IECEx TEST REPORT
IEC 60079-0
Explosive atmospheres – Part 0: Equipment – General requirements

ExTR Reference Number..... :	NO/DNV/ExTR21.0088/00
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Address ..... :	2-7-6, Azusawa, Itabashi-Ku, Tokyo, 174-8744, Japan
Standard..... :	IEC 60079-0:2017, Edition 7.0
Test procedure..... :	IECEx System
Test Report Form Number ..... :	ExTR60079-0_7C_DS (released 2021-10)
Related Amendments, Corrigenda or ISHs	N / A

Possible test case verdicts:

- test case does not apply to the test item .....:N / A
- test item does meet the requirement .....:Pass

General remarks:
The test results presented in this Ex Test Report relate only to the item or product tested.

- "(see Attachment #)" refers to additional information appended to this document.
- "(see appended table)" refers to a table appended to this document.
- Throughout this document, a comma "," is used as the decimal separator.

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IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
1 **DS 2021/004**	Scope		
2	Normative references		
3 **DS 2020/002**	Terms and definitions		
4	Equipment grouping		
4.1	General	According to clause 4.3.	Pass
4.2	Group I	Not for Group I.	N / A
4.3	Group II	IIC	Pass
4.4	Group III	Not for Group III.	N / A
4.5	Equipment for a particular explosive gas atmosphere	Certified for Group IIC.	N / A
5 **DS 2016/002** **DS 2015/011A**	Temperatures		
5.1	Environmental influences		
5.1.1	Ambient temperature	T_{amb} : -20°C to +60°C	Pass
5.1.2	External source of heating or cooling	No external sources of heating or cooling.	N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
5.2 **DS 2020/006**	Service temperature	Service temperature for Gas Sensor, Type NCR-6309 was determined to +69.3°C at the ambient temperature +60°C (ΔT=9.3K) Current and power consumption in normal use (stated by customer): - in normal use Current consumption・・・85mA Power consumption・・306mW - when alarm is activated Current consumption・・・110mA Power consumption・・・396mW Service temperature will be ≈ to ambient temperature.	Pass

5.3	Maximum surface temperature		
5.3.1	Determination of maximum surface temperature	Determined according to clause 5.3.3, 26.5.1 and IEC 60079-11. Maximum surface temperature for Gas Sensor, Type NCR-6309 was determined to +79.3°C at the ambient temperature +60°C (ΔT=19.3K) taking into the consideration results of thermal tests (see 60079-1 report). (T=79.3+8.4 x 1.2 =89.38 < 135-5 (T4) [℃]	Pass
5.3.2	Limitation of maximum surface temperature		
5.3.2.1	Group I electrical equipment	Not for Group I.	N / A
5.3.2.2	Group II electrical equipment	T4	Pass
5.3.2.3	Group III electrical equipment	Not for Group III.	N / A
5.3.2.3.1 **DS 2020/006**	Maximum surface temperature for EPL Da		N / A
5.3.2.3.2	Maximum surface temperature for EPL Db		N / A
5.3.2.3.3	Maximum surface temperature determined without a layer of dust for EPL Dc		N / A
5.3.3	Small component temperature for Group I or Group II electrical equipment	See appendix A.3 of the IEC 60079-11 report for details.	Pass
5.3.4	Component temperature of smooth surfaces for Group I or Group II electrical equipment	No such components.	N / A

6	Requirements for all electrical equipment

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
6.1	General	According to IEC 60079-0, IEC 60079-1 and IEC 60079-11. In addition according to these relevant industrial standards: EN 50270 - Electromagnetic compatibility - Electrical apparatus for the detection and measurement of combustible gases, toxic gases or oxygen EN IEC 63000 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances	Pass
6.2	Mechanical strength of equipment	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. The gas sensor, Type NCR-6309, is protected by impact by enclosure parts which considered as “guard”.	Pass
6.3	Opening times	For “ia”: Excluded by table 1 of IEC 60079-11. Sensor, Type NCR-6309, can’t be opened.	N / A
6.4	Circulating currents in enclosures (e.g. of large electric machines)	For “ia”: Excluded by table 1 of IEC 60079-11. No circulating currents.	N / A
6.5	Gasket retention	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. Sensor, Type NCR-6309, can’t be opened, Ex protection doesn’t rely on the gasket.	N / A
6.6	Electromagnetic and ultrasonic energy radiating equipment		
6.6.1	General		Pass

<table>
<tr><td colspan="4">IEC 60079-0</td></tr>
<tr><td>Clause</td><td>Requirement – Test</td><td>Result – Remark</td><td>Verdict</td></tr>
<tr><td>6.6.2</td><td>Radio frequency sources</td><td>Component IC16 is a BLE Module EYSHJN [TAIYO YUDEN].
Chip : Nordic nRF52832
Internal C = 1.5uFmax, L=0neg. (nano Henry range)
<table><tr><th>Symbol</th><th>Description</th><th>Min.</th><th>Typ.</th><th>Max.</th><th>Units</th></tr><tr><td>Fop</td><td>Operating frequencies</td><td>2402</td><td></td><td>2480</td><td>MHz</td></tr><tr><td>PLLchsp</td><td>PLL channel spacing</td><td></td><td>1</td><td></td><td>MHz</td></tr><tr><td>DfBLE2M</td><td>Frequency deviation @ BLE 1Mbps</td><td></td><td>+/-250</td><td></td><td>kHz</td></tr><tr><td>DfBLE2M</td><td>Frequency deviation @ BLE 2Msps</td><td></td><td>+/-500</td><td></td><td>kHz</td></tr><tr><td>PRF</td><td>Maximum output power</td><td></td><td>4</td><td>6</td><td>dBm</td></tr><tr><td>PRFC</td><td>RF power control range</td><td></td><td>24</td><td></td><td>dB</td></tr><tr><td>PRFCR</td><td>RF power accuracy</td><td></td><td></td><td>+/-4</td><td>dB</td></tr><tr><td>PRF1</td><td>1st Adjacent Channel Transmit Power 1 MHz</td><td></td><td>-25</td><td></td><td>dBc</td></tr><tr><td>PRF2</td><td>2nd Adjacent Channel Transmit Power 2 MHz</td><td></td><td>-50</td><td></td><td>dBc</td></tr><tr><td>PRXMAX</td><td>Maximum received signal strength at < 0.1% PER</td><td></td><td>0</td><td></td><td>dBm</td></tr><tr><td>PSENS,IT,1M,BLE</td><td>Receiver sensitivity 1Msps BLE Ideal transmitter <=37bytes (0.1% BER)</td><td></td><td>-94</td><td></td><td>dBm</td></tr><tr><td>PSENS,IT,2M,BLE</td><td>Receiver sensitivity 2Msps BLE Ideal transmitter Packet length<=37bytes</td><td></td><td>-91</td><td></td><td>dBm</td></tr></table>Maximum output RF power: 6dBm = 4mW
4mW < 2W
Frequency: 2,4GHz
2,4GHz → 9kHz to 60GHz</td><td>Pass</td></tr>
<tr><td>6.6.3</td><td>Ultrasonic sources</td><td>No ultrasonic sources in EUT.</td><td>N / A</td></tr>
<tr><td>6.6.4
DS 2018/004</td><td>Lasers, luminaires, and other non-divergent continuous wave optical sources</td><td>LEDs for alarm on both sides and top. These LEDs are divergent and not continuous.
According to IEC 60079-28 ISH1:2019 divergent light sources are not applicable to IEC 60079-28.</td><td>N / A</td></tr>
</table>

7	Non-metallic enclosures and non-metallic parts of enclosures		
7.1	General	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. Enclosure of the gas sensor, Type NCR-6309, made from two plastic parts with cemented joint (in between).	Pass
7.1.1	Applicability		
7.1.2 DS 2011/002A	Specification of materials		
7.1.2.1	General	Descriptive documents describe the materials used for manufacturing the enclosure.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
7.1.2.2	Plastic materials	Excluded by table 1 of IEC 60079-11. Annex F is not used. Panel sheet: a) U-CORPORATION Co., Ltd. b) PET PE84-0.125t, transparent. Protector (main part of material): a) Riken Technos Corp. b) TPE LSB9959R, black. There are also superficial areas made of other materials, but these are only external parts covering the bottom/top case. Electrostatic charging is considered for these materials, see clause 7.4.2 for details. “Gas Sensor, Type NCR-6309, enclosure” a) DIC Corporation b) PPS FZ1130-D5 (PPS GF30%), natural color. c) no surface treatment d) RTI: +130°C e) N/A (won’t be exposed to UV)	Pass
7.1.2.3	Elastomers	For Ex “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. A gasket is used between main part of the enclosure (front) and the lid (back). The gasket is kept in place even if the enclosure is opened. The enclosure and lid is mounted together by the use of four screws. (The enclosure shall not be opened by the customer.)	N / A
7.1.2.4	Materials used for cementing	For Ex “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. Cementing is not used for the external enclosure. Sensor, Type NCR-6309: The joints between the in-casted breather and the Cap and between the electrical contacts and Base are cemented joints. Since the joints are formed by injection molding (from the same material as enclosure) the molding parameters are relevant (specified in drawing M3-4463-10-02K).	Pass

7.2	Thermal endurance		
7.2.1	Tests for thermal endurance	See clause 26.7.1 below.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
7.2.2	Material selection	The RTI and COT of the materials specified are satisfactory with respect to minimum ambient temperature and maximum service temperature (see 7.1.2.2 and 7.1.2.4 above). See clause 26.5.1.2.	Pass
7.2.3	Alternative qualification of elastomeric sealing O-rings	No O-rings evaluated as part of Ex protection.	N / A

7.3	Resistance to ultraviolet light	Teijin Limited PC L-1225Z100M (black and clear): UL 746C: f1.	Pass

7.4	Electrostatic charges on external non-metallic materials		
7.4.1	Applicability	Enclosure is made of non-metallic materials.	Pass
7.4.2	Avoidance of a build-up of electrostatic charge for Group I or Group II	a) Panel sheet: U-corporation Co., Ltd, PET PE84-0.125t, surface resistance less than 1GΩ. See Measurement Section, including Additional Narrative Remarks for details. Protector (main part of material): Riken Technos Corp., TPE LSB9959R, surface resistance less than 1GΩ. See Measurement Section, including Additional Narrative Remarks for details. b) Several individual areas which are less than 400mm^2. See “measurement section” at the end of the report for details. c) N / A d) N / A e) N / A f) N / A g) N / A	Pass
7.4.3	Avoidance of a build-up of electrostatic charge for Group III	No dust certification.	N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
7.5	Attached external conductive parts	Nipple is metallic material and conductive.  Tested according to clause 26.14. See Measurement Section, including Additional Narrative Remarks for details. Screws and metallic parts less the size of the screws will present a capacitance of not more than 3pF, according to NOTE 1. These parts are also situated such that discharges to approaching earthed objects are not expected.	Pass
8	Metallic enclosures and metallic parts of enclosures	Enclosure made of non-metallic materials.	N / A
8.1	Material composition		N / A
8.2	Group I		N / A
8.3	Group II		N / A
8.4	Group III		N / A
8.5	Copper Alloys		N / A
9	Fasteners	For “ia”: Excluded by table 1 of IEC 60079-11. No fasteners used on gas sensor, Type NCR-6309, enclosure. Two parts of enclosure are permanently fixed together by metallic rim.	N / A
9.1	General		
9.2	Special fasteners		
9.3	Holes for special fasteners		
9.3.1	Thread engagement		
9.3.2	Tolerance and clearance		

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
9.4	Hexagon socket set screws		
10	Interlocking devices	For “ia”: Excluded by table 1 of IEC 60079-11. Interlocking devices are not used.	N / A
11	Bushings	For “ia”: Excluded by table 1 of IEC 60079-11. EUT is not a bushing.	N / A
12	(Reserved for future use)		
13 **DS 2014/001** **DS 2021/006**	Ex Components	EUT is not an Ex component. No Ex components are used in the certification.	N / A
13.1	General		N / A
13.2	Mounting		N / A
13.3	Internal mounting		N / A
13.4	External mounting		N / A
13.5 **DS 2020/002**	Ex Component certificate		N / A
14	Connection facilities	For “ia”: Excluded by table 1 of IEC 60079-11. No external connections to gas sensor, Type NCR-6309.	N / A
14.1	General		N / A
14.2	Type of protection		N / A
14.3	Creepage and clearance		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
15	Connection facilities for earthing or bonding conductors	For “ia”: Excluded by table 1 of IEC 60079-11. Battery powered equipment.	N / A
15.1	Equipment requiring earthing or bonding		
15.1.1	Internal earthing		N / A
15.1.2	External bonding		N / A
15.2	Equipment not requiring earthing		N / A
15.3	Size of protective earthing conductor connection		N / A
15.4	Size of equipotential bonding conductor connection		N / A
15.5	Protection against corrosion		N / A
15.6	Secureness of electrical connections		N / A
15.7	Internal earth continuity plate		N / A
16 **DS 2017/001**	Entries into enclosures	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. No entries to gas sensor, Type NCR-6309.	N / A
16.1	General		N / A
16.2	Identification of entries		N / A
16.3	Cable glands		N / A
16.4	Blanking elements		N / A
16.5	Thread adapters		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
16.6 **DS 2018/002**	Temperature at branching point and entry point		N / A
16.7	Electrostatic charges of cable sheaths		N / A
17	Supplementary requirements for electric machines	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. EUT is not an electrical machine.	N / A
17.1	General		N / A
17.2	Ventilation		
17.2.1	Ventilation openings		N / A
17.2.2	Materials for external fans		N / A
17.2.3	Cooling fans of rotating electric machines		N / A
17.2.3.1	Fans and fan hoods		N / A
17.2.3.2	Construction and mounting of the ventilating systems		N / A
17.2.3.3	Clearances for the ventilating system		N / A
17.2.4	Auxiliary motor cooling fans		N / A
17.2.5	Room ventilating fans		
17.2.5.1	Applicability		N / A
17.2.5.2	General		N / A
17.2.5.3	Fan and fan hoods		N / A
17.2.5.4	Construction and mounting		N / A
17.2.5.5	Clearances for rotating parts		N / A
17.3	Bearings		N / A
18	Supplementary requirements for switchgear	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. EUT is not a switchgear.	N / A
18.1	Flammable dielectric		N / A
18.2	Disconnectors		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
18.3	Group I – Provisions for locking		N / A
18.4	Doors and covers		N / A
19	Reserved for future use		
20 **DS 2020/007**	Supplementary requirements for external plugs, socket outlets and connectors for field wiring connection	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. EUT is handheld. No field wiring connections, but there is a USB-C terminal for charging of the battery in non-hazardous area.	N / A
20.1	General		N / A
20.2	Explosive gas atmospheres		N / A
20.3	Explosive dust atmospheres		N / A
20.4	Energized plugs		N / A
21	Supplementary requirements for luminaires	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. EUT is not a luminaire.	N / A
21.1 **DS 2020/001**	General		N / A
21.2	Covers for luminaires of EPL Mb, EPL Gb, or EPL Db		N / A
21.3	Covers for luminaires of EPL Gc or EPL Dc		N / A
21.4	Sodium lamps		N / A
22	Supplementary requirements for caplights and handlights	EUT is not a caplight or handlight.	N / A
22.1	Group I caplights		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
22.2	Group II and Group III caplights and handlights		N / A
23	Equipment incorporating cells and batteries		
23.1	General	EUT is powered by a single secondary cell. The cell is tested in NO/PRE/ExTR20.0043/00. See appendix B of IEC 60079-11 report for details.	Pass
23.2	Interconnection of cells to form batteries	Only a single cell is used.	N / A
23.3 **DS 2019/002**	Cell types	According to table 14: Type system: Lithium ion Positive electrode: (NCA) Li(NiCoAl)O2 Electrolyte: Liquid solution Negative electrode: Carbon Voltage: 3,6V Maximum open circuit voltage: 4,2V	Pass
23.4	Cells in a battery	Single cell.	Pass
23.5	Ratings of batteries	Ambient temperature discharge: -20°C to + 60°C Ambient temperature charge: +10°C to + 45°C Ambient temperature for EUT: -20°C to + 60°C Max discharge current for the battery is 8A. Nominal discharge for EUT is: 85mA Discharge when alarm is activated: 110mA	Pass
23.6	Interchangeability	Only one single battery in EUT.	Pass
23.7	Charging of primary batteries	Primary cells are not used.	N / A
23.8	Leakage	Tested according to clause 10.5.2 of IEC 60079-11. No leakage occurred.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
23.9	Connections	 Connections according to manufacturer's recommendations.	Pass
23.10	Orientation	Battery orientation is not important for safe operation.	Pass
23.11	Replacement of cells or batteries	User shall never replace the battery.	N / A
23.12	Replaceable battery pack	The battery is not replaceable.	N / A
24	Documentation	Manufacturer has prepared documentation that details the Ex safety of the equipment according to IEC 60079-0, IEC 60079-1 and IEC 60079-11.	Pass
25	Compliance of prototype or sample with documents	Test samples complies with the documentation.	Pass
26 **DS 2017/005**	Type tests		
26.1	General	Tested according to IEC 60079-0, IEC 60079-1 and IEC 60079-11. No any test judged as unnecessary (no justification records). Thermal testing of gas sensor, Type NCR-6309, is accepted based on reports NL/DEK/ExTR17.004/00-02 See Comment 4 at the end of this report. All test equipment is regular, calibrated, measurements are considered without any significant detrimental effect.	Pass
26.2	Test configuration	EUT is tested in the configuration considered to be the most unfavourable.	Pass
26.3	Tests in explosive test mixtures	Tested according to specifications of IEC 60079-1.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
26.4	Tests of enclosures		
26.4.1	Order of tests		
26.4.1.1	Metallic enclosures, metallic parts of enclosures and glass parts of enclosures	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. Applicable tests in the following order for gas sensor, Type NCR-6309: - maximum surface temperature - test for resistance to impact, - tests required by type protection.	Pass
26.4.1.2	Non-metallic enclosures or non-metallic parts of enclosures	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. Applicable tests in the following order for gas sensor, Type NCR-6309: - service temperature, - surface temperature, - thermal endurance test, - drop test - tests required by type protection.	Pass
26.4.1.2.1	General		Pass
26.4.1.2.2	Group I equipment	Not for Group I.	N / A
26.4.1.2.3	Group II and Group III equipment		Pass
26.4.2 **DS 2020/001**	Resistance to impact	For “ia”: Excluded by table 1 of IEC 60079-11. Annex F is not used. Gas sensor, Type NCR-6309,: Not applicable for hand held equipment.	N / A
26.4.3	Drop test	4 drop tests on two different test samples are performed from a height of 1m onto a concrete surface. Ambient temperature: -45°C for 24 hours prior to the tests. The actual tests were also performed in this temperature. See Measurement Section, including Additional Narrative Remarks test 2 for details.	Pass
26.4.4	Acceptance criteria	Only superficial scratches to the enclosure after drop tests. No damages.	Pass
26.4.5 **DS 2012/003**	Degree of protection (IP) by enclosures		
26.4.5.1	Test procedure	Tested according to IEC 60529 after drop tests.	Pass
26.4.5.2	Acceptance criteria	≥IP20 See Measurement Section, including Additional Narrative Remarks test 3 for details.	Pass

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Clause	Requirement – Test	Result – Remark	Verdict
26.5	Thermal tests		
26.5.1	Temperature measurement		
26.5.1.1	General	For Gas sensor, Type NCR-6309, See 26.1 above.	Pass
26.5.1.2	Service temperature	The service temperature rise is measured to (∆T=9.3K) on the (plastic) enclosure of the of the gas sensor, Type NCR-6309. See Comment 4 at the end of this report.	Pass
26.5.1.3	Maximum surface temperature	See appendix A and B of the IEC 60079-11 report for details. Maximum surface temperature determined to +79.3°C, for the gas sensor, Type NCR-6309, taking in to the consideration results of the thermal testing x1.2 (acc to 60079-1 15.4.3.1) See 26.1 above and Comment 4 at the end of this report.	Pass
26.5.2	Thermal shock test	For "ia": Excluded by table 1 of IEC 60079-11. Annex F is not used. Not applicable for gas sensor, Type NCR-6309.	N / A
26.5.3	Small component ignition test (Group I and Group II)	Small component ignition test not necessary to perform.	N / A
26.5.3.1	General		N / A
26.5.3.2	Procedure		N / A
26.5.3.3	Acceptance criteria		N / A

26.6	Torque test for bushings	No bushings.	N / A
26.6.1	Test procedure		N / A
26.6.2	Acceptance criteria		N / A

26.7	Non-metallic enclosures or non-metallic parts of enclosures	For "ia": Excluded by table 1 of IEC 60079-11. Annex F is not used.	Pass
26.7.1	General	Applicable to plastic body and cemented joint of gas sensor, Type NCR-6309.	Pass
26.7.2	Test temperatures	Gas sensor, Type NCR-6309: Low test temperature: -25°C to -30°C High test temperature: +80°C to +95°C	Pass

26.8 **DS 2020/003**	Thermal endurance to heat	Gas sensor, Type NCR-6309: Test conditions used: Endurance to heat and moisture applied for - 672 h at +90±2ºC and 90±5%RH, See Comment 5 at the end of this report.	Pass

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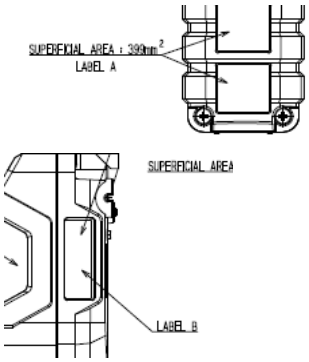
Clause	Requirement – Test	Result – Remark	Verdict
26.9	Thermal endurance to cold	Gas sensor, Type NCR-6309: Thermal endurance to cold performed prior to the drop tests. - 24±2 h at -60ºC, after reconditioning of 24-72 h at +20±ºC and 50±10% RH. See Comment 5 at the end of this report.	Pass
26.10	Resistance to UV light		
26.10.1	General		N / A
26.10.2	Light exposure		N / A
26.10.3	Acceptance criteria	Not applicable	N / A
26.11	Resistance to chemical agents for Group I equipment	Group II.	N / A
26.12	Earth continuity	Battery powered equipment.	N / A
26.13	Surface resistance test of parts of enclosures of non-metallic materials	Measurement Section, including Additional Narrative Remarks.	Pass
26.14	Measurement of capacitance		
26.14.1	General	A metallic nipple is isolated from earth.	Pass
26.14.2	Test procedure	Average capacitance: 1,4pF 1,4pF < 3pF → EPL Ga and gas group IIC. See test 1 in Measurement Section, including Additional Narrative Remarks for details.	Pass
26.15	Verification of ratings of ventilating fans	No ventilating fans in EUT.	N / A
26.16	Alternative qualification of elastomeric sealing O-rings	Alternative qualifications not used.	N / A
26.17	Transferred charge test		
26.17.1	Test equipment		N / A
26.17.2	Test sample		N / A
26.17.3	Test procedure		N / A
27	Routine tests	None	N / A
28	Manufacturer's responsibility		

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
28.1	Conformity with the documentation		Pass
28.2 **DS 2020/002** **DS 2021/005**	Certificate	DNV has prepared the certificate.	Pass
28.3	Responsibility for marking	Manufacturer's responsibility.	Pass
29 **DS 2012/005A** **DS 2017/007** **DS 2021/005** **DS 2021/006**	Marking		
29.1	Applicability		Pass
29.2	Location		Pass
29.3	General	a) RIKEN KEIKI Co., Ltd. b) MODEL GX-Force c) INST.No is serial number d) DNV 22 ATEX 05201X IECEx DNV 22.0029X e) X f) Ex da ia IIC T4 Ga Ex ia IIC T4 Ga g) Read manual for safety info.	Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
29.4	Ex marking for explosive gas atmospheres	a) Ex b) da ia ia c) IIC d) T4 e) Ga f) -20°C ≤ Ta ≤ +60°C	Pass
29.5	Ex marking for explosive dust atmospheres	No dust certification.	N / A
29.6	Combined types (or levels) of protection	da ia	Pass
29.7	Multiple types of protection		N / A
29.8	Ga equipment using two independent Gb types (or levels) of protection	da ia	N / A
29.9	Boundary wall	Hand held equipment.	N / A
29.10 **DS 2004/006A** **DS 2012/006A** **DS 2012/008**	Ex Components	EUT is not an Ex component.	N / A
29.11	Small Ex Equipment and small Ex Components		N / A
29.12	Extremely small Ex Equipment and extremely small Ex Components		N / A
29.13	Warning markings		N / A
29.14	Cells and batteries	The battery shall not be replaced by user.	N / A
29.15	Electric machines operated with a converter	EUT is not an electrical machine.	N / A
29.16	Examples of marking		Pass

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
30 **DS 2021/006**	Instructions		
30.1	General	- Ex marking - List of standards - Certificate numbers - Ambient temperature - Conditions for charging the battery - Address to manufacturer - Safety information - Use - Maintenance - Product configuration - Alarm activation	Pass
30.2	Cells and batteries	The battery shall not be replaced by user. Charging conditions are specified.	Pass
30.3	Electrical machines	EUT is not an electrical machine.	N / A
30.4	Ventilating fans	EUT is not a ventilating fan.	N / A
30.5	Cable glands	EUT is not a cable gland.	N / A
Annex A (Normative) **DS 2017/001**	Supplementary requirements for cable glands	EUT is not a cable gland.	N / A
A.1	General		N / A
A.2	Constructional requirements		
A.2.1	Cable sealing		N / A
A.2.2	Filling compounds		N / A
A.2.3	Clamping		
A.2.3.1	General		N / A
A.2.3.2	Group II or III cable glands		N / A
A.2.4	Lead-in of cable		
A.2.4.1	Sharp edges		N / A
A.2.4.2	Point of entry		N / A
A.2.5	Released by a tool		N / A
A.2.6	Fixing		N / A
A.2.7	Degree of protection		N / A

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict
A.3	Type tests		
A.3.1	Tests of clamping of non-armoured and braided cables		
A.3.1.1	Cable glands with clamping by the sealing ring		N / A
A.3.1.2	Cable glands with clamping by filling compound		N / A
A.3.1.3	Cable glands with clamping by means of a clamping device		N / A
A.3.1.4	Clamping test		N / A
A.3.1.5	Mechanical strength		N / A
A.3.2	Tests of clamping of armoured cables		N / A
A.3.2.1	Tests of clamping where the armourings are clamped by a device integral to the gland		
A.3.2.1.1	General		N / A
A.3.2.1.2	Clamping test		N / A
A.3.2.1.3	Mechanical strength		N / A
A.3.2.2	Tests of clamping where the armourings are not clamped by a device integral to the gland		N / A
A.3.3	Type test for resistance to impact		N / A
A.3.4 **DS 2019/005**	Test for degree of protection (IP) of cable glands		N / A
A.4	Marking		
A.4.1	Marking of cable glands		N / A
A.4.2	Identification of cable-sealing rings		N / A
A.5	Instructions		N / A

Annex B (Normative)	Requirements for Ex Components		
Table B.1	Applicability of clauses to Ex Components	EUT is not an Ex component.	N / A

Annex C (Informative)	Example of rig for resistance to impact test

Annex D (Informative)	Electric machines connected to converters

Annex E (Informative)	Temperature evaluation of electric machines

IEC 60079-0			
Clause	Requirement – Test	Result – Remark	Verdict

Annex F (Informative)	Guideline flowchart for tests of non-metallic enclosures or non-metallic parts of enclosures (26.4)

Annex G (Informative)	Guidance flowchart for tests of cable glands

Annex H (Informative)	Shaft voltages resulting in motor bearing or shaft brush sparking Discharge energy calculation

Measurement Section, including Additional Narrative Remarks (as deemed applicable)

7.4.2.a / 26.13)

§ 26.13	Surface resistance test	Pass
Part	Test condition	Remark
PET PE84-0.125t	24h pre-conditioning: 23°C & 50% rth. 500V insulation test in 60s duration. 10s rise/fall time.	2.375MΩ (<1GΩ)
Supplementary information: Test performed in NO/PRE/ExTR17.0021/01 / IECEx PRE 17.0020.		

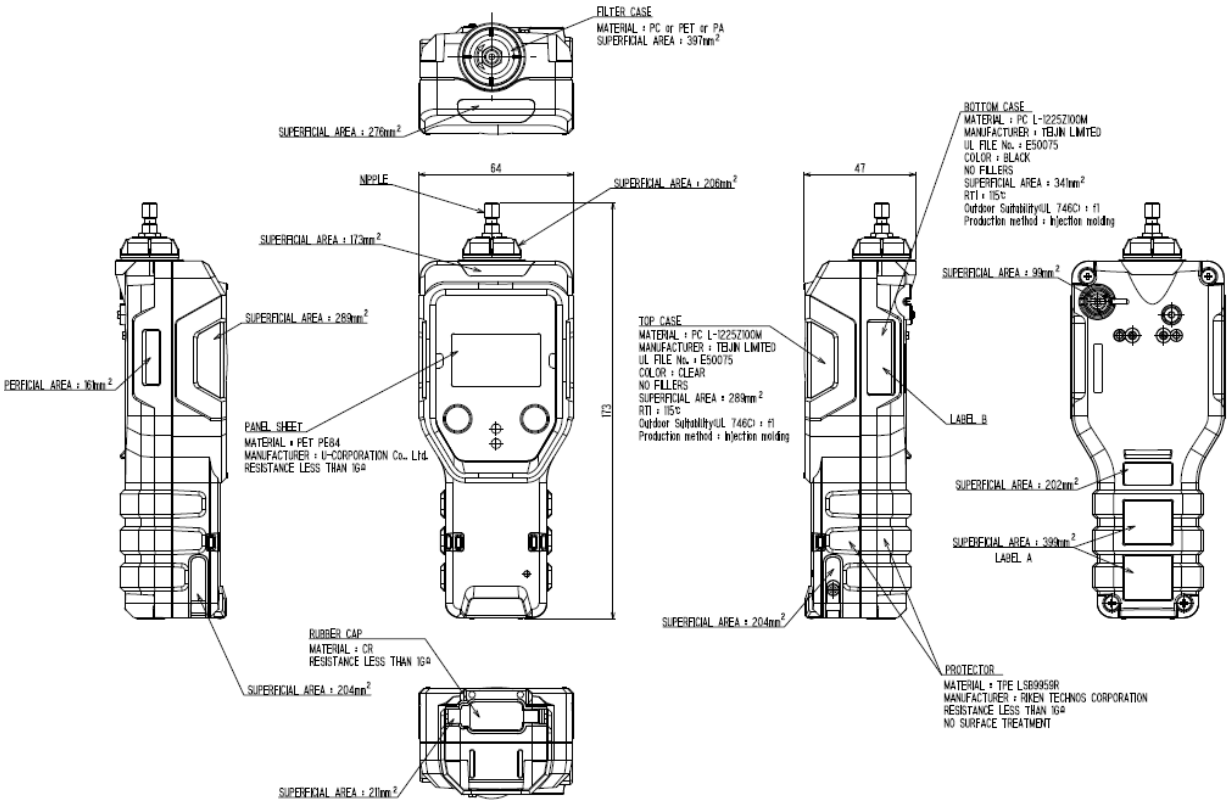
7.4.2.a)

Ref. ExTR reference No. NL/DEK/ExTR11.0038/02:

3.1.12 Plastic electrostatic hazard assessment and tests

Enclosure is at least IP20 and made of conductive materials: LSB9959R, ABS/PC ESC9448N and the window is made of PET 300R. All materials have a surface resistance of less than 1 GΩ, refer to drawing M2-4775-96-01K.

7.4.2.b)



1 Measurement of capacitance

Equipment Tested:	Complete test sample / nipple
Date of Test (yyyy/mm/dd):	2022/01/25
Clause and Standards:	26.14 of IEC 60079-0: 2017

1.1 Test procedures

The test sample was conditioned for 1,5 hours in 25°C and 50% RH.

1.2 Results

Test 1:
Stray capacitance 3-5mm above nipple and unearthed metal plate: 6,8pF
Measured capacitance between nipple and un-earthed metal plate: 7,8pF
Δ capacitance: 1pF

Test 2:
Stray capacitance 3-5mm above nipple and unearthed metal plate: 6,7pF
Measured capacitance between nipple and un-earthed metal plate: 8,3pF
Δ capacitance: 1,6pF

Test 3:
Stray capacitance 3-5mm above nipple and unearthed metal plate: 6,5pF
Measured capacitance between nipple and un-earthed metal plate: 8,0pF
Δ capacitance: 1,5pF

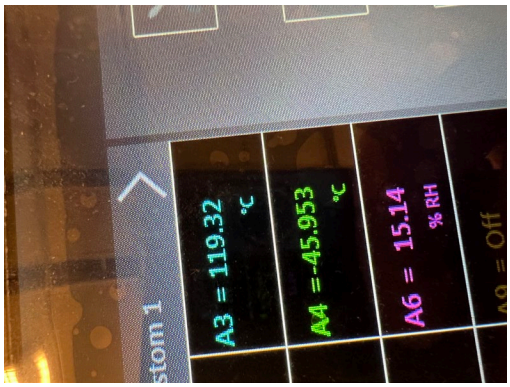
Average capacitance = (1pF + 1,6pF 1,5pF) / 3 = 1,4pF → 1,4pF < 3pF

2 Drop test

Equipment Tested:	GX-Force (test sample 7 and 8)
Date of Test (yyyy/mm/dd):	2022/01/26
Clause and Standards:	26.4.3 of IEC 60079-0: 2017

2.1 Test procedures

4 drop tests on two different test samples are performed from a height of 1m onto a concrete surface. Ambient temperature: -45°C for 24 hours prior to the tests. The actual tests were also performed in this temperature (inside freezer).



(Temperature measured on channel A4.)

2.2 Results

Only superficial scratches to the enclosure after drop tests. No damages to invalidate the protection.

3 IP20

Equipment Tested:	GX-Force (test sample 7)
Date of Test (yyyy/mm/dd):	2022/01/26
Clause and Standards:	26.4.5 of IEC 60079-0: 2017

3.1 Test procedures

Test probe for IP20 was used to determine the ingress protection, after the test sample was drop tested.

3.2 Results

The test probe could not enter the enclosure in any place. Ingress protection is IP20 or better.

4 Temperature measurement

Equipment Tested:	Gas Sensor NCR-6309
Date of Test (yyyy/mm/dd):	See report NL/DEK/ExTR17.0047/00-02
Clause and Standards:	26.5.1 of IEC 60079-0: 2017

The service temperature has been measured and then calculated to +69.3°C (ΔT=9.3K) on the external (plastic) surface of the gas sensor at the highest ambient temperature of +60°C.

The highest surface temperature has been measured and then calculated to +79.3°C (ΔT=19.3K) on the pressed metal wire of the (breather element) of the gas sensor at the highest ambient temperature of +60°C.

5 Thermal endurance

Equipment Tested:	Gas Sensor NCR-6309 3-1, 3-2, 3-3, 3-4 and 3-5 (Sensors especially prepared for FNT)
Date of Test (yyyy/mm/dd):	2022-01-07 to 2022-02-08
Clause and Standards:	26.8 and 26.9 of IEC 60079-0:2017
Instruments	
Climatic chamber	P0188
Data logger	P0327

Samples placed in an environmental chamber and subjected for the test in the following conditions:

5.1.1 Thermal Endurance to Heat and Moisture

- 672 h (28 days) at +90ºC and 90% RH.

The test started 2022-01-07 at 10:00 h and ended 2022-02-04 at 15:00 h in chamber P0188.

Total time: 672 h

Visual result: No any visible damage or changes on samples was observed.

4.1.3 Thermal Endurance to Normal

After Thermal endurance to heat and moisture, all of samples were left to cool down to temperature approximately +20ºC.

Reconditioning started on temperature +20ºC and 50% RH.

Recondition started 2022-02-04 at 19:00 h until 2022-02-07 at 10:30 h,

Total thermal endurance to normal time: 51.5 h

4.1.4 Thermal Endurance To Cold

The endurance to cold performed at -46 to -47ºC and started 2022-02-07 at 10:30 h until 2022-02-08 at 12:00 h in P0190.

Total time: 25.5 h.

Visual result: No any visible damage or changes on samples was observed.