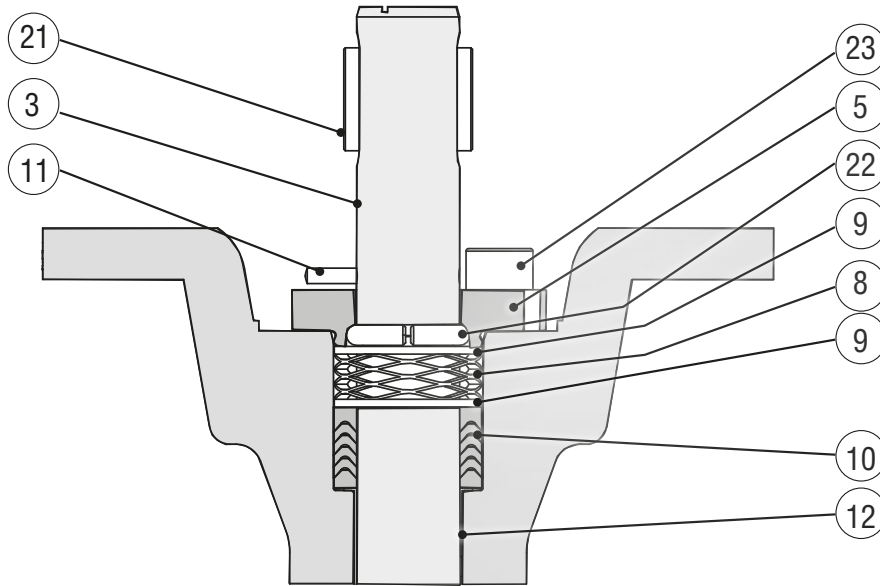
If the stem seal is leaking, the stem packing must be replaced. Even if the stem seal does not leak, we always recommend replacing the stem packing every time the valve is taken out of service. Replacing the stem packing will reduce unnecessary extra work and downtime caused by a stem leakage in the future. We always recommend the use of a stem sealing kit, spare part kit A according to Section 6.

**⚠ Due to safety reasons, parts for the primary blow-out protection (items 5, 22) for the stem should always be replaced each time the stem seal is replaced.**

**⚠ Make sure that the valve is not under pressure.**

- 1 Remove any actuator.
- 2 The 2 keys (21), the indicating pin (11), the 2 screws (23) and the gland cover (5) can now be removed. See Figure 3 and 4.
- 3 Remove the upper washer (9), the spring (8) and the lower washer (9).
- 4 Remove the stem packing (10). If the old stem packing (10) is difficult to remove, please follow section 8.3.
- 5 Check the stem (3) for any sharp edges, particularly around the key way. If necessary, gently grind off such sharp edges to make sure the stem packing (10) isn't damaged when put onto the stem (3).
- 6 Clean the stem seal area of the body (1) and put the stem packing rings (10) onto the stem using a suitable silicon grease both on the stem and into the stem seal area.
- 7 Use the new gland cover (5) to gently push the stem packing into the body (1).
- 8 Add the first washer (9), the spring (8) and the second washer (9) to the stem and use the gland cover (5) to gently push the stem packing (10) and the washers and spring into the valve body (1).
- 9 Put some silicon grease to the two locking segments (22) and put them into the groove of the stem (3).
- 10 Replace the old gland cover (5) with the new as the gland cover is an important part of the blow-out protection. Put some suitable silicone grease on the gland cover (5) and put it onto the stem.
- 12 Tighten the two screws (23) alternately in several stages until the spring (8) is completely compressed. Now tighten the two screws (23) firmly.
- 13 Put back the indicating pin (11) and the keys (21).
- 14 We recommend that the valve is tested for leakage after it has been re-assembled. All testing should follow applicable standards and be carried out under safe procedures. See section 8.6.

Figure 4 – Stem packing



### 8.3 Replacing the stem packing, blow-out protection and stem bushings

If there is a need to replace the stem bushings (22), or if the old stem packing (10) is difficult to remove, please follow this section. If the stem seal is leaking, the stem packing must be replaced. Even if the stem seal does not leak, we always recommend replacing the stem packing every time the valve is taken out of service. Replacing the stem packing will reduce unnecessary extra work and downtime caused by a stem leakage in the future. We always recommend the use of a stem sealing kit, spare part kit A according to Section 6, which also includes stem bushings and parts for the primary blow-out protection (items 5,22).

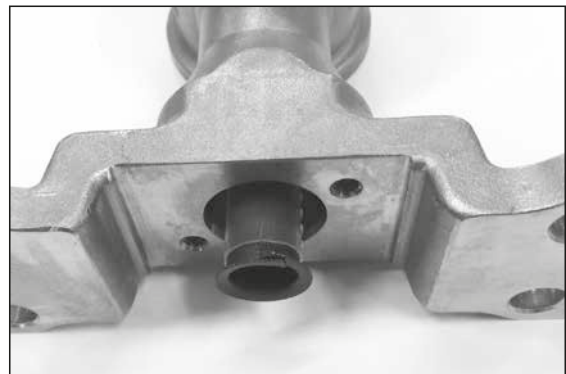
**⚠ Due to safety reasons, parts for the primary blow-out protection (items 5, 22) for the stem should always be replaced each time the stem seal is replaced.**

**⚠ Make sure that the valve is not under pressure.**

- 1 Remove any actuator.
- 2 Remove the 2 keys (21), the indicating pin (11), the 2 screws (23) and the gland cover (5). See Figure 4.
- 3 Untighten and remove the screws (24).
- 4 Push the ball sector (2) against the seat ring (7) and remove the lower stem (4) together with all connected parts (20, 13, 16, 6).
- 5 Through the bottom stem hole in the body (1), a suitable screwdriver now can be inserted in order to remove the screw (18) and washer (19) at the end of the upper stem.
- 6 The upper stem (3) can now be pushed out of the body (1) together with the stem packing (10), the upper washer (9), the spring (8) and the lower washer (9).
- 7 The upper and lower bushing (12) can now be removed from the valve body (1).

- 8 Insert the new bushings (12) into the body (1). This can be facilitated by using a thin walled tube to acc. to Figure 5. The bushing (12) should be slightly rolled up and placed into the tube. The bushing is then drawn with the tube into place.

Figure 5 – Inserting bushing

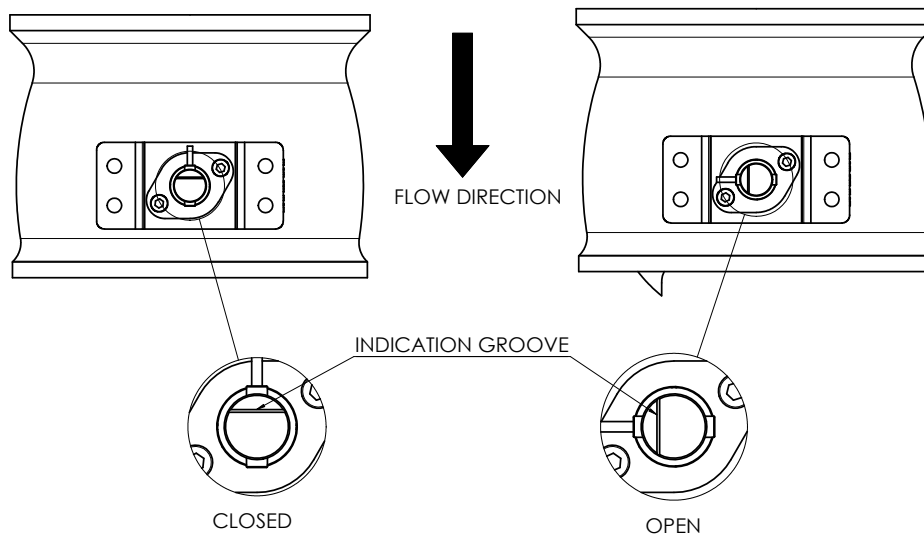


**Note:** If the seat ring (7) and seat seal (15) need to be replaced, it is convenient to do this at this point. Follow applicable steps under Section 8.4.

**Note:** Before inserting the stem into the valve body (1), it is important that the position of the stem is correct. It is necessary that the indication groove on the stem outside end is perpendicular to the flow direction when the valve is in its closed position. See Figure 6. If this is not the case, the upper stem (3) needs to be repositioned by turning it one or more splines until the indication groove is in its correct position

- 9 Clean and check the upper stem (3) for any sharp edges of the key ways or any other sharp edges. If necessary, gently grind off such sharp edges to make sure the stem packing (10) isn't damaged.
- 10 Put some suitable silicone grease onto the inside surface of the stem packing (10). Put the upper stem (3) into the stem packing (10) with the splined side of the stem entering first. Add the

Figure 6 – Indication groove



- lower washer (9), spring (8) and upper washer (9) onto the stem assembly from the other side of the stem (3).
- 11 Clean the stem seal area of the body (1). Put some suitable silicon grease into the stem seal area.
- 12 Push the ball sector (2) towards the seat ring (7) and push the entire stem assembly gently into the valve body through the bushing (22) when the hole in the ball sector (2) lines up with the stem (3).
- 13 Through the bottom stem hole, the screwdriver can now be inserted and the new washer (19) and screw (18) can be attached to the end of the upper stem (3). Please note that on small sizes, the washer is an integrated part of the screw and not a separate part.
- Note:** The washer and screw (19, 18) mentioned in step 13 above, will act as a secondary blow-out protection. It is therefore very important that these parts always are attached to the stem.
- 14 Insert the pin (20) into the small groove in the lower part of the ball sector (3).
- 15 Push the ball sector (2) towards the seat ring (7) and insert the lower stem (4) into the valve body (1) and ball sector (2). Make sure the pin (20) is in place, connecting the lower stem (4) to the ball sector (2).
- 16 Install the bearing washer (13), the new gasket (16), the bottom cover (6) and the screws (24).
- 17 Tighten the four screws (24) crosswise until they are firmly tightened.
- 18 Put some silicon grease to the two locking segments (22) and put them into the groove of the upper stem (3).

- 19 Replace the old gland cover (5) with the new as the gland cover is an important part of the blow-out protection. Put some suitable silicone grease on the gland cover (5) and put it onto the stem.
- 20 Tighten the two screws (23) alternately in several stages until the spring (8) is completely compressed. Now tighten the two screws (23) firmly.
- 21 Put back the indicating pin (11) and the keys (21).
- 22 We recommend that the valve is tested for leakage after it has been re-assembled. All testing should follow applicable standards and be carried out under safe procedures. See section 8.5.

## 8.4 Replacing the seat ring and the seat seal

After long time in service, it can eventually be necessary to replace the seat ring (7) and the seat seal (15) in order to maintain a good tightness of the valve. The parts needed to replace the seat are included in the spare part kit B (soft seats) or spare part kit C (metal seats) according to Section 6.



**Make sure that the valve is not under pressure.**

**Note:** For the smallest of the valve sizes, it may be necessary to remove the stems in order to remove the seat ring. Please follow the applicable steps in Section 8.3.




- 1 Remove any actuator.
- 2 Remove the indicating pin (11) from the upper stem (3).
- 3 With the indicating pin (11) now removed, turn the valve stem approx. 110-120 degrees in the counterclockwise direction past the fully open position. The ball sector (2) is no longer in contact with the seat ring (7).



- 4 Gently push the seat ring (7) out of the seat area of the valve body (1). The seat ring (7) can now be lifted out of the valve in between the ball sector (2) and the valve body (1).
- 5 Remove the wave spring (14) and seat seal (15).
- 6 Clean the seat area of the valve body.
- 7 Put a thin layer of suitable silicon grease onto the new seat seal (15) and snap it into place. Make sure the closed end of the cross section of the seat seal (15) is facing the outlet of the valve.
- 8 Put in the new wave spring (14).
- 9 Put a thin layer of suitable silicon grease onto the outside of the new seat ring (7) and into the seat area. Move the new seat (7) ring pass the ball sector (2) into the seat area. Gently push it towards to wave spring (14) until it clearly comes in contact with the wave spring. Make sure it doesn't damage the seat seal while doing this.
- 10 Push the seat ring towards the wave spring (14) and turn the stem until the ball sector (2) enters onto the seat ring (7). Gently turn the stem until the valve is fully closed and the ball sector (2) is covering the seat ring (7).
- 11 Put back the indicating pin (11) into the upper stem (3).
- 12 We recommend that the valve is tested for leakage after it has been re-assembled. All testing should follow applicable standards and be carried out under safe procedures. See Section 8.5.

## 8.5 Testing the valve

We recommend that the valve is tested for leakage after it has been re-assembled. All testing should follow applicable standards and be carried out under safe procedures using equipment suitable for the applicable pressure class.

-  **Testing the valve body tightness should not be performed at a pressure higher than 1.5 x maximum allowed working pressure (see Technical Bulletin).**
-  **Unless test equipment is especially designed for testing with gas, testing the valve body tightness with gaseous media is not recommended due to safety issues.**
-  **Testing of the seat tightness should not be performed at a pressure higher than 1.1 x maximum allowed differential pressure (see Technical Bulletin).**

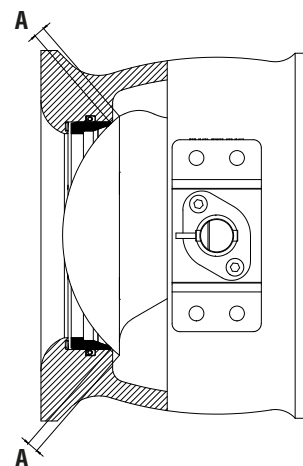
## 9 Fitting an Actuator to the Valve

- 1 Fit the actuator to the valve. Ensure that both the valve and the actuator are in the closed position before fitting the actuator. The valve is in the closed position when the keys (21) in the stem (3) face in the direction of flow. (An actuator which uses compressed air to close the valve and a return spring to open the valve should be fitted with the actuator and valve in the open position.)
- 2 Check the operation and check that the end stops have been correctly preset or adjust them so the ball sector is in the correct position.

**Note:** The direction of closure must always be clockwise, as viewed from the actuator.

**Note:** The rotary movement of the ball sector should be restricted to 90°, which is the movement needed between fully open and fully closed position. If the sector is turned beyond this range, the sealing surfaces of the sector and seat ring may be damaged. When an attempt is made to turn the ball sector back to the correct position the ball sector may jam against the seat ring. In practice, this is prevented by the indicating pin (11). It will come in contact with the screws (23) retaining the gland cover (5) if an attempt is made to turn the ball sector outside the range between fully open and fully closed position. When adjusting the actuator, make sure that the sphere of the ball sector is centered against the seat ring. See Figure 7.

Figure 7 - Ball sector in the closed position.



- 3 Follow installation procedure according to Section 4.

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**NAF AB**

SE-581 87 Linköping

**Sweden**

Telephone: +46 13 31 61 00

Facsimile: +46 13 13 60 54

e-mail: [salesnaf@flowserve.com](mailto:salesnaf@flowserve.com)

Website: [www.flowserve.com](http://www.flowserve.com)

[www.naf.se](http://www.naf.se)

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