TNO-rapport / TNO report

V5574

Validation of the in-place cleanability of the Butterfly Valve of SODIME S.A. according to the EHEDG test procedure.

Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek / Netherlands Organisation for Applied Scientific Research

SUMMARY

At the request of SODIME S.A., Chaponost, France the in-place cleanability of the Butterfly Valve was assessed according to the test procedure of the European Hygienic Engineering & Design Group (EHEDG) [Ref 1].

The test results show that the Butterfly Valve, including the EPDM gasket, is cleanable in-place at least as well as the reference pipe. The tests were conducted three times on one test object. The individual test results of the tests are comparable with each other. The Butterfly Valve complies with the hygienic criteria of the Machinery Directive 98/37/EC, annex 1 (additional essential health and safety requirements for certain categories of machinery) section 2.1 (agri-foodstuffs machinery), the hygienic requirements of EN1672 - part 2 and with the hygienic equipment design criteria of the EHEDG [2, 3, 4].

The results obtained are representative of the Butterfly Valve in the size range DN25 (1") up to DN104 (4").

1 INTRODUCTION

At the request of SODIME S.A., Chaponost France the in-place cleanability of the Butterfly Valve was assessed according to the test procedure of the European Hygienic Engineering & Design Group (EHEDG) [Ref 1].

2 DESCRIPTION OF THE TEST OBJECT

Name of test object	: Butterfly Valve
Type	: not applicable
Diameter of the outlet port	: SMS 51
Materials of construction	: Stainless Steel AISI 316L
Type of seal	: Gasket
Material of seal	: EPDM, FDA approved
TNO number	: 3119/03/0593

A sectional view of the test object is shown in figure 1. Further detailed information on the test object is given in Appendix A.

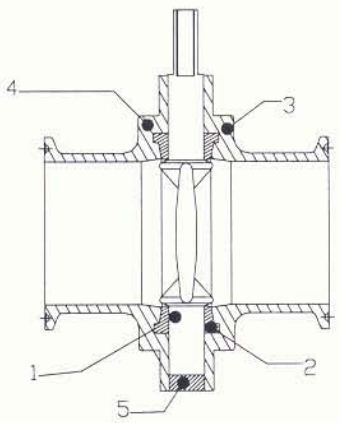


Figure 1. Sectional view of the butterfly valve. Specific parts relevant for the test are:
1) Disk, 2) Sectional gasket, 3) and 4) Body, 5) EPDM plug.

3 TIME SCHEDULE

The test object arrived at TNO Nutrition and Food Research in November 2003 and was registered under TNO number 3119/03/0593. The investigation was carried out from November 2003 to December 2003.

4 MATERIALS and METHOD

Before conducting the test programme, all elastomeric components have been checked against the test strain for antimicrobial properties. Prior to testing, the test object and the reference pipe (having a 0.5 μm Ra internal roughness) were dismantled, thoroughly cleaned and degreased by hand and steam-sterilized in-line or autoclaved at 121°C for 30 minutes.
The test object and reference pipe were reassembled with an auxiliary pipe at each end and soiled under 5 bar (gauge) pressure with a soured milk solution with spores of the test strain *Bacillus stearothermophilus* var. *calidolactis* (NIZO C953), mixed to give a final concentration of approx. 10^5 spores per cm^3 in the milk. The air pressure of 5 bar was applied 3 times to the closed assembly and held at pressure for 2 minutes on each occasion. Whilst under pressure, any movable parts of the test object were operated a total of ten times. After draining and drying by flushing with dry filtered air at a velocity of 1.0 m/s (for 2 to 4 hours) until an exterior relative humidity of $\leq$0.5% ±0.3% was achieved, the test object was cleaned in-place in an in-place cleaning test rig (see Appendix B) by:

1. Rinsing with cold water for 1 minute;

2. Circulating a 1% (w/v) detergent solution at 63°C ± 2°C for 10 minutes;

3. Rinsing with cold water for 1 minute.

For stages 1, 2 and 3 the mean velocity of flow in the reference pipe was 1.5 m/s. At the end of both rinsing procedures samples of the outflowing water were taken and two 5 ml portions of each were pour-plated with modified Shapton and Hindes agar (MSHA).

After cleaning the inner surface of the test object and reference pipe were covered with molten MSHA. After the agar had fully solidified the test object and reference pipe were placed in an incubator at 58°C for 16 hours.
After incubation the test object and reference pipe were examined for the presence of yellow discolouration in the agar. The degree of discolouration in the agar taken from the test object was compared to the degree of discolouration in the agar taken from the reference pipe.
A detailed description of the test procedure including a figure of the test rig is enclosed in Appendix B.

5 RESULTS

The tests were conducted three times on one test object. The results of the independent tests are comparable with each other. The gasket of the test object showed no antimicrobial properties.
The pressure during cleaning was 1.0 bar.
In table 1 the average yellow discolouration of the test object and reference pipe are summarized.

Table 1. Survey of the test results of the Butterfly Valve.

Test object	Average Surface finish [μm Ra]	Average discolouration (%)
Butterfly Valve		
1) Housing	< 0.8	<5
2) Gasket	na	<5
3) Disk	< 0.8	<5
Reference pipe	0.5	20-30

na = not applicable

6 CONCLUSIONS

The test results show that the Butterfly Valve, including the EPDM gasket, is cleanable in-place at least as well as the reference pipe. The tests were conducted three times on one test object. The individual test results of the tests are comparable with each other. The Butterfly Valve complies with the hygienic criteria of the Machinery Directive 98/37/EC, annex 1 (additional essential health and safety requirements for certain categories of machinery) section 2.1 (agri-foodstuffs machinery), the hygienic requirements of EN1672 - part 2 and with the hygienic equipment design criteria of the EHEDG [2, 3, 4].

The results obtained are representative of the Butterfly Valve in the size range of DN25 (1") up to DN104 (4").

7 RECORDS

Original data sheets, protocols and the final report will be filed in the archives of TNO for 5 years after completion of the study.

8 REFERENCES

1. A method for the assessment of in-place cleanability of food processing equipment, European Hygienic Equipment Design Group, Doc. 2, Second Edition March 2000.
2. Directive 98/37/EC of the European Parliament and of the Council of 22 June 1998 on the approximation of the laws of the Member states relating to Machinery
3. EN 1672: Food Processing Machinery - Basic Concepts - Part 2: Hygienic Requirements, April 1997
4. Hygienic equipment design criteria, European Hygienic Equipment Design Group, Doc. 8, July 1993

9 AUTHENTICATION

We, the undersigned, herewith declare that the tests reported here were carried out according to the agreed protocols, that this report contains an accurate description of the results obtained and that the results relate only to the tested object.

Date: January 2004

Ing R.A.A. van der Meer
Head of Department

Ing J. Kastelein
Project Manager

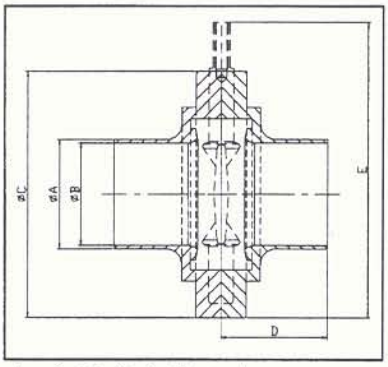
APPENDIX A

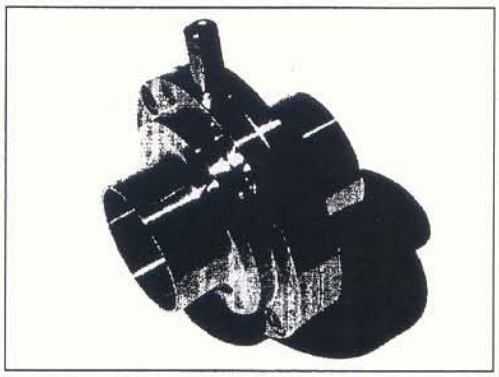
Detailed information on the Butterfly Valve.

Fiche technique
Technical data sheet

SODIME
TOUTE LA DYNAMIQUE DES FLUIDES

RPLLSMS
Vanne Papillon Lisse/Lisse SMS/SMS Butterfly Valve Weld/Weld





Dimensions (millimètre/millimeters) :

	Code	Kg/U	A	B	C	D	E
RPLL 6L S JEP 25	2077	0,76	25,00	22,50	79,00	34,00	101,00
RPLL 6L S JEP 38	2078	1,29	38,00	35,50	85,00	38,00	107,00
RPLL 6L S JEP 51	2079	1,29	51,00	48,00	105,00	40,00	127,00
RPLL 6L S JEP 63	2080	1,38	63,50	60,20	112,00	40,00	134,00
RPLL 6L S JEP 76	2081	1,74	76,10	72,10	125,00	41,00	147,00
RPLL 6L S JEP 104	2076	3,01	104,00	100,00	157,00	44,00	180,50

Joint/Gasket : EPDM (JEP), Silicone (JSI), Viton (JVI)

Couple de manœuvre/Torque : 25-1.5m.N ; 38-3m.N ; 51-17m.N ; 63.5-22m.N ; 76-24m.N ; 104-31m.N

Pression/Pressure (bars) :
Max : 18 bars (20°C) DN 25 - 63.5
15 bars (20°C) DN 76 / 104

Service :10 bars

Température/Temperature (°C) :
EPDM -40°c à/up to +130°c
Silicone/Silicon -60°c à/up to +200°c sauf vapeur/except steam
VITON® -20°c à/up to +200°c sauf vapeur/ except steam

Matière/Material : Acier inoxydable/Stainless steel 316L (1.4404) EN 10088-3

Traçabilité/Traceability : Certificat/Material Test Report 3.1B (EN 10204)

Accessoires/Accessories : Poignées/Handles, Actionneurs/Actuators, Joints/Gaskets, Papillons/Spindles

Maintenance/Spare parts : Préventive conseillée, à définir suivant process

Normes de fabrication/Manufacturing standards : SMS

Recommandations d'utilisation et de montage / Operating and mounting instructions :
Voir fiche 'RPLLLFFFCL-NUSOD.doc'

Température de surface : toujours inférieure à la température du fluide véhiculé.

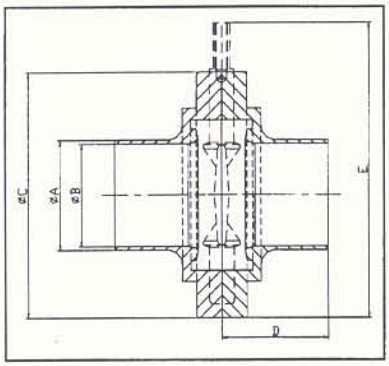
Modifiable sans préavis/Subject to change without notice *Photo non-contractuelle* *©Copyright SODIME 2002*

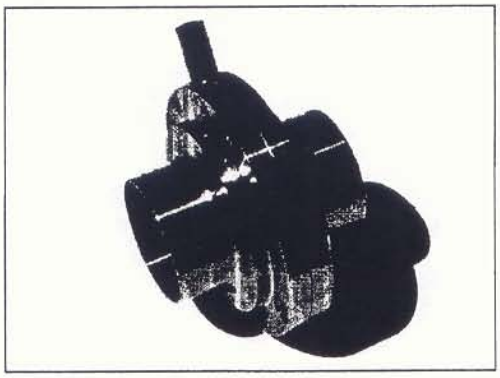
SODIME. S.A. +33 (0)4 78 56 30 32
12, rue Jules Verne +33 (0)4 78 56 08 82
F-69630 Chaponost info@e-sodime.com www.e-sodime.com

Fiche technique
Technical data sheet

SODIME
TOUTE LA DYNAMIQUE DES FLUIDES

RPLLOD
Vanne Papillon OD Lisse/Lisse/OD Butterfly Valve Weld/Weld





Dimensions (millimètre/millimeters) :

	Code	Kg/U	A	B	C	D	E
RPLL 6L M JEP 254 165	2058	0,71	25,40	22,10	79,00	34,00	101,00
RPLL 6L M JEP 381 165	2059	0,78	38,10	34,80	85,00	38,00	107,00
RPLL 6L M JEP 508 165	2060	1,28	50,80	47,50	105,00	40,00	127,00
RPLL 6L M JEP 635 165	2080	1,38	63,50	60,20	112,00	40,00	134,00
RPLL 6L M JEP 762 1,65	2081	1,74	76,20	72,20	125,00	41,00	147,00

Joint/Gasket : EPDM (JEP), Silicone (JSI), Viton (JVI)

Couple de manœuvre/Torque : 25.4-1.5m.N ; 38.1-3m.N ; 50.8-17m.N ; 63.5-22m.N ; 76.2-24m.N

Pression/Pressure (bars) :
Max : 18 bars (20°C) DN 25.4 - 63.5
15 bars (20°C) DN 76.2

Service :10 bars

Température/Temperature (°C) :
EPDM -40°c à/up to +130°c
Silicone/Silicon -60°c à/up to +200°c sauf vapeur/except steam
VITON® -20°c à/up to +200°c sauf vapeur/ except steam

Matière/Material : Acier inoxydable/Stainless steel 316L (1.4404) EN 10088-3

Traçabilité/Traceability : Certificat/Material Test Report 3.1B (EN 10204)

Accessoires/Accessories : Poignées/Handles, Actionneurs/Actuators, Joints/Gaskets, Papillons/Spindles

Maintenance/Spare parts : Préventive conseillée , à définir suivant process

Normes de fabrication/Manufacturing standards :BS. OD

Recommandations d'utilisation et de montage / Operating and mounting instructions :
Voir fiche 'RPLLLFFFCL-NUSOD.doc'

Température de surface : toujours inférieure à la température du fluide véhiculé.

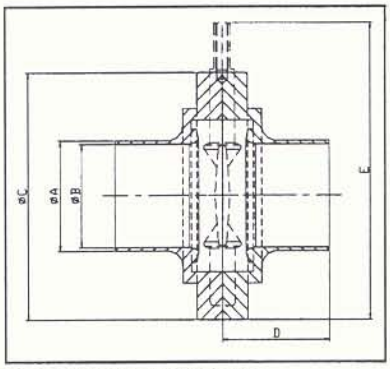
Modifiable sans préavis/Subject to change without notice *Photo non-contractuelle* *©Copyright SODIME 2002*

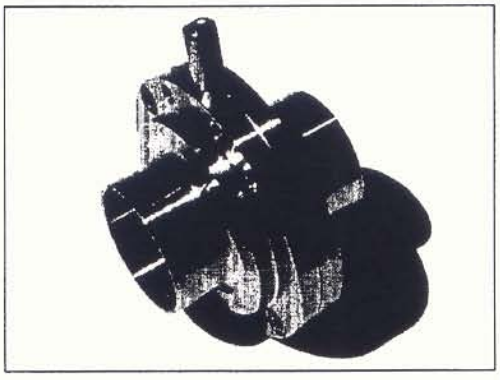
SODIME. S.A. +33 (0)4 78 56 30 32
12, rue Jules Verne +33 (0)4 78 56 08 82
F-69630 Chaponost info@e-sodime.com www.e-sodime.com

Fiche technique
Technical data sheet

SODIME
TOUTE LA DYNAMIQUE DES FLUIDES

RPLLDIN
Vanne Papillon Lisse/Lisse DIN/DIN Butterfly Valve Weld/Weld





Dimensions (millimètre/millimeters) :

	Code	kg/U	A	B	C	D	E
RPLL 6L D JEP 1016	2131	3,01	101,60	97,60	157,00	44,00	180,50
RPLL 6L D JEP 28	2132	0,79	28,00	25,00	79,00	34,00	101,00
RPLL 6L D JEP 34	2133	0,8	34,00	31,00	85,00	38,00	107,00
RPLL 6L D JEP 40	2134	0,87	40,00	37,00	90,00	38,00	112,00
RPLL 6L D JEP 52	2135	1,28	52,00	49,00	105,00	40,00	127,00
RPLL 6L D JEP 70	2136	1,72	70,00	66,00	125,00	41,00	147,00
RPLL 6L D JEP 85	2137	2,44	85,00	81,00	137,00	42,00	159,00

Joint/Gasket : EPDM (JEP), Silicone (JSI), Viton (JVI)

Couple de manœuvre/Torque : 28-1.5m.N ; 34-3m.N ; 40-4m.N ; 52-17m.N ; 70-24m.N ; 85-28m.N ; 101.6-31m.N

Pression/Pressure (bars) :
Max : 18 bars (20°C) DN 28 - 52
15 bars (20°C) DN 70 –101.6

Température/Temperature (°C) :
EPDM -40°c à/up to +130°c
Silicone/Silicon -60°c à/up to +200°c sauf vapeur/except steam
VITON® -20°c à/up to +200°c sauf vapeur/ except steam

Service :10 bars

Matière/Material : Acier inoxydable/Stainless steel 316L (1.4404) EN 10088-3

Traçabilité/Traceability : Certificat/Material Test Report 3.1B (EN 10204)

Accessoires/Accessories : Poignées/Handles, Actionneurs/Actuators, Joints/Gaskets, Papillons/Spindles

Maintenance/Spare parts : Préventive conseillée, à définir suivant process

Normes de fabrication/Manufacturing standards : DIN

Recommandations d'utilisation et de montage / Operating and mounting instructions :
Voir fiche 'RPLLLFFFCL-NUSOD.doc'

Modifiable sans préavis/Subject to change without notice *Photo non-contractuelle* *©Copyright SODIME 2002*

SODIME. S.A. +33 (0)4 78 56 30 32
12, rue Jules Verne +33 (0)4 78 56 08 82
F-69630 Chaponost info@e-sodime.com www.e-sodime.com

APPENDIX B

A method for the assessment of in-place cleanability of food processing equipment.