Test Report on Vibration Testing of Inserts carried in Safkeg-HS 3977A

Project No: Y09/10/04

Title	Test Report on Vibration Testing of Inserts carried in Safkeg-HS 3977A	Number Issue File Ref	TR2014/01/01 A TR20140101_v2.docx
Compiled	I Dingwall	Checked	S H Bryson
Approved	R A Vaughan	Date	9th January, 2014

Contents

1. Summary

1.1. Three separate vibration tests were carried out, one on a 3985 Tungsten Insert, one on a 3982 Tungsten Insert and one on a 3987 Stainless Steel Insert each carried inside a Safkeg-HS 3977A package.

1.2. All three tests were carried out successfully and all inserts remained leak tight during the vibration tests. The lids remained fully closed, there was no loss of test liquid carried inside the inserts and the inserts passed the vacuum bubble leakage test with a sensitivity of 1×10^{-4} Pa $m^3.s^{-1}$ SLR.

1.3. There was no visible damage to the inserts or package.

2. General

2.1. This test report records the results from three vibration tests carried out on inserts carried inside a Safkeg-HS 3977A package. Test 1 was carried out on a 3985 Tungsten Insert, Test 2 on a 3982 Tungsten Insert and Test 3 on a 3987 Stainless Steel insert.

2.2. The purpose of the test work was to verify that the inserts are not affected by the vibration test and remain leak tight in accordance with ANSI N14.5 [Ref:15.1].

2.3. The tests were carried out in accordance with Method Statement MS026 issue A [Ref: 15.2], Risk Assessment RA068 issue A [Ref: 15.3] and the applicable sections of Test Procedures CP485 issue A [Ref: 15.4] and CP486 issue A [Ref: 15.5], which reference the Safkeg-HS 3977A only. (Note: the Safkeg-LS-3979A was not tested at this time).

2.4. All tests were carried out at the premises of TÜV SÜD Ltd [Ref: 15.6] , who are an independent test house. The test work was carried out against Croft PO8660id Amendment 1. Permission to hold depleted uranium on site at TÜV SÜD Ltd was provided by the Environment Agency Standard Rules Permit: EPR/VB3533DD/A001, [Ref: 15.7].

2.5. Details of the TÜV SÜD test operations and test equipment is reported in TÜV SÜD Report 75925036 Report 01 issue 1, [Ref: 15.8].

2.6. The test package was shipped to and from TÜV SÜD inside a Croft 2949 Drumpak as a UN2909 excepted package (dangerous goods) by P J Harrison {Ref: Croft PO8661id)

3. Vibration Test Requirement

3.1. The vibration test meets the requirements of the applicable sections of 49 CFR 178.608 [Ref: 15.9].

4. Test Packaging

4.1. The packages consist of a stainless steel keg, cork packing, and a containment vessel which has a stainless steel double skin which completely encases a shielding medium. The shielding medium for the Safkeg-HS 3977A package is depleted uranium (DU).

4.2. The Safkeg-HS 3977A package is designed to be able to carry three different versions of inserts; 3982 Tungsten Insert, 3985 Tungsten Insert and a 3987 Stainless Insert.

4.3. The Safkeg-HS 3977A package configuration for test is shown below.

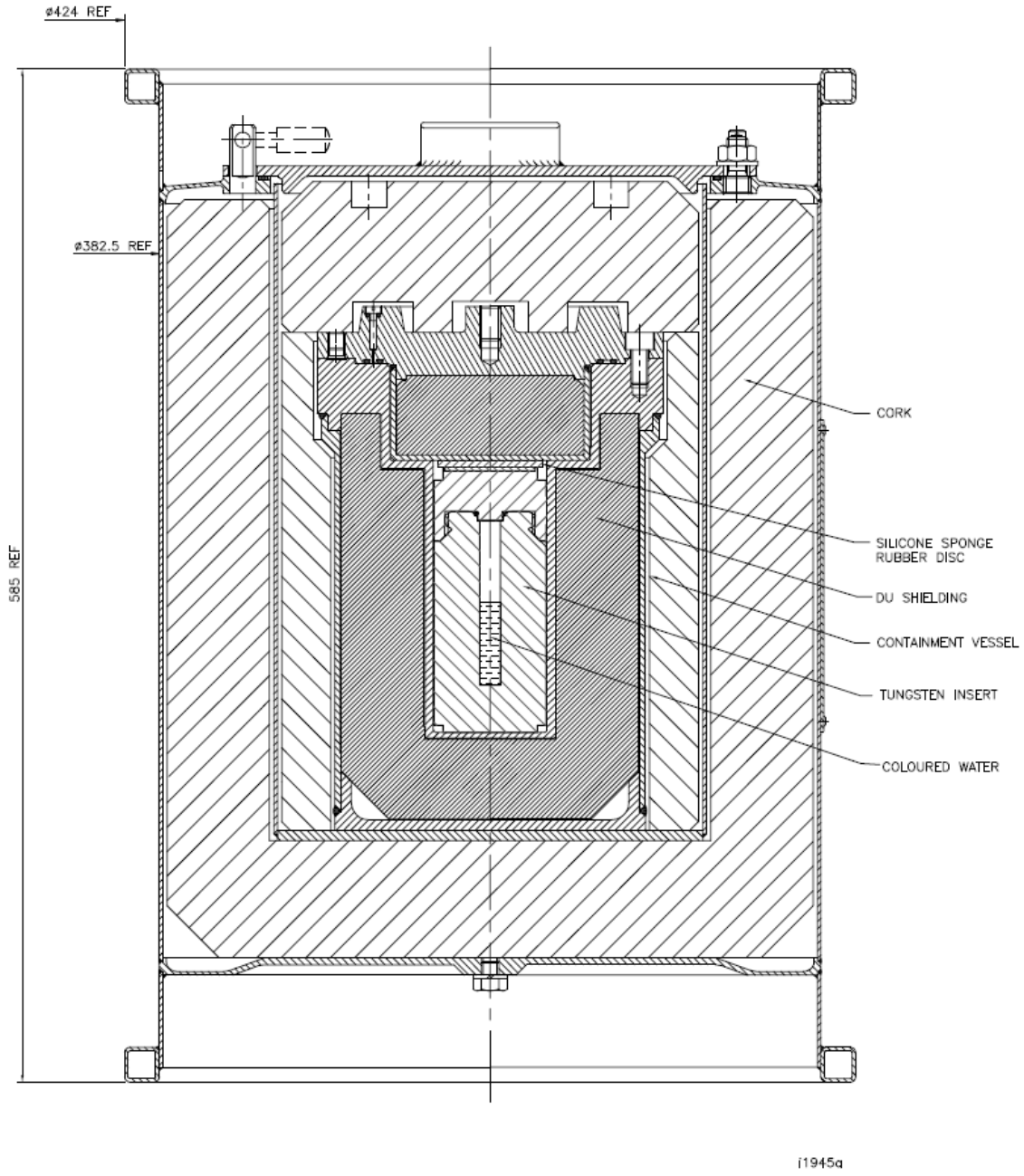


Figure 1, The Safkeg HS 3977A Package configuration for test

5. Packaging Equipment Used

5.1. The following packaging equipment was used for testing.

Equipment	Identification	Specification
Safkeg-HS 3977A packaging	3977/0001	QAC1474
HS 3985 tungsten insert	3985/0001	DL-2C-5891 issue C (Manufacturing Drawing List)
HS 3985 silicone O-rings	GRC2252	2C-6174 issue D, item 3 (Licensing Drawing)
HS 3982 tungsten insert	3982/0003	DL-2C-5890 issue A (Manufacturing Drawing List)
HS 3982 silicone O-rings	GRC2252	1C-6173 issue D, item 3 (Licensing Drawing)
HS 3987 stainless steel insert (without PTFE liner)	3987/0002	DL-2C-6161 "a" issue D (Manufacturing Drawing List)
HS 3987 silicone O-rings	GRC2252	PO8388id Amendment 1, item 4
Silicone sponge rubber discs (new for each test)	GRC2243/1	2C-6920 issue A (Licensing Drawing)
Coloured Water (Distilled water and natural red food colour)	GRC2099	-
Parker Super-O-Lube	GRC1688	-

6. Testing and Measuring Equipment Used

The following testing and measuring equipment was used

	Identification	Comments
Free cargo vibration test machine	TÜV SÜD Ltd equipment	
1.6mm thick metal shim	TÜV SÜD Ltd equipment	Used to check bounce height of package during vibration test
Doserate Meter	CC0016	Used to measure the dose rate during and after each test
Torque Wrench, 8-40Nm	CC0006	Used to close keg nuts before each test

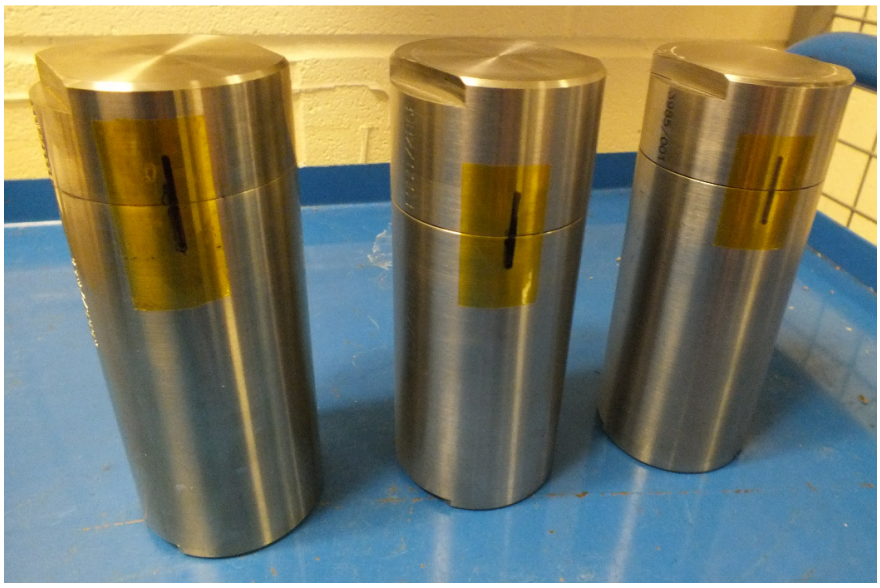
Torque Wrench , 2-12Nm	CC0007	Used to close containment vessel before each test
Croft feeler Gauge	-	Used to check that the gap between the insert lid and body did not increase during the vibration test. 0.05 mm thick feelers.
Measuring Cylinder	-	2ml graduations. Used to measure capacity of coloured water poured into each insert
Scales, 15kg capacity, 0.5g resolution	CC0027	Used to weigh inserts
Scales, 150kg capacity, resolution 10g	CC0021	Used to weigh complete package
Vacuum bubble leak test rig/vacuum gauge	ISO 010/CC0032	Used to leak test the inserts
CALT9	S/N 5692/0002	Used to verify that the Containment Vessel remained leak test after each test

7. Test Method

7.1. The inserts were assembled with Silicone 60 O-rings and checked that they were in a clean and good condition. A photographic record of the inserts was taken and the digital photographs are saved on the Croft Terastation.

7.2. The serial numbers and identification of the packages and inserts to be tested and equipment used were recorded.

7.3. The lid of each insert was screwed closed and a line was marked with an indelible marker across the lid and body to show alignment in the fully closed condition. It was found that the indelible ink adhered more easily to the surface of thin tape, therefore a strip of tape was applied to the insert body and lid of each insert, the tape being cut between the lid and body so that the lid was not constrained. The edge of the tape was also used as an alignment reference.



Photograph 1, Inserts fully closed with alignment of lid and body shown by tape and marked line. Note: the tape is cut between the lid and body

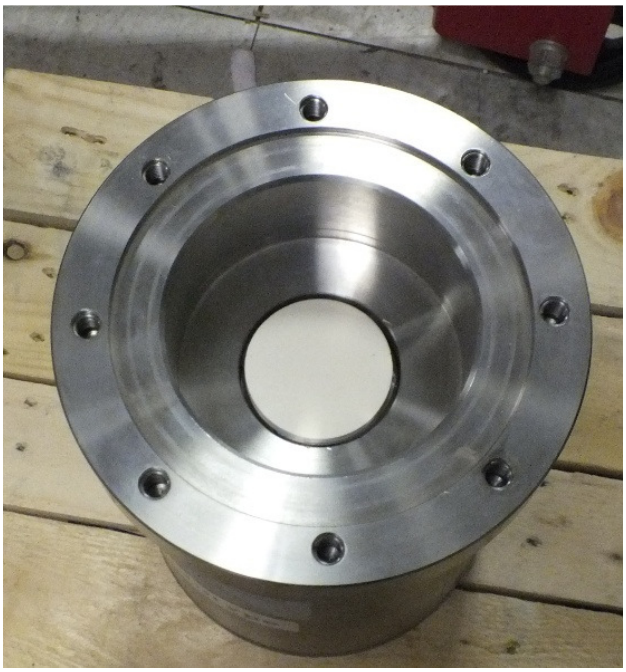
7.4. A leakage test on each insert using a vacuum bubble leak method was carried out in accordance with the criteria specified in ANSI N14.5, [Ref: 15.1.]. Note: This test gives a sensitivity of 1 x 10^{-4} Pa $m^3.s^{-1}$ SLR. The test acceptance is no visible stream of bubbles.

Each package was prepared for test in the following sequence:

7.5. The inserts were partially filled with coloured water and the insert lid fully closed so that the match lines were aligned. The capacity of the coloured water poured into each insert (partially filled) was measured using a measuring cylinder with 2ml graduations.

7.6. Each insert filled with coloured water was weighed using 15kg capacity scales with a resolution of 0.5g.

7.7. The insert was placed into the containment vessel and a silicone sponge rubber packing disc was placed on top of the insert.



Photograph 2, Silicone disc placed on top of insert inside the containment vessel body

7.8. The containment vessel lid was placed in position and the closure screws were tightened to 10±0.5 Nm using a calibrated torque wrench and its serial number recorded.

7.9. The package was assembled and the keg nuts tightened to 23±1 Nm using a calibrated torque wrench and its serial number recorded.

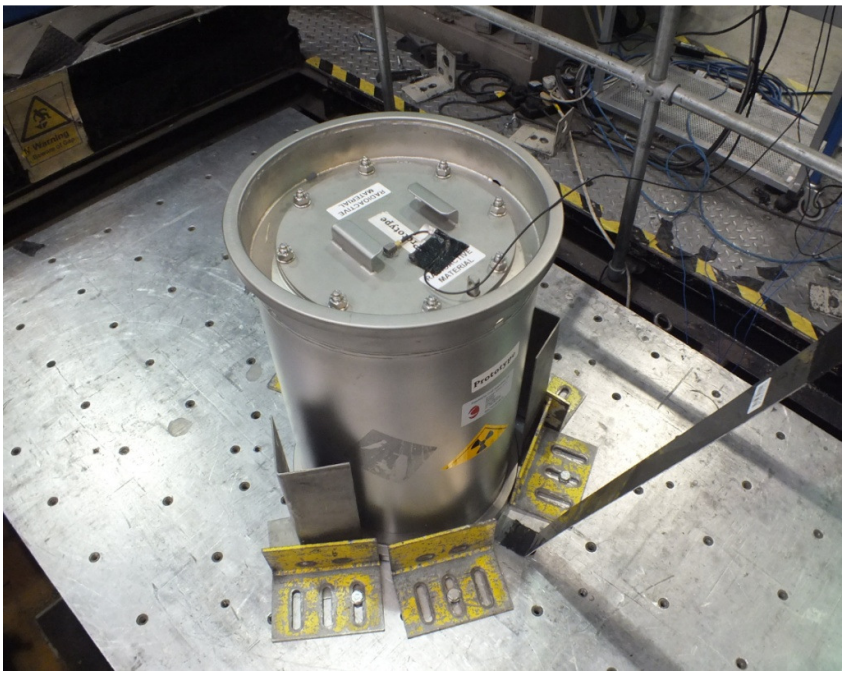
7.10. The weight of each complete package, including insert and coloured water was recorded for each test.

7.11. The interface between the containment vessel flange and body was checked with a feeler gauge (0.05mm thick feelers) to verify that the lid was fully closed.

7.12. A CALT leakage test was carried out to verify that the containment vessel was leak tight.

7.13. The package was placed on the free cargo vibration test bed with constrains to prevent the package moving horizontally but free to move vertically.

7.14. The vibration machine was started to produce a vertical stroke of 25.4mm peak to peak. The frequency was then adjusted until the package bounced to a height of 1.6mm. The bounce was measured by slipping a 1.6mm thick steel shim between the vibrating platform and the bottom of the package. It was determined that the frequency to generate the 1.6mm bounce was 4.5570Hz.



Photograph 3, Package sat on vibrating bed, metal shim being used to check the bounce height of the package

7.15. The test then ran for 60 minutes continuously at the set frequency. A short video clip "HS Vibration Test Video 11122013.mpg" of the test is saved on the Croft Terastation.

7.16. The radiation dose rate emitted from the DU was measured periodically, before during and after the test to verify that there was no change in the dose rate emitted from the DU encased within the stainless steel walls of the containment vessel measured before commencement of the test programme. [Refs: Para 16.5 and Para 16.6] .

On completion of each test the following checks were carried out:

7.17. The interface between the containment vessel flange and body was checked with a feeler gauge (0.05mm thick feelers) to verify that the lid had not opened during the vibration test.

7.18. A CALT leakage test was carried out after each test to verify that the containment vessel remained leak tight.

Photograph 4, Containment vessel being leakage tested after a vibration test using a CALT.

7.19. The insert was removed from the package and visually inspected for signs of damage to the insert and leakage of coloured water.

7.20. The marker line between the insert lid and body and the edge of the tape was checked that it was still aligned to indicate that the lid remained fully closed.

7.21. The gap between the insert lid and insert body was measured using a feeler gauge to check that the insert lid remained fully closed.

7.22. A leakage test on each insert was repeated using the vacuum bubble leak method in accordance with the criteria specified in ANSI N14.5, [Ref: 15.1], Note: This test gives a sensitivity of 1 x 10^{-4} Pa $m^3.s^{-1}$ SLR. The test acceptance is no visible stream of bubbles.

8. Test Programme

The following vibration tests were carried out on the following inserts

8.1. Test 1: Safkeg-HS package carrying a 3985 tungsten insert

8.2. Test 2: Safkeg-HS package carrying a 3982 tungsten insert

8.3. Test 3: Safkeg-HS package carrying a 3987 stainless steel insert (without PTFE liner)

9. Test 1 Results, Package carrying 3985 insert

9.1. Total weight of the tested package carrying 3985 insert recorded below

Insert	Total weight of test package carrying insert and coloured water.
3985	151.525kg

9.2. Test to check the gap between the Containment Vessel Lid and Body to verify that there has been no movement during the vibration test.

Gap measured with feeler gauge (0.05mm thick feelers)		
Before Test	After Test	Comments
No Gap	No Gap	No change

9.3. CALT test to check that the containment vessel remained leak tight after vibration test. CALT printout copied in Appendix [Para. 16.1].

CALT Test (S/N 5692/0002)	Measured Leakage Rate	Result
	9.05×10^{-7} Pa. m^3. S^{-1} SLR	PASS

Note: Acceptance Criteria: $<5.00 \times 10^{-5}$ Pa. m^3. S^{-1} SLR

9.4. Test to measure loss of liquid (coloured water) carried inside the insert during the vibration test

Volume of coloured liquid carried in insert (partially filled)		
Before Test	After Test	Comments
66ml	66ml	No loss of liquid

9.5. Visual check to verify that the insert lid remained aligned with the insert body after the vibration test.

Photograph 5, Insert lid and body remained aligned after vibration test

9.6. Test to measure the gap between the insert lid and the body as a secondary check to verify that the lid had not opened during the vibration test.

Gap measured with feeler gauge (0.05mm thick feelers)		
Before Test	After Test	Comments
0.4mm	0.4mm	No change

10. Test 2 Results, Package carrying 3982 insert

10.1. Total weight of the tested package carrying 3982 insert recorded below

Insert	Total weight of test package carrying insert and coloured water.
3982	152.854kg

10.2. Test to check the gap between the Containment Vessel Lid and Body to verify that there has been no movement during the vibration test.

Gap measured with feeler gauge (0.05mm thick feelers)		
Before Test	After Test	Comments
No Gap	No Gap	No change

10.1. CALT test to check that the containment vessel remained leak tight after vibration test. CALT printout copied in Appendix [Para. 16.2].

CALT Test (S/N 5692/0002)	Measured Leakage Rate	Result
	9.53×10^{-7} Pa. m^3. S^{-1} SLR	PASS

Note: Acceptance Criteria: $<5.00 \times 10^{-5}$ Pa. m^3. S^{-1} SLR

10.2. Test to measure loss of liquid (coloured water) carried inside the insert during the vibration test

Volume of coloured liquid carried in insert (partially filled)		
Before Test	After Test	Comments
5ml	5ml	No loss of liquid

10.3. Visual check to verify that the insert lid remained aligned with the insert body after the vibration test.

Photograph 6, Insert lid and body remained aligned after vibration test

10.4. Test to measure the gap between the insert lid and the body as a secondary check to verify that the lid had not opened during the vibration test.

Gap measured with feeler gauge (0.05mm thick feelers)		
Before Test	After Test	Comments
0.3mm	0.3mm	No change

11. Test 3 Results, Package carrying 3987 insert

11.1. Total weight of the tested package carrying 3987 insert (without PTFE liner) recorded below

Insert	Total weight of test package carrying insert and coloured water.
3987	145.389kg

11.2. Test to check the gap between the Containment Vessel Lid and Body to verify that there has been no movement during the vibration test.

Gap measured with feeler gauge (0.05mm thick feelers)		
Before Test	After Test	Comments
No Gap	No Gap	No change

11.3. CALT test to check that the containment vessel remained leak tight after vibration test. CALT printout copied in Appendix [Para. 16.2].

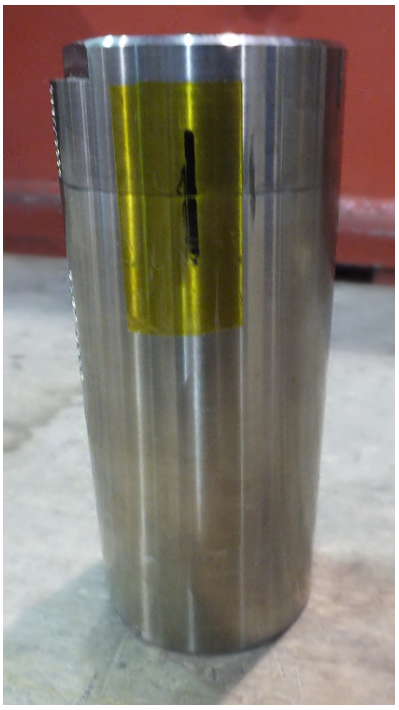
CALT Test (S/N 5692/0002)	Measured Leakage Rate	Result
	9.16×10^{-7} Pa. m^3. S^{-1} SLR	PASS

Note: Acceptance Criteria: $<5.00 \times 10^{-5}$ Pa. m^3. S^{-1} SLR

11.4. Test to measure loss of liquid (coloured water) carried inside the insert during the vibration test

Volume of coloured liquid carried in insert (partially filled)		
Before Test	After Test	Comments
159ml	159ml	No loss of liquid

11.5. Visual check to verify that the insert lid remained aligned with the insert body after the vibration test.



Photograph 7, Insert lid and body remain aligned after vibration test

11.6. Test to measure the gap between the insert lid and the body as a secondary check to verify that the lid had not opened during the vibration test.

Gap measured with feeler gauge (0.05mm thick feelers)		
Before Test	After Test	Comments
No gap	No gap	No change

12. Vacuum Bubble Leakage Test Results

12.1. All inserts passed the vacuum bubble leakage test before and after the vibration tests in accordance with CP121 issue B [Ref: 15.10]. The test sensitivity is 1 x 10^{-4} Pa $m^3.s^{-1}$ SLR and the test acceptance is no visible stream of bubbles. See test report sheets in Appendix Para.16.3 and Para. 16.4.

13. Radiation Measurements

13.1. The radiation surveys carried out before, during and after the vibration tests did not show any increase in radiation dose levels. The radiation surveys on the containment vessel and the Safkeg-HS 3977A package carried out the before vibration tests were used as used as benchmarks, [Para 16.5 and Para. 16.6].

14. Conclusion

14.1. All tested inserts met the acceptance requirements as listed below and are therefore considered to meet the vibration test requirement:

14.1.1. There was no rupture to any of the insert components. No part of the insert or package showed any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging effectiveness.

14.1.2. There was no visible leakage of the coloured water from the insert.

14.1.3. The insert passed the vacuum bubble leakage test [Ref 15.1] with the insert lid and insert body match marks aligned on completion of the vibration test.

15. References

15.1. ANSI N14.5, American Standards for Radioactive Materials – Leakage Tests on Packages for Shipment, American National Standards Institute, 1997.

15.2. MS026 issue A, Croft Method Statement for SAFKEG-HS 3977A Vibration Test.

15.3. RA068 issue A, Croft Risk Assessment for SAFKEG-HS 3977A Vibration Test.

15.4. CP485 issue A, Croft Procedure for Vibration Testing of inserts carried in Safkeg-LS 3979A and Safkeg-HS 3977A.

15.5. CP486 issue A, Croft Procedure for Vibration Testing of Safkeg-LS 3979A and Safkeg-HS 3977A.

15.6. TÜV SÜD Ltd, Octagon House, Concorde Way, Segensworth North, Fareham, Hampshire, PO15 5RL, Tel: 01355 593913, Contacts; Mandy Castle and Ian Veal.

Croft Approved Supplier, ASL296.

15.7. EPR/VB3533DD/A001, Environment Agency, Standard Rules Permit.

15.8. 75925036 Report 01 issue 1, TÜV SÜD Ltd Report on Vibration Testing for Croft Associates Ltd of a SAFKEG-HS 3977A Package.

15.9. Title 49, Code of Federal Regulations, Parts 106 – 180, Office of the Federal Register, Washington D.C.

15.10. CP121 issue B, Croft Procedure for Leak Testing Containers Requiring a Leaktightness of 1×10^{-4} Pa.m3.s^{-1} SLR

16. Appendix

16.1. CALT printout of leakage test carried out on containment vessel after Test 1 (3985 Insert)

Test 1 3985 Inserts

Croft

Test Date: 11 Dec 2013 14:12:36
CALTS SeNr: 18040818
Software Version: 1804v19
User Name: Croft
Asset Number: PN5692/0002
Press Sensor SeNr: SN2379519
Calibration Date: 12 Aug 2013 11:12:49
Calibration Span: 121 Days old
Temp Sensor SeNr: ISN577
Calibration Date: 12 Aug 2013 11:8:41
Calibration Span: 121 Days old

VOLUME TEST DATA

Test Reference No: 1
Design No: 3978
Serial No: 001
Comment: Interspace
Reference Volume: 1.978 cc
Ref Volume No: ISN342
No. Measurements: 2
Operator Name: D Fisher

VOLUME TEST RESULTS

Atmospheric Pressure: 1023.3 mBar
Volume Test Temperature: 21.1 degC

Start mBar	Finish mBar	Volume cc
82122.7	81491.5	1.688
82226.9	81534.2	1.583

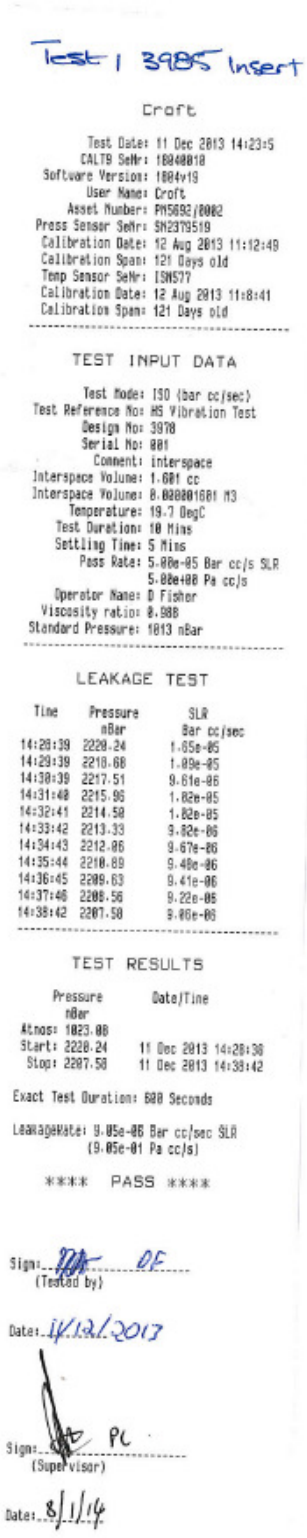
Average Volume: 1.681 cc
Average Volume: 0.000001681 M3

Sign: DF (Tested by)

Date: 11/12/2013

Sign: PC (Supervisor)

Date: 8/1/14



Test 1 3985 Insert

Croft

Test Date: 11 Dec 2013 14:23:5
CALTS SeNr: 18040818
Software Version: 1804v19
User Name: Croft
Asset Number: PN5692/0002
Press Sensor SeNr: SN2379519
Calibration Date: 12 Aug 2013 11:12:49
Calibration Span: 121 Days old
Temp Sensor SeNr: ISN577
Calibration Date: 12 Aug 2013 11:8:41
Calibration Span: 121 Days old

TEST INPUT DATA

Test Mode: ISO (bar cc/sec)
Test Reference No: HS Vibration Test
Design No: 3978
Serial No: 001
Comment: Interspace
Interspace Volume: 1.681 cc
Interspace Volume: 0.000001681 M3
Temperature: 19.7 DegC
Test Duration: 10 Mins
Settling Time: 5 Mins
Pass Rate: 5.00e-05 Bar cc/s SLR
5.00e+00 Pa cc/s
Operator Name: D Fisher
Viscosity ratio: 0.988
Standard Pressure: 1013 mBar

LEAKAGE TEST

Time	Pressure mBar	SLR Bar cc/sec
14:28:39	2228.24	1.65e-05
14:29:39	2218.68	1.09e-05
14:30:39	2217.51	9.61e-06
14:31:40	2215.96	1.02e-05
14:32:41	2214.58	1.02e-05
14:33:42	2213.33	9.82e-06
14:34:43	2212.06	9.67e-06
14:35:44	2210.89	9.48e-06
14:36:45	2209.63	9.41e-06
14:37:46	2208.56	9.22e-06
14:38:42	2207.58	9.06e-06

TEST RESULTS

	Pressure mBar	Date/Time
Atmos:	1023.08	
Start:	2228.24	11 Dec 2013 14:28:38
Stop:	2207.58	11 Dec 2013 14:38:42

Exact Test Duration: 600 Seconds

LeakageRate: 9.05e-06 Bar cc/sec SLR
(9.05e-01 Pa cc/s)

**** PASS ****

Sign: DF (Tested by)

Date: 11/12/2013

Sign: PC (Supervisor)

Date: 8/1/14

16.2. CALT printout of leakage test carried out on containment vessel after Test 2 (3982 Insert) and Test 3 (3987 Insert)

Test 2 3982 insert

Croft

Test Date: 12 Dec 2013 10:33:33
CALT9 SeNr: 13040010
Software Version: 1004v19
User Name: Croft
Asset Number: PN5692/0002
Press Sensor SeNr: SN2379519
Calibration Date: 12 Aug 2013 11:12:49
Calibration Span: 122 Days old
Temp Sensor SeNr: 15N577
Calibration Date: 12 Aug 2013 11:8:41
Calibration Span: 122 Days old

TEST INPUT DATA

Test Mode: ISO (bar cc/sec)
Test Reference No: HS Vibration Test
Design No: 3978
Serial No: 001
Comment: Insert 3982
Interspace Volume: 1.601 cc
Interspace Volume: 0.000001601 M3
Temperature: 20.0 DegC
Test Duration: 10 Mins
Settling Time: 5 Mins
Pass Rate: 5.00e-04 Bar cc/s SLR
5.00e+01 Pa cc/s
Operator Name: D Fisher
Viscosity ratio: 0.989
Standard Pressure: 1013 mBar

LEAKAGE TEST

Time	Pressure mBar	SLR Bar cc/sec
10:38:48	2107.57	1.38e-05
10:39:49	2106.20	1.07e-05
10:40:50	2104.84	1.09e-05
10:41:51	2103.48	1.09e-05
10:42:52	2102.21	1.07e-05
10:43:53	2100.94	1.06e-05
10:44:54	2099.78	1.05e-05
10:45:55	2098.70	1.02e-05
10:46:56	2097.73	9.92e-06
10:47:57	2096.66	9.79e-06
10:48:51	2095.80	9.55e-06

TEST RESULTS

	Pressure mBar	Date/Time
Atmos:	1020.65	
Start:	2107.57	12 Dec 2013 10:38:47
Stop:	2095.80	12 Dec 2013 10:48:51

Exact Test Duration: 600 Seconds

LeakageRate: 9.53e-06 Bar cc/sec SLR
(9.53e-01 Pa cc/s)

**** PASS ****

Sign: DF
(Tested by)

Date: 12/12/2013

Sign: PC
(Supervisor)

Date: 8/1/14

Test 3 3987

Croft

Test Date: 12 Dec 2013 16:21:7
CALT9 SeNr: 13040010
Software Version: 1004v19
User Name: Croft
Asset Number: PN5692/0002
Press Sensor SeNr: SN2379519
Calibration Date: 12 Aug 2013 11:12:49
Calibration Span: 122 Days old
Temp Sensor SeNr: 15N577
Calibration Date: 12 Aug 2013 11:8:41
Calibration Span: 122 Days old

TEST INPUT DATA

Test Mode: ISO (bar cc/sec)
Test Reference No: HS Vibration Test
Design No: 3978
Serial No: 001
Comment: Insert 3987
Interspace Volume: 1.601 cc
Interspace Volume: 0.000001601 M3
Temperature: 20.0 DegC
Test Duration: 10 Mins
Settling Time: 5 Mins
Pass Rate: 5.00e-04 Bar cc/s SLR
5.00e+01 Pa cc/s
Operator Name: D Fisher
Viscosity ratio: 0.989
Standard Pressure: 1013 mBar

LEAKAGE TEST

Time	Pressure mBar	SLR Bar cc/sec
16:27:21	2061.21	1.67e-05
16:28:22	2060.04	9.86e-06
16:29:23	2058.68	1.07e-05
16:30:24	2057.51	1.05e-05
16:31:25	2056.34	1.04e-05
16:32:26	2055.17	1.03e-05
16:33:26	2054.20	1.00e-05
16:34:27	2053.23	9.76e-06
16:35:28	2052.25	9.60e-06
16:36:29	2051.37	9.56e-06
16:37:24	2050.60	9.19e-06

TEST RESULTS

	Pressure mBar	Date/Time
Atmos:	1017.72	
Start:	2061.21	12 Dec 2013 16:27:20
Stop:	2050.60	12 Dec 2013 16:37:24

Exact Test Duration: 600 Seconds

LeakageRate: 9.18e-06 Bar cc/sec SLR
(9.18e-01 Pa cc/s)

**** PASS ****

Sign: DF
(Tested by)

Date: 12/12/2013

Sign: PC
(Supervisor)

Date: 8/1/14

16.3. Vacuum bubble leakage test report before carrying out vibration tests.

Vacuum Bubble Leakage Test Record

Procedure No CP 129

Test liquid: Deionized Water.

Container Design/Serial No	Pass/Fail	Comments
3985.	Pass	Tests carried out before Vibration Tests.
3982	Pass.	
3987.	Pass	

Signature T Draycott Date 2/12/2013

[PF242N-F213.W51]

16.4. Vacuum bubble leakage test report after carrying out vibration tests.

Vacuum Bubble Leakage Test Record

Procedure No CP 129

Test liquid: Deionized Water.

Container Design/Serial No	Pass/Fail	Comments
3985	Pass	Tests carried out after Vibration Tests.
3982	Pass.	
3987.	Pass	

Signature I Dingwall. Date 13/12/2013

[PF242N-F213.W51]

16.5. Radiation survey carried out on containment vessel before vibration tests. Survey was used as a benchmark.

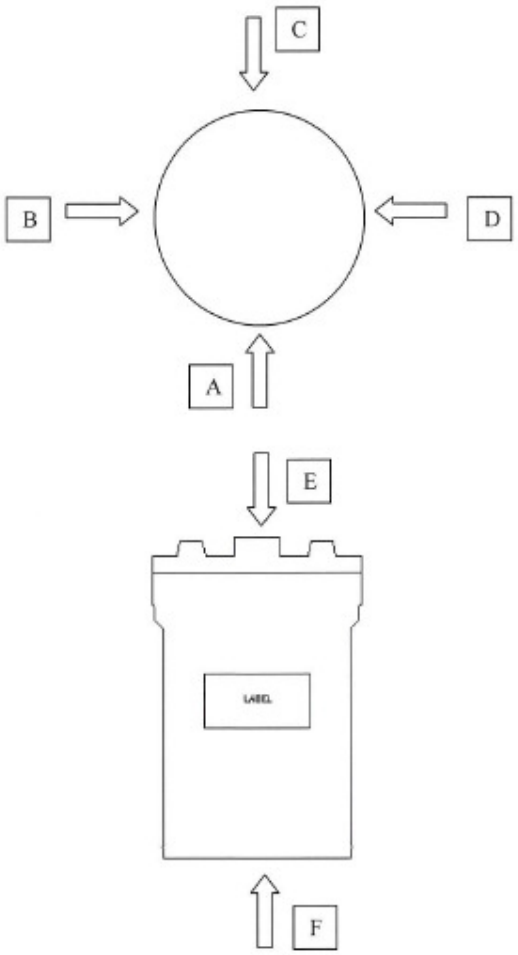
Radiation Survey

CROFT

Project No: Y09/10/04

Package Design/Serial No: CV 3978/0001

Contents: N/A



Distance	Maximum readings taken with Dose Rate Meter CC0016, (micro Sv/h)					
	A	B	C	D	E	F
Surface	43	45	43	41	15	37
1 meter	1	1	2	1	0	2

Test carried out by: I Dingwall Signature: I Dingwall.

Date: 03/11/2013

16.6. Radiation survey carried out on the Safkeg-HS 3977A package before vibration tests. Survey used as a benchmark.

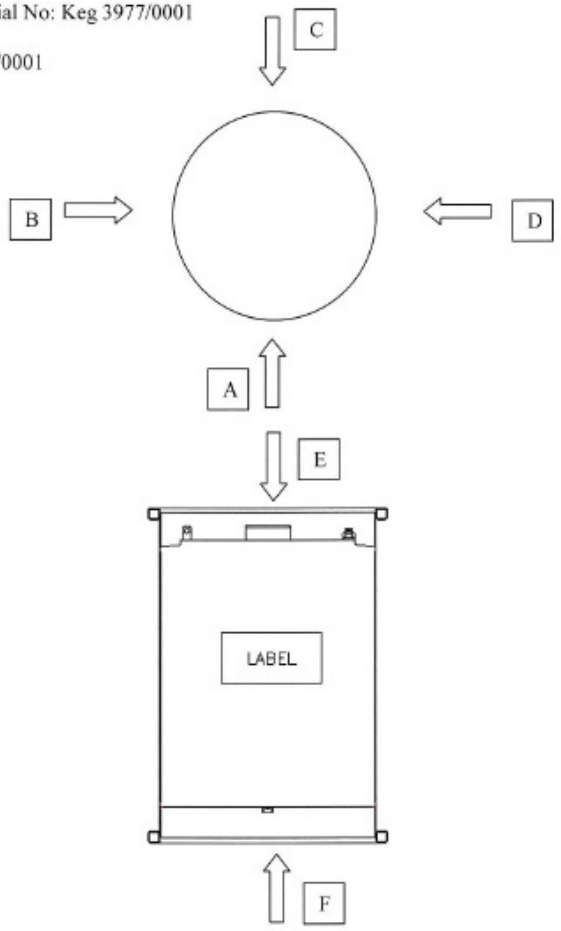
Radiation Survey

CROFT

Project No: Y09/10/04

Package Design/Serial No: Keg 3977/0001

Contents: CV 3978/0001



Distance	Maximum readings taken with Dose Rate Meter CC0016, (micro Sv/h)					
	A	B	C	D	E	F
Surface	9	10	9	11	3	11
1 meter	1	1	1	1	1	2

Test carried out by: I Dingwall Signature: I Dingwall

Date: 03/11/2013