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(54) **A method of preparing a system for maintenance.**

(57) A method of preparing a system for a maintenance operation, said system comprising
- a first subsystem containing a super-atmospheric gas, and
- a second subsystem connected with said first subsystem via an intermediate subsystem comprising valve seats with a vent opening in between. The intermediate subsystem is for example a ball valve. To avoid gas escaping from the system, suction is applied to the vent opening to discharge the gas.

# A method of preparing a system for maintenance

The present invention relates to a method of preparing a system for a maintenance operation, said system comprising

- a first subsystem containing a super-atmospheric gas, and
- a second subsystem,

said first subsystem and said second subsystem being connected via an intermediate subsystem capable of allowing gas to flow between the first subsystem and the second subsystem, said intermediate subsystem comprising

- a first sealing valve seat,
- a second valve seat between the first sealing valve seat and the second subsystem, and
- a vent opening between the first sealing valve seat and the second valve seat;

said method comprising the discharge of gas present between the first sealing valve seat and the second valve seat via the vent opening before performing a maintenance step of the maintenance operation downstream of said second valve seat with respect to the first sealing valve seat.

Systems comprising super-atmospheric gas are well known in the art. They are for example systems comprising natural gas, syngas, or carbon dioxide, where the gas is treated, or increased or reduced in pressure. Such a gas may thus be flammable, toxic or otherwise constitute a hazzard. Often it is paramount that a plant comprising such a system remains operational despite the maintenance, or that the downtime for maintenance is kept to a minimum. The presence of gas escaped from the system at the location where maintenance is to be performed may however pose a risk for people performing the maintenance. Depending on the job at hand, these may be expensive specialists and the number of them can be considerable. If ambient gas measurements at the location where maintenance is to be performed show that the leaked gas levels are above what is acceptable according to safety procedures or allowable, the resulting delay can be very costly. To prevent gas in the intermediate system from passing to the (ambient) atmosphere at the location where the maintenance operation is to be performed, it is known to block gas from passing from the first subsystem into the intermediate subsystem using the first

sealing valve seat, and then bleed the gas from the intermediate subsystem via a vent opening into the outside atmosphere.

The object of the present invention is to provide a method with a reduced risk of delay and/or an increased level of safety and/or to improve the availability of a plant or a larger part thereof.

To this end, a method according to the preamble is characterized in that suction is applied to the vent opening for discharging the gas present between the first sealing valve seat and the second valve seat before performing said maintenance step.

Thus the risk is effectively reduced that gas present in the first subsystem can pass the second valve seat and reach the location where maintenance is to be performed. This may occur if the first sealing valve seat and the second valve seat don't properly seal.

In the present application, maintenance includes any work on a second subsystem, whether it is inspection, cleaning, repair, modification, or replacement of a part. A maintenance operation is a series of one or more maintenance steps, and the method according to the invention specifies that at least one of these is not performed before the discharge of gas using suction.

The first and second valve seats may, for example, be seats of plug valves, butterfly valves etc. Active discharge (suction) of gas is achieved using a vacuum-pump.

The first subsystem or the second subsystem may be a pressure vessel.

In the present application, the term gas also encompasses vapour. The term 'sealing valve seat' is a seat for blocking the flow of pressurized gas from a pressurized subsystem to a subsystem at a lower pressure, such as a depressurized subsystem.

Preferably, the gas is discharged using a bleed conduit that releases the gas from the intermediate subsystem into the outside atmosphere at a safe location away from the location where maintenance is to be performed.

According to a favourable embodiment, the system comprises a third subsystem containing a super-atmospheric gas, said third subsystem and said second subsystem being connected via a further intermediate subsystem capable of allowing gas to flow between the third subsystem and the second subsystem, said further intermediate subsystem comprising

- a third sealing valve seat,
- a fourth valve seat between the third sealing valve seat and the third subsystem, and
- a second vent opening between the third sealing valve seat and the fourth valve seat;

said method comprising the discharge of gas present between the third sealing valve seat and the fourth valve seat via the second vent opening before performing a maintenance step of the maintenance operation between the second valve seat and the fourth valve seat by applying suction to both the first vent opening and the second vent opening.

Thus the third subsystem can be isolated from the first and second subsystem and subjected to maintenance without having to depressurize either of the first and second subsystems.

According to a favourable embodiment, the intermediate subsystem, the third subsystem and the further intermediate subsystem define a branche connecting the first subsystem with the second subsystem, the system further comprising a second branch connecting the first subsystem and the second subsystem.

Such a system allows for maintenance of the third subsystem of one branch while the other branch remains operational, albeit the system operates possibly at a lower capacity.

According to a favourable embodiment, the system comprises a pressure gauge for measuring the pressure of an intermediate subsystem of the system.

This gives an indication of the safety of the place where maintenance is to be carried out. The pressure gauge can also be used to control the vacuum pump used to provide suction. Also, the pressure gauge can be used in combination with a PLC to detect a sudden leak rate (exceeding of a preset pressure gradient limit) or a leak rate beyond the capacity of the suction system (exceeding of a preset pressure limit) and can be used to generate an alarm at the location where the maintenance is performed and/or in the Control Room without delay in case of a developping potential dangerous situation.

According to a favourable embodiment, the system comprises a pressure gauge for measuring the pressure upstream of a vacuum pump providing said suction, the flow resistance $R_{vv-pg}$ between i) the location of the gas between the first sealing valve seat and the

second valve seat and ii) the location of the pressure gauge being lower than the flow resistance $R_{pg-vp}$ between i) the location of the pressure gauge and ii) the vacuum pump.

Thus the risk can be reduced that in case of strong leakage by the first sealing valve seat, the pressure measured by the pressure gauge represents the pressure between the first sealing valve seat and the second valve seat, with a sub-atmospheric reading indicating that no gas will pass from the first subsystem past the second valve seat. The relatively high flow resistance between the pressure gauge and the vacuum pump can be achieved using a constriction. For practical purposes, the constriction will be balanced by the desire to effectively extract gas to be discharged by the vacuum pump.

According to a favourable embodiment, the gas extracted by suction is diluted to below the its Lower Explosion Limit.

For example, natural gas will be diluted to below 5% by volume of natural gas in air. Thus it cannot explode.

According to a favourable embodiment, dilution is done with an inert gas.

The inert gas is for example carbon dioxide. According to an interesting embodiment, the inert gas is flue gas obtained by combustion, e.g. by combusting a hydrocarbon such as methane, propane, butane, or a liquid fuel such as diesel or gasoline. Thus it is possible to reduce the oxygen content of air before dilution. This saves significantly in the amount of gas used for dilution. Advantageously, the inert gas is nitrogen or steam, both of which are often available at plants.

According to a favourable embodiment, the suction is applied using a venturi-based vacuum pump.

Thus the gas extracted from the intermediate system does not pass any mechanical moving parts that might cause ignition if the gas is flammable. The venturi-based pump is an ejector or a jet pump. In case the gas extracted is flammable, the venturi-based pump is preferably fed with an inert gas such as nitrogen or steam instead of air, reducing the risk of an explosive atmosphere in the means used for discharging the gas.

According to a favourable embodiment, the intermediate subsystem comprises a ball valve, said ball valve comprising the first sealing valve seat, the second valve seat and the vent opening.

Venting ball valves is an important area of application of the method according to the invention.

According to a favourable embodiment, the second valve seat is a second sealing valve seat.

In such a case, it is easier to achieve a sub-atmospheric pressure. Also, the second sealing valve seat acts as a safety measure should there be a failure in the system that provides for the sub-atmospheric pressure. A ball valve comprising both first and second sealing valve seats is commercially available as a ball valve with double-piston effect, a.k.a. as a double isolation and bleed valve.

According to a favourable embodiment, the suction is applied to achieve sub-atmospheric pressure in at least one intermediate system of the system.

By way of example, a sub-atmospheric pressure between the first sealing valve seat and the second valve seat prevents gas from flowing past it to the second subsystem. Any sub-atmospheric pressure is effective, however minute. For practical purposes, the sub-atmospheric pressure is at least 0.02 Bar below ambient atmospheric pressure, preferably at least 0.05 Bar and more preferably at least 0.08 Bar. A deeper sub-atmospheric pressure makes the method less susceptible to any changes in sub-atmospheric pressure applied or other disturbances.

According to a favourable embodiment, the sub-atmospheric pressure is maintained while the at least one maintenance step of the maintenance procedure is performed.

Thus the method is a method for performing maintenance. Preferably, the sub-atmospheric pressure is maintained during the full maintenance procedure, thus reducing the risk of gas leakage via an intermediate system to the depressurized subsystem during the full maintenance procedure.

According to a favourable embodiment, the pressure in the intermediate subsystem is monitored using a pressure gauge, and a vacuum pump used for applying suction is controlled by the pressure gauge.

This allows for a saving in energy and/or, if an inert gas such as nitrogen is used (e.g. as used as a motive gas), in a saving of inert gas. This control of the suction is for example achieved by controlling the flow of the motive gas for a venturi-based vacuum

pump.

According to a favourable embodiment, the bleed line comprises between the pressure gauge and the vacuum pump a non-return valve.

When a sufficiently low pressure in the intermediate subsystem is achieved, measured by the pressure gauge, the vacuum pump can be stopped upon which this non-return valve closes. In case the pressure in the intermediate subsystem then raises due to leakage of pressured gas and/or air into the intermediate subsystem, and exceeds a certain preset level, the vacuum pump can be started again, until the pressure is sufficiently low to stop the pump again, etcetera. If there is very little leakage of pressured gas and/or air into the intermediate system, limited uptime of the pump needs to be applied and a significant saving in energy and/or inert gas is achieved.

The present invention will now be illustrated with reference to the drawing where

Fig. 1 shows a schematic layout of a super-atmospheric pressure system;

Fig. 2 shows a cross-sectional view through an intermediate subsystem of the system of Fig. 1; and

Fig. 3 shows a schematic layout of an alternative super-atmospheric pressure system similar to Fig. 1.

Fig. 1 shows a schematic layout of a system 100 comprising a first subsystem 110 and a second subsystem 120. The system 100 comprises a first branch 101 connecting the first subsystem 110 to the second subsystem 120; and comprises a second branch 102, also connecting the first subsystem 110 with the second subsystem 120.

In the embodiment discussed here, natural gas in the first subsystem 110 with a pressure of 90 Bar is raised in pressure to 200 Bar using compressors 121, 121'. If compressor 121 of the first branch 101 needs maintenance, it needs to be isolated from any subsystem that remains pressurized and be brought to atmospheric pressure. To this there is an intermediate subsystem 170a between the first subsystem 110 and a third subsystem 130 comprising the compressor 121; and a further intermediate subsystem 170b between the third subsystem 130 and the second subsystem 120. The intermediate subsystem of the first branch comprises an upstream ball valve 123, and the further intermediate subsystem 170b comprises a downstream ball valve 122. To perform maintenance on the compressor 121, both of these ball valves

are closed. Conveniently, said ball valves are double piston effect ball valves.

The internal volume of the ball valves contain gas under high pressure. This gas is, as is known in the art, discharged via a bleed opening into the (outside) atmosphere.

If, for example, the upstream ball valve 123 is leaky, gas may stil leak from the first subsystem 110 towards the compressor 121, causing a dangerous situation to exist.

According to the present invention, a sub-atmospheric pressure is applied to the ball valves by connecting a bleed line 150 and a vacuum pump 160 to the bleed opening. This will be discussed in more detail with reference to Fig. 2.

To apply the sub-atmospheric pressure, the bleed line 150 is provided with an ejector vacuum pump 160, driven by an air pump 161. This air pump 161 preferably provides so much motive air that the gas in the bleed line 150 is diluted to below the Lower Explosion Limit, eliminating the danger of an explosion, and discharged via a section of the bleed line 150 downstream of the ejector vacuum pump 160 to a safe location.

By keeping the valves 122', 123' of the second branch 102 open, the second branch 102 can remain operational, whereas maintenance can be performed on the first branch 101.

Fig. 2 shows a cross-sectional view through an intermediate subsystem 170 of the system of Fig. 1, embodied in a ball valve. The ball valve is a standard double-piston-effect ball-valve comprising a first sealing valve seat 231 and a second sealing valve seat 241. The valve seats can slide in a corresponding seat pocket. In general, there will be O-rings (not shown) for sealing the valve seats against the seat pocket The first sealing valve seat 231 comprises a through-hole 232 and the second sealing valve seat 241 comprises a through-hole 242.

The ball valve further comprises a ball 233 having a through-hole 234. Springs 291 are present to push the valve seats against the ball 233. The ball 233 can be rotated using spindle 292 so as to open and close the ball valve. In Fig. 2 it is closed. If the ball 233 is rotated over 90°, the through-holes 232, 234 and 242 are aligned and the ball 233 allows gas to be transported through the ball valve.

To discharge gas present in the cavity 245 of the ball valve, a

vent opening 246 is provided, which is connected to bleed line 150.

A ball valve as disclosed above is known in the art.

According to the present invention, suction is applied. Thus, not only is gas actively discharged from the cavity 245, but more importantly leakage of gas via the first sealing valve seat 231 through the second valve seat 241 is reduced and – if sub-atmospheric pressure is achieved in the cavity of the ball valve – prevented. Thus, escape of gas from the first subsystem 110 downstream of the second valve seat 241 can be prevented, helping to create a safe working environment for performing a maintenance operation.

In the embodiment shown, there is a pressure gauge 270 for determining whether sub-atmospheric pressure has been achieved, indicating that no gas will escape from the ball valve. The pressure gauge 270 can be used to control the air pump 161, which can save energy and/or save inert gas such as nitrogen if that is used as motive gas. In the embodiment shown in Fig. 2, the bleed line 150 comprises between the pressure gauge 270 and the vacuum pump 160 a non-return valve 287. When a sufficiently low pressure in the intermediate subsystem is achieved, meassured by the pressure gauge, the vacuum pump can be stopped upon which this non-return valve closes. In case the pressure in the intermediate subsystem then raises due to leakage of pressured gas and/or air into the intermediate subsystem, and exceeds a certain preset level, the vacuum pump can be started again, until the pressure is sufficiently low to stop the pump again, etcetera. If there is very little leakage of pressured gas and/or air into the intermediate system, limited uptime of the pump needs to be applied and a significant saving in energy and/or inert gas is achieved.

The bleed line 150 contains a constriction 251. As a result, the flow resistance in an upstream section 252 of the bleed line 150 where the pressure gauge 270 is located is lower than the flow resistance in a downstream section 253 between the pressure gauge 270 and the ejector vacuum pump 160. Thus the reliability of the pressure gauge 270 being capable of indicating that a sub-atmospheric pressure is present in the cavity 245 is improved when the pump is in operation and the non-return valve 287 is open.

A drain opening 293 may be present between the first sealing valve seat 231 and the second valve seat 241. During normal operation

this drain opening 293 is closed using a plug. While not preferred because gas might escape via it, an open drain opening 293 is allowable if strong suction is applied by the vacuum pump (here ejector vacuum pump 160), in particular if the flow resistance via said drain opening 293 is larger than the flow resistance in the bleed line 150 from the cavity to the ejector vacuum pump 160. Thus, ambient air is sucked in, preventing gas from escaping from the cavity 245 through the drain opening 293.

The drain opening 293 may be advantageously provided with the pressure gauge 270, to ensure the reading on the pressure gauge corresponds with the pressure in the cavity and is not affected by any dynamic pressure losses in the bleed line 150.

Fig. 3 corresponds substantially to Fig. 1, with the difference that instead of (double piston effect) ball valves use is made of two pairs of single sealing seat valves 330. Each pair has a bleed line 336 provided between the two single sealing seat valves 330 of that pair.

By closing said single sealing seat valves 330, and opening valves 335 of the bleed lines 336, suction can be applied and gas present between the single sealing seat valves 330 of each pair discharged.

By keeping, for the second branch 102 which connects the pressurized first subsystem 110 with the pressurized subsystem 120, the valves 330 open and the valves 335 closed, the second branch 102 can remain operational, whereas maintenance can be performed on the first branch 101 safely.

The method according to the present invention can be varied in many ways within the scope of the appending claims. For example, if one of the pressurized subsystems 110, 120 is depressurized during maintenance, only one intermediate subsystem 170 is necessary. The bleed lines 150 may be present permanently in a system, or are connected to an intermediate system using a mobile vacuum system before maintenance and removed after maintenance. Each individual intermediate subsystem may have an individual suction system, independent of other intermediate subsystems, or they can be combined in any favourable combination, depending on the situation at hand.

C O N C L U S I E S

1. Werkwijze voor het voorbereiden van een systeem (100) op een onderhoudshandeling, waarbij het genoemde systeem (100) omvat

- een eerste subsysteem (110) dat een super-atmosferisch gas bevat, en
- een tweede subsysteem (120),

waarbij het genoemde eerste subsysteem (110) en het genoemde tweede subsysteem (120) zijn verbonden via een tussenliggend subsysteem (170a) via welk gas tussen het eerste subsysteem (110) en het tweede subsysteem (120) kan stromen, waarbij het genoemde tussenliggende subsysteem (170a) omvat

- een eerste afdichtende klepzitting (231),
- een tweede klepzitting (241) tussen de eerste afdichtende klepzitting (231) en het tweede subsysteem (120), en
- een uitlaatopening (246) tussen de eerste afdichtende klepzitting (231) en de tweede klepzitting (241);

waarbij de genoemde werkwijze de afvoer via de uitlaatopening (246) omvat van gas dat aanwezig is tussen de eerste afdichtende klepzitting (231) en de tweede klepzitting (241), voordat een onderhoudsstap van de onderhoudshandeling benedenstrooms van de genoemde tweede klepzitting (241) ten opzichte van de eerste afdichtende klepzitting (231) wordt uitgevoerd, **met het kenmerk**, dat zuiging op de uitlaatopening (246) wordt uitgeoefend voor het afvoeren van het gas dat aanwezig is tussen de eerste afdichtende klepzitting (231) en de tweede klepzitting (241) voordat de genoemde onderhoudsstap wordt uitgevoerd.

2. Werkwijze volgens conclusie 1, waarbij het systeem (100) een derde subsysteem (130) omvat dat een super-atmosferisch gas bevat, waarbij het genoemde derde subsysteem (130) en het genoemde tweede subsysteem (120) zijn verbonden via een verder tussenliggend subsysteem (170b) via welk gas kan stromen tussen het derde subsysteem (130) en het tweede subsysteem, waarbij het genoemde verdere tussenliggende subsysteem (170b) omvat

- een derde afdichtende klepzitting (231),
- een vierde klepzitting tussen de derde afdichtende klepzitting (231) en het derde subsysteem (130), en

- een tweede uitlaatopening (246) tussen de derde afdichtende klepzitting (231) en de vierde klepzitting (241);

waarbij de genoemde werkwijze het afvoeren via de tweede uitlaatopening (246) omvat van gas dat aanwezig is tussen de derde afdichtende klepzitting (231) en de vierde klepzitting (241) door het uitoefenen van zuiging op zowel de eerste uitlaatopening als de tweede uitlaatopening (246) voordat een onderhoudsstap van de onderhoudshandeling wordt uitgevoerd tussen de tweede klepzitting (241) en de vierde klepzitting (241).

3. Werkwijze volgens conclusie 2, waarbij het tussenliggende subsysteem (170a), het derde subsysteem (130) en het verdere tussenliggende subsysteem (170b) een tak (101) definiëren die het eerste subsysteem (110) met het tweede subsysteem (120) verbindt, waarbij het systeem (100) verder een tweede tak (102) omvat die het eerste subsysteem (110) en het tweede subsysteem (120) verbindt.

4. Werkwijze volgens een der voorgaande conclusies, waarbij het systeem (100) een drukmeter (270) omvat voor het meten van de druk van een tussenliggend subsysteem (170a, 170b) van het systeem (100).

5. Werkwijze volgens conclusie 4, waarbij het systeem (100) een drukmeter (270) omvat voor het meten van de druk bovenstrooms van een vacuümpomp (160) die de genoemde zuiging verschaft, waarbij de stromingsweerstand $R_{vv-pg}$ tussen i) de locatie van het gas tussen de eerste afdichtende klepzitting (231) en de tweede klepzitting (241) en ii) de locatie van de drukmeter (270) lager is dan de stromingsweerstand $R_{pg-vp}$ tussen i) de locatie van de drukmeter (270) en ii) de vacuümpomp (160).

6. Werkwijze volgens een der voorgaande conclusies, waarbij het door zuiging geëxtraheerde gas tot onder de onderste explosiegrens (Lower Explosion Limit) ervan wordt verdund.

7. Werkwijze volgens een der voorgaande conclusies, waarbij het verdunnen met een inert gas wordt gedaan.

8. Werkwijze volgens een der voorgaande conclusies, waarbij de zuiging

wordt uitgeoefend onder gebruikmaking van een op een venturi gebaseerde vacuümpomp (160).

9. Werkwijze volgens een der voorgaande conclusies, waarbij het tussenliggende subsysteem (170a) een kogelklep (123) omvat, waarbij de genoemde kogelklep (123) de eerste afdichtende klepzitting (231), de tweede klepzitting (241) en de uitlaatopening (246) omvat.

10. Werkwijze volgens een der voorgaande conclusies, waarbij de tweede klepzitting (241) een tweede afdichtende klepzitting (241) is.

11. Werkwijze volgens een der voorgaande conclusies, waarbij de zuiging wordt uitgeoefend om sub-atmosferische druk te bereiken in ten minste één tussenliggend systeem (170a, 170b) van het systeem (100).

12. Werkwijze volgens een der voorgaande conclusies, waarbij de sub-atmosferische druk wordt gehandhaafd terwijl de ten minste ene onderhoudsstap van de onderhoudsprocedure wordt uitgevoerd.

13. Werkwijze volgens een der voorgaande conclusies, waarbij de druk in het tussenliggende subsysteem (170a) wordt gevolgd onder gebruikmaking van een drukmeter (270), en een vacuümpomp (160) gebruikt voor het uitoefenen van zuiging wordt bestuurd door de drukmeter (270).

14. Werkwijze volgens conclusie 13, waarbij de afgasleiding (150) tussen de drukmeter (270) en de vacuümpomp (160) een terugslagklep (287) omvat.

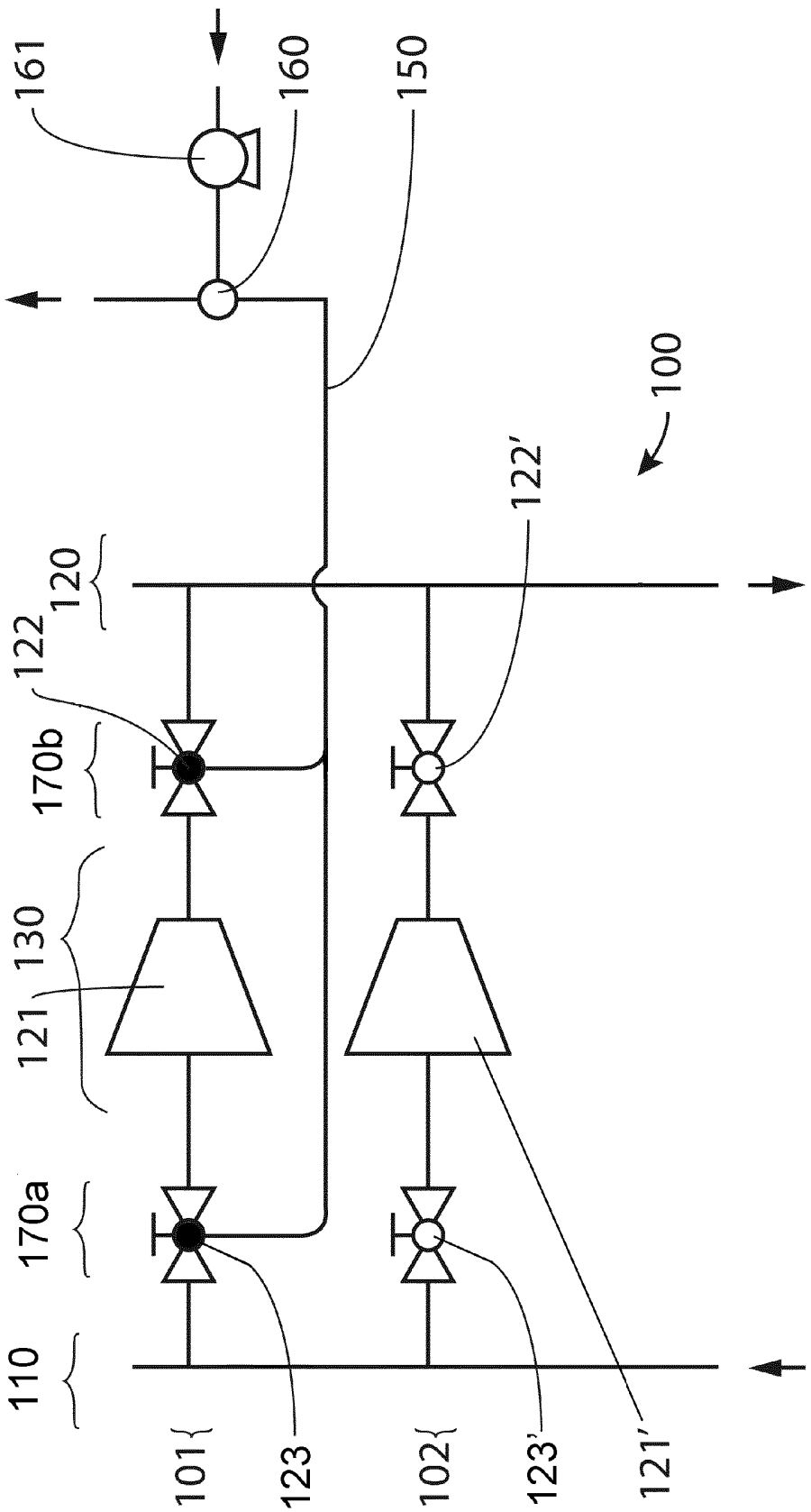
161
160
150
100
122'
120
122
170b
130
121
170a
110
101
123
102
123'
121'

Fig. 1

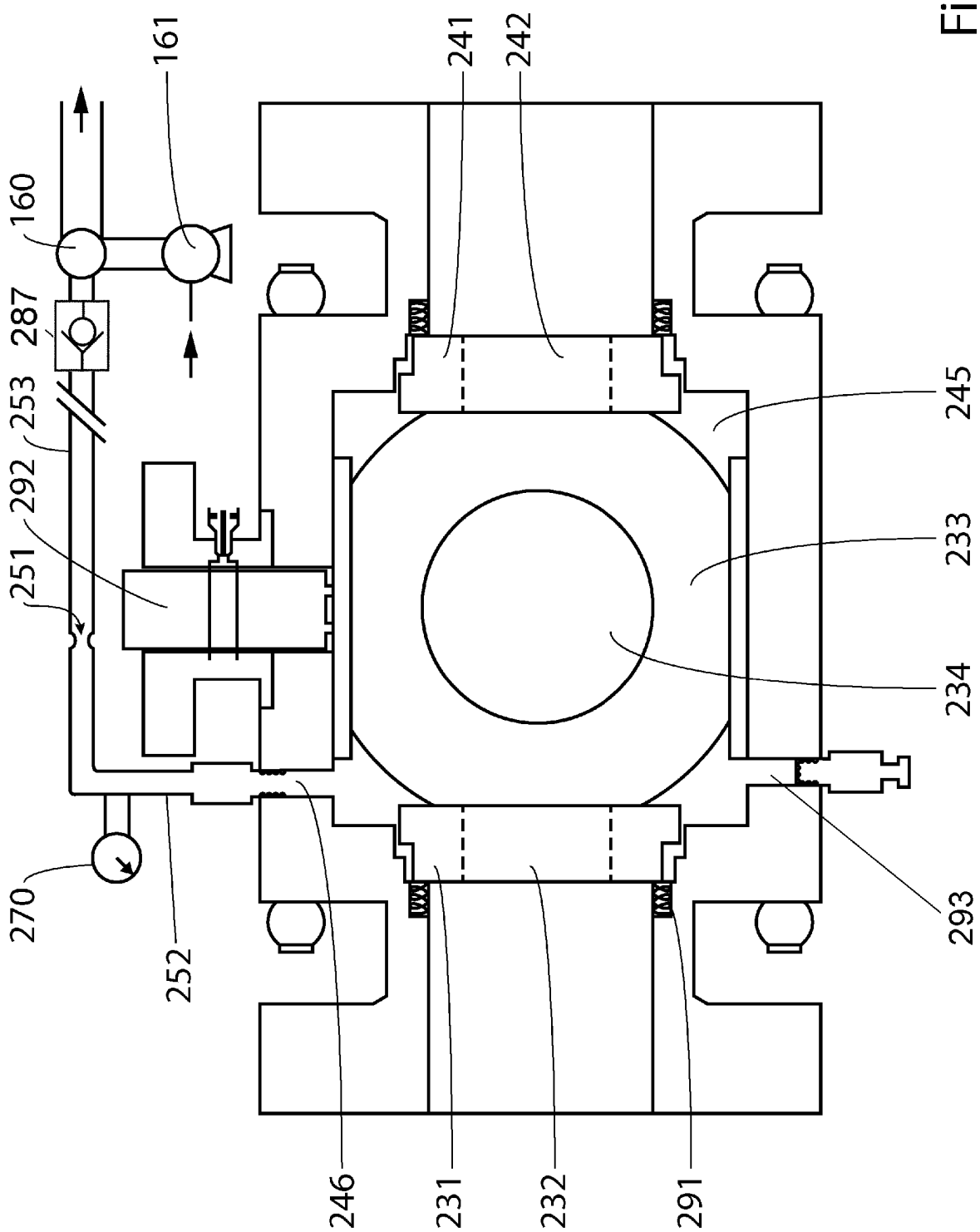
161
241
242
160
287
253
292
251
245
233
234
270
252
293
246
231
232
291

Fig. 2

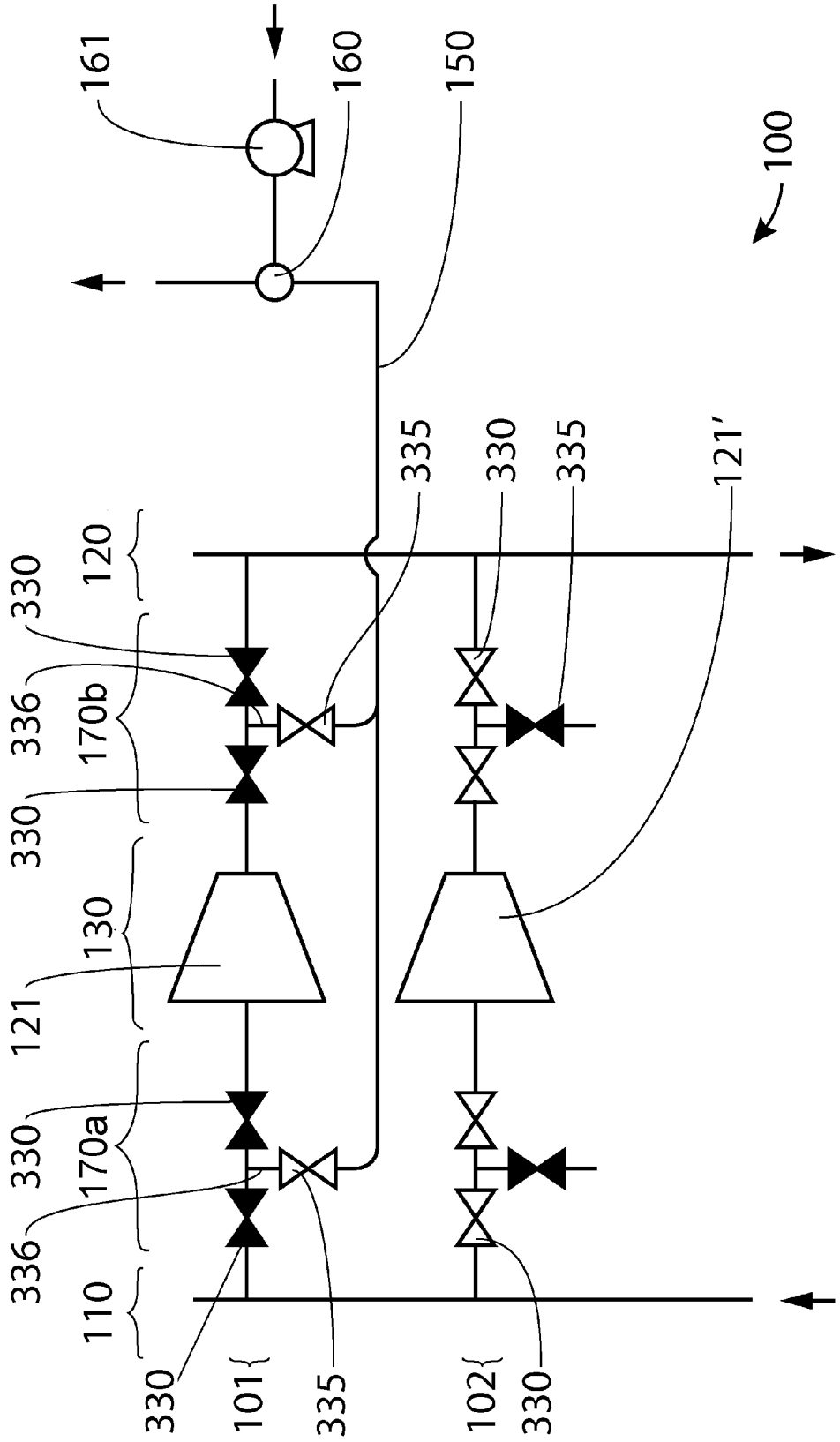
161
160
150
100
335
330
335
121'
120
330
336
170b
330
130
121
330
170a
336
110
330
101
335
102
330

Fig. 3

# A B S T R A C T

A method of preparing a system for a maintenance operation, said system comprising

- a first subsystem containing a super-atmospheric gas, and
- a second subsystem connected with said first subsystem via an intermediate subsystem comprising valve seats with a vent opening in between. The intermediate subsystem is for example a ball valve. To avoid gas escaping from the system, suction is applied to the vent opening to discharge the gas.

Agentschap NL
*Ministerie van Economische Zaken*

OCTROOIAANVRAAG NR.:
NO 139200
NL 2013505

**ONDERZOEKSRAPPORT**

BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK

## RELEVANTE LITERATUUR

| Categorie[1] | Literatuur met, voor zover nodig, aanduiding van speciaal van belang zijnde tekstgedeelten of figuren. | Van belang voor conclusie(s) nr: | Classificatie (IPC) |
|---|---|---|---|
| X | WO 2005/026603 A1 (TOKYO GAS CO LTD [JP]; KANAZAWA KAZUHIRO [JP]; TABATA KAZUHIRO [JP]; I) 24 maart 2005 (2005-03-24)<br>* samenvatting; figuren 1-7 *<br>----- | 1-14 | INV.<br>F17D1/04<br>F17C7/00 |
| X | JP 2000 161592 A (OSAKA GAS CO LTD)<br>16 juni 2000 (2000-06-16)<br>* samenvatting *<br>----- | 1-14 | |
| X | Linde ag: "Sicherheitshinweise 18",<br>,<br>1 september 2003 (2003-09-01),<br>XP002740840,<br>Gevonden op het Internet:<br>URL:http://www.storhy.net/train-in/PDF-TI/10_f.pdf<br>[gevonden op 2015-06-10]<br>* bladzijde 3, kolom 1, alinea 2 - kolom 2, alinea 3 *<br>----- | 1-14 | |
| X | US 2009/084194 A1 (SHOCK ROBERT [US] ET AL) 2 april 2009 (2009-04-02)<br>* alinea [0017] - alinea [0109] *<br>----- | 1-14 | Onderzochte gebieden van de techniek<br>F17D<br>F17C |
| A | JP H10 331624 A (SONY CORP)<br>15 december 1998 (1998-12-15)<br>* samenvatting *<br>----- | 1-14 | |
| A | WO 01/59308 A1 (HYDAC TECHNOLOGY GMBH [DE]; BALTES HERBERT [DE])<br>16 augustus 2001 (2001-08-16)<br>* bladzijde 3, regel 24 - bladzijde 10, regel 12 *<br>----- | 1-14 | |

Indien gewijzigde conclusies zijn ingediend, heeft dit rapport betrekking op de conclusies ingediend op:

| Plaats van onderzoek: | Datum waarop het onderzoek werd voltooid: | Bevoegd ambtenaar: |
|---|---|---|
| München | 12 juni 2015 | Stängl, Gerhard |

[1] CATEGORIE VAN DE VERMELDE LITERATUUR

X: de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur
Y: de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht
A: niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft
O: niet-schriftelijke stand van de techniek
P: tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur
T: na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding
E: eerdere octrooi(aanvrage), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven
D: in de octrooiaanvrage vermeld
L: om andere redenen vermelde literatuur
&: lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie



EOB FORM 02.83 (P0414B)

## AANHANGSEL BEHORENDE BIJ HET RAPPORT BETREFFENDE HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK, UITGEVOERD IN DE OCTROOIAANVRAGE NR.

NO 139200
NL 2013505

Het aanhangsel bevat een opgave van elders gepubliceerde octrooiaanvragen of octrooien (zogenaamde leden van dezelfde octrooifamilie), die overeenkomen met octrooischriften genoemd in het rapport.
De opgave is samengesteld aan de hand van gegevens uit het computerbestand van het Europees Octrooibureau per
De juistheid en volledigheid van deze opgave wordt noch door het Europees Octrooibureau, noch door het Bureau voor de Industriële eigendom gegarandeerd; de gegevens worden verstrekt voor informatiedoeleinden.

12-06-2015

| In het rapport genoemd octrooigeschrift | Datum van publicatie | Overeenkomend(e) geschrift(en) | Datum van publicatie |
|---|---|---|---|
| WO 2005026603 A1 | 24-03-2005 | JP 4313123 B2 | 12-08-2009 |
| | | JP 2005083475 A | 31-03-2005 |
| | | WO 2005026603 A1 | 24-03-2005 |
| JP 2000161592 A | 16-06-2000 | GEEN | |
| US 2009084194 A1 | 02-04-2009 | US 2009084194 A1 | 02-04-2009 |
| | | WO 2009045713 A2 | 09-04-2009 |
| JP H10331624 A | 15-12-1998 | GEEN | |
| WO 0159308 A1 | 16-08-2001 | AT 242434 T | 15-06-2003 |
| | | CA 2401712 A1 | 16-08-2001 |
| | | EP 1254318 A1 | 06-11-2002 |
| | | JP 4689926 B2 | 01-06-2011 |
| | | JP 2003528264 A | 24-09-2003 |
| | | NO 20023778 A | 23-09-2002 |
| | | US 2003075234 A1 | 24-04-2003 |
| | | WO 0159308 A1 | 16-08-2001 |



Algemene informatie over dit aanhangsel is gepubliceerd in de 'Official Journal' van het Europees Octrooibureau nr 12/82 blz 448 ev

# SCHRIFTELIJKE OPINIE

| DOSSIER NUMMER | INDIENINGSDATUM | VOORRANGSDATUM | AANVRAAGNUMMER |
|---|---|---|---|
| NO139200 | 19.09.2014 | | NL2013505 |

CLASSIFICATIE
INV. F17D1/04 F17C7/00

AANVRAGER
Valvetight B.V.

Deze schriftelijke opinie bevat een toelichting op de volgende onderdelen:

- ☒ Onderdeel I Basis van de schriftelijke opinie
- ☐ Onderdeel II Voorrang
- ☐ Onderdeel III Vaststelling nieuwheid, inventiviteit en industriële toepasbaarheid niet mogelijk
- ☐ Onderdeel IV De aanvraag heeft betrekking op meer dan één uitvinding
- ☒ Onderdeel V Gemotiveerde verklaring ten aanzien van nieuwheid, inventiviteit en industriële toepasbaarheid
- ☐ Onderdeel VI Andere geciteerde documenten
- ☒ Onderdeel VII Overige gebreken
- ☐ Onderdeel VIII Overige opmerkingen

| | DE BEVOEGDE AMBTENAAR |
|---|---|
| | |

Aanvraag nr.:

# SCHRIFTELIJKE OPINIE

NL2013505

## Onderdeel I Basis van de Schriftelijke Opinie

1. Deze schriftelijke opinie is opgesteld op basis van de meest recente conclusies ingediend voor aanvang van het onderzoek.

2. Met betrekking tot **nucleotide en/of aminozuur sequenties** die genoemd worden in de aanvraag en relevant zijn voor de uitvinding zoals beschreven in de conclusies, is dit onderzoek gedaan op basis van:

   a. type materiaal:

   ☐ sequentie opsomming

   ☐ tabel met betrekking tot de sequentie lijst

   b. vorm van het materiaal:

   ☐ op papier

   ☐ in elektronische vorm

   c. moment van indiening/aanlevering:

   ☐ opgenomen in de aanvraag zoals ingediend

   ☐ samen met de aanvraag elektronisch ingediend

   ☐ later aangeleverd voor het onderzoek

3. ☐ In geval er meer dan één versie of kopie van een sequentie opsomming of tabel met betrekking op een sequentie is ingediend of aangeleverd, zijn de benodigde verklaringen ingediend dat de informatie in de latere of additionele kopieën identiek is aan de aanvraag zoals ingediend of niet meer informatie bevatten dan de aanvraag zoals oorspronkelijk werd ingediend.

4. Overige opmerkingen:

Aanvraag nr.:

# SCHRIFTELIJKE OPINIE

NL2013505

## Onderdeel V Gemotiveerde verklaring ten aanzien van nieuwheid, inventiviteit en industriële toepasbaarheid

1. Verklaring

| | | |
|---|---|---|
| Nieuwheid | Ja: | Conclusies |
| | Nee: | Conclusies 1-14 |
| Inventiviteit | Ja: | Conclusies |
| | Nee: | Conclusies 1-14 |
| Industriële toepasbaarheid | Ja: | Conclusies 1-14 |
| | Nee: | Conclusies |

2. Citaties en toelichting:

**Zie aparte bladzijde**

## Onderdeel VII Overige gebreken

De volgende gebreken in de vorm of inhoud van de aanvraag zijn opgemerkt:

**Zie aparte bladzijde**

The examination is being carried out on **the application documents as originally filed.**

*****

Reference is made to the following documents:

D1 WO 2005/026603 A1 (TOKYO GAS CO LTD [JP]; KANAZAWA KAZUHIRO [JP]; TABATA KAZUHIRO [JP]; I) 24 maart 2005 (2005-03-24)

D2 JP 2000 161592 A (OSAKA GAS CO LTD) 16 juni 2000 (2000-06-16)

Point V

Claim 1

1. Document D1 discloses an evacuation/purge method for piping or other parts of a gas installation whereby the pipe connects two other parts having a valve (2) on each side to be closed for the isolation of the pipe or other installation, a vent opening (3) in between the valves (2) a suction device (B) to discharge the gas in between the area of the section isolated by the valves (2).

2. Thus the main features of Claim 1 are known from D1. Claim 1 therefore seems to lack novelty

Claims 2 - 14

3. The subject - matters set out in dependent Claims 2 - 14 are in substance known to the man skilled in the art or made obvious by D1 or the other documents cited in the search - report.

Dependent Claims therefore lack at least inventive step).

Point VII

1. Documents D1 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.

2. It is not at present apparent which part of the application could serve as a basis for a new claim which would satisfy the criteria for novelty and inventive step. The applicant should also indicate in the letter of reply the difference vis-à-vis the state of the art and the significance thereof.