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ATT: GJERDE AERO Series 1 and MUD 1 Vent Valve Users

TECHNICAL BULLETIN

Maintenance of Vent Valves Manufactured By
John Gjerde

Gjerde Models AERO 1.1, 1.2,1.3,1.4,1.5 1.6
& MUD 1

Bulletin No. 1 2017

Broken Floats, Evaluation & Reommendations

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Bulletin No1 2017.

Broken floats, evaluation and recommendations

From time to time we receive reports about broken float in the AERO valves. The very same floater we are also using in our MUD1 check valve.

In this bulletin we want to explain why this happen and what can be done to solve and to avoid this serious problem. Some vessels experience broken floats in the air vent check valves even after short time.

Reliable valves are key for the safety.

The main task of the air vent check valve is to let the tank breathe and prevent stresses to the ship structure. The main purpose is to let air from outside compensate for the vacuum and increased pressure due to filling and emptying tanks, or pressure changes simply caused by the shape of the inside structure in different filling- and sea conditions. All tanks need to be equipped with an Air Vent Check valve.

The secondary task of an “Air Vent Check valve” is to protect the tank from sea water flowing in during rough sea conditions or in a critical listing situation. The valve shall automatically close when water reach the valve, and open again when water level is lower than the valve opening.

These valves are one of the most critical safety functions at any Vessel. That is why Marine Insight pinpointed these valves as no 8 of the “16 Things that Can Detain Your Ship During Port State Surveys” (Marin Insight, APRIL 10, 2012 BY KARANC). Ref out videos at <http://www.gjerde.com/>

Correct sizing is key for safe operation.

Correct sizing of Air vent heads is essential for robust, safe and reliable operation of such valves. A correct designed valve has an air outflow capacity with a sufficient margin to avoid the float to be lifted and thereby block the flow. Thereby only sea water from rough sea conditions or heavily listing will activate the float and safely close the valve.

The two most possible reasons for broken floats are:

1. **Suction blocking.** In cases were the airflow exceeds the capacity of the valve there is two possible consequences:
 - a. The float is sucked into the seat and close - Suction Blocking. This generates high pressure that might lead to damages or total breakage of the tank. The design criteria are that the float should break before the tank structure break. Strength of the float is regulated by IACS P3
 - b. **Valve Oscillations.** The ship movements in might cause oscillations in a fluid tank that again cause relative strong air flow oscillation through the air vent pipe. In such cases where the selected air vent head valve has too low air suction flow capacity the oscillating airflow will lift the float and lead to suction blocking. The oscillating airflow in tank and pipe system will shortly after release the float from blocking. Characteristics of such oscillations are an annoying hammering sound on the pipe with different frequencies dependent of liquid level in the tank and ship movement. Such hammering might lead to fatigue breakage of the float.
2. **Tear and wear.** In a normal operation the tank is breathing and the float is not moving at all. Consequently, if tear and wear occur it is most likely caused by:
 - a. Undersized valve and rapidly “suction blocking”.
 - b. Serious vibration from the structure

- c. External mechanical stress or damage
- d. Very rough sea conditions with huge water on deck over numerous long timespans.

The AERO float strength and shape.

The AERO is designed and tested according to requirements from IACS P3 for the float (resist 5 punch of 25 newton in -25 degree). This means that the float will break before the tank structure collapsing. Hence, broken float is a normal consequence of suction blocking. The float is designed for an airflow capacity sufficient to avoid unwanted suction blocking.

Recommended Action

Problem	Caused by	To be done
Suction blocking	The air speed is definitely beyond the valve capacity. The tank generate abnormal air streams due to structural design	Increase valve size (HIDE) Install more valves Install High Flow Cup *) Configure center ventilation *)
Visible Tear & wear or Broken float	Suction Blocking	As above Replace float
	Serious vibrations. (Note: The guiding pin is protection the closing functions against tear & wear).	Frequent maintenance Decrease vibration if possible
	External mechanical stress or damage	Replace the parts
	Rough sea conditions, long timespan	Frequent maintenance Replace parts

*) John Gjerde will advise.

HIDE is design has following improvements

The development of the new HIDE product range is based on the last regulations and many years of experience with AERO. We have done our very best to optimize the size, weight and the airflow. The unique and high reliable float with guiding pin and lip gasket principles are improved and used also in HIDE.

All verifications and tests show an over capacity compared to the P3 regulations. video at <http://www.gjerde.com/>



- **Superior capacity**
- **High reliability**
- **Quick and safe closure.**
- **Small footprint**
- **Light weighted**

See



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Aero 1

Maintenance manual

2010

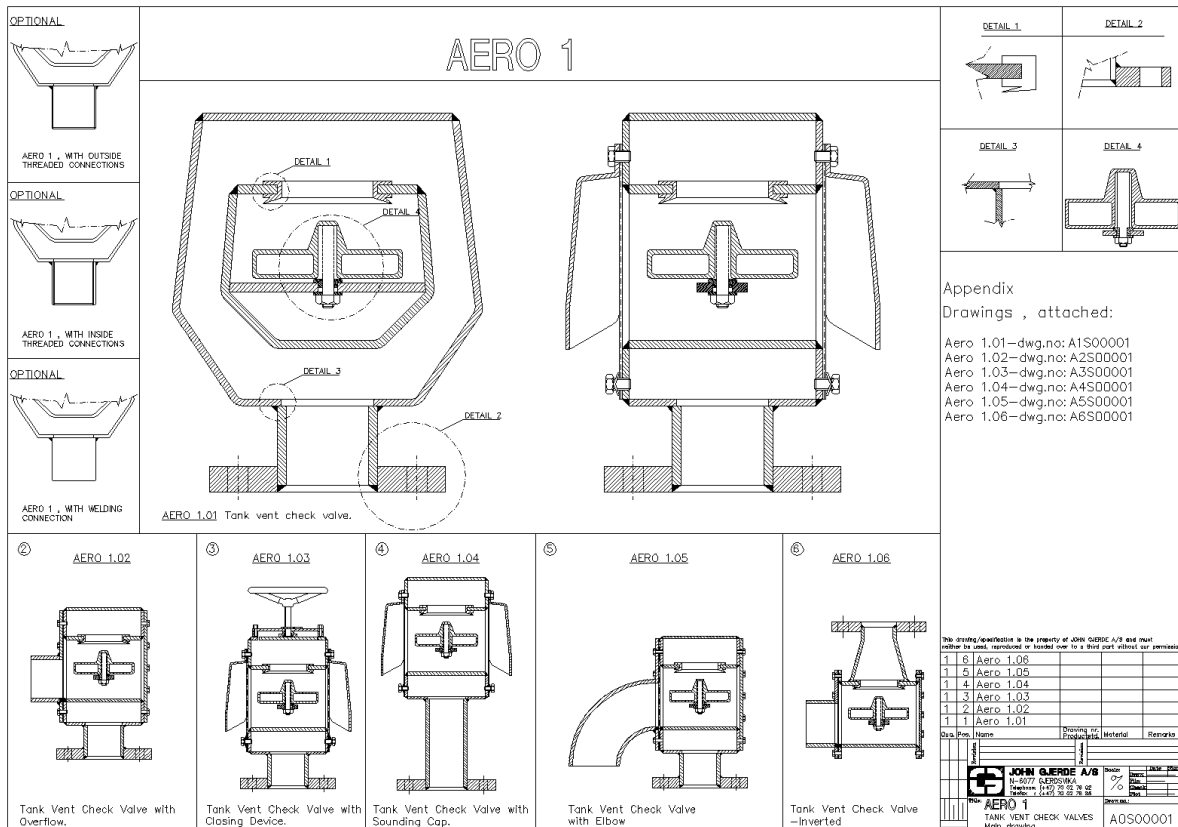


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Aero 1 - Maintenance

The Aero 1 is an air vent check valve series, for ventilating tanks containing fresh water, ballast, fuel, lub oil etc. It is constructed in, hot dip galvanized or epoxy coated JR235 carbon steel, Aluminum or stainless steel material.



The automatic mechanism in all Aero valves is a flat float, covered by ABS plastic, working with a soft EPDM lip-packing. With reference to the enclosed drawing, one can see that under normal operating conditions the float is resting on the float support. The vent opening is open, allowing free flow of air into and out of the tank. If the valve is submerged in water, the float will, through its buoyancy, ascent up to the float gasket, thereby closing the valve and preventing water from flowing into the tank. The valve is also equipped with side covers, preventing direct access, to the vent opening, for 'flying' water. The valve can be equipped with an insect screen/ rat screen or a flame arresting screen which will prevent the penetration of sparks and other contaminants, to the tank.

Before any valve is shipped from the factory it is checked to see that it operates properly. However, due to the demanding environment that these valves operate in it is also necessary to perform regular inspection and maintenance of these valves. We recommend that an inspection is performed every six months on these valves.

Mounting flame screen / insect screen / rat screen

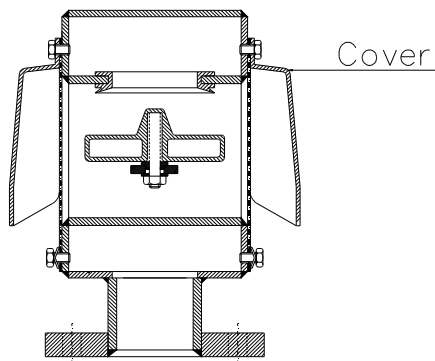


fig 1

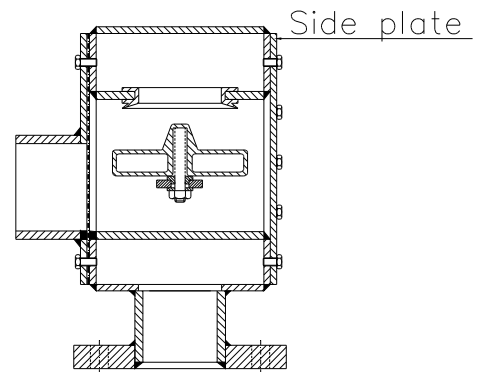


fig 2



Photo 1

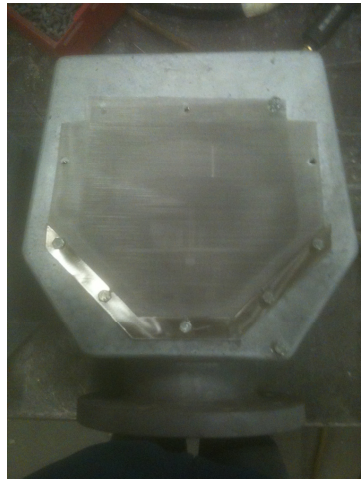


photo 2



photo 3

Mounting instruction:

- First remove the side covers/side plates by disassembling the bolts (fig 1 and 2)
- Put the flame/insect/rat screen over the vent opening (photo 1)
- Mount the flamescreen-strip on the lower part of the vent opening (photo 2)
- Put the cover back on it's place and tighten the bolts (photo 3)
- Do the same at the other side of the vent check valve.

Maintenance:

Check the flame/insect/rat screen's each 3 months on damage and replace if necessary.



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High Flow Cups

High Flow Cups for tank vent check valves.



The High Flow Cup for the Aero 1 series tank vent check valves is a result of us continuously testing our valves to improve the flowcapacity. When the return flow (air into the tank) is high, due to severe conditions, this could cause the float to be sucked up and thereby close the ventline.

By mounting a High Flow Cup under the float the return flowcapacity is nearly doubled. The effect of this is safer and more noiseless operation. It will also protect the tank for structural damage due to the devices shutting of This device is mostly mounted on the tank vent check valves for stabilization tanks on board of Supply Vessels.

For more information contact:

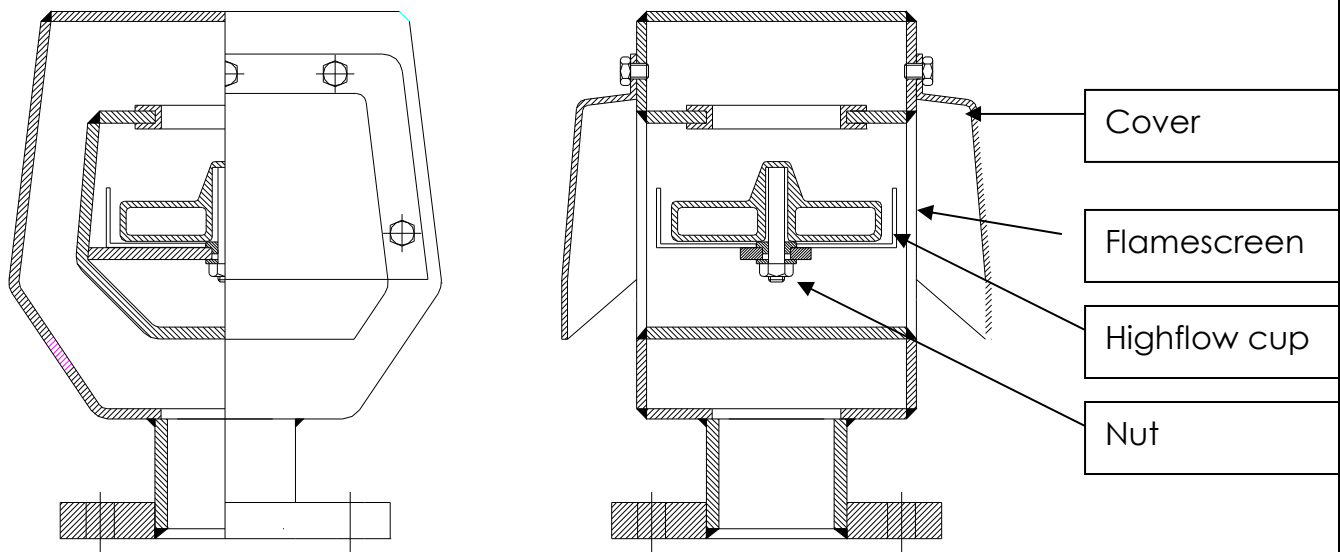
John Gjerde AS, Byggjebakken, N-6083 Gjerdsвика, Norway

Telephone: +47 7002 6500, Fax: +47 7002 6501

e-mail: office@gjerde.com, website: www.gjerde.com



5.3 Mounting High Flow cup in Tank Vent



Maintenance / mounting instruction:

- Remove the cover by disassembling the bolts.
- Remove the flame screen if mounted.
- Loosen nut and remove the guiding-pin and float.
- Now place the "high flow cup" in position on the guiding-pin (over the thread side). Replace the float over the guiding-pin. **Do this outside the valve.**
- Careful place the mounted assembly in position and tighten the nut.
- Install flame screen (if necessary) and cover back in position.



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Maintenance schedule:

1. Monthly, visual inspection of flame screen. If this is clogged up by dirt it will need to be cleaned.
2. Float and gasket recommended changed every five year.
3. Yearly, complete inspection of valve, according to following instructions.

Vital inspection points, for yearly inspection.

1. Float
2. Float gasket
3. Guiding pin
4. Flame screen
5. General execution

Maintenance instructions:

1. Remove the side covers, access is gained to the flame screens, if fitted. They have to be checked to ensure that they are clean and free of damage.
2. Remove flame screen, access is now gained to the internals of the valve.
3. Ensure that the float is moving freely up and down the guiding pin, and is unharmed.
4. Ensure that the guiding pin has not deteriorated.
5. Inspect the float gasket, ensure that the float gasket is soft and smooth. If it is damaged it should be removed and renewed. To fix the new float gasket, please observe that the metal to which it is going to be fixed should be clean and free of oil and other lubricants. The adhesive is applied continuously around the gasket groove, and the gasket is then firmly pressed into place, leave for 12-20 hours to fix.
6. A visual inspection is performed on the body of the valve. Using a sharpened tool, one should check for corrosive deterioration.

If damaged parts are found, make a note of the dimension of the valve and the part that is damaged.

- Spare names/nr:
1. Float
 2. Float gasket
 3. Flame screen /Flame screen holders
 4. Guiding pin
 5. Side covers

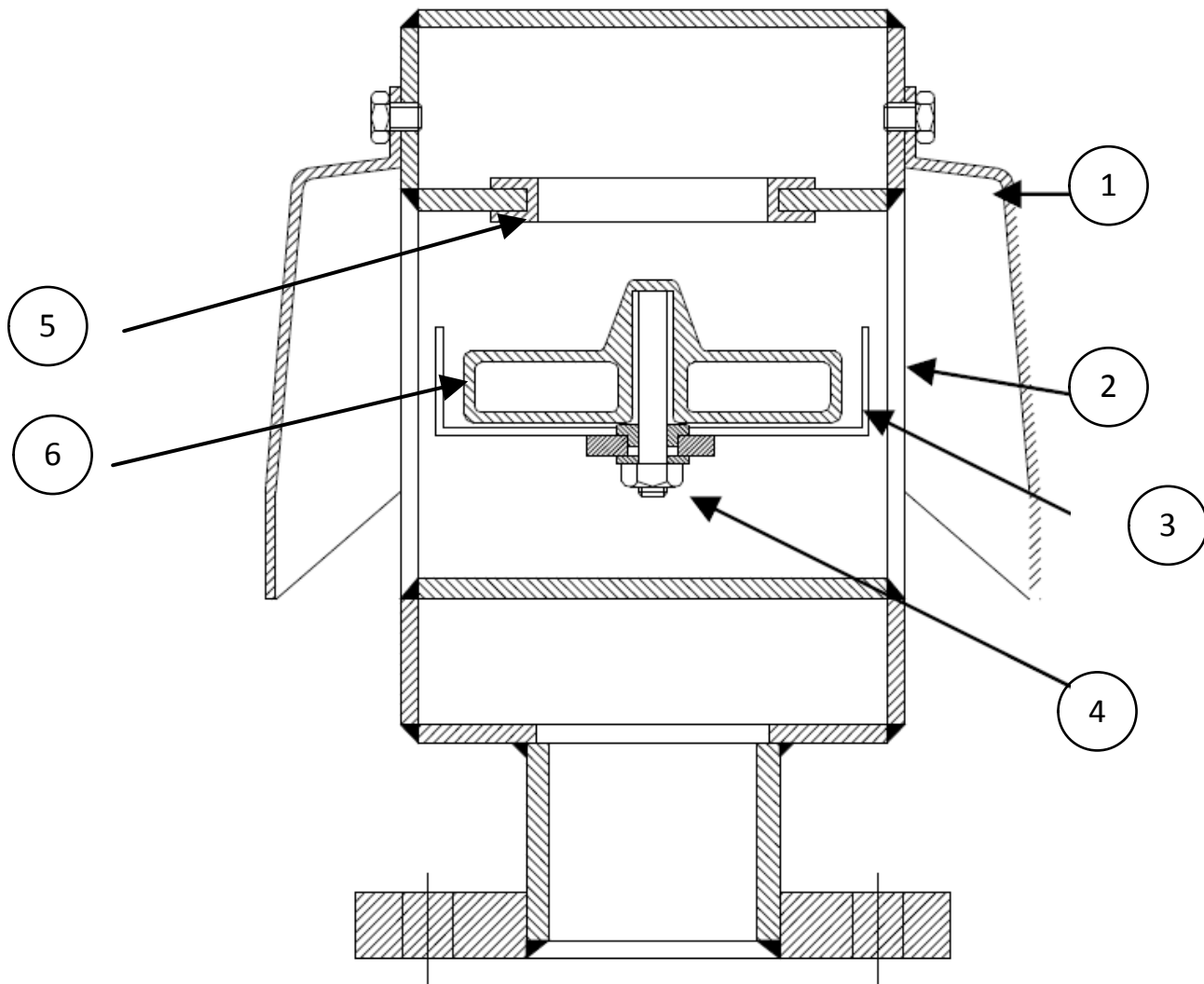
Spare requirements:

Classification societies have no specific demands for spare parts for vent check valves. We do however recommend a full set of spares according to the following key:

No of valves	Set of spares
1-5	1
6-10	2
11-15	3

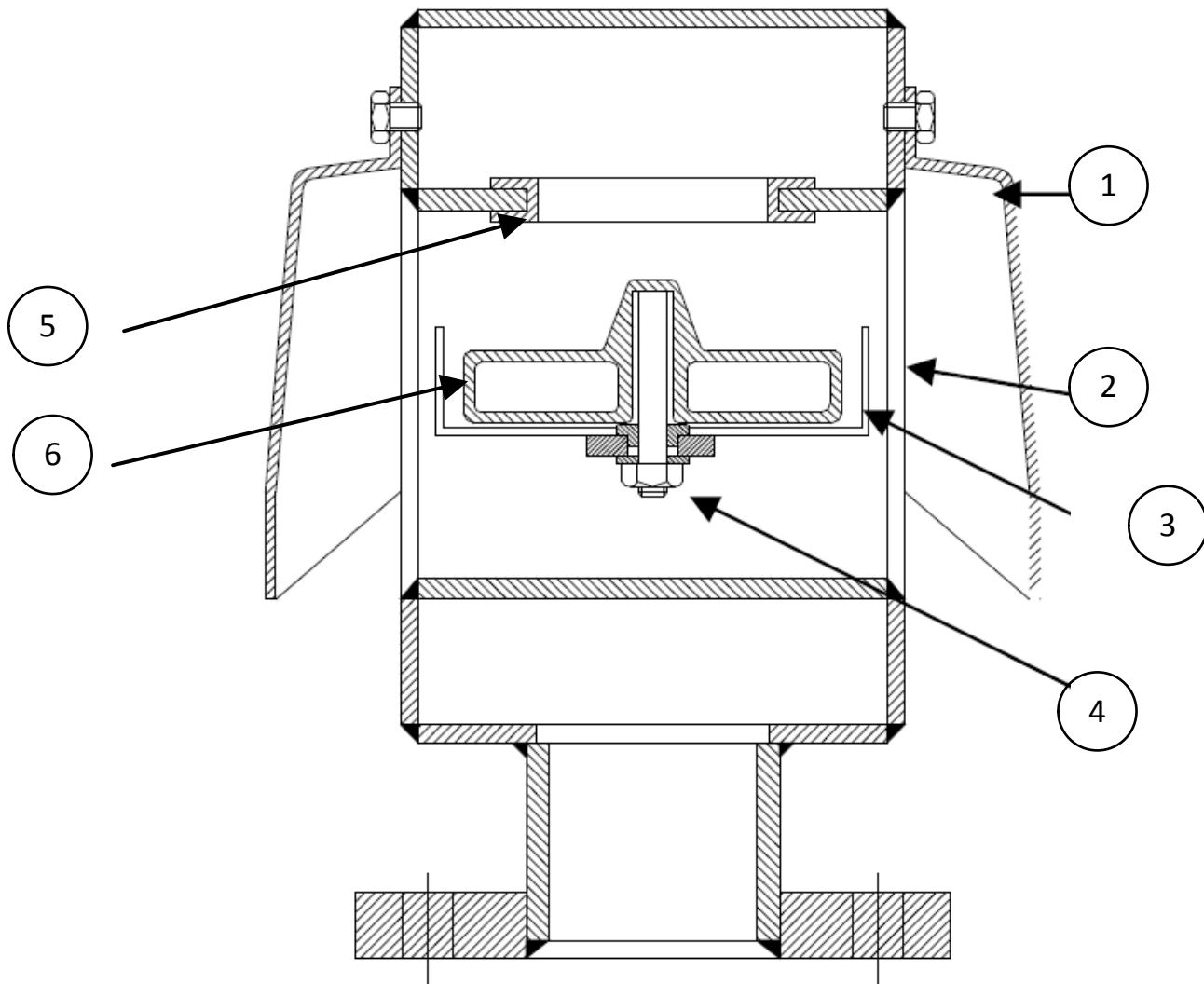
We have spare parts in stock, to process an order we need the dimension and type of valve, and the spare name. (See attached order form)

GJERDE AERO 1.1 REPLACEMENT PARTS LIST 2" NPS



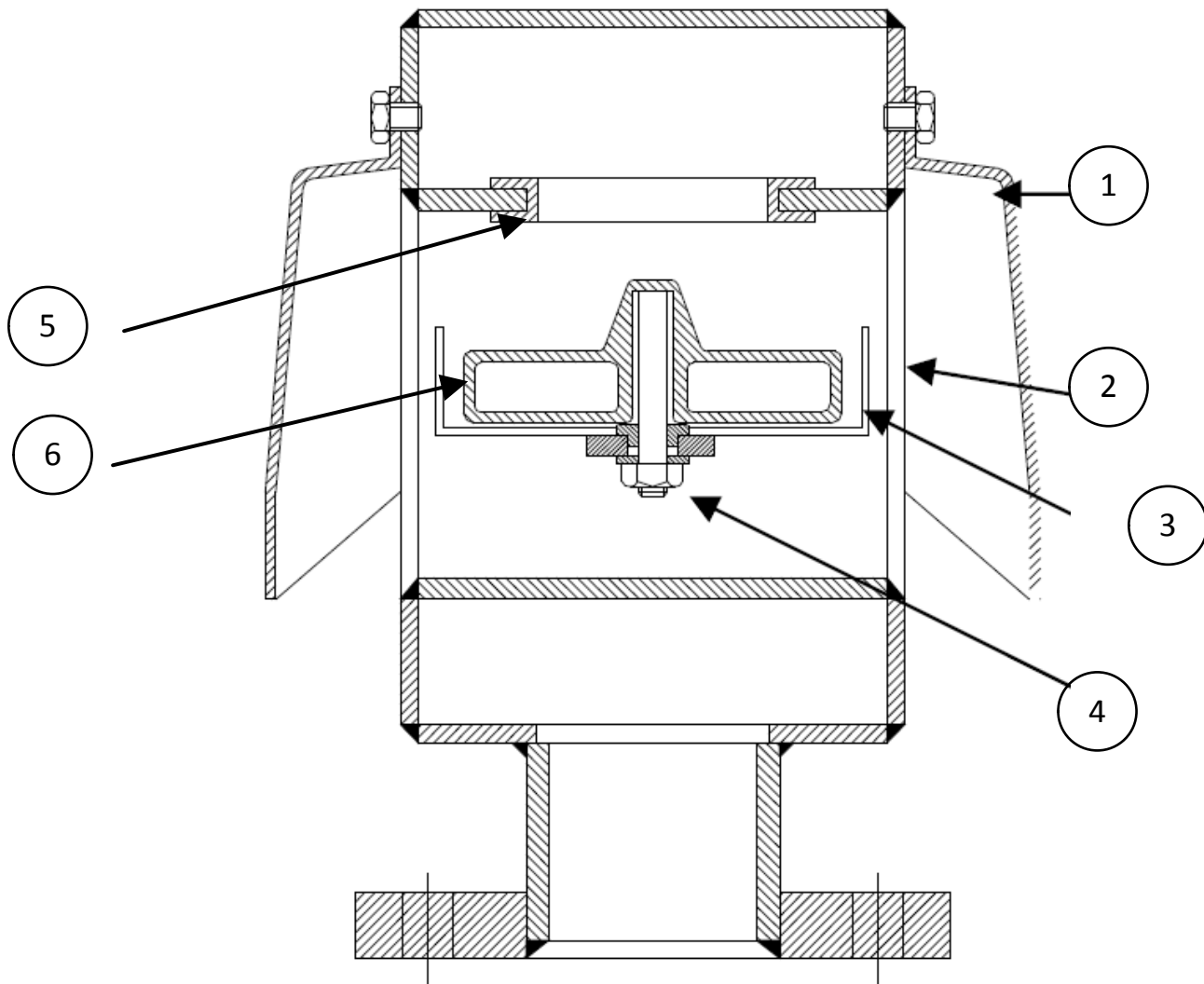
2" AERO 1.1 PARTS LIST				
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.10392	10392	2"	Aero Cover Galvanized ND 40/50/65
1A	520.10392SS	10392SS	2"	Aero Cover 316SS ND 40/50/65
2	520.11845.40	11845-40	2"	Flame screen set ND50/65 mesh 40
2A	520.11845.18	11845-18	2"	Insect screen set ND50/65 mesh 18
3	520.12482	12482	2"	Aero High flow cup ND 50/65
4	520.10846	10846	2"	Guiding pin DN 50/65 with nut
5	520.10702	10702	2"	Aero Gasket DN40/50/65 EPDM rubber
6	520.10579	10579	2"	Aero - Float DN40/50/65 ABS Plastic

GJERDE AERO 1.1 REPLACEMENT PARTS LIST 2-1/2" NPS



2-1/2" AERO 1.1 PARTS LIST				
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.10392	10392	2-1/2"	Aero Cover Galvanized ND 40/50/65
1A	520.10392SS	10392SS	2-1/2"	Aero Cover 316SS ND 40/50/65
2	520.11845.40	11845-40	2-1/2"	Flame screen set ND50/65 mesh 40
2A	520.11845.18	11845-18	2-1/2"	Insect screen set ND50/65 mesh 18
3	520.12482	12482	2-1/2"	Aero High flow cup ND 50/65
4	520.10846	10846	2-1/2"	Guiding pin DN 50/65 with nut
5	520.10702	10702	2-1/2"	Aero Gasket DN40/50/65 EPDM rubber
6	520.10579	10579	2-1/2"	Aero - Float DN40/50/65 ABS Plastic

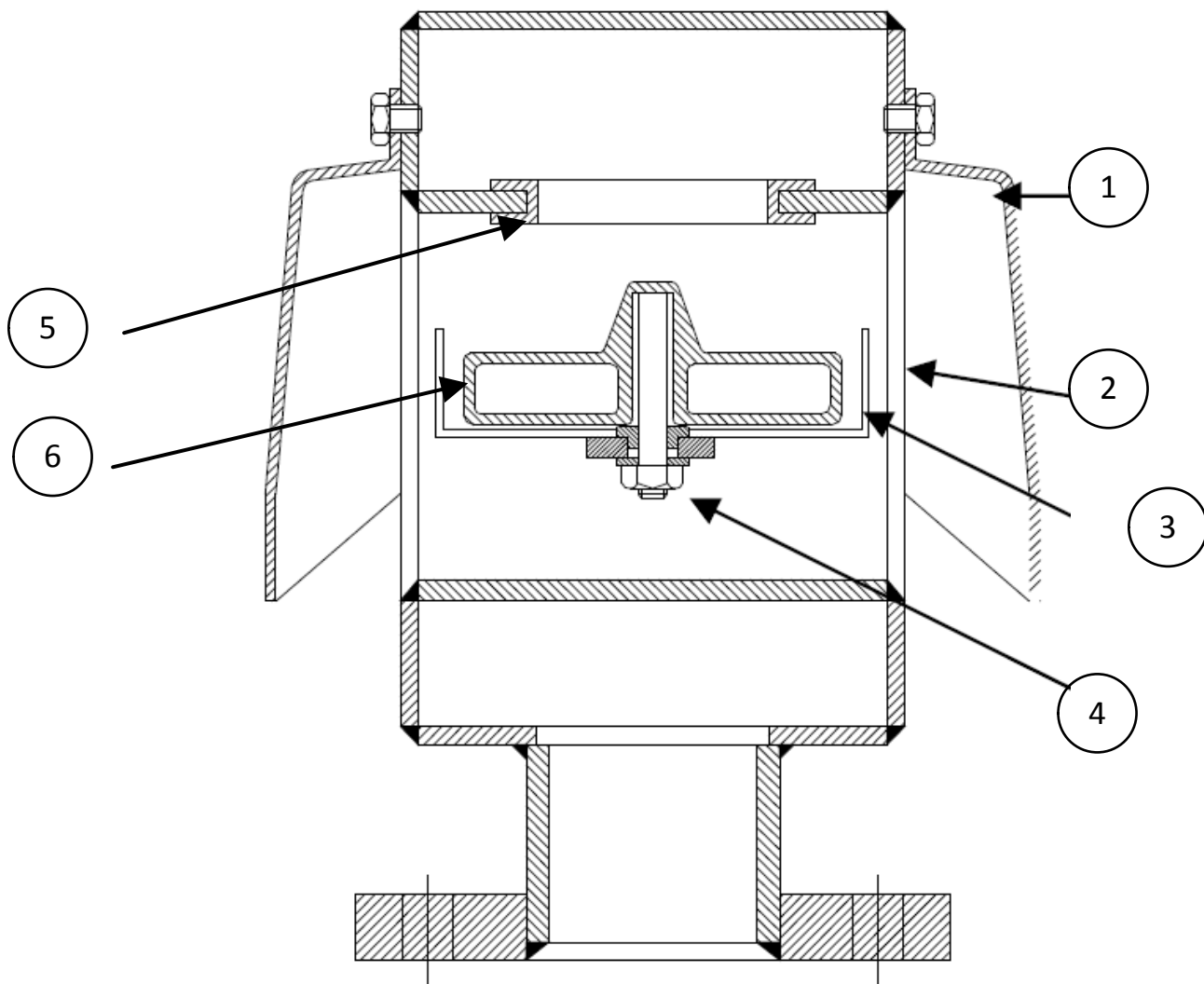
GJERDE AERO 1.1 REPLACEMENT PARTS LIST 3" NPS



3" AERO 1.1 PARTS LIST

ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.10393	10393	3"	Aero Cover St37 2019 ND 80/100
1A	520.10393SS	10393SS	3"	Aero Cover 316SS ND 80/100
2	520.11846.40	11846	3"	Flame screen set ND80/100 mesh 40
2A	520.11846.18	11846	3"	Insect screen set ND80/100 mesh 18
3	520.12261	12261	3"	Aero High flow cup, DN 80/100(OPTIONAL)
4	520.11279	11279	3"	Guiding pin DN 80/100 with nut
5	520.10587	10587	3"	Aero Gasket DN80/100 EPDM rubber
6	520.10580	10580	3"	Aero - Float DN80/100 ABS Plastic

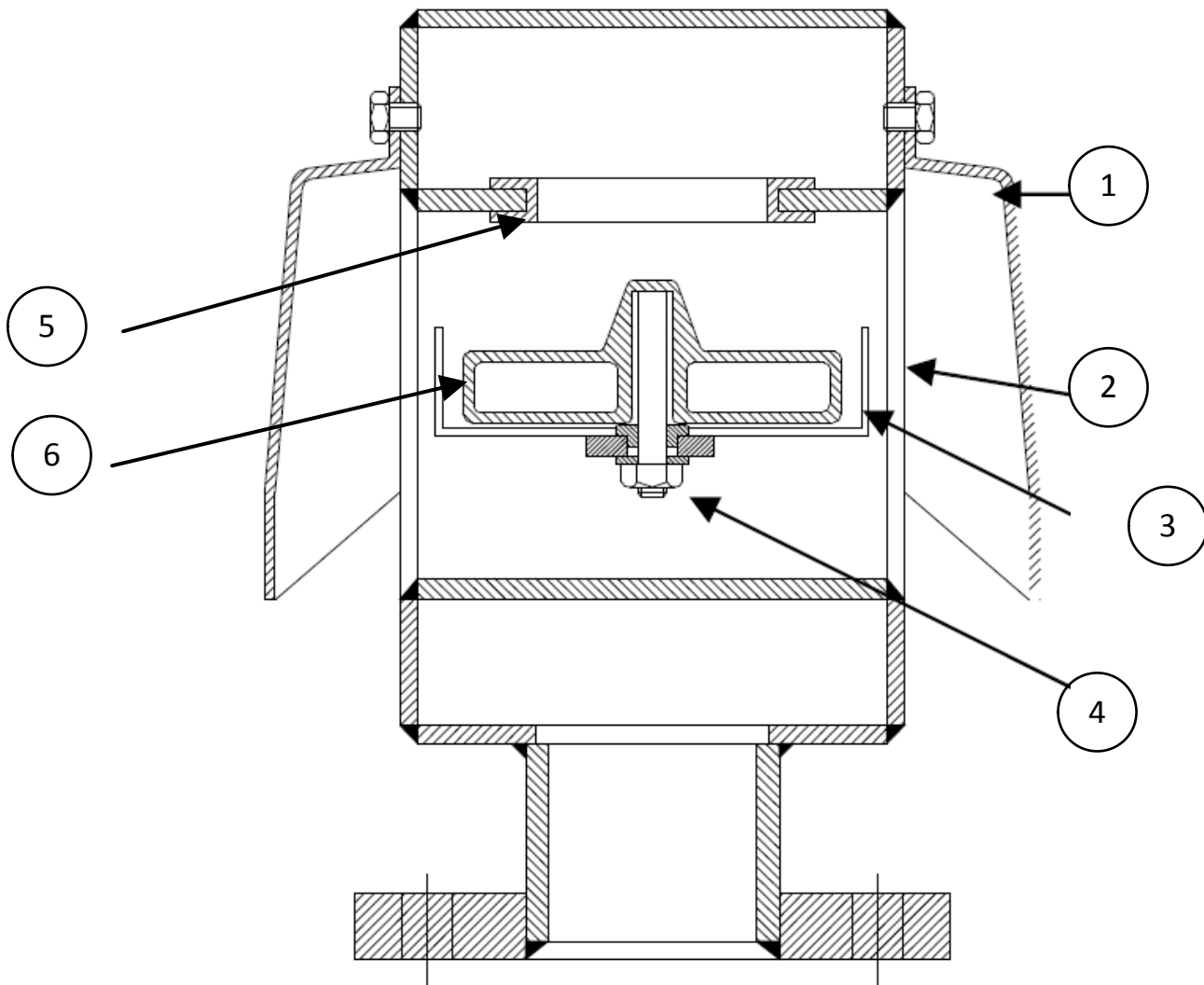
GJERDE AERO 1.1 REPLACEMENT PARTS LIST 4" NPS



4" AERO 1.1 PARTS LIST

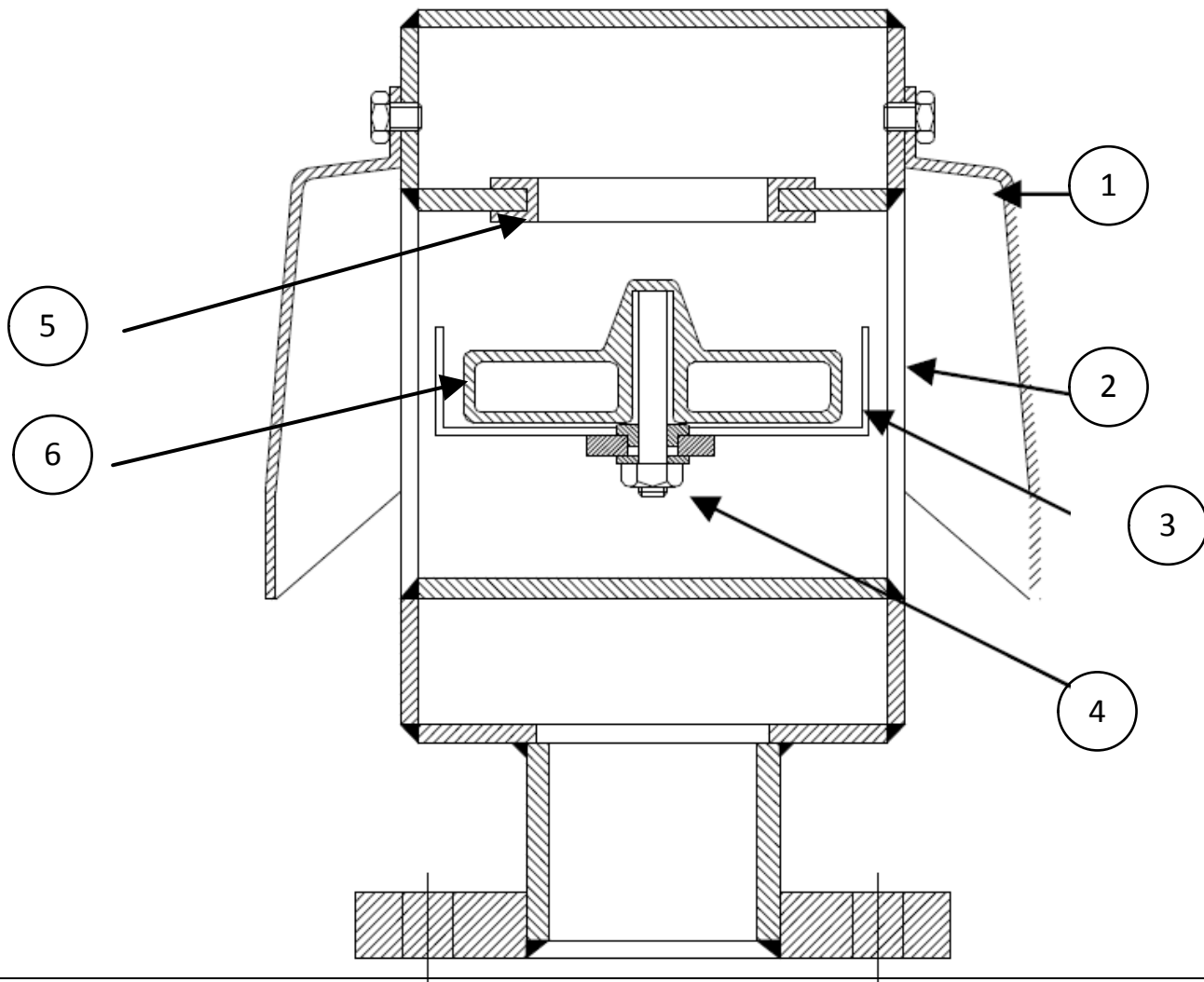
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.10393	10393	4"	Aero Cover St37 2019 ND 80/100
1A	520.10393SS	10393SS	4"	Aero Cover 316SS ND 80/100
2	520.11846.40	11846	4"	Flame screen set ND80/100 mesh 40
2A	520.11846.18	11846	4"	Insect screen set ND80/100 mesh 18
3	520.12261	12261	4"	Aero High flow cup, DN 80/100(OPTIONAL)
4	520.11279	11279	4"	Guiding pin DN 80/100 with nut
5	520.10587	10587	4"	Aero Gasket DN80/100 EPDM rubber
6	520.10580	10580	4"	Aero - Float DN80/100 ABS Plastic

GJERDE AERO 1.1 REPLACEMENT PARTS LIST 5" NPS



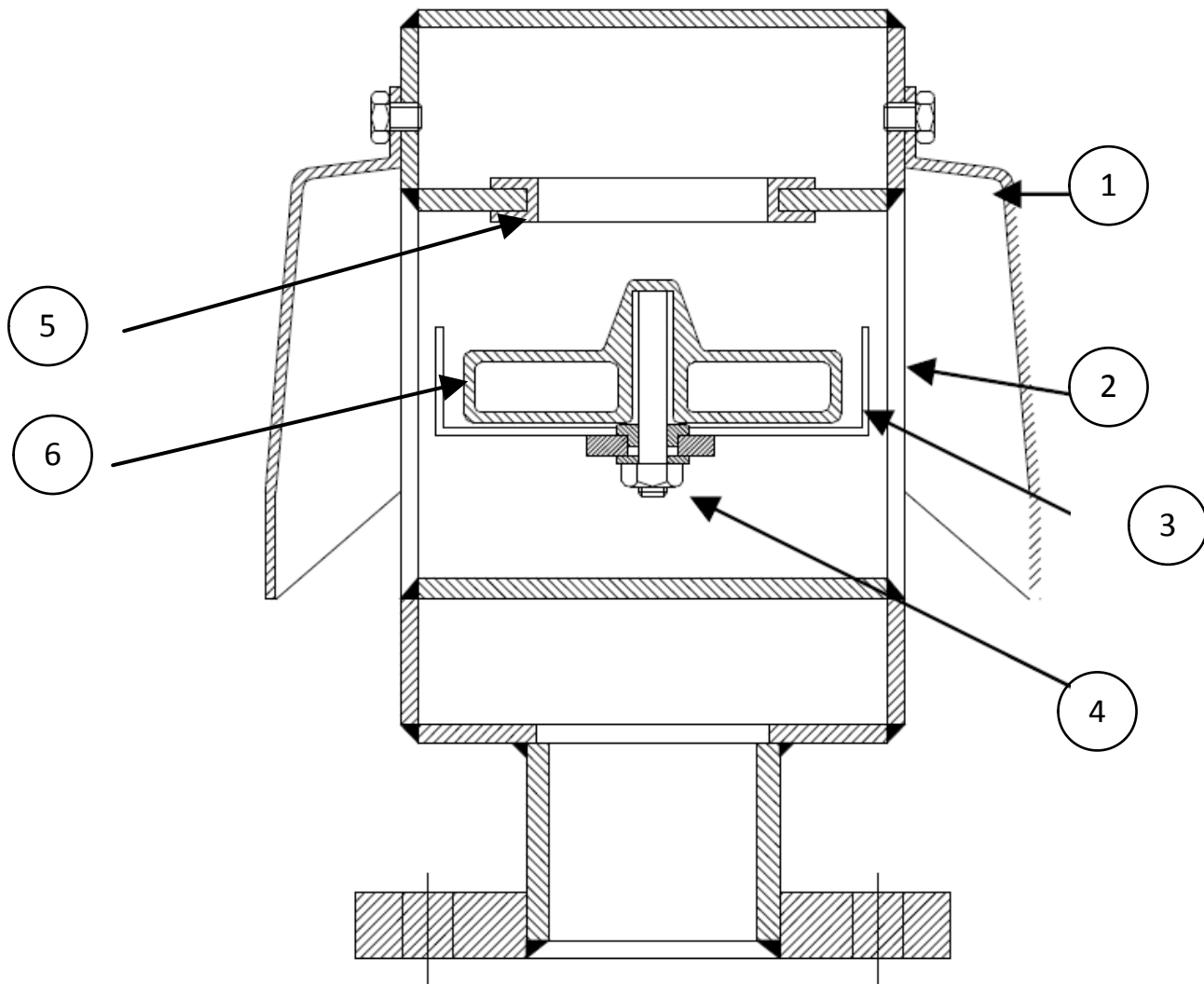
5" AERO 1.1 PARTS LIST				
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.10394	10394	5"	Aero Cover St37 3017 ND 125 Galvanized
1A	520.10394SS	10394	5"	Aero Cover 316SS ND 125
2	520.11847.40	11847	5"	Flame screen set ND125 mesh 40
2A	520.11847.18	11847	5"	Insect screen set ND125 mesh 18
3	520.12484	12484	5"	Aero High flow cup, DN125
4	520.10847	10847	5"	Guiding pin DN 125 with nut
5	520.10588	10588	5"	Aero Gasket DN125 EPDM rubber
6	520.10581	10581	5"	Aero - Float DN125 ABS Plastic

GJERDE AERO 1.1 REPLACEMENT PARTS LIST 6" NPS



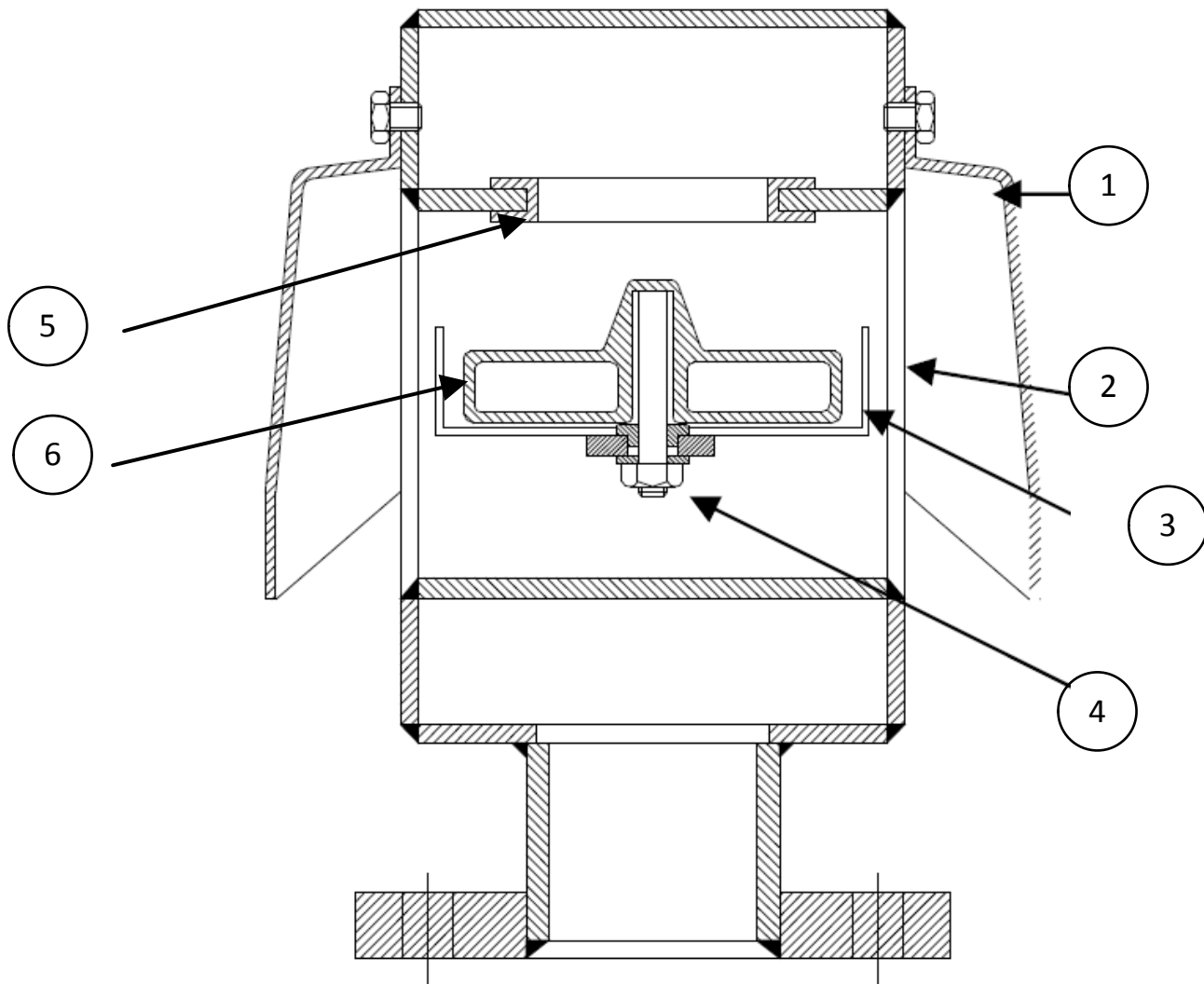
6" AERO 1.1 PARTS LIST				
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.10395	10395	6"	Aero Cover St37 4017 ND 150 Galvanized
1A	520.10395SS	10395	6"	Aero Cover 316SS ND 150 SS
2	520.11848.40	11848	6"	Flame screen set ND150 mesh 40
2A	520.11848.18	11848	6"	Insect screen set ND150 mesh 18
3	520.11645	11645	6"	Aero High flow cup ND 150
4	520.10848	10848	6"	Guiding pin DN 150 with nut
5	520.10589	10589	6"	Aero Gasket DN150 EPDM rubber
6	520.10582	10582	6"	Aero - Float DN150 ABS Plastic

GJERDE AERO 1.1 REPLACEMENT PARTS LIST 8" NPS



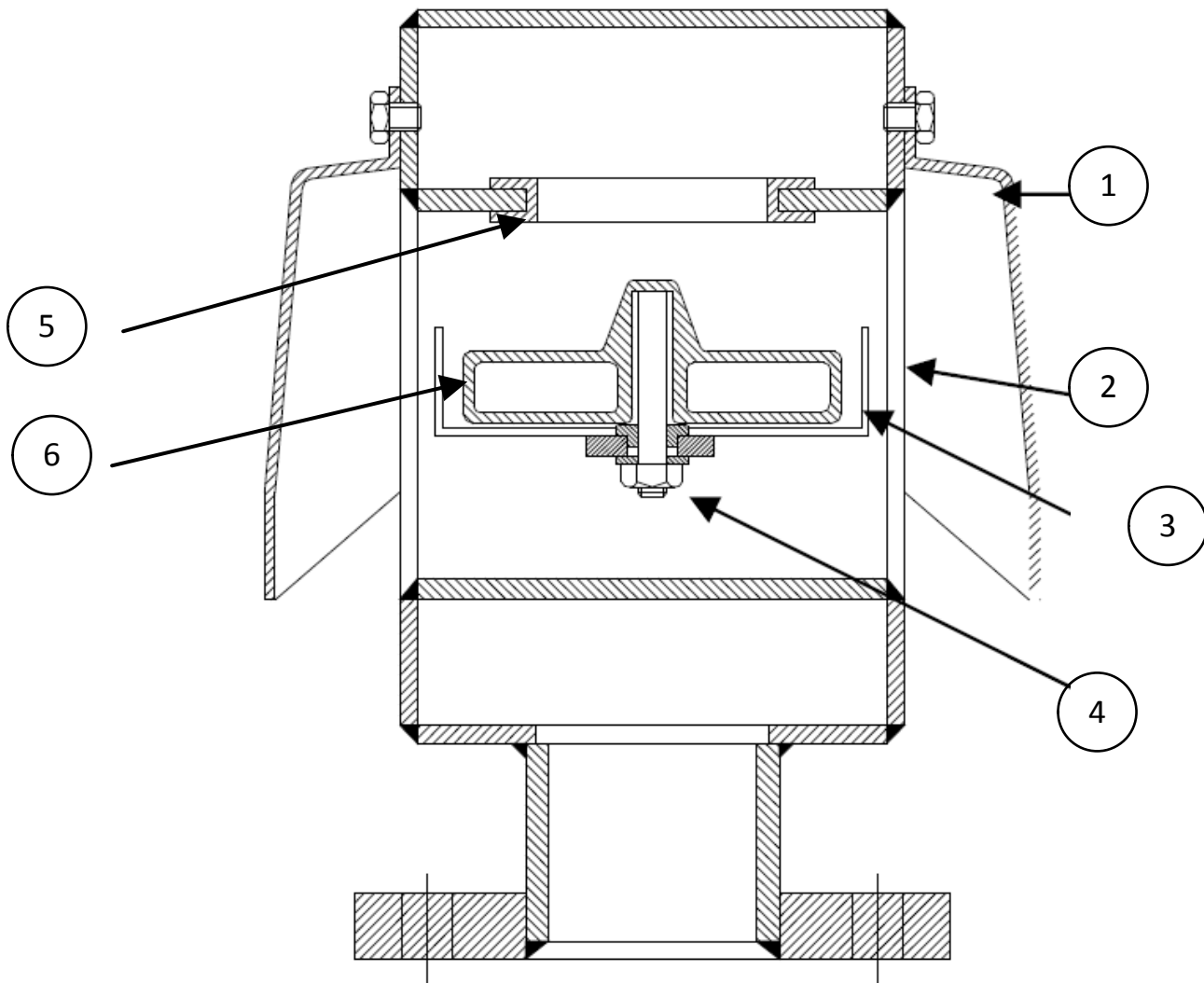
8" AERO 1.1 PARTS LIST				
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.10397	10397	8"	Aero Cover St37 6017 ND 200 Galvanized
1A	520.10397SS	10397	8"	Aero Cover 316SS ND 200
2	520.11850.40	11850	8"	Flame screen set ND200 mesh 40
2A	520.11850.18	11850	8"	Insect screen set ND200 mesh 18
3	520.11608	11608	8"	Aero High flow cup ND 200
4	520.10849	10849	8"	Guiding pin DN 200 with nut
5	520.10591	10591	8"	Aero Gasket DN200 EPDM rubber
6	520.10583	10583	8"	Aero - Float DN200 ABS Plastic

GJERDE AERO 1.1 REPLACEMENT PARTS LIST 10" NPS



10" AERO 1.1 PARTS LIST				
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.10398	10398	10"	Aero Cover St37 ND 250 Galvanized
1A	520.10398SS	10398	10"	Aero Cover 316SS ND 250
2	520.11851.40	11851	10"	Flame screen set ND250 mesh 40
2A	520.11851.18	11851	10"	Insect screen set ND250 mesh 18
3	520.11838	11838	10"	Aero High flow cup ND 250
4	520.10850	10850	10"	Guiding pin DN 250 with nut
5	520.10592	10592	10"	Aero Gasket DN250 EPDM rubber
6	520.10584	10584	10"	Aero - Float DN250 ABS Plastic

GJERDE AERO 1.1 REPLACEMENT PARTS LIST 12" NPS

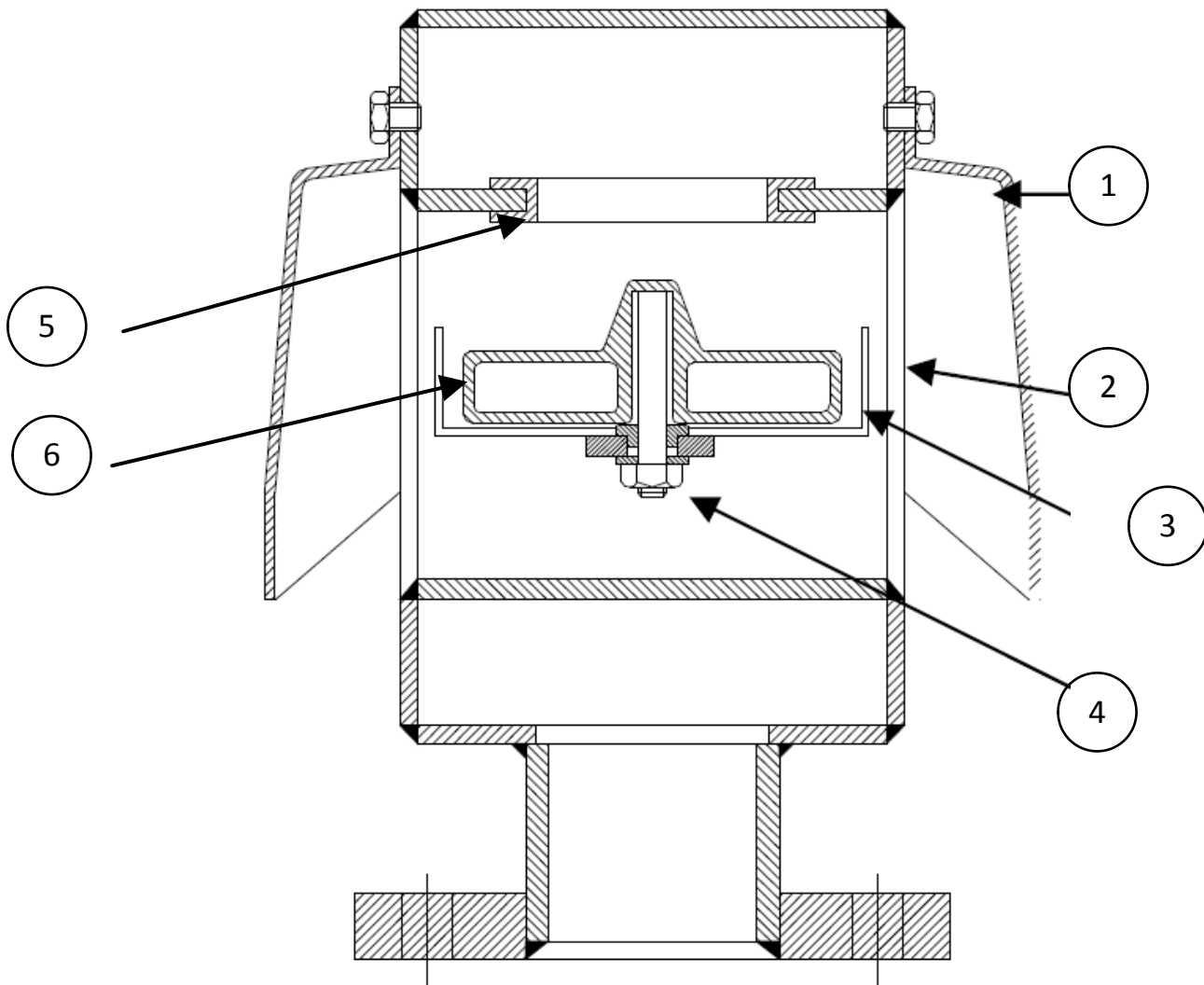


12" AERO 1.1 PARTS LIST				
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.10399	10399	12"	Aero Cover St37 ND 300 Galvanized
1A	520.10399SS	10399	12"	Aero Cover 316SS ND 300
2	520.11852.40	11852	12"	Flame screen set ND300 mesh 40
2A	520.11852.18	11852	12"	Insect screen set ND300 mesh 18
3	520.11839	11839	12"	Aero High flow cup ND 300
4	520.10851	10851	12"	Guiding pin DN 300 with nut
5	520.10593	10593	12"	Aero Gasket DN300 EPDM rubber
6	520.10585	10585	12"	Aero - Float DN300 ABS Plastic

GJERDE AERO 1.1

REPLACEMENT PARTS LIST

14" NPS

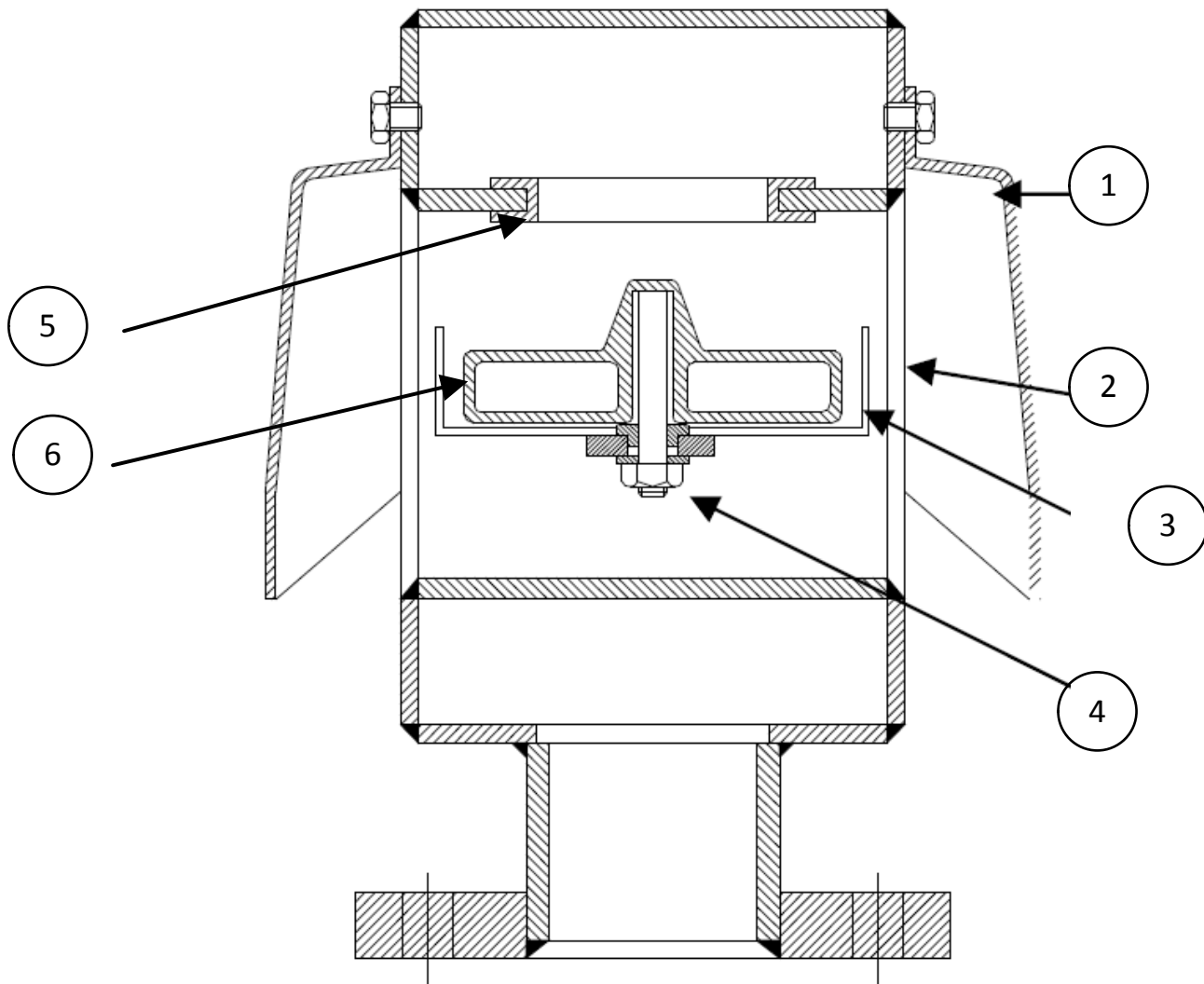


14" AERO 1.1 PARTS LIST				
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.1ND0400.DN350/400	1ND0400	14"	Aero Cover St37 ND 350/400 Galvanized
1A	520.1ND0400.DN350/400.316	1ND0400	14"	Aero Cover 316SS ND 350/400
2	520.11853.40	11853	14"	Flame screen sett ND350/400 mesh 40
2A	520.11853.40	11853	14"	Flame screen sett ND350/400 mesh 40
3	520.11840	11840	14"	Aero High flow cup ND 350
4	520.10852.DN350	10852	14"	Guiding pin DN 350 with nut
5	520.10594.DN350	10594	14"	Aero Gasket DN350EPDM rubber
6	520.10586	10586	14"	Aero - Float DN350 ABS Plastic

GJERDE AERO 1.1

REPLACEMENT PARTS LIST

16" NPS



16" AERO 1.1 PARTS LIST				
ITEM #	W&O Part #	Gjerde Part #	Size	Item Description
1	520.1ND0400.DN350/400	1ND0400	16"	Aero Cover St37 ND 350/400 Galvanized
1A	520.1ND0400.DN350/400.316	1ND0400	16"	Aero Cover 316SS ND 350/400
2	520.11853.40	11853	16"	Flame screen sett ND350/400 mesh 40
2A	520.11853.40	11853	16"	Flame screen sett ND350/400 mesh 40
3	520.11576	11576	16"	Aero High flow cup ND 400
4	520.10852.DN400	10852	16"	Guiding pin DN 400 with nut
5	520.10594.DN400	10594	16"	Aero Gasket DN400 EPDM rubber
6	520.12053	12053	16"	Aero - Float DN400 ABS Plastic