STANDARD OPERATING PROCEDURE

Organisation: **TU Dublin - Tallaght**

Section: **School of Engineering**

Procedure Name:	**Code of Conduct within Engineering Laboratory Electric Vehicle Development Lab (EV Lab)**
Procedure No:	**E 2092**
Revision:	**A**
Prepared By:	**Mark Murphy**
Date:	**15/05/13**
Approved By:	**James Wright**
Date:	**15/05/13**

REVISION HISTORY					
Rev	Reason for change	Effective from	Prepared date/by	Approved date/by	Description of change
A	-	Immediate	15/05/13 MM	15/05/13 JW	Initial Release

1.0 POLICY

The School of Engineering provides and maintains laboratories for the purpose of supporting courses run by the School. In order to ensure a safe, learning environment, and to maintain the high standard and quality of laboratory and classroom resources, all users of School laboratories are required, at all times, to comply with the School of Engineering policy outlined below.

2.0 PURPOSE

The purpose of this procedure is to outline to the Institutes staff the proper code of conduct to be observed by all users of the School of Engineering Laboratories.

3.0 ORGANISATIONAL UNITS AFFECTED

All units

4.0 DEFINITIONS

None

5.0 RESPONSIBILITY

It is the responsibility of the Head of School and Heads of Department (Electronic and Mechanical) to ensure compliance with this procedure.

6.0 DESCRIPTION OF PROCEDURE

6.1 Eating and/or drinking in laboratories is not permitted at any time.

6.2 School resources should not be used to download, distribute and/or play games, music or videos.

6.3 School resources must not be used to download, distribute and/or view material, likely to cause offence to others.

6.4 All litter must be disposed of properly in the appropriate bins provided.

6.5 Modification and/or repairs to laboratory equipment or computers must only be performed by ITTD technical support staff or external authorised contractors.

6.6 All persons using the laboratory and its resources must do so with due regard for other users and must behave in a manner that will not cause offence or disruption.

6.7 Laboratory resources must be used for legitimate coursework purposes and authorised activities only.

6.8 It is a condition of use of the laboratory, that users maintain a safe and tidy workspace. On completion of work, users must leave their workspace tidy (all equipment and accessories must be switched off and returned into storage, where applicable, and any waste material must be disposed of in the correct manner). Computer users should logout. Return chairs and any laboratory furniture to their correct positions.

6.9 Laboratory equipment, tools and materials must be used in a proper and responsible manner at all times. If in doubt, consult the supervising lecturer or laboratory technician.

6.10 Where required, users must comply with the wearing of personal protective clothing and accessories, such as safety goggles.

6.11 Laboratory users are obliged to immediately report to the supervising lecturer or laboratory technician, all accidents or equipment faults or damage.

6.14 It is a condition of use of a laboratory that all users must comply with any instructions issued by authorised ITTD staff to ensure best and safe practice within the laboratory environment.

6.15 It is a condition of use of the ***EV Lab*** that all users must comply with the standard operating procedures specified below which govern the safe use of particular laboratory resources/processes deemed to carry a risk associated with their use. These procedures are available from the technical officer responsible for the laboratory.

TBA

These procedures are available from the technical officer responsible for the laboratory.

7.0 REVISION OF THIS PROTOCOL

7.1 Where an error, omission, or possible improvement to this protocol is identified by any member of staff, that information should be brought to the attention of the HOD / HOS as soon as possible in order that this protocol may be revised immediately.

7.2 This protocol will be subject to review at the end of each academic year to reflect any change in Institute, School, or Department policy or any identified error, omission, or improvement.

7.3 All changes will be carried out in accordance with the policy for the *'Generation of new SOPs and update and revision of existing SOPs DR001'.*

Appendix A: Nines Laboratory Risk Assessments and Safety Information

Note:
This laboratory has been temporarily designated for use by Nines Photovoltaics.
The attached risk assessment was conducted and supplied by Nines Photovoltaics and is presented below **Risk Assessment for Nines Photovoltaics – Lab 017A)**

Risk Assessment/Control Data – Lab17A(Nines Photovoltaics)

	Hazard/Consequence	Control	Risk Evaluation	Date Identified	Action Person	Date Rectified
	Chemical Hazard ADE Reactor unintentional opening. Pneumatic circuit could lose energy.	**Mechanical** The reactor is enclosed in a locked and ventilated enclosures that will detect and contain any chemical hazardous release but as an added measure ADE reactor should also be mechanically fixed in the closed position.	Unlikely x Harmful 2	20/7/2016	L Clochard	
	Chemical Hazard At present we have no alarm on the lab room ventilation/ extraction.	**Mechanical control** Add a pressure sensor to the lab room extraction duct and connect the auxiliary contact signal back to the alarms SPC panel.	Likely x slightly harmful 2	20/7/2016	L Clochard	
	Pressurised gas Hazard All Nitrogen/air lines used with Blow Guns should have a maximum line pressure of 30 psi.	**Mechanical control** Air regulator added to all lines used with Blow guns.	Likely x slightly harmful 2	20/06/2016	L Clochard	

Ref	Area	Hazard/Consequence	Control	Risk Evaluation	Date Identified	Action Person	Date Rectified
			systems Gmbh.. See Nines PV Lab 017a Lab SL2SL2 sign off				
	Facilities	**Chemical Hazard** Fault with gas lines/panels containing Fluorine gas.	**Mechanical** All gas lines and panels containing Fluorine gas are specially designed and installed by trained specialist teams. They enclosed in either ventilated and lock boxes or in dual wall containment tubing. All are fitted with leak containment and detection facilitates and exhausted through the emergency scrubber. The gas containment lines are installed and commissioned by Sempa Systems and the then leak check and qualified by FST Tech Services… See Nines PV Lab 017a Lab SL2 Sign off	Unlikely x Harmful 2	20/4/2016	Ed Duffy	22/06/2016
	Facilities	**Manual Handling** Fluorine B50 Cylinder Delivery- Shipped on a pallet.	**Training & Wear correct PPE** Two Persons required, Wear Red Cotton suit provided, Safety boots, Safety Glasses, Face Shield, Nitrile Gloves with Leather Gloves over them. See _F2 Cabinet_Nines SOPs Pallet Lift equipment to be hired or purchased, or request that all future deliveries from Solvay, the truck has a tail-lift.	Unlikely x Harmful 2	25/06/2016	L Clochard	**For next delivery**
	Facilities	**Chemical Hazard** The temperature within the container should	**Mechanical control** Cooling exhaust of Air compressor has been	Unlikely x Slightly Harmful 1	10/06/2016	L Clochard	20/07/2016

Ref	Area	Hazard/Consequence	Control	Risk Evaluation	Date Identified	Action Person	Date Rectified
		be kept below 35 Degrees Celsius as recommended by CS Clean for the scrubber media. Operational Hazard: The useful life of the scrubber media may be reduced.	routed directly to outside of container so that it does not add to internal heating. If excess temperature continues an external cladding may be needed on south facing wall of the container.				
	Facilities	**Oxygen depletion by excess Nitrogen**	**O2 Sensor** The Oxygen level in the container is monitored by a Honeywell sensors. The Honeywell sensor will alert when the sensor cell needs replacing. Also the container is ventilated constantly to reduce the impact of any gas leak or build up.	Unlikely x Very Harmful 3	27/07/2016	L Clochard	27/7/2016
	Facilities	**Manual Handling** Lifting High pressure gas cylinder delivery into container.	**Training & Wear correct PPE** A ramp has been designed to aid the loading of cylinders. Wear slip resistant safety boots which are SRB rated. Only position the ramp outside the container on wet days when you are ready to move the trolley with cylinder into the container. The Ramp Gradient is 12 Degrees.	Likely x Slightly Harmful 2	25/04/2016	Ed Duffy	25/05/2016
	Facilities	**Manual Handling** Exchanging N2 B50 Cylinders: To exchange a Nitrogen cylinder its recommended to blow out the Cylinder valve to remove dust particles by opening the cylinder valve and allowing three short burst of nitrogen to escape before making the connection	**Training & Wear correct PPE** When exchanging a N2 Cylinder the ramp will be in place and this keeps the pedestrian door open and prevents the build-up of nitrogen in the container. The Hazard is the noise generated by the escaping nitrogen which effect a person's hearing. Cylinder exchange Procedure F2 Cabinet_Nines SOPs	Likely x slightly harmful 2	20/06/2016	Ed Duffy	20/7/2016

Ref	Area	Hazard/Consequence	Control	Risk Evaluation	Date Identified	Action Person	Date Rectified
	Lab area 017a - Nines ADE Machine	**Crush Hazard** – Reactor opening and closing for exchanging a Conveyor belt or removing wafers or general maintenance or inspection	**Training & Wear Correct PPE** Trained Engineers only allowed performing this task. A Pressure regulator is used manually to close the reactor with the pneumatic cylinders. The reactor opens under its own weight.	Unlikely x harmful 2	20/06/2016	L Clochard	20/7/2016
	Lab area 017a - Nines ADE Machine	**Chemical Hazard** Fault with gas lines/panels or process reactor containing Fluorine gas.	**Mechanical** All gas lines and panels and the ADE reactor containing fluorine gas are enclosed in ventilated and lock boxes. All are fitted with leak containment and detection facilitates and exhausted through the emergency scrubber. There are two levels of containment in the ADE tool itself and each is fitted with detection devices that shut off supply if a release is detected. This early warning/containment approach ensures that a release from the tool into the lab is highly unlikely. Testing and validation report of these and other safety interlock systems on the ADE tool See Nines PV Lab 017a Lab SL2 Sign off	Unlikely x Very Harmful 3	20/02/2016	L Clochard	20/7/2016
	Lab area 017a - Nines ADE Machine	**High Temperature Hazard** Some parts on Nines ADE machine runs at 300 Degrees Celsius.	**Training & Wear correct PPE** Safety labels for the machine panels The front All hot surfaces are protected from accidental access by doors that are interlocked on the machine. Burn Cream should be made available in the First Aid Kit	Likely x slightly harmful 2	20/06/2016	Ed Duffy	20/7/2016
	Lab area 017a - Nines ADE Machine	**Physical Hazard, Sharp objects** Within the machine and while loading the cassettes silicon wafers	**Training & Wear correct PPE** Suitable container/ bin to be sourced for disposal/ recycling of wafers.	Likely x slightly harmful 2	20/7/2016	Ed Duffy	

Ref	Area	Hazard/Consequence	Control	Risk Evaluation	Date Identified	Action Person	Date Rectified
	Facilities	**Chemical Hazard** In the case of loss of power the electro-mechanical, exhaust fans, valves etc and PLC safety equipment may not perform as desired.	**Electrical** All safety critical system are run vis a dedicated UPS system. There is also a second UPS specifically for the SEMP fluorine gas delivery system.	Unlikely x Harmful 2	1/12/15	L Clochard	20/4/16
	Facilities	**Chemical Hazard** In the event of a fan failure, the safety ventilated enclosures would be ineffective.	**Mechanical** The extraction fans system used two fan redundancy systems. Each Fan can deliver double the require extraction fro all enclosures. If one fan fails the second fan will instantly start-up. All ventilated enclosure are constantly monitors and any loss of extraction shuts down all hazardous gas systems.	Unlikely x Harmful 2	1/12/15	L clochard	20/4/16
	Facilities	**Chemical Hazard** Fluorine -B50 Cylinder fault/leak -F2 20% N2 80% Mix	**Mechanical** The B50 cylinders are stored in a specially designed and commissioned G90 containment cabinet. The G90 cabinet is fitted with leak containment and detection facilitates. The G90 cabinet is exhausted is through an emergency gas scrubber that can pacify 1 full B50 cylinder of 20%F2 in 80% N2 gas. This system has been fully commissioned by its supplier SEMPA	Unlikely x Harmful 2	20/04/2016	Ed Duffy	22/06/2016

FLUORINE/NITROGEN (20/80)

SECTION 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

- Product name : **FLUORINE/NITROGEN (20/80)**
- Molecular formula : F2/N2
- Type of product : Mixture

1.2. Relevant identified uses of the substance or mixture and uses advised against

- Identified uses :
  - Automotive industry
  - Plastic industry
  - Chemical industry
  - Electronic industry

1.3. Details of the supplier of the safety data sheet

- Company : SOLVAY CHEMICALS INTERNATIONAL SA
- Address : RUE DE RANSBEEK, 310 B-1120 BRUXELLES
- Telephone : +3222642111
- Fax :
- E-mail address : manager.sds@solvay.com

1.4. Emergency telephone number

- **Emergency telephone number** **+44(0)1235 239 670 [CareChem 24] (Europe)**

SECTION 2. HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

2.1.1. European regulation (EC) 1272/2008, as amended

Classified as hazardous according to the European regulation (EC) 1272/2008, as amended

Hazard class	Hazard category	Route of exposure	H Phrases
Oxidising gases	Category 1		H270
Gases under pressure	Compressed gas		H280
Acute toxicity	Category 2	Inhalation	H330
Skin corrosion	Category 1A		H314

2.1.2. European Directive 67/548/EEC or 1999/45/EC, as amended

Classified as hazardous according to European Directive 67/548/EEC or 1999/45/EC, as amended

Hazard class / Hazard category	R-phrase(s)
O	R 7
T+	R26
C	R35

2.2. Label elements

2.2.1. Name(s) on label

Hazardous components : Fluorine (20 %)

2.2.2. Signal word

Danger

2.2.3. Hazard pictograms

2.2.4. Hazard statements

H270	-	May cause or intensify fire; oxidiser.
H280	-	Contains gas under pressure; may explode if heated.
H314	-	Causes severe skin burns and eye damage.
H330	-	Fatal if inhaled.

2.2.5. Precautionary statements

Prevention	P220	-	Keep/Store away from clothing/ flammable /combustible materials.
	P260	-	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
	P280	-	Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response	P303 + P361 + P353	-	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
	P305 + P351 + P338	-	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
	P310	-	Immediately call a POISON CENTER or doctor/ physician.

2.3. Other hazards

- Chronic exposure to the product can cause bone calcification disorders.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

3.2 Mixtures

3.2.1.Concentration

Substance name:	Concentration
Fluorine CAS-No.: 7782-41-4 / EC-No.: 231-954-8 / Index-No.: 009-001-00-0	ca. 20 %
Nitrogen CAS-No.: 7727-37-9 / EC-No.: 231-783-9 / Index-No.: -	ca. 80 %

3.2.2. Hazardous components - According to Regulation (EC) 1272/2008, asamended

Substance name	Hazard class	Hazard category	Route of exposure	H Phrases
Fluorine	Gases under pressure	Compressed gas		H280
	Oxidising gases	Category 1		H270
	Acute toxicity	Category 2	Inhalation	H330
	Skin corrosion	Category 1A		H314

3.2.3. Hazardous components - European Directive 67/548/EEC or 1999/45/EC, asamended

Substance name	Classification	Hazard category	R-phrase(s)
Fluorine	O	Oxidising	R 7
	T+	Very toxic	R26
	C	Corrosive	R35

SECTION 4. FIRST AID MEASURES

4.1. Description of first aid measures

4.1.1. If inhaled

- In case of accident by inhalation: remove casualty to fresh air and keep atrest.
- Oxygen or artificial respiration if needed.
- Victim to lie down in the recovery position, cover and keep himwarm.
- Call a physician immediately.
- Take victim immediately to hospital.

4.1.2. In case of eye contact

- Immediate medical attention is required.
- Take victim immediately to hospital.
- Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
- In the case of difficulty of opening the lids, administer an analgesic eye wash (oxybuprocaine).

4.1.3. In case of skin contact

- Call a physician immediately.
- Take victim immediately to hospital.
- Take off contaminated clothing and shoesimmediately.
- Wash off with plenty of water.
- First treatment with calcium gluconate paste.

4.1.4. If swallowed

- not applicable

4.2. Most important symptoms and effects, both acute and delayed

4.2.1. Inhalation

- Inhalation of vapours is irritating to the respiratory system, may cause throat pain and cough.
- Aspiration may cause pulmonary oedema and pneumonitis.
- risk of hypocalcemia with nervous problems (tetany) and cardiacarrhythmia
- Symptoms: Breathing difficulties, sore throat, Nosebleeding
- Repeated exposure: chronic bronchitis

4.2.2. Skin contact

- Causes severe burns.
- Intoxication hazards by simultaneous inhalation of theproduct.
- Risk of shock.
- Risk of hypocalcemia following the extent of thelesions.
- Symptoms: Irritation, Redness, Swelling of tissue, Burn

4.2.3. Eye contact

- May cause permanent eye injury.
- May cause blindness.
- Intoxication hazards by simultaneous inhalation of the product.
- Symptoms: Lachrymation, Redness, Swelling of tissue, Burn

4.2.4. Ingestion

- gas
- not applicable

4.3. Indication of any immediate medical attention and special treatment needed

- HF-Antidote Gel from IPS Healthcare is recommended as treatment for injuries from hydrofluoric acid.
- If skin irritation occurs:
- Immediately apply calcium gluconate gel 2.5% and massage into the affected area using rubber gloves; continue to massage while repeatedly applying gel until 15 minutes after pain is relieved.

SECTION 5. FIREFIGHTING MEASURES

5.1. Extinguishing media

5.1.1. Suitable extinguishing media

- powder
- Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

5.1.2. Unsuitable extinguishing media

- Never use water.

5.2. Special hazards arising from the substance or mixture

- Oxidizer
- Contact with flammables may cause fire or explosions.
- Pay attention to the spreading of gases especially at ground level (heavier than air) and to the direction of the wind.
- Contact with water liberates hazardous gas.
- Contact with water may produce heat release and presents risks of splashing.
- Hazardous decomposition products formed under fire conditions.

5.3. Advice for firefighters

- Evacuate personnel to safe areas.
- Wear self-contained breathing apparatus and protective suit.
- Wear chemical resistant oversuit
- Protect intervention team with a water spray as they approach the fire.
- Clean contaminated surface thoroughly.
- Keep product and empty container away from heat and sources of ignition.
- Cool containers / tanks with water spray.
- Keep from any possible contact with water.
- Approach from upwind.
- Never spray water onto a spillage of liquid gas.
- Never try to extinguish a burning gas leak which cannot be stopped or controlled.
- Prevent fire extinguishing water from contaminating surface water or the ground water system.

SECTION 6. ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. Advice for non-emergency personnel

- Keep people away from and upwind of spill/leak.
- Advice people to take refuge in upper floors and in closed rooms and to wait for instructions.

6.1.2. Advice for emergency responders

- Wear self-contained breathing apparatus and protective suit.
- Keep away from open flames, hot surfaces and sources of ignition.
- Approach from upwind.
- Suppress (knock down) gases/vapours/mists with a water spray jet.
- Avoid spraying the leak source.
- Try to re-position leaking containers, to have the leak in the gaseous phase.
- Ventilate the area.
- Prevent further leakage or spillage if safe to do so.
- Keep away from Incompatible products.

6.2. Environmental precautions

- Discharge into the environment must be avoided.
- If the product contaminates rivers and lakes or drains inform respective authorities.
- Prevent product from entering drains.

6.3. Methods and materials for containment and cleaning up

- Prevent product from entering drains.
- If possible, dam up the resulting liquid phase with sand or earth.
- Treat recovered material as described in the section "Disposal considerations".

6.4. Reference to other sections

- Refer to protective measures listed in sections 7 and 8.

SECTION 7. HANDLING AND STORAGE

7.1. Precautions for safe handling

- Carry out all operations in closed piping circuits and equipment.
- Use only in well-ventilated areas.
- Before all operations, passivate the piping circuits and vessels according to the procedure recommended by the producer.
- Clean and dry piping circuits and equipment before any operations.
- Purge piping circuits and equipment with nitrogen.
- Purge open drums with nitrogen before resealing.
- Use only equipment and materials which are compatible with the product.
- Keep away from heat and sources of ignition.
- Containers and equipment used to handle the product should be used exclusively for that product.
- Keep away from water.
- Provide piping circuits assembled by welding, or equipped with flanges using metallic gaskets compatible with the product.
- Provide shields between piping circuits or equipment and the operators; provide preferably remote operated valves.
- Provide pressure reducers at the outlet of gas cylinders.
- Do not attempt to regulate flow rate or pressure from the cylinder valve; use a suitable regulating device.
- Do not subject piping circuits or equipment to abnormal mechanical stress.
- For further information, please contact: Supplier
- Avoid inhalation, ingestion and contact with skin and eyes.
- Keep away from Organic materials.

7.2. Conditions for storage, including incompatibilities

7.2.1. Storage

- Keep tightly closed in a dry, cool and well-ventilated place.
- Keep away from combustible material.
- Keep away from direct sunlight.
- Keep away from heat and sources of ignition.
- Do not store in confined space.
- Keep the cylinder cap hermetically closed and open it cautiously.

- Provide tight electrical equipment well protected against corrosion.

7.2.2. Packaging material

7.2.2.1. Suitable material

- Stainless steel cleaned and passived

7.2.2.2. Unsuitable material

- Aluminium
- in cardboard box
- glass bottles
- Paper bags
- Plastic material, including expanded plastics material
- Woven plastic material.

7.3. Specific end use(s)

- For further information, please contact: Supplier

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

8.1.1. Exposure Limit Values

Fluorine

- Ireland. Occupational Exposure Limits 2011 time weighted average = 1 ppm
  time weighted average = 1,58 mg/m3
  Remarks: Indicative OELV
- Ireland. Occupational Exposure Limits 2011
  Short term exposure limit = 2 ppm
  Short term exposure limit = 3,16 mg/m3
  Remarks: Indicative OELV
- US. ACGIH Threshold Limit Values 03 2013 time weighted average = 1 ppm
- US. ACGIH Threshold Limit Values 03 2013 Short term exposure limit = 2 ppm
- EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU 12 2009
  time weighted average = 1 ppm
  time weighted average = 1,58 mg/m3
  Remarks: Indicative
- EU. Indicative Exposure Limit Values in Directives 91/322/EEC, 2000/39/EC, 2006/15/EC, 2009/161/EU 12 2009
  Short term exposure limit = 2 ppm
  Short term exposure limit = 3,16 mg/m3
  Remarks: Indicative

Nitrogen

- Ireland. Occupational Exposure Limits 2011
  Remarks: Included in the regulation but with no data values. See regulation for further details.
- US. ACGIH Threshold Limit Values 03 2013
  Remarks: Included in the regulation but with no data values. See regulation for further details.

8.2. Exposure controls

8.2.1. Appropriate engineering controls

- Use only with adequate ventilation and in closed systems.
- Apply technical measures to comply with the occupational exposure limits.
- Detection of small leaks using ammonia or preferably KI (potassiumiodide) - papers or qualified leak detectors

8.2.2. Individual protection measures

8.2.2.1. Respiratory protection

- Self-contained breathing apparatus in confined spaces/insufficient oxygen/in case of large uncontrolled emissions/in all circumstances when the mask and cartridge do not give adequate protection.
- Use only respiratory protection that conforms to international/ national standards.
- Respirator with a full face mask
- Recommended Filter type: B

8.2.2.2. Hand protection

- Wear suitable gloves.
- Suitable material: Copolymer VF2-HFP (fluoroelastomer)

8.2.2.3. Eye protection

- Chemical resistant goggles must be worn.

8.2.2.4. Skin and body protection

- Complete suit protecting against chemicals
- impervious clothing

8.2.2.5. Hygiene measures

- Eye wash bottles or eye wash stations in compliance with applicable standards.
- Handle in accordance with good industrial hygiene and safety practice.
- Consult the industrial hygienist or the safety manager for the selection of personal protective equipment suitable for the working conditions.

8.2.3. Environmental exposure controls

- Dispose of rinse water in accordance with local and national regulations.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

9.1.1. General Information

Appearance	Compressed gas
Colour	colourless
Odour	pungent

9.1.2. Important health safety and environmental information

pH	not applicable
pKa	not applicable
Melting point/freezing point	-220 °C (Fluorine)
Boiling point/boiling range	-188 °C (Fluorine)
Flash point	not applicable
Evaporation rate	No data
Flammability (solid, gas)	The product is not flammable.
Flammability	not applicable
Explosive properties	See section 10.
Vapour pressure	1.013 mbar, at -188 °C
Vapour density	1,3 (Fluorine)
Density	No data
Relative density	1,51, at -188 °C (Fluorine)
Bulk density	not applicable

Solubility(ies)	not applicable
Solubility/qualitative	Decomposes in contact with water.
Partition coefficient: n-octanol/water	not applicable
Auto-ignition temperature	No data
Decomposition temperature	No data
Viscosity	1.013 mPa.s, at 25 °C (Fluorine)
Oxidizing properties	Oxidizing properties

9.2. Other information

Critical temperature	-129,2 °C (Fluorine)
Critical pressure	55,72 hPa (Fluorine)

SECTION 10. STABILITY AND REACTIVITY

10.1. Reactivity

- Risk of ignition.
- Risk of explosion.
- Reacts violently with water.

10.2. Chemical stability

- Chemically very reactive
- Stable under recommended storage conditions.

10.3. Possibility of hazardous reactions

- Decomposes in contact with water.
- Fire or intense heat may cause violent rupture of packages.
- Heating can release hazardous gases.
- Gives off hydrogen by reaction with metals.

10.4. Conditions to avoid

- Heat.
- Exposure to moisture.

10.5. Incompatible materials

- Organic materials, Flammable materials, Combustible material, Hydrogen

10.6. Hazardous decomposition products

- Hydrogen fluoride

SECTION 11. TOXICOLOGICAL INFORMATION

11.1. Acute toxicity

11.1.1. Acute inhalation toxicity

- LC50, 1 h, rat , 925 ppm, calculated value

11.1.2. Irritation (other route)

- Inhalation, rat, Corrosive (Fluorine)

11.2. Skin corrosion/irritation

- Corrosive (Fluorine)

11.3. Serious eye damage/eye irritation

- Corrosive (Fluorine)

11.4. Sensitisation

- no data available

11.5. Mutagenicity

- no data available

11.6. Carcinogenicity

- The carcinogenic effect found in animals is not demonstrated in human (Fluorine)

11.7. Toxicity for reproduction

- Risk of toxic effect on reproduction (Fluorine)

11.8. Repeated dose toxicity

- Inhalation, Prolonged exposure, rat, Target Organs: Respiratory system, Central nervous system, Cardio- vascular system, testes, Kidney, Liver, observed effect (Hydrogenfluoride)

11.9. Other information

- no data available

SECTION 12. ECOLOGICAL INFORMATION

12.1. Toxicity

- Fishes, Salmo gairdneri, LC50, 96 h, 51 mg/l(Fluorides)
- Crustaceans, Daphnia magna, EC50, 48 h, 97 mg/l, fresh water (Fluorides)
- Crustaceans, Mysidopsis bahia, EC50, 96 h, 10,5 mg/l, salt water (Fluorides)
- Fishes, Salmo gairdneri, LC50, 21 Days, from 2,7 - 4,7 mg/l (Fluorides)
- Crustaceans, Daphnia magna, NOEC, 21 Days, 3,7 mg/l(Fluorides)
- Algae, Scenedesmus sp., EC50, 96 h, 43 mg/l (Fluorides)

12.2. Persistence and degradability

12.2.1. Abiotic degradation

- Water, Soil
  Result: complexation/precipitation of inorganic materials (Fluorides)
- Water, Soil Result:
  hydrolyses
  Degradation products: hydrofluoric acid / fluoride (Fluorine)

12.2.2. Biodegradation

- The methods for determining biodegradability are not applicable to inorganic substances.
  (Fluorine)

12.3. Bioaccumulative potential

- Result: The methods for determining the biological degradability are not applicable to inorganic substances.
  (Fluorine)

12.4. Mobility in soil

-
  Reacts violently with water. (Fluorine)

12.5. Results of PBT and vPvB assessment

- no data available

12.6. Other adverse effects

- no data available

SECTION 13. DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

- Refer to manufacturer/supplier for information on recovery/recycling.
- or
- Absorb the product in a KOH solution.
- Filtrate the product and send the cake to a landfill for industrial waste.
- Discharge liquid filtrate to a wastewater treatment system

13.2. Contaminated packaging

- To avoid treatments, as far as possible, use dedicated containers.
- Do not rinse the dedicated containers.

SECTION 14. TRANSPORT INFORMATION

International transport regulations

- IATA-DGR

14.1. UN number	UN 3306
14.2. UN proper shipping name	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.(FLUORINE/NITROGEN MIXTURE 20/80)
14.3. Transport hazard class(es)	
Hazard class	FORBIDDEN
Labels	2.3 - Toxic gas 5.1 - Oxidizing substances 8 - Corrosive
14.4. Packing group	
14.5. Environmental hazards	
14.6. Special precautions for user	

- IMDG

14.1. UN number	UN 3306
14.2. UN proper shipping name	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.(FLUORINE/NITROGEN MIXTURE 20/80)
14.3. Transport hazard class(es)	
Hazard class	2.3
Labels	2.3 - Toxic gasses 5.1 - Oxidizing substances 8 - Corrosive
14.4. Packing group	
14.5. Environmental hazards	
14.6. Special precautions for user	
EmS	F-C S-W

- ADR

14.1. UN number	UN 3306
14.2. UN proper shipping name	COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.(FLUORINE/NITROGEN MIXTURE 20/80

14.3. Transport hazard class(es)

Hazard class	2
Labels	2.3 - Toxic gas 5.1 - Oxidizing substances 8 - Corrosive

14.4. Packing group

14.5. Environmental hazards

14.6. Special precautions for user

HI/UN No.	265 / 3306
Tunnel restriction code	C/D

- **RID**

14.1. UN number — UN 3306

14.2. UN proper shipping name — COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.(FLUORINE/NITROGEN MIXTURE 20/80)

14.3. Transport hazard class(es)

Hazard class	2
Labels	2.3 - Toxic gas 5.1 - Oxidizing substances 8 - Corrosive

14.4. Packing group

14.5. Environmental hazards

14.6. Special precautions for user

HI/UN No.	265 / 3306

- **ADN**

14.1. UN number — UN 3306

14.2. UN proper shipping name — COMPRESSED GAS, TOXIC, OXIDIZING, CORROSIVE, N.O.S.(FLUORINE/NITROGEN MIXTURE 20/80)

14.3. Transport hazard class(es)

Hazard class	2
Labels	2.3 - Toxic gas 5.1 - Oxidizing substances 8 - Corrosive

14.4. Packing group

14.5. Environmental hazards

14.6. Special precautions for user

SECTION 15. REGULATORY INFORMATION

15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture

- Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), as amended
- Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations, as amended
- Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, asamende

- Council Directive 98/24/EC of 7 April 1998 on the protection of the health and safety of workers from the risks related to chemical agents at work,as amended
- COUNCIL DIRECTIVE 96/82/EC on the control of major-accident hazards involving dangerous substances as amended
- Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste
- 1999 Code of Practice for the Safety, Health and Welfare at Work (Chemicals Agents) Regulations, 1994 (S.I. No. 445 of 1994) as amended

15.1.1. Notification status

Inventory Information	Status
Australia. Inventory of Chemical Substances (AICS)	- In compliance with inventory
Canada. Domestic Substances List (DSL)	- In compliance with inventory
China. Inventory of Existing Chemical Substances (IECSC)	- In compliance with inventory
Japan (ENCS) List (ENCS (JP))	- All ingredients are on the following inventories or are exempted from listing
New Zealand. Inventory of Chemicals (NZIOC)	- In compliance with inventory
USA. Toxic Substances Control Act (TSCA)	- In compliance with inventory
EU list of existing chemical substances (EINECS)	- In compliance with inventory
Korea. Existing Chemicals Inventory (KECI (KR))	- In compliance with inventory
Philippines PICCS (PICCS (PH))	- In compliance with inventory
Mexico INSQ (INSQ)	- In compliance with inventory

15.2. Chemical Safety Assessment

- no data available

SECTION 16. OTHER INFORMATION

16.1. Full text of H-Statements referred to under section 3

H270 - May cause or intensify fire; oxidiser.
H280 - Contains gas under pressure; may explode if heated.
H314 - Causes severe skin burns and eye damage.
H330 - Fatal if inhaled.

16.2. Full text of R-phrases referred to under sections 2 and 3

16.2.1. Full text of R-phrases referred to under section 2 R 7

- May cause fire.

R26 - Very toxic by inhalation.
R35 - Causes severe burns.

16.2.2. Full text of R-phrases referred to under section 3 R 7

- May cause fire.

R26 - Very toxic by inhalation.
R35 - Causes severe burns.

16.3. Other information

- Update
  This data sheet contains changes from the previous version in section(s): 1.3,5.3,6,7,8,14,15.1.1

This SDS is only intended for the indicated country to which it is applicable. The European SDS format compliant with the applicable European legislation is not intended for use nor distribution in countries outside the European Union with the exception of Norway and Switzerland. Safety datasheets applicable in other countries/regions are available upon request.
The information given corresponds to the current state of our knowledge and experience of the product, and is not exhaustive. This applies to product which conforms to the specification, unless otherwise stated. In this case of combinations and mixtures one must make sure that no new dangers can arise. In any case, the user is not exempt from observing all legal, administrative and regulatory procedures relating to the product, personal hygiene, and protection of human welfare and the environment.

5.13.2. Commissioning Sign-Off

Nines
Photovoltaics

FINAL SIGN OFF

☐ Final HAZOP risk assessment of the full installation

Appendix 12 ITT / Nines _____Date_____

☐ Acceptance by insurance underwriters

Appendix 13 ITT / Nines _____Date_____

Service Report 40124354 ORIGINAL

Date of Service	05-25-2016	Life Safety Distribution GmbH
Customer PO	PO 000775	Javastrasse 2
Customer Contact	Laurent Clochard	8604 Hegnau
		Switzerland

Bill To

Nines PV Finance Dept
Synergy Center
D24FKT9 Dublin IE

Sold To

Ultra High Vacuum Solutions Li
37 Rathfarnham Gate
Dublin D14 AY88 IE

Order Information

Internal Reference	50767772
Service Type	Field
Honeywell Location	Ireland
Local Honeywell Contact	
Payment Terms	Advance payment
Project Name	IT Tallaght Commissioning

Ship To

Nines PV
Synergy Centre
Dublin D24FKT9 IE

ITEM NO.	PART NUMBER	DESCRIPTION	QUANTITY	UNIT OF MEASURE	UNIT PRICE	EXT. PRICE
10	SERVICE_RATE_1	Commissioning	1.000	AU	0.00	0.00

Completed commissioning on the following F2 detection units:
Sat Serial Number: 0216102(EN CAT 002)
Sat Serial Number: 0216101(EN CAT 001)
Midas Serial Number: V16020117(EN CAT 004)

All above units are mounted on the tool and their outputs feed back to the tool PLC.
Connected up the Sat units to the ducts. Installed sensors, Set A1,A2 at 0.1ppm. Set relays at NO/Denergised.
We did not verify output operation to tool as tool was not up and running.

Did commissioning on midas. Installed F2 cartridge. Set the ma o/p as follows:
Midas source, jumpered as INT J4 and out on pin 10 to PLC with return on pin 9 jumpered to EXT on J5.
Set relays as NO/Denergised. Set the A1,A2 to 0.48 ppm as the LAL is 0.48 could not set to 0.1ppm as requested.

Installed batteries in TP4 unit. Connected 2 12 vdc in series to give 24 vdc as supplied by Laurent, I verified operation by switching off 220 vac to unit, and power supply kicked in with no issue.
The fault on the TP4 unit common module was due to a bad connection internally on the common module card. I reseated this and fault cleared with no issue. Panel was clear and in monitoring on leaving.

To Do: Sample point tubing will need to be mounted on tool to monitoring point and exhaust tubing will need to be ran to scrub exhaust
All 3 units outputs will need cause/effect verification to tool PLC when up and running.

Registered No	CH-020.3.925.850-0			Federal ID		Duns	

HA IE Service Team Ireland

Service Team Leader — Customer Service Team

Certified that the whole of the supplies/services detailed in this consignment have been inspected and tested in accordance with the conditions and requirements of the contract or purchase order and unless otherwise stated conform in all respects to the specification(s), drawing(s) relevant thereto.

On Behalf of Honeywell	On Behalf of Customer
Print	Print

Additional Comments
2nd day of commissioning, 1st day linked to SO 40110649

Sub Totals

Materials	0.00	
Labour	0.00	
Travel & Expenses	0.00	
Shipping Charge	0.00	
TOTAL	0.00	EUR

All prices stated above are net prices and are subject to VAT where applicable and will be billed accordingly with the appropriate VAT rate at the time of shipment.

Registered No	CH-020.3.925.850-0			Federal ID		Duns	

HA IE Service Team Ireland

Service Team Leader | Customer Service Team

Certified that the whole of the supplies/services detailed in this consignment have been inspected and tested in accordance with the conditions and requirements of the contract or purchase order and unless otherwise stated conform in all respects to the specification(s), drawing(s) relevant thereto.

On Behalf of Honeywell | On Behalf of Customer

Print | Print

Service Report 40119074 ORIGINAL

Date of Service	03-18-2016	Life Safety Distribution GmbH
Customer PO	000775	Javastrasse 2
Customer Contact	Laurent Clochard	8604 Hegnau
		Switzerland

Bill To

Nines PV Finance Dept
Synergy Center
D24FKT9 Dublin IE

Sold To

Ultra High Vacuum Solutions Li
37 Rathfarnham Gate
Dublin D14 AY88 IE

Order Information

Internal Reference	50715830
Service Type	Field
Honeywell Location	Ireland
Local Honeywell Contact	
Payment Terms	Advance payment
Project Name	IT Tallaght Project

Ship To

Nines PV
Synergy Centre
Dublin D24FKT9 IE

ITEM NO.	PART NUMBER	DESCRIPTION	QUANTITY	UNIT OF MEASURE
10	SERVICE_RATE_1	Commissioning	1.000	AU

Additional Comments
Completed Commissioning and start up on the following unit:
TP4 Serial Number: C08260113. Outputs to horn/strobes wired in through the relays at points 4 and 5 NC
Sat F2 Serial No: 0815113, QS 040 located on pole in Lab sampling ambient. The 4-20 ma o/p from this unit is connected to Channel 2 on TP4. Alarm level 1 and 2 set to 0.1 with full scale at 5. TP4 set up the same. The relays are set up as A1 and A2 energized NC. The fault relay set up as de energized NO.
Sat F2 Serial No: 0815110, Q 20 located on wall in container sampling ambient. The 4-20 ma o/p from this unit is connected to Channel 2 on TP4. Alarm level 1 and 2 set to 0.1 with full scale at 5. TP4 set up the same. The relays are set up as A1 and A2 energized NC. The fault relay set up as de energized NO.
Signal point O2 Serial No 719161709, O2 No 2 located on wall in Lab sampling ambient. The 4-20 ma loop on this unit is connected to Channel 3 on TP4. Alarm level 1 and 2 set to 19.5% v/v with full scale at 25% on TP4
Signal point O2 Serial No 719343709, O2 No 1 located on wall in container sampling ambient. The 4-20 ma loop on this unit is connected to Channel 4 on TP4. Alarm level 1 and 2 set to 19.5% v/v with full scale at 25% on TP4.
All four units above had their sensors replaced and were zeroed. For F2 units I forced the 4-20 ma and verified A1 and A2 activation on TP4. From this the O/P's from the TP4 activated the horns/strobes as scheduled. The relay O/P's were also verified to the Nines panel and all were activating as required.
For the O2 units the O2 was depleted on the sensors and horn/strobe activation verified.
The following units that will not be connected to the TP4 panel were also set up:
Sat F2 Serial No: 0815112, QS 030 located on wall in Lab for tool duct. Alarm level 1 and 2 set to 0.1 with full scale at 5. The relays are set up as A1 and A2 energized NC. The fault relay set up as de energized NO. Verified the A1 A2 and Fault relay o/p to Nines panel and all good
Sat F2 Serial No: 0815111, Q 10 located on wall in container for tool

Registered No	CH-020.3.925.850-0			Federal ID		Duns	

HA IE Service Team Ireland

Service Team Leader — Customer Service Team

Certified that the whole of the supplies/services detailed in this consignment have been inspected and tested in accordance with the conditions and requirements of the contract or purchase order and unless otherwise stated conform in all respects to the specification(s), drawing(s) relevant thereto.

On Behalf of Honeywell — On Behalf of Customer

Print — Print

duct. Alarm level 1 and 2 set to 0.1 with full scale at 5. The relays are set up as A1 and A2 energized NC. The fault relay set up as de energized NO. Verified the A1 A2 and Fault relay o/p to Nines panel and all good
All units had up to date cal stickers installed.

All prices stated above are net prices and are subject to VAT where applicable and will be billed accordingly with the appropriate VAT rate at the time of shipment.

Registered No	CH-020.3.925.850-0			Federal ID		Duns	

HA IE Service Team Ireland

Service Team Leader Customer Service Team

Certified that the whole of the supplies/services detailed in this consignment have been inspected and tested in accordance with the conditions and requirements of the contract or purchase order and unless otherwise stated conform in all respects to the specification(s), drawing(s) relevant thereto.

On Behalf of Honeywell	On Behalf of Customer
Print	Print

	Sensor	Description	Sensor	Setting	Wired to	SPC PANEL	FIRE	SCCL	Ch 1	Ch 2	Buzz	Ch 1	Ch 2	Buzz	Ch 1	Ch 2	Buzz	Ch 1	Ch 2	Relay	(duplicate)
02	QS0.2	F2 sensor	0mA	n/a	TOUCHPOINT4 - ZONE1		✓														
			4mA	n/a	TOUCHPOINT4 - ZONE2		✓														
			20mA	n/a	TOUCHPOINT4 - ZONE3		✓	✓										✓	✓		
			Relay 1	0.1 ppm	SEMPA PLC																8
			Relay 2	0.1 ppm	SEMPA PLC																
01		O2 sensor	4-20mA	n/a	TOUCHPOINT4 - ZONE4		✓											✓	✓		
02	QS0.4	F2 sensor	0mA	n/a	TOUCHPOINT4 - ZONE2		✓														0
			4mA	n/a	TOUCHPOINT4 - ZONE3		✓														
			20mA	n/a	TOUCHPOINT4 - ZONE4		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓				
			Relay 1	0.1 ppm	SEMPA PLC																8
			Relay 2	0.1 ppm	SEMPA PLC																
03		O2 sensor	4-20mA	n/a	TOUCHPOINT4 - ZONE3		✓			✓			✓			✓					
	QS0.1	F2 sensor	0mA	n/a	SEMPA PLC	0															
			4mA	n/a	SEMPA PLC																
			20mA	n/a	SEMPA PLC																
			Relay 1	0.1 ppm	SEMPA PLC	8															8
			Relay 2	0.1 ppm	SEMPA PLC	8															
1	QS0.3	F2 sensor	0mA	n/a	SEMPA PLC																
			4mA	n/a	SEMPA PLC																
			20mA	n/a	SEMPA PLC																
			Relay 1	0.1 ppm	SEMPA PLC	8															8
			Relay 2	0.1 ppm	SEMPA PLC	8															
02		F2 sensor		0.1 ppm	ADE PLC																
03		F2 sensor		0.1 ppm	ADE PLC																
04		F2 sensor		0.1 ppm	ADE PLC																
0003		F2 sensor	4-20mA	n/a	DATA LOG																
	(internal)	F2 sensor			CS200BS PLC																
		Flow sensor			SPC																
		Flow sensor			SPC																
		Smoke		n/a																	
		Heat		n/a																	
		Break glass		n/a																	
		Smoke		n/a																	
		Heat		n/a																	
		Break glass		n/a																	

Comment: SEMPA PLC could not display any of the F2 sensor value.

✓ → test OK

CLEANVENT DATA SHEET

Fraunhoferstrasse 4
85737 Ismaning
Germany
Phone: +49 (89) 96 24 00-0
Fax: +49 (89) 96 24 00-122
sales@csclean.com
www.cscleansystems.com

CS CLEAN SYSTEMS®

CLEANVENT Type / Serial No.	CV02S / CV02S15011
Filling Code	FC 9577
Filling suitable for gas species*	F2 (N_2, H_2)
Capacity	120 standard litres
Outlet Concentration	
Intended use	Passive dry-bed absorber for removal of hazardous vent gases
Construction material	316 / 316L stainless steel
Construction features	Overall length 400 mm, outside diameter 114 mm, 1/4" VCR compatible fittings at inlet and outlet
Environmental temperature range	5-35 °C (40-95 °F) (please contact manufacturer if different temperature range required)
Installation site	indoors
Operation pressure	≤ 1 MPa (145 psi)
Emergency relief valve	fitted
Wallmounting included	yes
Inlet flow restrictor	internal
Weight	Approx. 8 kg
Month of expiry	05/2017

Leak test passed	Date: 18.05.2015, Operator:
Functional test passed	Date: 18.05.2015, Operator:

* Gases listed in (brackets) are permitted, but not retained by the cartridge.

Before installing the CLEANVENT cartridge please ensure that you have read the operating manual.

Ultra High Purity Pressure Transducer

Production Test Report

Traneducer #	M4141	Serial #	5125632
Model	WU 10	Ambient Temperature	19.0 °C
Pressure Range	-1 - 200 bar	Power Supply	24 V DC
Output Signal	4 - 20 mA	Test Date	02.05.2007

Pressure bar	Signal (increasing pressure) mA	Signal (decreasing pressure) mA	Error (increasing pressure) %	Error (decreasing pressure) %
-1.00	4.004	3.995	0.026	-0.034
0.00	4.075	4.070	-0.029	-0.060
99.50	11.992	11.984	-0.053	-0.101
200.00	19.993	19.986	-0.045	-0.090

Maximal Error in % FS	**-0.101**
Non-Linearity in % FS	**-0.041**
Particles	**< 0.1 per ft³ > 0.1 mm**
Helium Leakrate	**< 1* 10^{-9}mbar l/s / atm cm³/s**

WIKA Alexander Wiegand GmbH & Co. KG
Alexander-Wiegand-Strasse 63911 Klingenberg
Phone +49-9372 / 132-0 Fax +49-9372 / 132-406
http://www.wika.de E-mail: info@wika.de
http://www.wika.com

(signed)

Ultra High Purity Pressure Transducer

Production Test Report

Transducer #	M4015	Serial #	5125634
Model	WU 10	Ambient Temperature	19.0 °C
Pressure Range	-1 - 200 bar	Power Supply	24 V DC
Output Signal	4 - 20 mA	Test Date	02.05.2007

Pressure bar	Signal (increasing pressure) mA	Signal (decreasing pressure) mA	Error (increasing pressure) %	Error (decreasing pressure) %
-1.00	4.005	3.990	0.033	-0.065
0.00	4.064	4.068	0.028	-0.073
99.50	12.008	11.999	0.050	-0.005
200.00	20.022	20.021	0.135	0.133

Maximal Error in % FS	**0.135**
Non-Linearity in % FS	**-0.037**
Particles	**< 0.1 per ft³ > 0.1 mm**
Helium Leakrate	**< 1* 10^{-9} mbar l/s / atm cm³/s**

WIKA Alexander Wiegand GmbH & Co. KG
Alexander-Wiegand-Strasse 63911 Klingenberg
Phone +49-9372 / 132-0 Fax +49-9372 / 132-406
http://www.wika.de E-mail: info@wika.de
http://www.wika.com

(signed)

Ultra High Purity Pressure Transducer

Production Test Report

Transducer #	N4400	Serial #	06983909
Model	WU 10	Ambient Temperature	19.0 °C
Pressure Range	-1 - 9 bar	Power Supply	24 V DC
Output Signal	4 - 20 mA	Test Date	22.05.2015

Pressure bar	Signal (increasing pressure) mA	Signal (decreasing pressure) mA	Error (increasing pressure) %	Error (decreasing pressure) %
-1.00	3.989	3.978	-0.066	-0.138
0.00	5.590	5.590	-0.060	-0.064
4.00	12.000	11.988	0.001	-0.077
9.00	20.001	19.998	0.008	-0.010

Maximal Error in % FS	**-0.138**
Non-Linearity in % FS	**0.030**
Particles	**< 0.1 per ft³ > 0.1 mm**
Helium Leakrate	**< 1* 10^{-9} mbar l/s / atm cm³/s**

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Strasse 63911 Klingenberg
Phone +49-9372 / 132-0 Fax +49-9372 / 132-406
http://www.wika.de E-mail: info@wika.de
http://www.wika.com

Matthias Zöller
(signed)

Ultra High Purity Pressure Transducer

Production Test Report

Transducer #	N4383	Serial #	06983906
Model	WU 10	Ambient Temperature	19.0 °C
Pressure Range	-1 - 9 bar	Power Supply	24 V DC
Output Signal	4 - 20 mA	Test Date	22.05.2015

Pressure bar	Signal (increasing pressure) mA	Signal (decreasing pressure) mA	Error (increasing pressure) %	Error (decreasing pressure) %
-1.00	3.995	3.988	-0.034	-0.072
0.00	5.593	5.593	-0.046	-0.043
4.00	11.999	11.991	-0.009	-0.057
9.00	20.003	20.004	0.017	0.025

Maximal Error in % FS	**-0.072**
Non-Linearity in % FS	**-0.017**
Particles	**< 0.1 per ft³ > 0.1 µm**
Helium Leakrate	**< 1* 10^{-9} mbar l/s / atm cm³/s**

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Strasse 63911 Klingenberg
Phone +49-9372 / 132-0 Fax +49-9372 / 132-406
http://www.wika.de E-mail: info@wika.de
http://www.wika.com

(signed)

Ultra High Purity Pressure Transducer

Production Test Report

Transducer #	N4307	Serial #	06983910
Model	WU 10	Ambient Temperature	19.0 °C
Pressure Range	-1 - 9 bar	Power Supply	24 V DC
Output Signal	4 - 20 mA	Test Date	22.05.2015

Pressure bar	Signal (increasing pressure) mA	Signal (decreasing pressure) mA	Error (increasing pressure) %	Error (decreasing pressure) %
-1.00	3.996	3.982	-0.024	-0.110
0.00	5.604	5.588	0.026	-0.075
4.00	12.002	11.996	0.014	-0.027
9.00	20.010	20.011	0.062	0.066

Maximal Error in % FS	**-0.110**
Non-Linearity in % FS	**0.030**
Particles	**< 0.1 per ft³ > 0.1 µm**
Helium Leakrate	**< 1* 10^{-9} mbar l/s / atm cm³/s**

WIKA Alexander Wiegand SE & Co. KG
Alexander-Wiegand-Strasse 63911 Klingenberg
Phone +49-9372 / 132-0 Fax +49-9372 / 132-406
http://www.wika.de E-mail: info@wika.de
http://www.wika.com

(signed)

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

Benannte Stelle nach Druckgeräterichtlinie (97/23/EG)
der TÜV SÜD Industrie Service GmbH

Industrie Service

1 SCHWEISSER-PRÜFUNGSBESCHEINIGUNG / ZERTIFIKAT

2	Bezeichnung	**EN 287-1 141 T BW 8 S t1.0 D12 H-L045 ss nb**
4	Hersteller-Schweißanweisung	Teiln.-Nr.: 8453
5	Beleg-Nr. (falls verfügbar):	P9349 Zertifikat Nr.: Z-IS-DD1-DRE-13-12-2379031-10094010
6	Name des Schweißers:	**Uhlig, Giselher**
8	Art der Legitimation:	Personalausweis
9	Geburtsdatum und Ort:	07.06.1965 Dresden
10	Beschäftigt bei:	Sempa Systems GmbH, Dresden
11	Vorschrift / Prüfnorm:	EN 287-1 und AD 2000 HP3
	Bemerkung:	

12	Fachkunde	bestanden	
13		Prüfdaten - Angaben	Geltungsbereich
14	Schweißprozesse	141 (WIG) Wolfram-Inertgas (Massivstab)	141, 142, 143, 145
15	Produktform (Blech/Rohr)	T (Rohr)	T, P
16	Nahtart	BW (Stumpfnaht)	BW
17	Werkstoffgruppe(n)	8 (X2CrNiMo18-14-3 (1.4435))	8, 10 (9.2, 9.3 mit SZW Gruppe 8, 10)
18	Art des Zusatzwerkstoffes	Massivstab (S)	S (Massivstab), nm (ohne Zusatz)
	Bezeichnung	EN 12072: W 19 12 3 L Si	
19	Schutzgas / Pulver	EN ISO 14175 - I1	geeignete Schutzgase
20	Hilfsstoffe	Formiergas	—
21	Werkstoffdicke (mm)	1	1 - 2
22	Rohrdurchmesser (außen)(mm)	12	12 - 24
23	Schweißpositionen	H-L045 (steigend)	PA, PC, PE, PF, PH, H-L045
24	Schweißnahteinzelheiten	ss nb (einseit. o.B.)	ss nb, ss mb, bs

25 Hinweise Erfüllt die Richtlinie 97/23/EG.

	Art der Prüfung	ausgeführt und bestanden	nicht verlangt
30	Sichtprüfung	Ja	-
31	Durchstrahlungsprüf.	Ja	-
32	Magnetp./Farbeindring.	-	x
33	Kerbzugprüfung	-	x
34	Bruchprüfung	-	x
35	Biegeprüfung	-	x
36	Makroskop. Untersuchung *)		x

Name und Unterschrift: Steffen Kuntzsch
TÜV SÜD Industrie Service GmbH
Zertifizierstelle für Personal
Datum des Schweißens: 28.11.2013
Ort / Datum: Königsbrück 10.12.2013
Gültigkeit der Prüfung: 27.11.2015

TÜV SÜD Industrie Service GmbH 00 36 Benannte Stelle

VERLÄNGERUNG DER PRÜFUNG DURCH BESTÄTIGUNG DES(R) ARBEITGEBER(S) ODER PRÜFAUFSICHT

Datum	Unterschrift	Dienststellung oder Titel

37 *)falls notwendig, Angaben auf Zusatzblatt

38 VERLÄNGERUNG DER PRÜFUNG DURCH PRÜFSTELLE

Datum	Unterschrift	Dienststellung oder Titel

40 TÜV SÜD Industrie Service GmbH, Drescherhäuser 5d, Dresden, Telefon +49 351 4202 -235, Fax -230
inge-lore.reschies@tuev-sued.de - Echtheit des Zertifikats mit QR-Code verifizierbar © WordWeld 2.5.1

Übersetzung des Formblatt-Textes auf der Rückseite

Translation of printed text on the reverse side

Traduction des rubriques imprimées au verso

de (D)

1 SCHWEISSER-PRÜFUNGSBESCHEINIGUNG ZERTIFIKAT
2 BEZEICHNUNG
3 Seite von
4 Hersteller - Schweißanweisung Prüfstelle
5 Beleg-Nr. (falls verfügbar): / Prüf-Nr.:
6 Name des Schweißers:
7 Legitimation:

8 Art der Legitimation: Fotografie
9 Geburtsdatum und -ort: / (falls nötig)
10 Beschäftigt bei:
11 Vorschrift / Prüfnorm:
12 Fachprüfung: Bestanden / nicht geprüft (Unzutreffendes streichen)
13 Prüfdaten - Angaben Geltungsbereich
14 Schweißverfahren
15 Blech oder Rohr
16 Nahtart
17 Werkstoffgruppe(n)
18 Zusatzstoffart / Bezeichnung

19 Schutzgas / Pulver
20 Hilfsstoffe
21 Prüfstückdicke [mm]
22 Rohraußendurchmesser [mm]
23 Schweißpositionen
24 Ausfugen / Badsicherung
25 Zusätzliche Hinweise siehe beigefügtes Blatt und/oder Schweißanweisung Nr.:

26 Ausgeführt und, Name und Unterschrift
27 Art der Prüfung
28 bestanden, nicht verlangt Prüfstelle
29
30 Sichtprüfung
31 Durchstrahlungsprg. / Tag der Ausgabe:
32 Magnetpulver- / Farbeindringprüfung Ort:
33 Makroschliff Gültigkeit der Prüfung:
34 Bruchprüfung
35 Biegeprüfung VERLÄNGERUNG DER PRÜFUNG DURCH BESTÄTIGUNG DES(R) ARBEITGEBER(S) ODER PRÜFAUFSICHT
36 Zusatzprüfungen
37 Datum, Unterschrift, Dienststellung oder Titel
38 VERLÄNGERUNG DER PRÜFUNG DURCH PRÜFER / PRÜFSTELLE
39 Datum, Unterschrift, Dienststellung oder Titel

en (GB)

1 WELDER APPROVAL TEST CERTIFICATE
2 DESIGNATION
3 Page of
4 Manufacturer's Welding Procedure Specification Inspecting Authority
5 Reference N°:
6 Welder's Name:
7 Identification:

8 Method of identification: Photograph
9 Date and place of birth: / (if required)
10 Employer:
11 Code / Testing Standard:
12 Job knowledge Acceptable / not loaded (delete as necessary)
13 Weld test details Range of approval
14 Welding process
15 Plate or pipe
16 Joint type
17 Parent metal group
18 Filler metal type / designation

19 Gas / flux
20 Auxiliaries
21 Material thickness [mm]
22 Pipe outside diameter [mm]
23 Welding positions
24 Gouging / Backing
25 Additional information is available on attached sheet and / or welding procedure specification N°:
26 Performed and, Name and Signature
27 Type of test
28 acceptable - not required Inspecting Authority
29
30 Visual
31 Radiography / Date of issue:
32 Magnetic particle / Penetrant Location:
33 Macro Validity of approval until:
34 Fracture
35 Bend PROLONGATION FOR APPROVAL BY EMPLOYER / SUPERVISOR

36 Additional Tests
37 Date, Signature Position or Title
38 PROLONGATION FOR APPROVAL BY INSPECTING AUTHORITY
39 Date, Signature Position or Title

fr (F)

1 CERTICAT DE QUALIFICATION DE SOUDEUR
2 DESIGNATION
3 Page de
4 Mode opératoire de soudage du constructeur Organisme de contrôle
5 N° de référence: / N° de référence:
6 Nom du soudeur:
7 Identification:
8 Méthode d'identification: Photographie
9 Date et lieu de naissance:/(si demandée)
10 Employeur:
11 Code / Norme de essai:
12 Vérification des connaissances: Acceptable / non vérifée (rayer la mention inutile)
13 Éléments de l'essai Domaine de validité
14 Procédé de soudage
15 Tôle ou tube
16 Type de joint
17 Groupe du métal de base
18 Type du métal d'apport

19 Gaz de protection
20 Auxillaires de soudage
21 Épaisseur du matériau [mm]
22 Diamètre extérieur du tube [mm]
23 Positions de soudage
24 Gougeage / Reprise envers
25 Des informations supplémentaires sont données sur la feuille jointe et/ou sur la spécifiction de soudage N°:
26 réalisée et, Nom et signature
27 Type d'essai
28 acceptable / nonrequis Organisme de contrôle
29
30 Visuel
31 Radiographie / Date d'émission:
32 Magnetoscopie /Ressuage Lieu:
33 Macroscopie Certicat valable jusqu'au:
34 Texture
35 Pliage PROLONGATION DE VALIDITÉ PAR L'EMPLOYEUR

36 Autres
37 Date, Signature Position ou titre
38 PROLONGATION DE VALIDITÉ PAR L'ORGANISME DE CONTROLE
39 Date, Signature Position ou titre

it (I)

1 CERTIFICAZIONE DELLA QUALIFICA DI SALDATURA
2 DENOMINAZIONE
3 Pagina di
4 Istruzioni di saldature del costruttore Centro di collaudo
5 Nr. del giustificativo (se esistente) (nr. di collaudo)
6 Nome del saldatore
7 Legittimazione nr.
8 Tipo di legittimazione Fotografia
9 Data e luogo di nascita (se necessario)
10 Dipendente presso:
11 Prescrizione / Norma di collaudo
12 Esame tecnico Superato / non sottoposto ad esame (Cancellare la voce che non interessa)
13 Dati – Indicazioni del collaudo Campo di validità
14 Procedimento di saldatura
15 Lamiera o tubo
16 Tipo di smusso
17 Gruppo / gruppi di materiale
18 Tipo del materiale di apporto / denominazione
19 Gas inerte / polvere
20 Materiali ausiliari
21 Spessore del pezzo in prova (in mm)
22 Diametro esterno del turbo (mm)
23 Posizioni di saldatura
24 Molatura della radice / Protezioni del bagno
25 Ulteriori indicazioni – vedi foglio allegato e/o istruzioni di saldatura nr.

26 Compilato e, nome e firma
27 Tipo di collaudo
28 Superato, non richiesto Centro di collaudo
29
30 Esame visivo
31 Esame radiografico / giorno del rilascio
32 Esame magnatoscopico / liquido penetrante Luogo:
33 Provino per esame macrostruttura Validità dell' esame
34 Prova di rottura
35 Prova a flessione ESTENSIONE DELLA QUALIFICA TRAMITE CONFERMA DEL DATORE / DEI DATORI DI LAVORO O DELLA SORVEGLIANZA DELL' ESAME
36 Prove supplementari
37 Data, firma Funzione o titolo
38 ESTENSIONE DELLA QUALIFCA TRAMITE IL COLLAUDATORE / CENTRO DI COLLAUDO
39 Data, firma Funzione o titolo

es (E)

1 CERTIFICADO DE EXAMEN DE SOLDADOR No. de referencia :
2 DESIGNACIÓN
3 Pagina de
4 Instrucción de soldadura del fabricante
5 No. de referencia :
6 Appellido y nombre del soldador:
7 Identificación:
8 Método de identificación:
9 Fecha de nacimiento y lugar:
10 Empleado de:
11 Codigo / Norma de comprobación:
12 Examen teórico
13 Datos del examen Alcance de validez
14 Proceso de soldadura
15 Chapa o tubo
16 Forma de soldadura
17 Grupo(s) de material(es) base(s)
18 Material de aportación / designación
19 Gas de portección
20 Material auxiliar
21 Espesor del material [mm]
22 Diametro exterior do tubo [mm]
23 Posición de soldadura
24 Descarnar / Respaldo
25 Información adicional:
26 Realizado y, apellido, nombre y firma
27 Tipo de prueba
28 aprobado, no requerido Organismo de control
29
30 Control visual
31 Radiografía / Fecha de edición:
32 Particulas magnet. / Liquidos penetrantes Lugar:
33 Macrografía Validez del examen
34 Ensayo de rotura
35 Ensayo de doblado PRORROGA DE VALIDEZ POR CONFIRMACIÓN DE LA EMPRESA O DEL PRSONAL SUPERVISOR
36 Ensayo adicionales
37 Fecha, Firma Posición o título
38 PRORROGA DE VALIDEZ POR ORGANISMO DE CONTROL
39 Fecha, Firma Posición o título

po (P)

1 CERTIFICADO DE QUALIFICAÇÃO DE SOLDADOR Referência No.:
2 DESIGNAÇÃO
3 Pagina de
4 Especificação do Procedimento de Soldadura do Construtor
5 Referência No.:
6 Nome do soldador:
7 Identificação:
8 Metodo de identificação:
9 Data e local de nascimento:
10 Empresa:
11 Codigo / Norma de ensaios:
12 Conhecimentos do trabalho
13 Detalhes do exame Campo de validade
14 Processo de soldadura
15 Chapa ou tubo
16 Tipo de junta
17 Grupo do(s) material(is) base(s)
18 Tipo de material de adição / designação
19 Gas
20 Auxiliares
21 Espessura do material base [mm]
22 Diâmetro exterior do tube [mm]
23 Posições de soldadura
24 Limpeza da raiz / Cobrejunta
25 Informação adicional:
26 Realizado e, Nome e assinatura:
27 Tipo de teste
28 aceitavel, não requerido Entidade inspectora
29
30 Visual
31 Radiografia / Data de emissão:
32 Magnetoscopia / Liquidos penetrantes Local:
33 Macrografia Aprovação válida até:
34 Fractura
35 Dobragem REVALIDAÇÃO PELA EMPRESA / SUPERVISOR

36 Outros testes
37 Data, Assinatura Posição ou título
38 REVALIDAÇÃO PELA ENTIDADE INSPECTORA
39 Data, Assinatura Posição ou título

un (H)

1 HEGESZTŐVIZSGA BIZONYÍTVÁNY
2 JELÖLÉS
3 Oldalak száma
4 A gyártó hegesztési utasítása Vizsgáztató
5 Bizonyítvány sz. /ha van:/ Vizgaszám
6 Hegesztő neve:
7 Azonosítójel:
8 Azonosítás módja: Fénykép
9 Születési idő és hely: /ha szükséges/
10 Munkaadó
11 Vizsgázatási előírás, szabvány
12 Szakmai ismeret: Sikeres vizsgát tett / nem vizsgált (a nem megfelelő rész törlendő)
13 Vizsgadatok Érvényességi tartomány
14 Hegesztési eljárás
15 Lemez vagy cső
16 Varratfajta
17 Anyagcsoport
18 Hozaganyag / Jelölés
19 Védőgáz / por
20 Segédanyagok
21 Vizsgadarab vastagsága (mm)
22 Cső külső átmérője (mm)
23 Hegesztési pozíciók
24 Gyökoldali kimunkálás / varratmegtamasztás
25 Kiegészítő utasításokat lásd. a mellekelt lapon és/vagy a ..... sz. hegesztési utasításban
26 Kivitelezett és. Név és aláírás
27 Vizsgálat módja
28 megfelelt, nem szükséges Vizsgáztató
29
30 Szemrevételezés
31 Radiográfiai vizsgálat / a kibocsátás napja:
32 Mágnesporos / behatolófolyadékos repedésvizsgálat Hely:
33 Makrocsiszolat A vizsga érvényessége:
34 Töretpróba
35 Hajlitópróba A VIZSGA MEGHOSSZABBÍTÁSA A MUNKAADÓ VAGY FELÜGYELETI SZEMÉLY IGAZOLÁSÁVAL
36 Kiegészítő vizsgálatok
37 Dátum, Aláírás Munkaadó vagy a cime
38 A VIZSGA MEGHOSSZABBÍTÁSA A VIZSGÁZTATÓ/A VIZSGÁZTATÓ HELY ÁLTAL
39 Dátum, Aláírás Vizsgáztató, vagy a cime

ts (CZ)

1 OSVĚDČENÍ O SVAŘEČSKÉ ZKOUŠCE
2 OZNČENÍ
3 Strana z
4 Podmínky výrobce pro svařování Přezkoušeno v
5 Čislené označení podmínek (je-li k dispozici) /zkouška č.'
6 Jméno svářeče
7 Průkaz:
8 Druh průkazu:
9 Datum a místo narození.
10 Zaměstnán u:
11 Předpismorma:
12 Odbornou zkoušku: složil/nesložil (nehodící se škrtněte)
13 Zkušební data-údaje Oblast platnosti
14 Svařovací postup
15 Plech nebo roura
16 Druh svaru
17 Materiálová skupina
18 Přídavné materiály/označení
19 Ochranný plyn/tavidlo
20 Pomocné látky
21 Tloušťka vzorku /mm/
22 Vnější průmár roury /mm/
23 Svařovací pozice
24 Odstranění kořene/ochrana lázně
25 Ostatní podrobnosti viz přiložený list a/ nebo svářečský průkaz č.'
26 Vyplněno a.
27 Druh zkoušky
28 Splnil, není požadováno Odzkoušeno v
29
30 Vizuální zkouška
31 Zkouška prozářením/den vyhotovení
32 Zkouška magnetickými částicemi/ barevná indikace Misto:
33 Makro výbrus Platnost zkoušky
34 Lomová zkouška
35 Zkouška ohybem PRODLOUŽENÍ ZKOUŠKY POTVRZENÍM ZAMĚSTNAVATELE, NEBO ZKUŠEBNÍHO DOHLEDU
36 Přídavné zkoušky
37 Datum, podpis Služební postavení, nebo titul
38 PRODLOUŽENÍ ZKOUŠKY ZKUŠEBNÍ ORGANIZACÍ/MÍSTO PŘEZKOUŠENÍ.
39 Datum, podpis. služební postavení nebo titul

Declaration of decontamination

Because of the legal regulations and for the safety of our employees it is mandatory for you to fill out this declaration of decontamination and sign it before your order can be handled.

Please attach this document well readable and protected from wetness on the outside of the packaging and place a copy with the shipment papers.

Device/component _____

Serial no. _____

Point of use/environment _____

Reason for sending in:

_____

_____

_____

Was the device in operation?

☐ No – Device still in the packaging.
☐ No – Unpacked, but not in operation.
☐ Yes – operated with:

_____

Contamination:

Could the component be contaminated? ☐ No ☐ Yes, contaminated with: _____

explosive	flammable	oxidizing	corrosive	toxic	health hazard	environm. hazard	other _____	harmless
☐	☐	☐	☐	☐	☐	☐	☐	☐

The device/component was purged with: _____

Sender:

Company _____ Contact person _____

Street _____ Phone _____

Zip code, city _____ E-Mail _____

I confirm, that the device/component mentioned above is free of hazardous or potential hazardous substances. This declaration of decontamination has been filled in to the best of our knowledge und was signed by an authorized person.

Legally binding declaration:

I hereby confirm, that die statements in this form are correct and complete. The shipment of the (decontaminated) devices and components follows the legal regulations.

Name (in block letters) _____ Company stamp

Position _____

Place, Date _____

Legally binding signature _____

14.10 Component documentation

NOTICE!

The data sheets for the components are in pdf-format on the attached CD. They are not printed out because of their high page count and environmental concerns.

➔ *Please refer to the CD, if you need a certain data sheet or manual.*

SEMPA SYSTEMS GmbH
Grenzstr. 13
01109 Dresden, Germany

Phone: +49 351 88810-0
Fax: +49 351 88810-15
E-Mail: info@sempa.de – Web: www.sempa.de

CS-UK-LTD SERVICE REPORT

Date: 15/03/2016	Purchase Order: N/A	Engineer: S.Johnstone
Client: Nines PV	Address: University of Sheffield, NanoScience & Technology Building, Broad Lane, Sheffield, S3 7HQ	
Contact Person: Laurent Clochard		
Tel: N/A		
Reason For Visit: To Commission 1 off CP500SF & 1 off CS200BS		

Description of Work:

Commissioning of CS200BS, Serial No. CS150042. System installed in Lab area for Photovoltaics PECVD. Remove inlet/outlet caps & complete visual inspection of all components.
Power up unit spur & switch on internal fuses.
Open external N2 supply & regulate pressure to 6 bar, set internal regulator to 0.3bar.
Check & tighten all internal connections & fixings. Install 250mm St/St flexible on outlet of system on customer's behalf. Install column, CC1891, & connect inlet & outlet flexible & Kf40 clamps & centring rings. Full function test of bypass actuator & gas detection sample unit. Function test of detection N2 purge. Install internal gas detection for monitoring of outlet concentrations, TX-1461-KFP, serial no. 903404 & GS-1461DP(F2) cell, serial no. 889144.
Full test of sensor using 2ppm Cl2 gas.
Pressure drop test across system @ 0.2bar for 1 hour, all ok.
System ready for process.

Commissioning of CP500SF, with in-line filter, serial no. 150004.
CP500 installed in container with internal heating supplied. CP for emergency abatement on gas Cabinet. Removed both upper & column lids to check granulate levels after shipping, all ok. Reinstalled lids. Inspection of Pre-filter installation, all ok. Fan switched on & magnehelic readings recorded, CP Granulate bed 0 Pascal's & CP filter 0 Pascal's.
System ready for process.

Materials:	Additional Comments: Temporary N2 supply installed on CS-200-BS system. Customer advised that permanent 6 Bar supply was to be installed, which was due to be done after commissioning visit.
Print: Scott Johnstone	System training on both systems carried out with names of attendees below,
Signature:	Ed Duffy, Laurent Clochard & John Clarke
Date: 15/03/2016	

CS CLEAN SYSTEMS

Date: 15-03-2016 Service no : Engineer: Scott Johnstone

Client: NINES PV Address: Nines Photovoltaics, Synergy Centre, IT Tallaght, Dublin, Ireland

Location: Lab Area Responsible: Laurent Clochard

Order/Ref no. Client: Commissioning Visit Tel: 00353 (0) 76 6152321

Start-up: ☐ Commissioned : ■ Repair: ☐ Extra Work: ☐ Other: ☐

Description:

Commissioned & calibrated internal gas detection unit on CS-200BS system monitoring outlet concentrations.

1 x Fluorine: TX-1461-KFP sensor serial no. 903404 & GS-1461-DP cell, serial no. 889144

Calibrated using 2ppm Cl2.

Calibration successful and operation of Sensor correct

Quick connect & sample lines clean.

Next service due March 2017.

Materials	Quantity
Electrolyte	
Membranes	
"O" ring	
Gen tubes	
Gen liquid	
Test canisters	
Pyrolyser	
Cal tubes	
Other Consumables:	
	Calibration Gas Cl2 2ppm

Labour & Travel Cost	Quantity
Labour hours	1 hr
Travel hours	N/A
Travel km/Miles	
Living cost € / £	
Backup SIMS / Pact ➡	Backup performed: ☐

Date: 15 / 03 / 2016	Start: hour
	End : hour
Date: / /	Start: : hour
	End : : hour
Date: / /	Start: : hour
	End : : hour
Date: / /	Start: : hour
	End : : hour

Client Signature: Date: