



January 15, 2020

MATERIALS SAFETY LICENSING BRANCH DIVISION OF  
MATERIAL SAFETY, STATE, TRIBAL AND RULEMAKING  
PROGRAMS OFFICE OF NUCLEAR MATERIALS SAFETY  
AND SAFEGUARDS

U.S. NUCLEAR REGULATORY COMMISSION

WASHINGTON, DC 20555-0001

ATTN: Don Lowman

Subject: REQUEST FOR ADDITIONAL INFORMATION REGARDING CHEMPRO TECHNOLOGIES,  
INCORPORATED EXEMPT DISTRIBUTION LICENSE APPLICATION AND SEALED SOURCE  
AND DEVICE REGISTRATION CERTIFICATE APPLICATION

ChemPro Technologies Inc, dba Environics USA, Inc.

Dear Mr. Lowman,

ChemPro Technologies, Inc. Dba Environics USA is pleased to provide the additional information as requested by NRC letter dated January 2, 2020. Our responses are below.

A. Exempt Distribution License

The information related to review of your exempt distribution license application is required by Title 10 of the Code of Federal Regulations (10 CFR) Part 32, Sections 30.20, 32.26, 32.27, 32.28, 32.29, and 32.210 and is described in the relevant guidance document NUREG-1556, Volume 8, titled "Program-Specific Guidance about Exempt Distribution Licenses," available on the NRC public web site (<https://www.nrc.gov/reading-rm/docollections/nuregs/staff/sr1556/v8/>).

Please provide the information required by the regulations. These regulations apply to companies that import products as well as those that manufacture products within the United States. Note that it is the applicant's responsibility to confirm the validity of all information.

1. Paragraph 32.26(a) of 10 CFR requires the applicant to satisfy the general requirements specified in 10 CFR 30.33. To do so, please provide us with a copy of your revised Texas possession license to account for the addition of Model X. Please note that an exempt distribution license cannot be issued until you have provided a copy of the revised possession license in your response to us.

**Response:** Our Texas Possession license is for models referenced in Sealed Source and Device Registration and we have been told that they cannot issue license until ChemProX is listed on the SSD. The below statement concerning models from our Possession License:



14. The licensee is authorized to manufacture and distribute sealed sources and devices in accordance with the following sealed source and device (SSD) registration, and the statements and representations included in the SSD registration:

A. NR-1417-D-101-E dated August 27, 2019 for the device models Chempro Series (100i, FXi, DM, PD)

Our Request to Modify the Possession license is in Appendix 1 of this letter.

2. Please update your radiation exposure evaluation found in your initial application for the Model X as per 10 CFR 32.26, "Requirements to license to manufacture, process, produce, or initially transfer" as follows:

- 32.26(b)(4) - Solubility in water and body fluids of the forms of the identified byproduct material.

- 32.26(b)(6) - Maximum external radiation levels at 5 and 25 centimeters from any external surface for the model X, averaged over an area not to exceed 10 square centimeters, and the method of measurement or calculation.

In your letter dated November 13, 2019, under the section titled, Change B, it states that for the new ChemPro X "The max radiation level at 100 mm (3.93 in.) is 27.2  $\mu$ rem/hr." The radiation levels of the previous models were 1.3  $\mu$ rem/hr at 5 cm thus the radiation level is higher at the longer distance. If you experience the same anomaly when you take the radiation measurements at the distances stated in the above bulleted item, please explain the increase in radiation levels between the ChemPro X and the previously registered models in the ChemPro series. Please note that previously submitted radiation profiles do not support the new values.

- 32.26(b)(8) - Total quantity of byproduct material expected to be distributed annually for model X.

**Response:** In our previous letter there were incorrect radiation level measurements for ChemProX. Please see attachment "ChemProX drawing ED28002 rev 5, page 3 (Appendix 2) and ChemProX Meas Unit Drawing ED29312 rev 3, page 3 (Appendix 2) for new measurements from distances 5 and 25 centimeters, max radiation level is 10  $\mu$ rem/hr at 5cm.

Upon review of your comments concerning the difference in radiation levels, our research shows that the values listed in the previous license were incorrect. The radiation levels previously measured were <0.1  $\mu$ Sv/h (same as ChemProX) as stated in the STUK test report dated Oct. 2, 2006 (Appendix 3), not 0.01  $\mu$ Sv/h as referenced in the license. It is my understanding that this is the report that was submitted with the earlier license request back in 2006. I can only speculate that a decimal point was misplaced during generation of the previous license back in 2006.

The expected total quantity of byproduct material expected to be distributed annually for ChemProX is 50 millicuries

## B. Sealed Source and Device Registration

1. We note a change in dimensions in the sensor unit between the previously registered



devices in the ChemPro Series and the sensor unit requested for the ChemPro X. Please describe the difference between the two.

**Response:** Please see attachment ChemProX IMS Sensor Unit Dimension comparison-ED29500 rev 1 in Appendix 4. The radiation source, radiation source attachment, radiation shield material and thickness is the same as ChemPro100i

2. Please discuss if there were any changes made to the source shield assembly. This includes any changes in materials or dimensions. If changes were made please provide the prototype testing results and procedures in order to demonstrate that the device will maintain its integrity during normal use and likely accident conditions. Please see NUREG-1556, Volume 3, Rev. 2, Section 10.5, "Prototype Testing", for the forms acceptable prototype testing.

**Response:** Please see attachment "ChemProX IMS Sensor Unit Dimension comparison-ED29500 rev 1 (Appendix 4). The source shield assembly is same as previous ChemPro Models, only miniaturized. ChemProX is ruggedized device designed for military use. It is tested against MIL-STD-810G for drop test, general vibration test and loose cargo test. These reports are submitted in Appendix 5 for your review. We assume that no need for more testing to demonstrate that the device will maintain its integrity during normal use and likely accident conditions.

We are also submitting updated descriptions for Change B and Change C in our initial modification request to better describe the ChemProX device for your consideration.

- Change B

ChemPro Series detectors (100i, FXi, DM and PD) use the same Sensor Unit. The Sensor Unit is 46 mm (1.81 in) long, 21 mm (0.83 in) wide, and 11.9 mm (0.47 in) high. The Am-241 source has no on-off mechanism, and radiation levels are constant during both use and storage. The radiation level at 5 cm (1.97 in) from the surface of a ChemPro detector is measured at 10  $\mu\text{rem/hr}$  (0.1  $\mu\text{Sv/hr}$ ). The Sensor Unit assembly is held together with six (6) Cup Spring lock washers and SecuFast 6-Lobe machine screws. These are stainless steel tamper-proof screws to prevent access to the inside of the device and the radioactive source.

The new ChemProX Sensor Unit is 39.70 mm (1.56 in) long, 17.75 mm (0.70 in.) wide and 15.20 mm (0.60 in.) high. The max radiation level at 5cm (1.97 in.) is 10  $\mu\text{rem/hr}$  (0.1  $\mu\text{Sv/hr}$ ). The Sensor Unit assembly is held together with five (5) Cup Spring lock washers and SecuFast 6-Lobe machine screws. These are stainless steel tamper-proof screws to prevent access to the inside of the device and the radioactive source.

- Change C

The ChemPro X is a new and improved handheld, portable detector with GPS, communications modes and a color display with a new graphic user interface. The device casing consists of front cover, back cover and frame. Front cover and back cover are injection molded fiberglass reinforced covers made of IXEF 1022, a high impact material. Frame is machined from EN AW-6082 grade aluminium. Between covers and frame there is electromagnet protection shields which are made of AISI 304 stainless steel. The device weighs approximately 770 g (27 oz.), with battery pack and its overall dimensions are 160 x 100 x 50 mm (6.3"L x 3.9"W x 2.0"D).



If you have any questions or concerns after reviewing this response, please do not hesitate to contact me.

Respectfully

A handwritten signature in black ink that reads "Michael R. Phillips".

**Michael Phillips**

President/CEO

386-383-0386

michael.phillips@environicsusa.com





## APPENDIX 1

Letter to Texas Department of State Health Services dated 11/22/2019



January 16, 2020  
Round Rock, TX.

Keith Smith  
Industrial Licensing Program  
Radiation Safety Licensing Branch  
Texas Department of State Health Services

Subject: Amendment to Texas Radioactive Material License #L07016

Dear Mr. Smith

ChemPro Technologies Inc. is hereby requesting an amendment to our Radioactive Material License referenced above. Chempro Technologies Inc has a new ChemPro model which we will begin selling in the USA. We would like Section 8A to be modified by adding "ChemProX" to this section. Also, the Sealed Source and Device Registration is also being modified to add the new ChemProX model to it. See the attached letter to NRC and Appendix 2 with requested SS&DR changes.

There will be no changes to the Environics USA Operating Procedures as was recently approved in Amendment 01 dated September 24<sup>th</sup> 2019. As the new model uses the same source as the already approved models in the Material License and the total quantity of allowed sources is not changing, the previously submitted Public Maximum Radiation Exposure Justification will remain unchanged.

We would appreciate your expeditious processing of this amendment and thank you in advance for yours efforts.

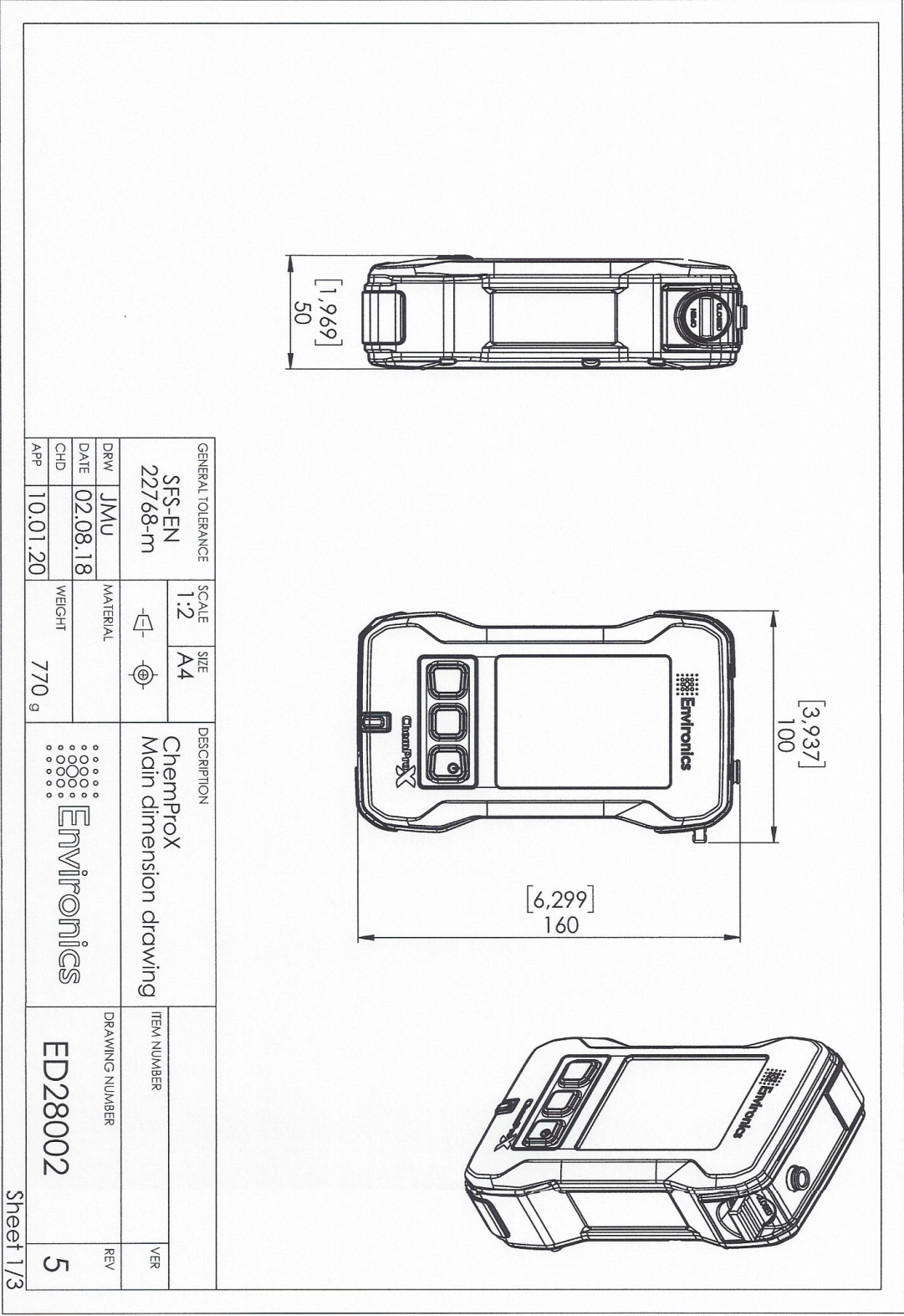
If you have any questions or concerns after reviewing this request, please do not hesitate to contact me at (386) 383-0386 or michael.phillips@environicsusa.com.

Respectfully,

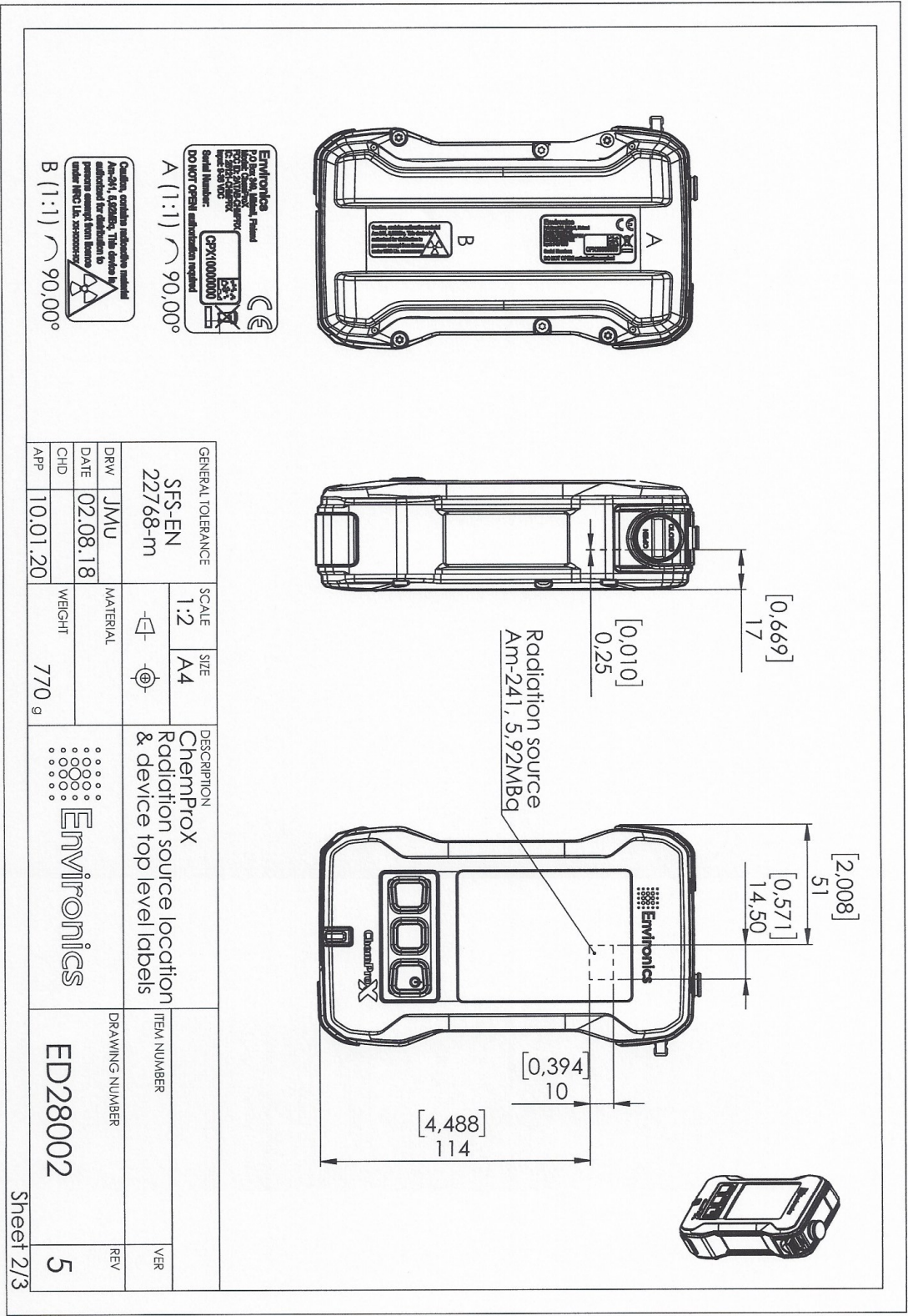
**Michael Phillips**  
President/CEO  
386-383-0386



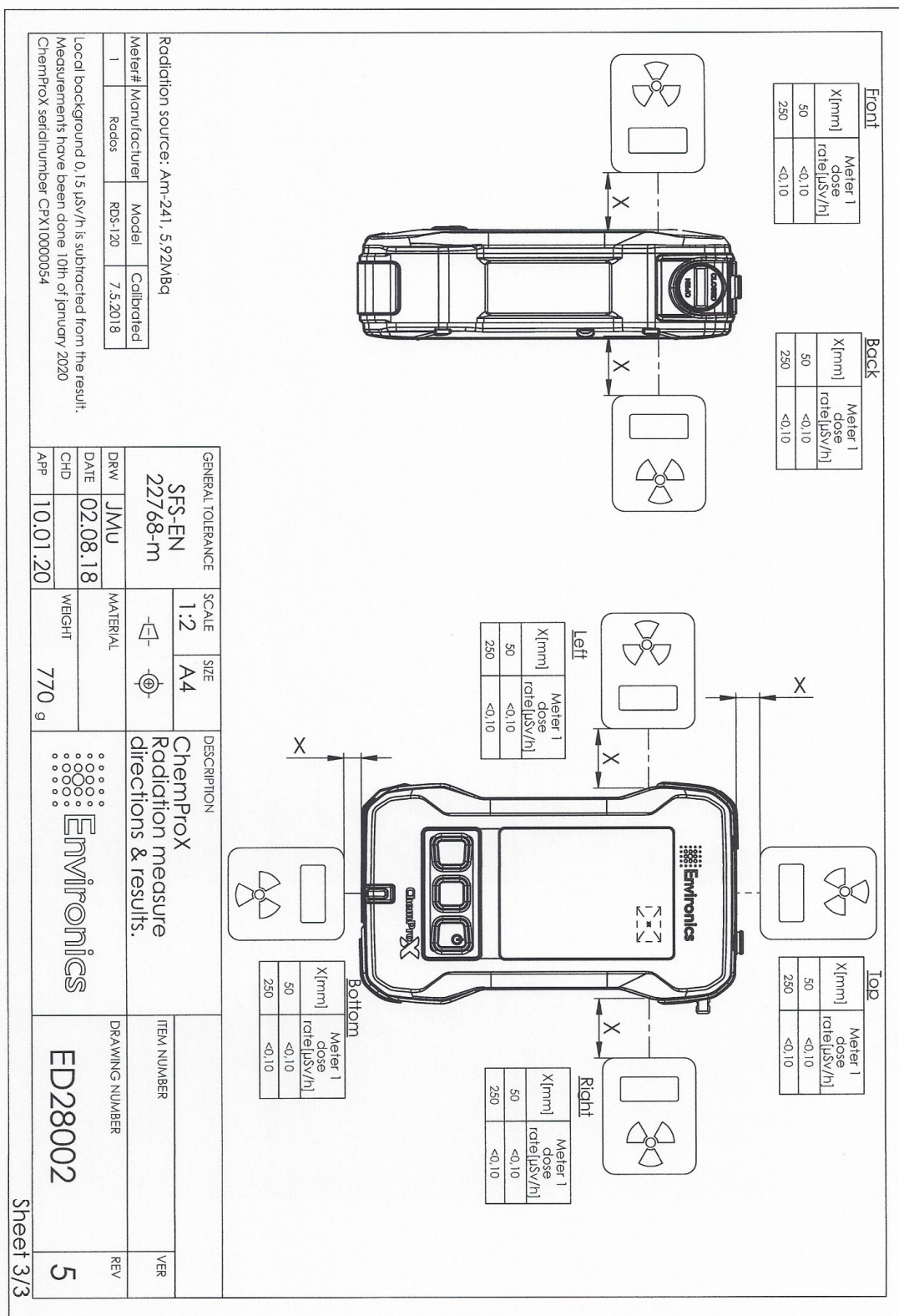
## Appendix 2 Radiation Measurement for ChemPro X System and Sensor Unit

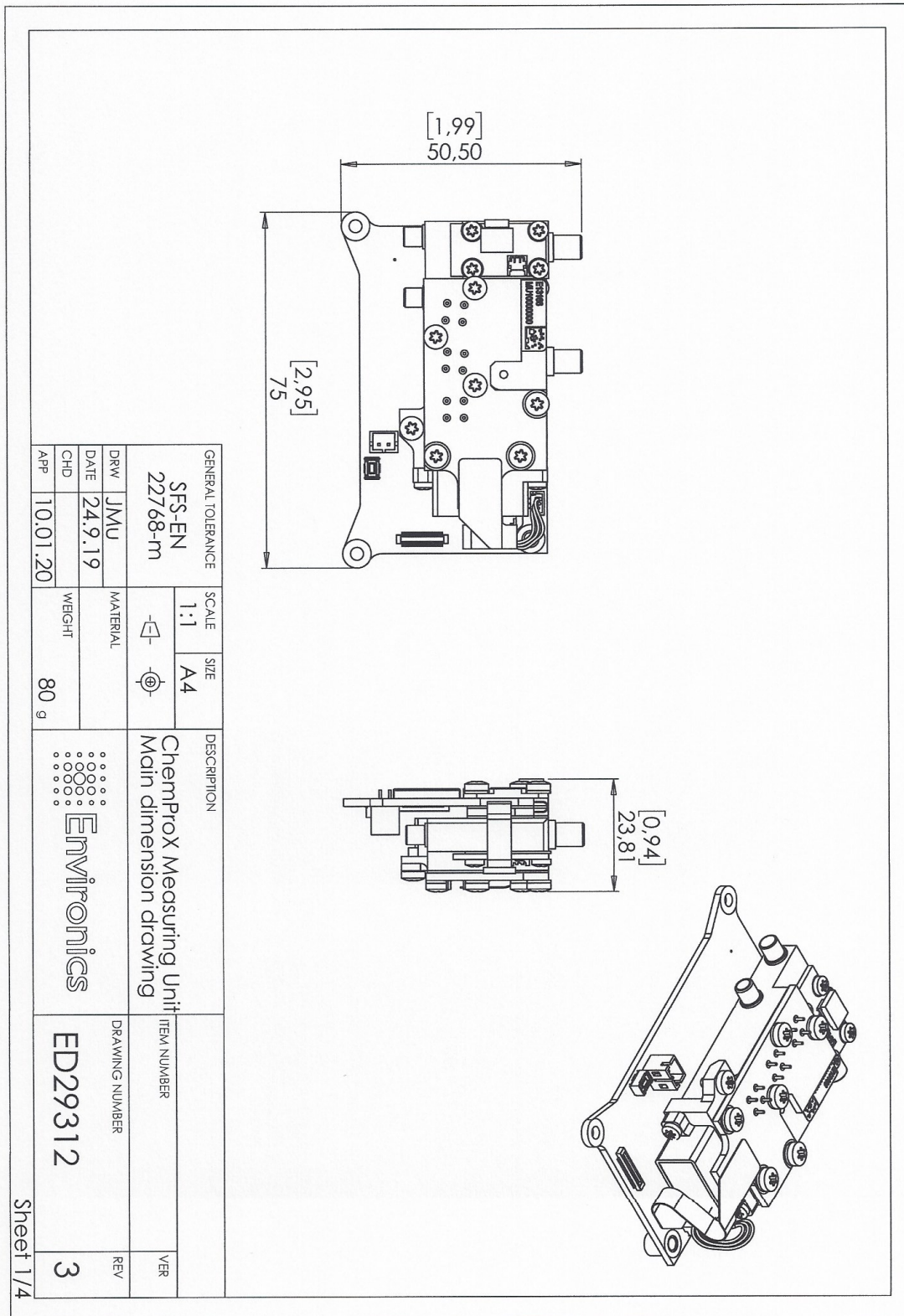




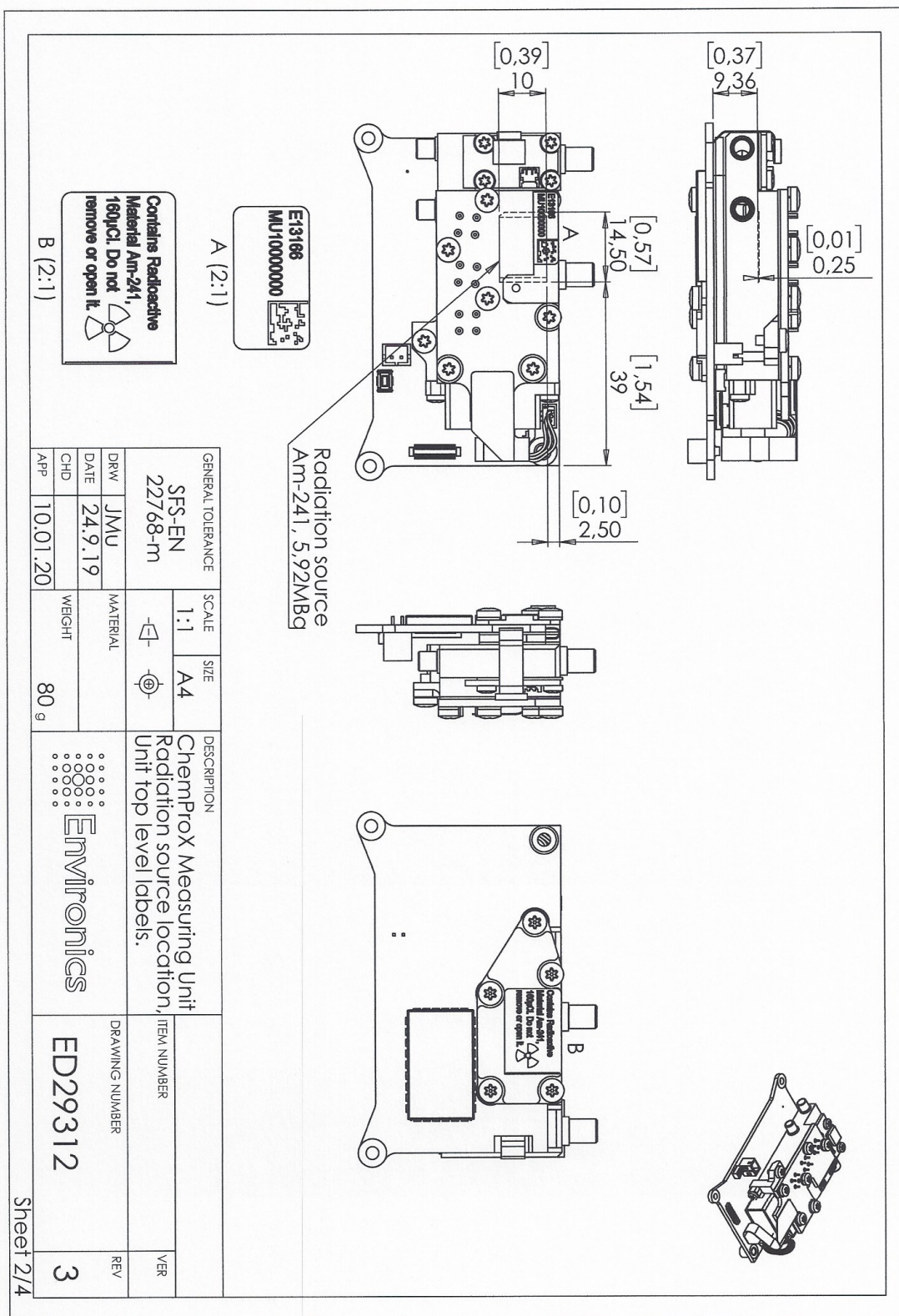


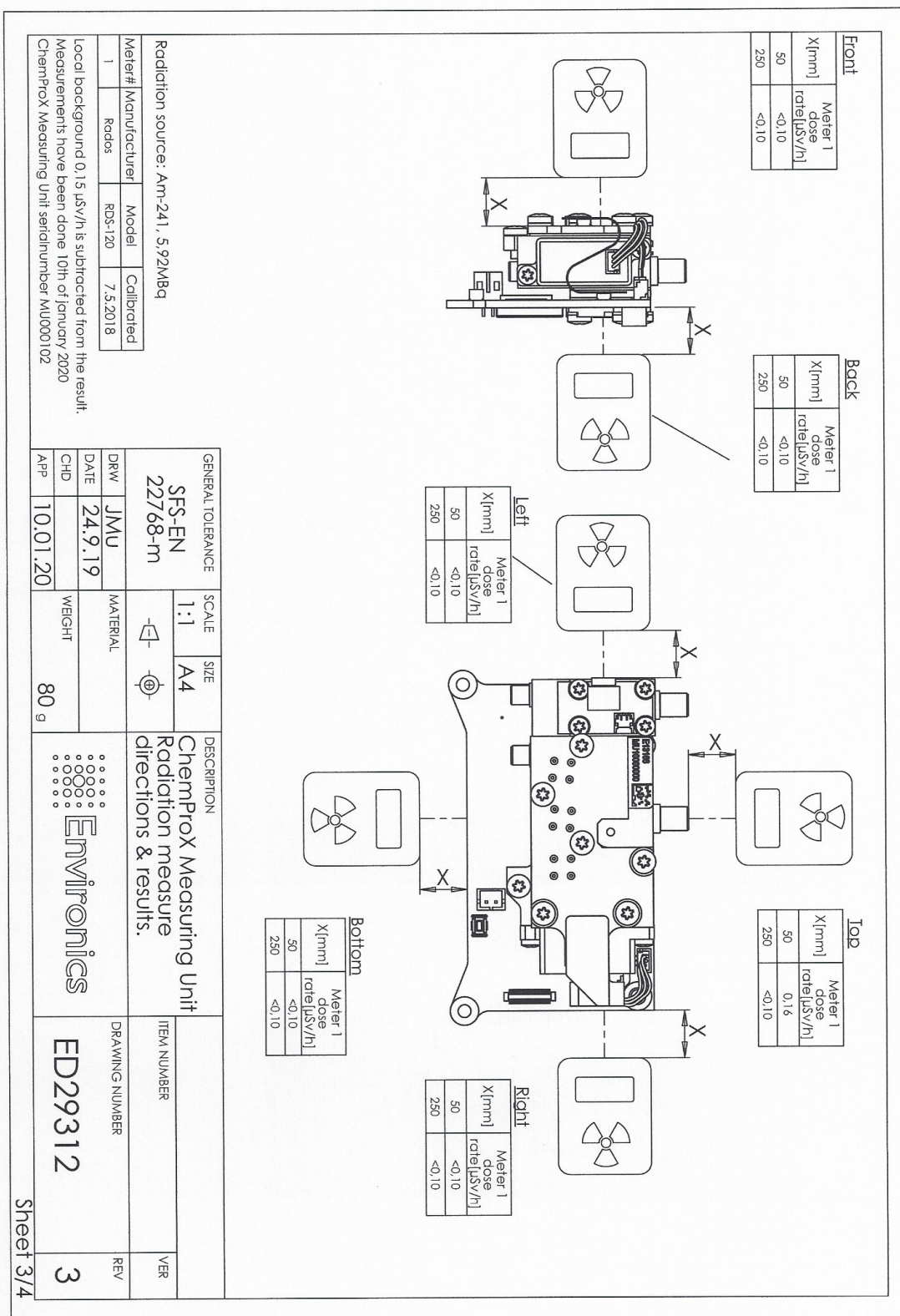




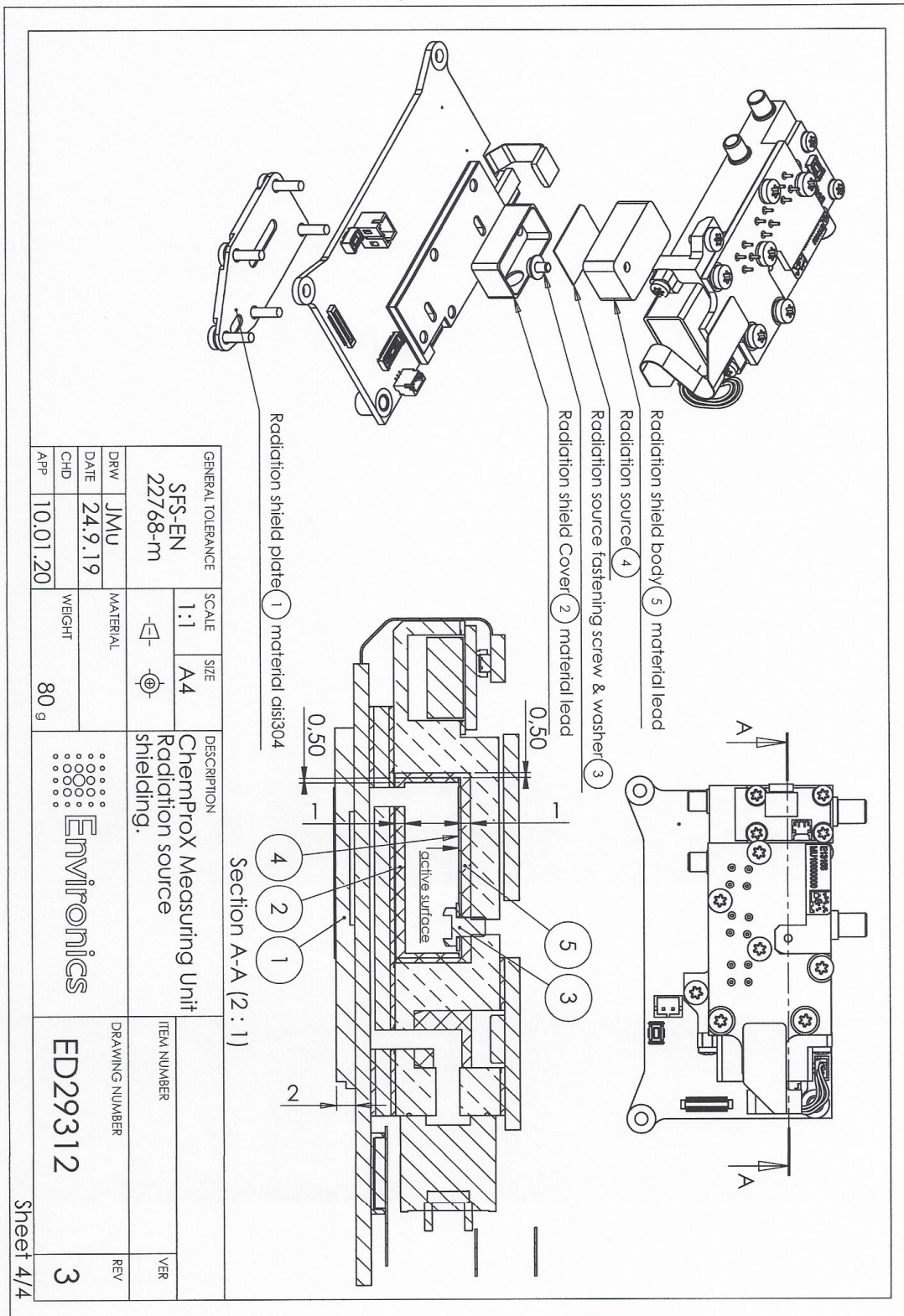
















APPENDIX 3  
ChemPro100 Radiation Measurement by STUK  
Report dated Oct.2, 2006



Radiation and Nuclear Safety  
Authority In Finland

PROTOCOL

1 (2)

2.10.2006

5/311/06

### MEASURING REPORT

Inspected instrument: Chemical Warfare Agent Detector  
Type: ChemPro 100  
Serial number: CP100 V3 PROTO 20  
Manufacturer: Environics Oy  
P.O.Box 349  
FIN-50191 MIKKELI  
Radiation source: 5.9 MBq, <sup>241</sup>Am  
Date of inspection: 27.9.2006  
Place of inspection: STUK, Helsinki, Finland  
Measured by: Inspector Markku Koskelainen  
Measuring equipment: Cardinal Health, Victoreen 451P-DE-SI-R4R, Calibrated 12.11.2004  
Mini-Instruments, Mini-Monitor Series 900 with scintillation probe 42 A  
Calibrated 12.9.2006

ChemPro 1000 is a portable chemical warfare agent detector utilising ionising radiation to identify chemical agents. The ionising radiation in the detector is produced by a 5,9 MBq <sup>241</sup>Am source.

Following dose rate measurements were made:

1. External dose rate on various sides of the instrument
2. External dose rate on various sides of the sensor unit detached from the instrument
3. External dose rate on various sides of the source box

Results of measurements with Victoreen 451P-DE-SI-R4R

Local background 0,15 µSv/h is subtracted from the results. Key for measuring directions is given in attached figures.

1. Dose rates (µSv/h) on various sides of the instrument (Figure 1, drawing number ED01858)

measuring direction	A	B	C	D	E	F
at 5 cm distance	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
at 25 cm distance	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
measuring direction	G	H	I	J		
at 5 cm distance	<0.1	<0.1	<0.1	<0.1		
at 25 cm distance	<0.1	<0.1	<0.1	<0.1		

2. Dose rates (µSv/h) on various sides of the sides of the sensor unit detached from the instrument (Figure 2, drawing number ED01860)

measuring direction	A	B	C	D
at 5 cm distance	<0.1	0.1	<0.1	<0.1
at 25 cm distance	<0.1	<0.1	<0.1	<0.1



3. Dose rates ( $\mu\text{Sv/h}$ ) on various sides of the source box (Figure 3, drawing number ED01862)

measuring direction	A	B	C	D	E
at 5 cm distance	<0.1	0.1	<0.1	<0.1	<0.1
at 25 cm distance	<0.1	<0.1	<0.1	<0.1	<0.1

Results of measurements with Mini-Monitor Series 900 with scintillation probe 42 A

Counts per second converted to dose rate in accordance to instruction manual figure 4, Gamma dose response of type 42 probe. Average energy for photons is assumed to be 30 keV. Local background 0,15  $\mu\text{Sv/h}$  is subtracted from the results. Key for measuring directions is given in attached figures.

1. Dose rates ( $\mu\text{Sv/h}$ ) on various sides of the instrument (Figure 1, drawing number ED01858)

measuring direction	A	B	C	D	E	F
at 5 cm distance	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
at 25 cm distance	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

measuring direction	G	H	I	J
at 5 cm distance	<0.1	<0.1	<0.1	<0.1
at 25 cm distance	<0.1	<0.1	<0.1	<0.1

2. Dose rates ( $\mu\text{Sv/h}$ ) on various sides of the sides of the sensor unit detached from the instrument (Figure 2, drawing number ED01860)

measuring direction	A	B	C	D
at 5 cm distance	<0.1	0.35	<0.1	0.35
at 25 cm distance	<0.1	<0.1	<0.1	<0.1

3. Dose rates ( $\mu\text{Sv/h}$ ) on various sides of the source box (Figure 3, drawing number ED01862)

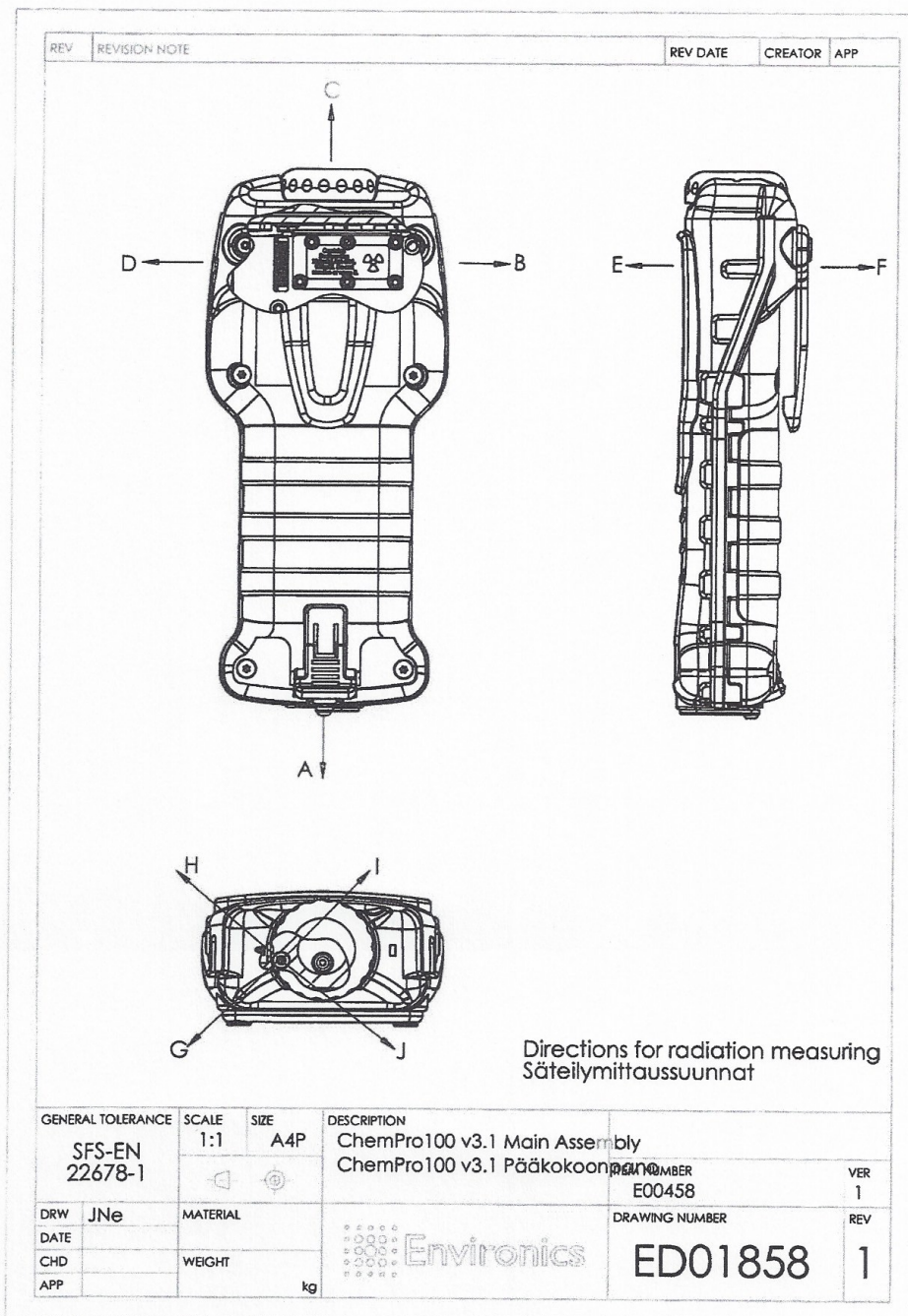
measuring direction	A	B	C	D	E
at 5 cm distance	0.35	0.35	<0.1	0.35	0.35
at 25 cm distance	<0.1	<0.1	<0.1	<0.1	<0.1

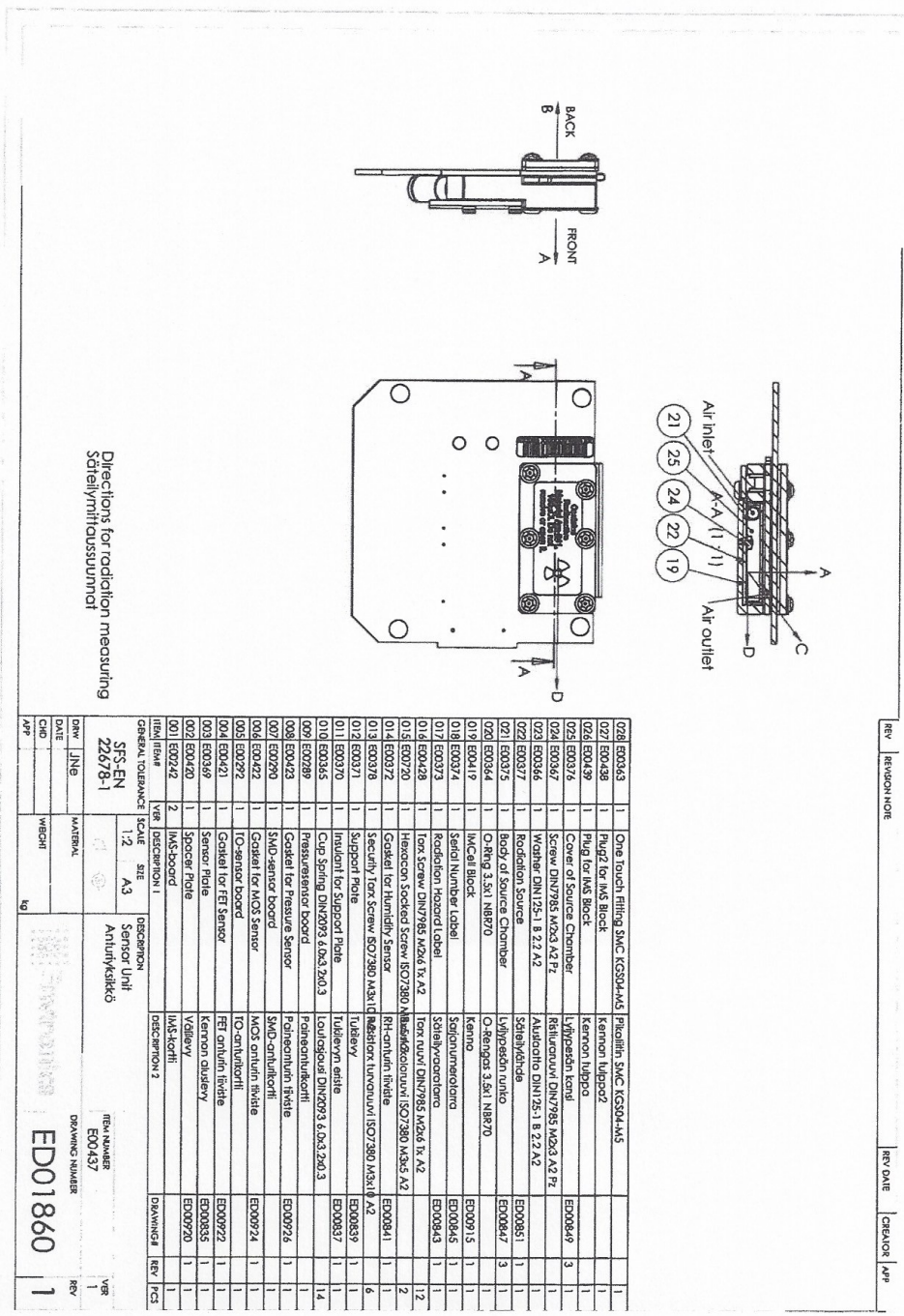
The maximum dose rate 0.35  $\mu\text{Sv/h}$  was detected from all sides of the source at 5 cm distance from the source box. All dose rates at 25 cm distance are below 0.1  $\mu\text{Sv/h}$ .

Markku Koskelainen  
Inspector

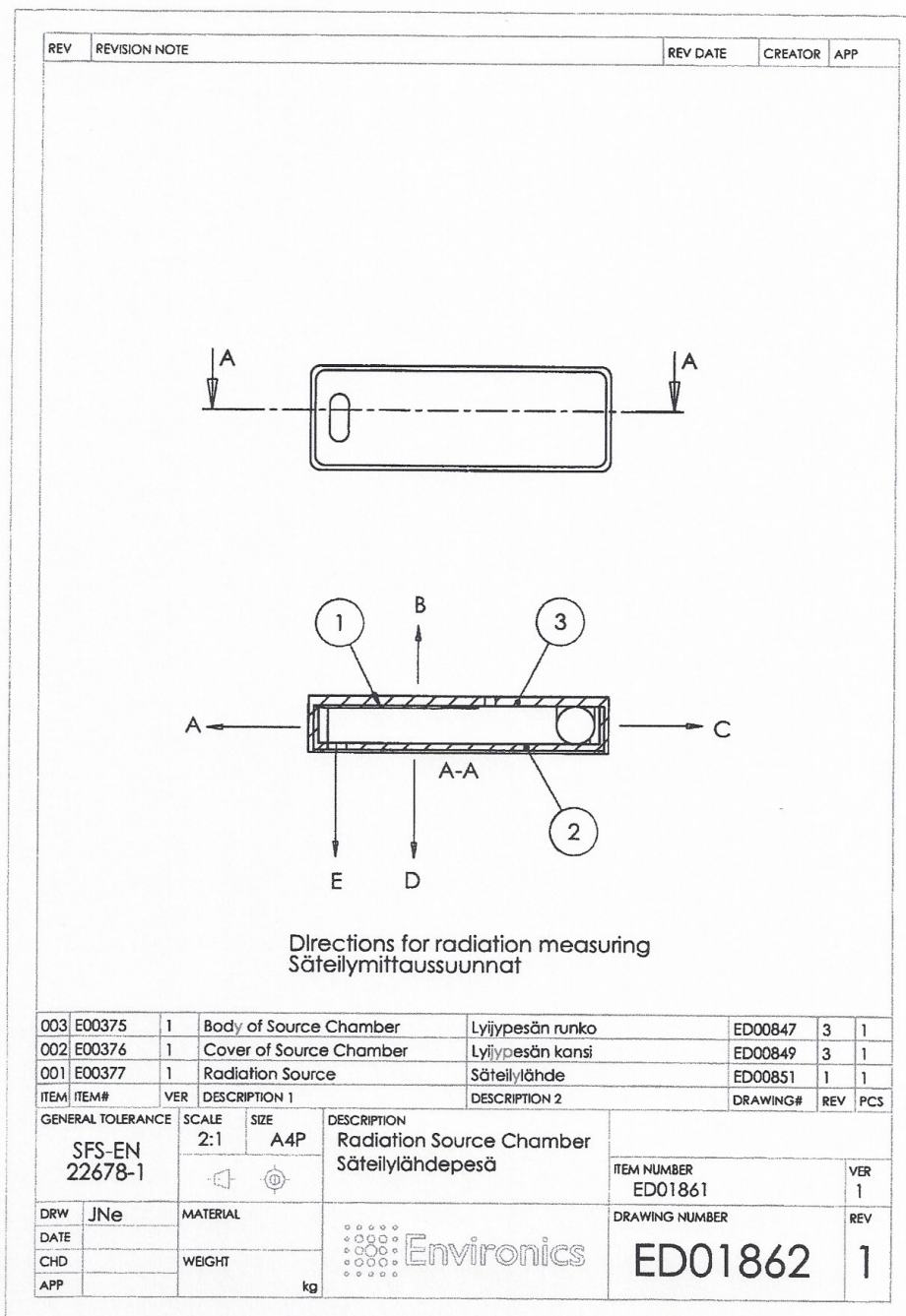
Attachments: Figures 1-3











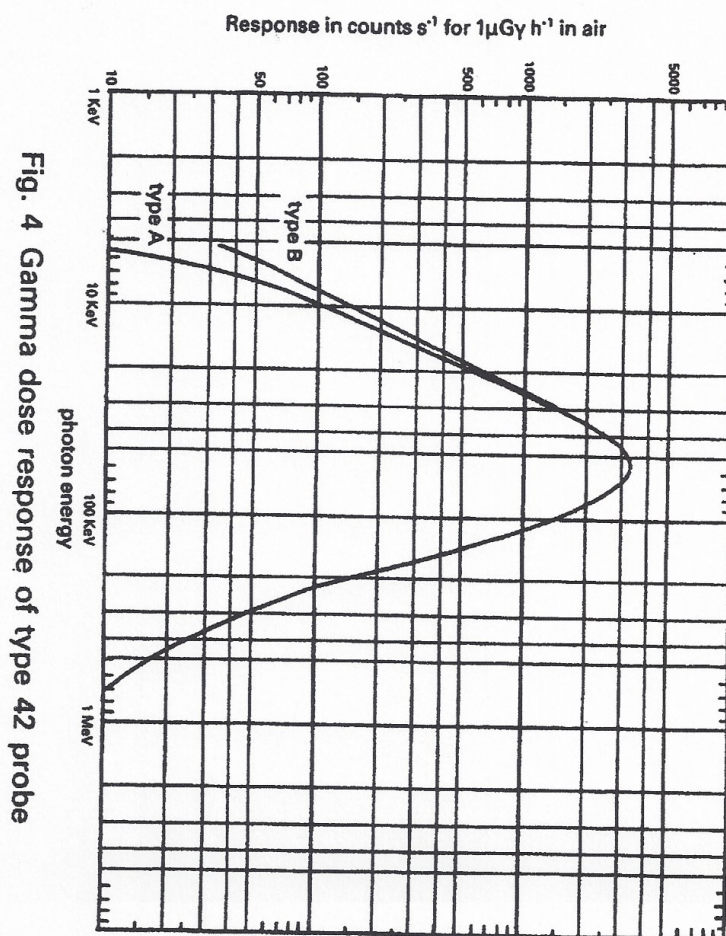


Fig. 4 Gamma dose response of type 42 probe

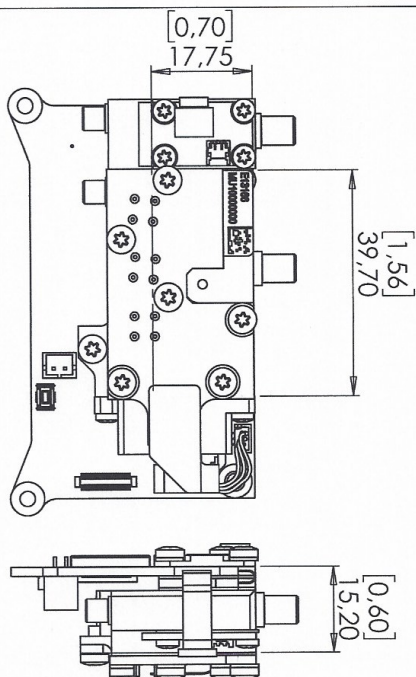


## APPENDIX 4 ChemPro X vs ChemPro100 IMS Sensor Unit Comparison

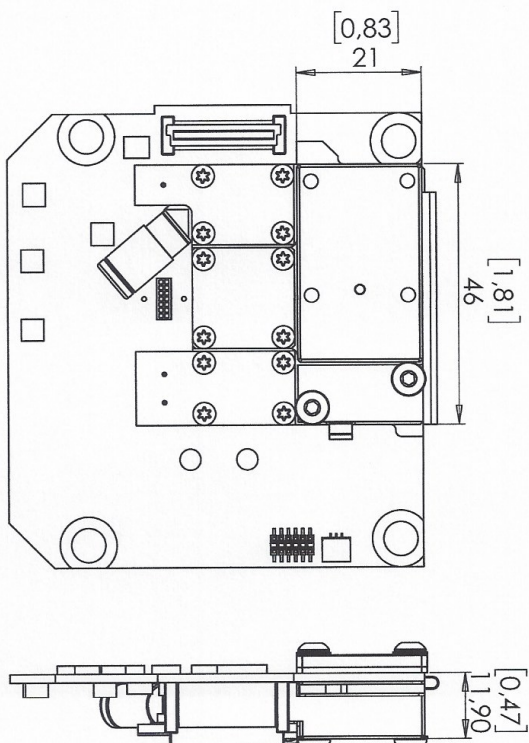




ChemProX IMS Sensor unit dimensions:



ChemPro 100i, FXi, DM, PD IMS sensor unit dimensions:



IMS sensor unit in ChemProX is miniaturized version of previous version IMS sensor unit.  
Radiation source, radiation source fixation, thickness of radiation shields are exactly same as in previous version.

GENERAL TOLERANCE		SCALE		SIZE	DESCRIPTION		
SFS-EN 22768-m				A4		ITEM NUMBER	VER
DRW	JMU	MATERIAL			ChemProX IMS Sensor Unit Dimension Comparison	DRAWING NUMBER	REV
DATE	10.1.20						
CHD		WEIGHT					
APP		kg					
						ED29500	1



## **APPENDIX 5**

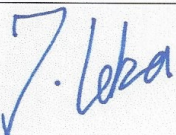
### **Environmental Test Reports**

### **General Vibration, Loose Cargo, Shock**





Test report 1 (6)  
Customer: Environics Oy

Numbers of pages:	6	Date of Report:	01.07.2019
		Contact Person:	Sami Inkilä
Testing Laboratory:	Etteplan Embedded Finland Oy	Client:	Environics Oy (Ltd.)
Address:	Mattilanniemi 6-8  FI-40101 Jyväskylä Finland		Contact person: Jussi Miettunen Sammonkatu 12  50130 Mikkeli Finland
Telephone:	+358 9 8565 8600		
email:	<a href="mailto:sami.inkila@etteplan.com">sami.inkila@etteplan.com</a>		<a href="mailto:jussi.miettunen@environics.com">jussi.miettunen@environics.com</a>
Testing has been carried out in accordance with:	Tests were derived from MIL-STD-810G-CHG1 method 514.7 procedure I: "General vibration".		
Test sample:	One (1) gas detector / ChemProX. DUT was ON during tests.		
Test result:	PASS		
Tested by:	Sami Inkilä and Juho Leikas		
Reported by:	Juho Leikas		
Signature:	<div><div>Digitally signed by Juho Leikas DN: cn=Juho Leikas, o=Etteplan, ou, email=juho.leikas@etteplan.co m, c=FI Date: 2019.07.01 13:06:44 +03'00'</div></div>		



Test report 2 (6)  
Customer: Environics Oy

## Table of Contents

1. Overview .....	3
2. Reference .....	3
3. Acceptance criteria .....	3
4. Equipment Under Tests .....	3
5. Severities .....	4
6. Humidity and temperature .....	5
7. Control strategy .....	5
8. Testing equipment .....	5
9. Calibration traceability .....	5
10. Test setup images .....	6
11. Test result .....	6



Test report 3 (6)  
Customer: Environics Oy

## 1. Overview

**MIL-STD-810G-CHG1 method 514.7 procedure I: General vibration:** this procedure I is used for materiel to be transported as secured cargo or deployed for use on a vehicle. This procedure applies to ground vehicles as well as fixed and rotary wing aircraft. For this procedure, the test item is secured to a vibration exciter, and vibration is applied to the test item as an input at the fixture/test item interface. Steady state or transient vibration may be applied as appropriate.

Test was executed at Jyväskylä, Etteplan Embedded Finland Oy's test laboratory during 22.03.2019.

## 2. Reference

Test severities were derived from MIL-STD-810G-CHG1 method 514.7 procedure I: General vibration.

## 3. Acceptance criteria

MIL-STD-810G-CHG1 method 514.7: *A vibration qualification test is complete when all elements of the test item have successfully passed a complete test.*

## 4. Equipment Under Tests

Sample Under Tests:		Mechanical / Software version:
ChemProX	Serial number: CPX10000055	1 / 5.4.0.





Test report 4 (6)  
Customer: Environics Oy

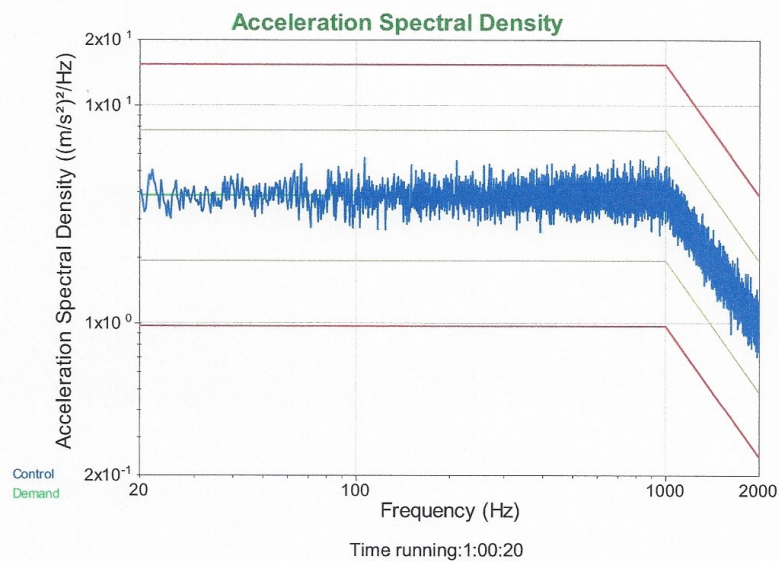
## 5. Severities

### 5.1. Broad band random vibration

**Acceleration:** 7.697 G RMS  
**Velocity:** 0.06952 m/s RMS  
**Amplitude:** 1.942 mm peak-peak  
**Test duration (hh:mm:ss) and level:** 1:00:00 100 %  
DUT set ON during the exposure.

### 5.2. Breakpoint table

Freq	Amp
20 Hz	3.847
1000 Hz	3.847 - 6 dB
2000 Hz	0.9663

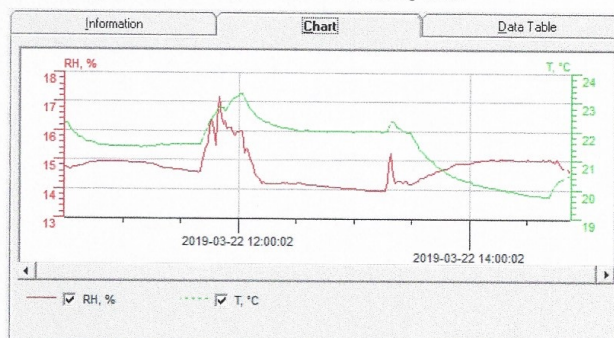




Test report 5 (6)  
Customer: Environics Oy

## 6. Humidity and temperature

Temperature and humidity recorded in vibration test room during tests:



## 7. Control strategy

Single sensor was used to drive the vibration system.

## 8. Testing equipment

Following test equipment setup was used in sinusoidal vibration test:

- Medallion II vibration controller, serial number 952670EF
- Acceleration sensor at channel 1 (serial number LW243323)
- LDS HPAK power amplifier (HPA-K v2 CE, serial number S6896-004/1)
- Air cooled vibrator (V790-335T SP serial number S6896-001/1) attached to Weiss WT11-180/4 temperature chamber
- Vaisala HMP77B temperature and humidity gauge
- Test jigs between DUT and vibration table

## 9. Calibration traceability

### 9.1. Medallion II vibration controller

Serial Number: 952670EF  
Calibration due date: Mar 19, 2019

### 9.2. Acceleration sensor used in control loop

Channel	Sensitivity	Serial number and calibration due date
Ch1	101.4 mV/G	Mar 19, 2020

### 9.3. Vaisala temperature and humidity gauge HMP77B

Calibration certificate number is IC-001-0918-Vaisala\_HM70-JM01309, calibration date Sep 12, 2018

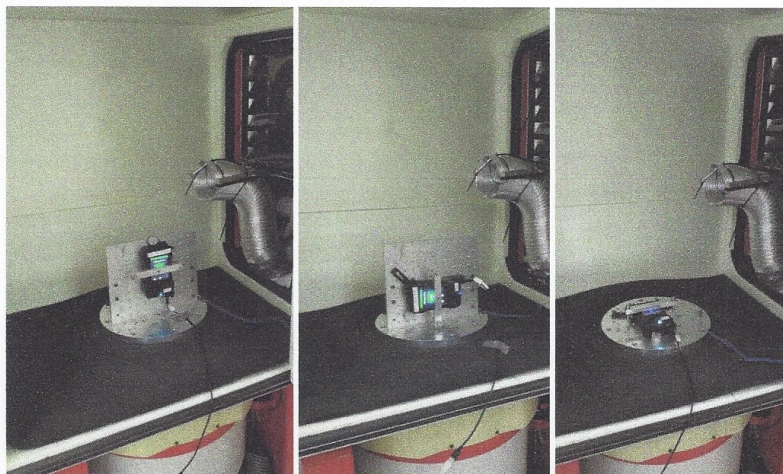




Test report 6 (6)  
Customer: Environics Oy

## 10. Test setup images

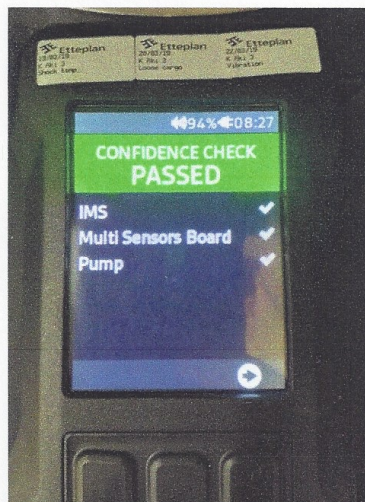
### 10.1. Installation for broadband random test



These images represents the installation to a vibration test system in Z-, and X- and Y- orientations.

## 11. Test result

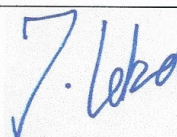
According to MIL-standard the result is pass. Device remained powered on during the whole test. Functionality was checked before the exposures, after each 60 minute exposures to random vibration, and it was found to be normal.







Test report 1 (5)  
Customer: Environics Oy

Numbers of pages:	5	Date of Report:	01.07.2019
		Contact Person:	Sami Inkilä
Testing Laboratory:	Etteplan Embedded Finland Oy	Client:	Environics Oy (Ltd.)
Address:	Mattilanniemi 6-8  FI-40101 Jyväskylä Finland	Contact person:	Jussi Miettunen
Telephone:	+358 9 8565 8600		Sammonkatu 12
email:	<a href="mailto:sami.inkila@etteplan.com">sami.inkila@etteplan.com</a>		50130 Mikkeli Finland
Testing has been carried out in accordance with:	Tests were derived from MIL-STD-810G-CHG-1 method 514.7 procedure II: Loose Cargo		
Test sample:	One (1) gas detector / ChemProX. DUT was ON during tests.		
Test result:	PASS		
Tested by:	Sami Inkilä and Juho Leikas		
Reported by:	Juho Leikas		
Signature:	<div><div>Digitally signed by Juho Leikas DN: cn=Juho Leikas, o=Etteplan, ou, email=juho.leikas@etteplan.com, c=FI Date: 2019.07.01 13:04:43 +03'00'</div></div>		



Test report 2 (5)  
Customer: Environics Oy

## Table of Contents

1. Overview .....	3
2. Reference .....	3
3. Acceptance criteria .....	3
4. Equipment Under Tests .....	3
5. Severities .....	3
6. Humidity and temperature .....	4
7. Control strategy .....	4
8. Testing equipment .....	4
9. Equipment calibrations .....	4
10. Test setup images .....	5
11. Test result .....	5





Test report 3 (5)  
Customer: Environics Oy

## 1. Overview

**MIL-STD-810G-CHG1 method 514.7 procedure II: Loose Cargo:** this procedure is used for material to be carried in/on trucks, trailers, or tracked vehicles and not secured to (tied down in) the carrying vehicle. The test severity is not tailorable, and represents loose cargo transport in military vehicles traversing rough terrain.

Test was executed at Jyväskylä, Etteplan Embedded Finland Oy's test laboratory during 20.03.2019.

## 2. Reference

Test severities were derived from MIL-STD-810G-CHG1 method 514.7 procedure II: Loose Cargo.

## 3. Acceptance criteria

MIL-STD-810G-CHG1 method 514.7: *A vibration qualification test is complete when all elements of the test item have successfully passed a complete test.*

## 4. Equipment Under Tests

Sample Under Tests:		Mechanical / Software version:
ChemProX	Serial number: CPX10000055	1 / 5.3.6.

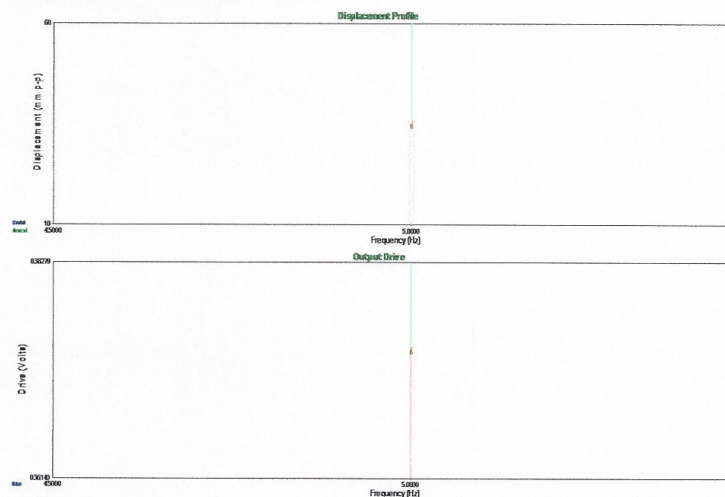
## 5. Severities

Loose cargo

DUT set ON during exposure.

**Amplitude:** 25.4 mm

**Test duration (hh:mm:ss) and level:** 0:20:00 100 % at 5 Hz



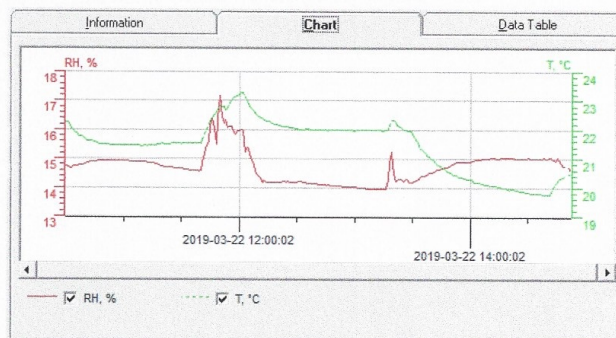




Test report 4 (5)  
Customer: Environics Oy

## 6. Humidity and temperature

Temperature and humidity recorded in vibration test room during tests:



## 7. Control strategy

Single sensor was used to drive the vibration system.

## 8. Testing equipment

Following test equipment setup was used in sinusoidal vibration test:

- Medallion II vibration controller, serial number 952670EF
- Acceleration sensor at channel 1 (serial number LW243323)
- LDS HPAK power amplifier (HPA-K v2 CE, serial number S6896-004/1)
- Air cooled vibrator (V790-335T SP serial number S6896-001/1) attached to Weiss WT11-180/4 temperature chamber
- Vaisala HMP77B temperature and humidity gauge
- Test jigs between DUT and vibration table

## 9. Equipment calibrations

### 9.1. Medallion II vibration controller

Serial Number: 952670EF

Calibration due date: Mar 2019

### 9.2. Acceleration sensor used in control loop

Channel	Sensitivity	Serial number and calibration due date
Ch1	101.4 mV/G	Mar 19, 2020

### 9.3. Vaisala temperature and humidity gauge HMP77B

Calibration certificate number is IC-001-0918-Vaisala\_HM70-JM01309, calibration date Sep 12, 2018



Test report 5 (5)  
Customer: Environics Oy

## 10. Test setup images



These images represents the setup for loose cargo testing.

## 11. Test result

According to MIL-standard the result is pass. Device remained powered on during the whole test. Functionality was checked before and after the exposure, and it was found to be normal. The warning triangle in the top of the screen is a result of a low battery.







Test report 1 (8)  
Customer: Environics Oy (Ltd.)

Numbers of pages:	8	Date of Report:	01.07.2019
		Contact Person:	Sami Inkilä
Testing Laboratory:	Etteplan Embedded Finland Oy	Client:	Environics Oy (Ltd.)
Address:	Mattilanniemi 6-8  FI-40101 Jyväskylä Finland	Contact person:	Jussi Miettunen
Telephone:	+358 9 8565 8600		Sammonkatu 12
email:	<a href="mailto:sami.inkila@etteplan.com">sami.inkila@etteplan.com</a>		50130 Mikkeli Finland
			<a href="mailto:jussi.miettunen@environics.com">jussi.miettunen@environics.com</a>
Testing has been carried out in accordance with:	Tests were derived from MIL-STD-810G-CHG1, method 516.7, Shock procedure IV – "Transit Drop"		
Test sample:	Five (5) gas detector / ChemProX. DUT was ON during tests.		
Test result:	PASS		
Tested by:	Juho Leikas		
Reported by:	Juho Leikas		
Signature:	<div><div>Digitally signed by Juho Leikas DN: cn=Juho Leikas, o=Etteplan, ou, email=juho.leikas@etteplan.com, c=FI Date: 2019.07.01 12:29:53 +03'00'</div></div>		





Test report 2 (8)  
Customer: Environics Oy (Ltd.)

## Table of Contents

1. Overview .....	3
2. Reference .....	3
3. Acceptance criteria .....	3
4. Equipment Under Tests .....	3
5. Severities .....	3
6. Testing equipment .....	3
7. Test setup images .....	4
8. Test result .....	8



Test report 3 (8)  
Customer: Environics Oy (Ltd.)

## 1. Overview

### MIL-STD-810G-CHG1 method 516.7, Shock procedure IV – Transit Drop:

*This procedure is used to determine if the materiel is capable of withstanding the shocks normally induced by loading and unloading when it is (1) outside of its transit or combination case, e.g., during routine maintenance, when being removed from a rack, being placed in this transit case, etc., or (2) inside its transit or combination case. Such shocks are accidental, but may impair the functioning of the materiel.*

The scope of this report is to describe the test procedures used for the product in the Etteplan Embedded Finland's Jyväskylä laboratory by its staff, and the test results. Tests were executed on 3.4.2019.

## 2. Reference

Test severities were derived from MIL-STD-810G-CHG1 method 516.7 procedure IV.

## 3. Acceptance criteria

The equipment under testing must maintain its functionality during and after exposure and no major material defects are allowed.

## 4. Equipment Under Tests

Samples Under Tests:		Software version:
ChemProX	Serial number: CPX10000053	0.5.4.0
ChemProX	Serial number: CPX10000055	0.5.4.0
ChemProX	Serial number: CPX10000057	0.5.4.0
ChemProX	Serial number: CPX10000058	0.5.4.0
ChemProX	Serial number: CPX10000077	0.5.4.0
MIL-STD-810G-CHG1 Page 581/1086: Note 5: If desired, divide the 26 drops among no more than five test items (see paragraph 4.6.5.1).		

## 5. Severities

DUT was set ON during testing.

Dropping height: 1.22 m

Drop surface: 5 cm plywood+hardwood

Orientation: Drop on each face, edge and corner; total of 26 drops with 5 units.

## 6. Testing equipment

Following test equipment setup was used in tests:

- Guided free fall tester, Automation assistant LG3000
- Cross line laser, Meganex
- in some orientations a plexiglass was glued to the unit to get a better grip for the drop



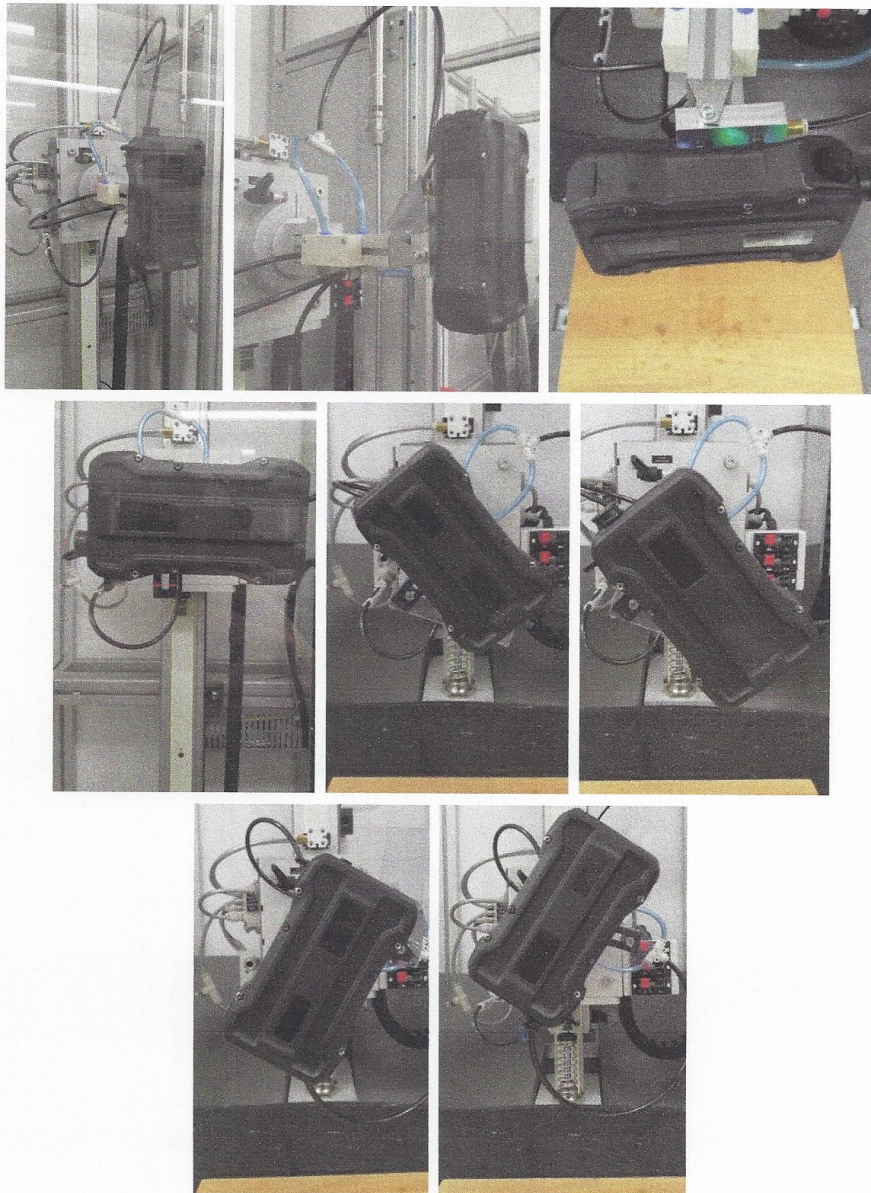




Test report 4 (8)  
Customer: Environics Oy (Ltd.)

## 7. Test setup images

1 - 8 Drops: ChemProX CPX10000055 -unit

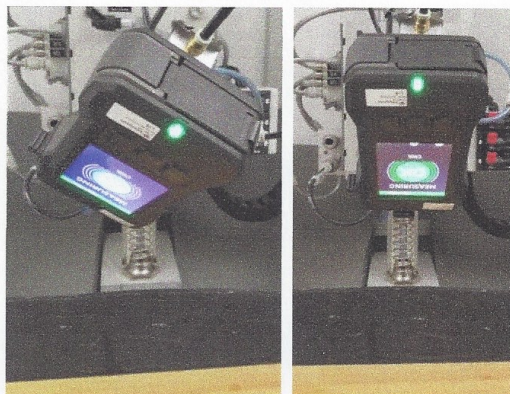
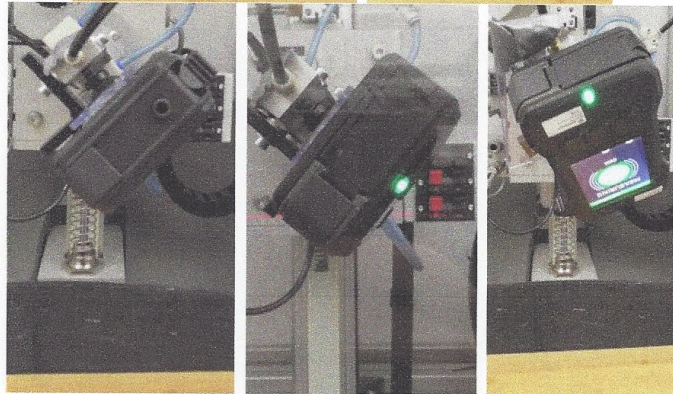
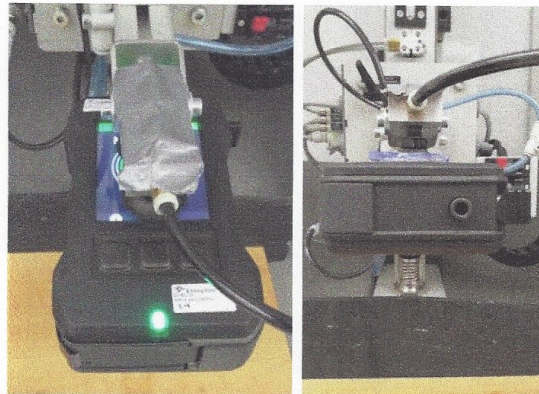






Test report 5 (8)  
Customer: Environics Oy (Ltd.)

9 - 15 Drops: ChemProX CPX10000058 -unit

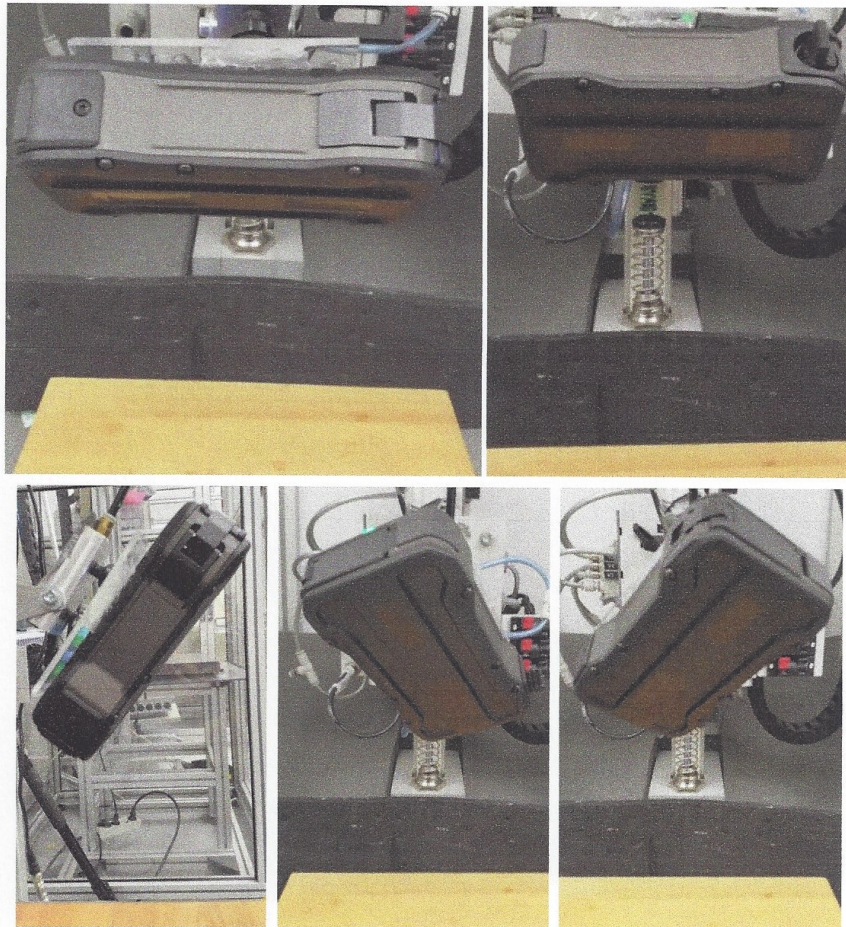






Test report 6 (8)  
Customer: Envirionics Oy (Ltd.)

16 - 20 Drops: ChemProX CPX10000057 -unit

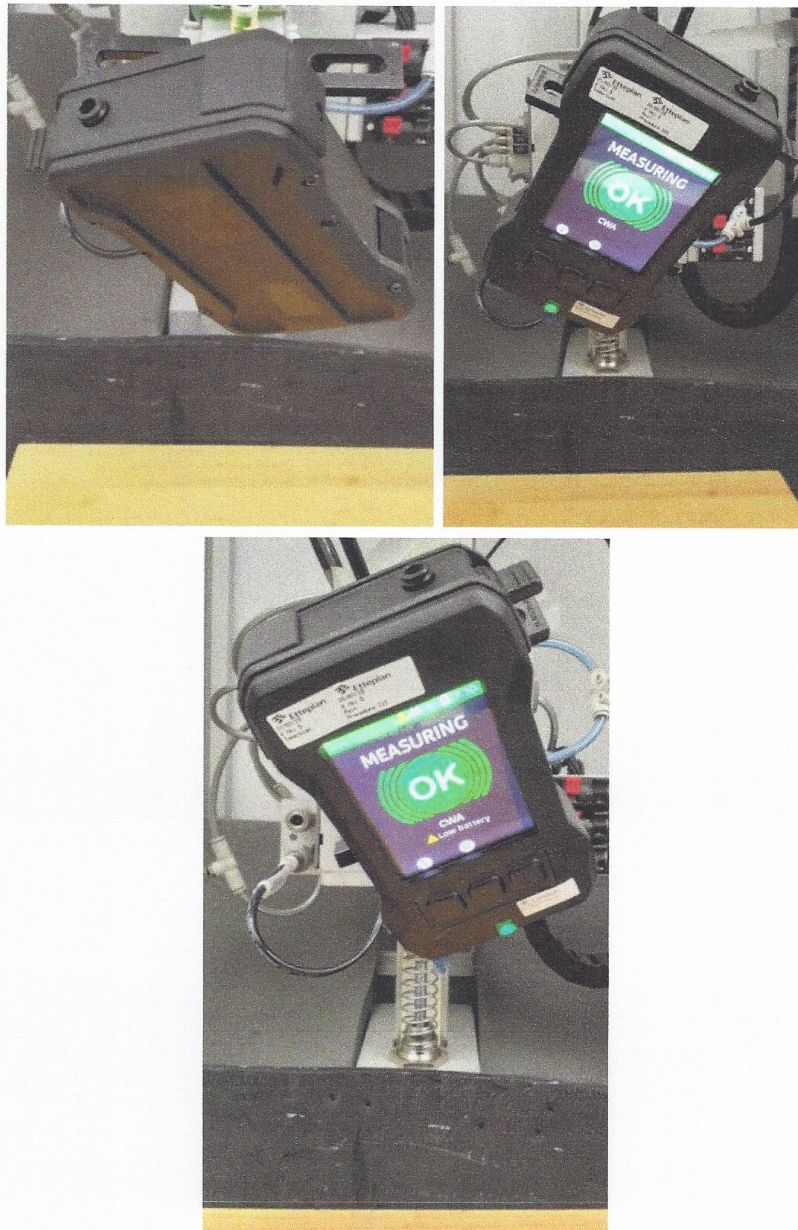






Test report 7 (8)  
Customer: Environics Oy (Ltd.)

21 - 23 Drops: ChemProX CPX10000077 -unit

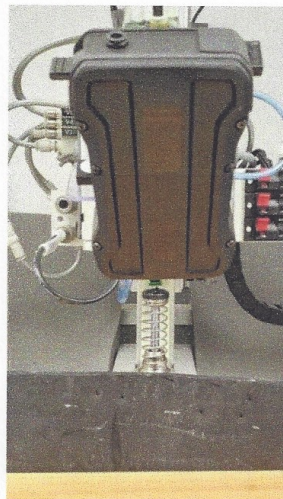
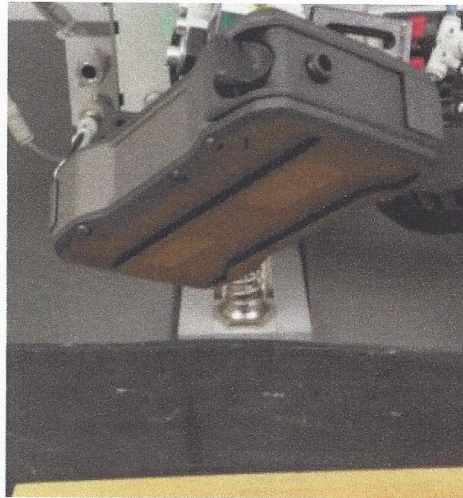






Test report 8 (8)  
Customer: Environics Oy (Ltd.)

24 - 26 Drops: ChemProX CPX10000053 -unit



## 8. Test result

Five units survived the total of 26 drops from 1.22 meters and, according to the MIL-standard, the result is pass. The unit survived the drop, if the functionality was normal, confidence check passed and there weren't damages that could stop the unit from working in rough use. Filter and rain cap were considered to be replaceable and those did have damages on some drops.