Ultracell®
'Quality in Every Language'

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

EU Declaration of Conformity

According to Article 17/Annex VIII of Regulation (EU) 2023/1542

Document No.: UC_DoC_101224_VRLA003_V1R1

We, the company, here with

Manufacturer Name:	**Ultracell (UK) Limited**
Manufacturer Address:	**Vesty Business Park, Vesty Road, L30 1NY, Liverpool, United Kingdom**
Authorized Representative Name:	**NA**
Authorized Representative Address:	**NA**

Declares under our sole responsibility that follow products:

Product Name:	**Valve-regulated sealed lead-acid battery (Middle Size series)**
Product Category:	**Industrial battery**
Product Batch or Series Nr.:	**See 1.1 battery range for details**
Trade Mark:	**Ultracell**

Is in conformity with the relevant Union harmonisation legislation:
Regulation (EU) 2023/1542

With applied relevant harmonised standards or the common specifications:
- Regulation (EU) 2023/1542
- IEC 60896-21 Stationary lead-acid batteries
- IEC 60896-22 Stationary lead-acid batteries

Authorized person signed for and on behalf of:

Name:	**Connor Finnegan**
Function:	**General Manager**
Address:	**Vesty Business Park, Vesty Road, L30 1NY, Liverpool, United Kingdom**

01 / 12 / 2024
Date of Issue

Signature

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

Summary according to EU Reg. 2023/1542 Att. VIII Part A Section 2.

1. **General description of the battery pack and its intended use (2.a).**
2. **Conceptual design and manufacturing drawings (2.b).**
3. **Explanations necessary for the understanding of the drawings referred to in point (b) and the operation of the battery pack (2.c).**
4. **Specimen of the label required in accordance with Article 13 (2.d).**
5. **List of the harmonised standards (2.e).**
6. **Description of the solutions adopted to meet the applicable requirements (2.f).**
7. **Results of design calculations and the examinations carried out (2.g).**
8. **Test reports (2.h).**

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

1. General description of the battery pack and its intended use (2.a).

1.1Present technical document is referred to Middle size range and includes the following battery models: UL40-12,UCG55-12,UL55-12,UL70-12,UL65-12,UL75-12,UL80-12,UL100-12 FR,UL150-12,UCG45-12,UCG55-12,UCG55-12,UCG65-12,UCG75-12,UCG100-12,UCG100-12,UCG100-12,UCG120-12,UCG120-12,UCG150-12,UCG150-12,UCG200-12,UCG200-12,UCG250-12,UCG250-12,UCG275-12,UFT150-12,UCG85-12,UCG38-12,UCG40-12,UC45-12,UC65-12,UC75-12,UC150-12E,UC200-12E,UC200-12,UC200-12,UHR40-12,UHR65-12,U-HR100-12,UHR120-12,UL65-12,UC100-12,UC120-12,UC250-12E,UC100-12E,UC120-12E,UHR120-12,UHR150-12,UHR55-12,UHR155-12, Middle size series valve-regulated sealed lead-acid battery, a device capable of outputting and storing electrical energy, are batteries with electrodes made primarily of lead and its oxides, and an electrolyte of sulphuric acid. The battery consists of 6 single cells, The nominal voltage is around 12V, there is an exhaust safety valve on the battery cover, which can discharge the gas generated inside the battery according to the internal pressure of the battery. There are positive and negative terminals on the battery, which are standard connectors for connecting with equipment for charging and discharging.

1.2 This product can be used for:

- Communication base station (wired or wireless), indoor communication room;
- Power system communication, military communication, etc.;
- Network communication, including data transmission, television signal transmission, etc.;
- Power DC screen, high-voltage DC, communication UPS, EPS, IDC data room, etc.

1.3 Main construction features

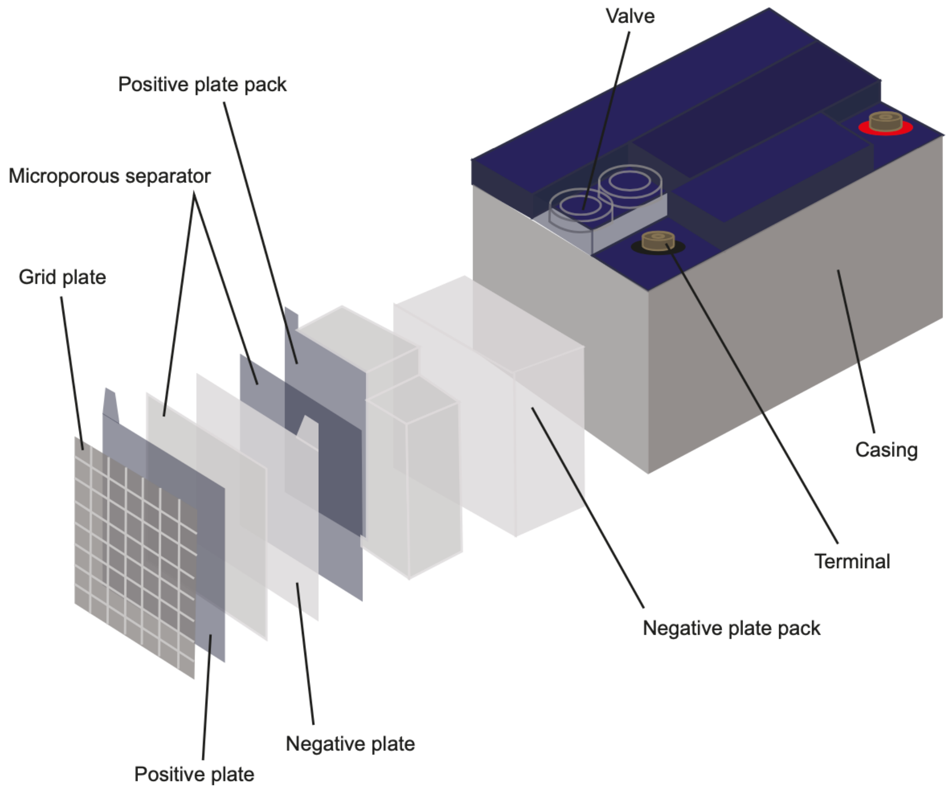
- Positive plate: It consists of porous PbO2, which is the positive active material, and conductive skeleton positive plate grid.
- Negative plate: consists of negative active material porous Pb and conductive skeleton negative plate grid.
- Electrolyte: an aqueous solution of sulphuric acid. Sulphuric acid participates in both the positive and negative electrode reactions and the ionic conductivity process
- Separator: AGM Separator is used. The separator material is non-conductive, isolates the positive and negative plates, and there are many micropores in the separator, so the ions in the electrolyte can easily pass through the micropores of the separator.
- Soldering alloy: Connect the same polarity plates to form an electrode group, and connect the electrode groups of each single cell of the battery in series.
- Battery case cover: It is the container of the battery. Commonly used ABS plastic production, with good insulation, strength, corrosion resistance, high and low temperature resistance.
- Handle: It adopts an accessory installation design, making it easy to handle the battery.
- Safety valve: Made of acid resistant rubber material, it can discharge the internal gas of the battery, but can prevent external flames from entering the battery.
- Terminal: Used for series connection with other batteries or connection to loads, with clear identification and not easily worn or damaged.

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

2. Conceptual design and manufacturing drawings (2.b).

See attachment 1 for drawings.



3. Explanations necessary for the understanding of the drawings referred to in point (b) and the operation of the battery pack (2.c).

3.1 Explanations

- Positive plate: As the positive pole of the battery, according to the external dimensions of the battery, the suitable size of the plate is selected, the amount of active material needed is designed according to the power demand, and according to the capacity demand, the positive plate needed is calculated. Adopting lead-calcium gravity casting grid, the required amount of active material is coated on the grid to make the required positive plate.
- Negative plate: As the negative electrode of the battery, according to the external dimensions of the battery, choose the suitable size of the plate, design the amount of active material needed according to the demand of capacity, calculate the needed negative plate according to the demand of capacity, and evenly distribute it in 6 single compartments. Adopting lead-calcium gravity casting grid, the required amount of active material is coated on the grid to make the required negative plate.
- Electrolyte: The role is the medium of electrochemical reaction, the ions of electrolyte are involved in the charging and discharging reaction of the battery. The electrolyte is usually prepared from sulphuric acid and distilled water in a certain proportion. This battery is liquid-poor design, the electrolyte inside the battery is not flowing.
- Separator: The function of the separator is to prevent short circuit caused by direct contact between positive and negative plates. And adsorb electrolyte. Therefore, the separator is required to be porous, acid-resistant, high-temperature-resistant, not deformed due to oxidation, and have good insulation.
- Welding alloy: After each single cell of the battery is assembled with the required plates, the positive or negative plates are connected through welding as a path for current conduction.
- Protective sheet: protects the separator when the battery is pumping acid.

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

- Battery case & cover (including battery case, battery cover): the function is to hold the pole plate and electrolyte. Made of ABS plastic. Battery tank for the overall structure, 12V battery is divided into 6 non-communicating single cell (battery), each single cell battery with a cover, cover and tank sealed by the glue seal. The bottom of the battery tank has convex ribs to increase the strength and support the pole plate group.
- Safety valve: During use, batteries will produce gas, which is a mixture of hydrogen and oxygen gas. To prevent external sparks from igniting the hydrogen and oxygen gas inside the battery, an exhaust safety valve is installed at the exhaust hole. The safety valve can discharge the internal gas of the battery and prevent external flames from entering the battery.
- Terminals: The function is to lead out the positive and negative terminals inside the battery for connection with the external circuit. The positive and negative terminals of lead-acid batteries are of the internationally accepted cylindrical type.

3.2 Operation

- The battery is marked with "+" and "-" symbols, "+" represents the positive terminal of the battery "-" represents Negative terminal of the battery. First, connect the batteries, and then connect the battery pack to the charger or load. When multiple batteries are connected in parallel, follow the wiring method of series' first and then parallel. To ensure better heat dissipation conditions, the distance between batteries should not be less than 20mm, and the distance between battery cabinets and equipment and walls should be maintained at least 150mm. After the battery installation is completed and the total voltage of the battery pack is measured without error, during installation and disassembly, be careful not to short-circuit the two poles of the battery and avoid contact with open flames.
- After the installation of the battery is completed and the total voltage of the battery pack is measured to be correct, it can be loaded and powered on. The battery needs to be recharged once after being stored for more than 3 months. In case of battery loss caused by various reasons during use, it should be charged in a timely manner to prevent performance degradation caused by sulfation of the battery plates.
- Conduct a rational inspection of the battery pack every month, including voltage, appearance, temperature, and connection parts. Activate and charge the battery pack every quarter, and conduct a verification discharge test on the battery pack every year.
- When the battery is not used for a long time, the battery should be fully charged before storage, otherwise it will affect the service life of the battery.
- When using the charger to charge the battery, the charger should be switched off after charging, and then the connection cable between the charger and the battery should be removed.
- Batteries are consumables with a certain lifespan. Considering factors such as usage conditions and environmental temperature, the battery should be replaced before reaching its designed service life. Fully ensure the safe, reliable, and normal operation of the power system.

4. Specimen of the label required in accordance with Article 13 (2.d)

- See attachment 2 for label drawing.

5. List of the harmonised standards (2.e).

- IEC 60896-21 Stationary lead-acid batteries
- IEC 60896-22 Stationary lead-acid batteries
- Regulation (EU) 2023/1542

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

6. Description of the solutions adopted to meet the applicable requirements (2.f)
OPERATING FEATURES:

6.1 Capacity:
The amount of power that a fully charged battery can provide under specified conditions, usually expressed in ampere-hours (Ah). Note: The international unit of this power is the coulomb (1c=1A*s). However, in practice, battery capacity is usually expressed in Ah.

The rated capacity of an FLB battery pack is defined as a discharge rate of 10 (or 20) hours (expressed as C10 or C20), with constant current at 25 °C to 1.80V (or 1.75V per C20) volt per cell.

6.2. Capacity in relation to discharge rate:
Batteries will release different capacities under different discharge currents and termination voltages.

6.3. Capacity in relation to the temperature:
Environmental temperature is the most significant factor affecting battery performance. Generally speaking, the higher the environmental temperature, the higher the capacity released by the battery, but the shorter its lifespan; The lower the ambient temperature, the lower the battery capacity and the longer its lifespan.

6.4. Internal impedance and short circuit current:
Internal impedance is the resistance within a battery or other electrical component that opposes the flow of current. It is measured in mΩ and represents the loss of energy due to internal resistance. Internal impedance can be caused by various factors such as the resistance of the electrolyte, the resistance of the plates, and the resistance of the separators. In lead-acid batteries, internal impedance can increase over time due to sulfation of the plates, corrosion, and drying out of the electrolyte. High internal impedance can lead to reduced battery performance, such as decreased capacity and increased self-discharge rate.

Short-circuit current refers to the maximum amount of current that can flow through a battery or other electrical component when a short circuit occurs. Short-circuit current is typically measured in amperes (A) . In lead-acid batteries, short-circuit current is limited by the internal impedance and other factors such as the plate thickness and separator resistance.

6.5. Service life:
The service life of a battery refers to the length of time it can effectively store and provide energy before it needs to be replaced or recharged. This duration is determined by a variety of factors, including the type of battery, how it is used, and the conditions it is exposed to. Proper maintenance and care can extend a battery's service life. This includes storing batteries in a cool, dry place, avoiding exposure to extreme temperatures, and regularly charging and discharging them.

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

6.6. Open circuit voltage - State of charge :

OCV refers to the voltage measured across the battery terminals when the battery is not connected to a load (i.e., in an open circuit condition). It is a measure of the battery's potential energy or electrochemical state. The OCV provides a direct indication of the battery's internal chemistry and its ability to store energy. The OCV varies with the SoC of the battery. As the battery discharges, the OCV decreases, and as it charges, the OCV increases. Manufacturers typically provide a relationship curve or table that shows the relationship between OCV and SoC for a given battery type. This curve can be used to estimate the SoC of a battery based on its measured OCV. It's important to note that the OCV-SoC relationship may vary slightly depending on factors such as battery aging, temperature, and discharge rate. Therefore, it's important to calibrate and monitor these parameters to accurately estimate SoC based on OCV.

6.7. Charging:

Lead-acid battery charging typically involves several stages to ensure safe and effective charging. The charging process is designed to gradually restore the battery's charge while protecting it from damage. Here is a brief overview of the charging stages for lead-acid batteries:

Pre-charge: If the voltage of a single battery cell is below a certain threshold (typically less than 2.1V), the charging cycle begins with a pre-charge stage. During this stage, a low current is applied to the battery to gradually increase its voltage and prepare it for the next charging stage.

Boost Charge: This is the main charging stage where the battery is rapidly charged with a higher current rate. The charging voltage may also be higher during this stage to compensate for voltage losses during discharge. The goal is to restore the battery to a near-fully charged state as quickly as possible.

Float Charge: During this stage, the battery is maintained at a constant voltage that is just high enough to offset its self-discharge. This ensures that the battery remains fully charged without overcharging it. Float charging is typically used in applications where the battery is continuously connected to a power source.

6.8. Floating charge

Lead-acid battery float charging is a charging method used to maintain the battery at a fully charged state without overcharging it. Float charging is typically used in applications where the battery is continuously connected to a power source, such as in standby power systems or telecommunications equipment.

During float charging, the battery is charged at a constant voltage that is just high enough to offset the self-discharge of the battery. This constant voltage is typically set slightly above the open-circuit voltage of the battery, which is the voltage measured when the battery is not being charged or discharged.

6.9 Boost charge (Recharge following a discharge):

Boost charge, refers to the process of rapidly restoring a discharged battery to a near-fully charged state. This type of charging is typically used after a battery has been discharged to a significant level, such as after being used to power a device or system.

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

During a boost charge, the battery is charged with a higher current rate than during float charging. This higher current allows the battery to recover its charge more quickly. The charging voltage may also be higher during the boost charge stage to compensate for voltage losses during discharge and to ensure that the battery cells are evenly charged. Once the battery has reached a near-fully charged state through the boost charge process, it may then transition to float charging to maintain its charge level. Float charging keeps the battery ready for use while preventing overcharging and ensuring that it is available when needed.

6.10 Battery pack test:
The test must be carried out in accordance with EN 60896-21/22.
Prior to the discharge test, the battery pack must be properly prepared for charging (2.40 volts per cell, 24 hours at 25°C) to ensure that the battery pack is in a fully charged state. To take a temperature reading of the battery pack, A test cell or battery should be selected. The surface temperature at the center of the container wall of each test cell or battery shall be measured immediately prior to the discharge test. Individual readings should be between 15°C and 30°C. The temperature of the selected battery block shall be considered representative of the average temperature of the battery pack. Average temperature of the battery pack. The average surface temperature of the battery pack and the ambient temperature Preferably as close as possible to a reference temperature of 20°C or 25°C.

6.11 Service/Functional test:
When it comes to Acid Lead Batteries, service/functional tests are conducted to ensure the battery is operating as expected and meets its specified performance requirements. These tests help identify any potential issues or malfunctions that may affect the battery's ability to store and deliver energy efficiently.

Here are some common service/functional tests conducted on Acid Lead Batteries:
Voltage Check: The voltage of the battery is measured using a voltmeter to ensure it is within the acceptable range. A low voltage may indicate that the battery is not charging properly or that it is discharging too quickly.
Load Test: This test involves connecting a load to the battery and measuring its ability to maintain a stable voltage while discharging. The load can be resistive, capacitive, or inductive, depending on the specific requirements of the application.

Terminal Corrosion Check: The battery terminals are inspected for corrosion, which can affect the connection and cause performance issues. If corrosion is found, it should be cleaned and treated to prevent further damage.

Temperature Monitoring: The temperature of the battery is monitored during operation to ensure it remains within the recommended range. High temperatures can shorten the battery's lifespan and affect its performance.
Regularly conducting these service/functional tests on Acid Lead Batteries can help identify and address potential issues before they become more serious problems. It is important to follow the manufacturer's recommendations and guidelines when performing these tests to ensure accurate and reliable results.

6.12 Capacity test:
The capacity test for Acid Lead Batteries, also known as the discharge test, is conducted to measure the total amount of energy that a battery can store and deliver before it reaches a specified cut-off voltage. This test is important in assessing the battery's performance and determining if it meets its rated capacity.

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

During the capacity test, the battery is fully charged to its maximum voltage and then discharged using a controlled load until the voltage reaches the specified cut-off point. The load is usually resistive, capacitive, or inductive, depending on the specific requirements of the application. The discharge rate, which is measured in amps, is controlled to simulate the actual load conditions the battery will encounter in its intended use.

The capacity test results are compared to the battery's rated capacity to assess its performance. If the actual capacity is significantly lower than the rated capacity, it may indicate that the battery is damaged or has reached the end of its useful life.

6.13 Power test:

The power test for lead-acid batteries is designed to measure the amount of stabilized power a battery can provide before reaching a specified cut-off voltage. This test is very important for evaluating battery performance and determining whether the battery can provide stable power output to the load.

During a power test, the battery is fully charged to its maximum voltage and then discharged using a controlled load until the voltage reaches a specified cutoff point. The discharge rate is controlled in watts to simulate actual load conditions encountered by the battery in its intended use.

As the battery discharges, the voltage decreases and the current increases. The power test records the voltage and current at different stages of discharge, usually the load power P = U (voltage) * I (current). The arrival of the termination voltage during the discharge process can still maintain the load power is an important indicator of the power performance of the battery.

Setting different cut-off voltage and load power can test the power performance of the battery under different circumstances.

7. Results of design calculations and the examinations carried out (2.g).

Reference	Performance		Dimensions		
	Rated voltage (V)	10hr @1.80V/cell	L (mm)	W (mm)	H (mm)
UL40-12	12	38	197	165	173.5
UCG55-12	12	55	229	138	211
UL55-12	12	55	229	138	211
UL70-12	12	70	348	167	178
UL65-12	12	65	348	167	178
UL75-12	12	75	260	168	214
UL80-12	12	80	260	168	214
UL100-12 FR	12	100	330	173	220
UL150-12	12	150	483	170	238.5
UCG45-12	12	45	197	165	170
UCG55-12	12	55	229	138	230
UCG55-12	12	55	229	138	216
UCG65-12	12	65	348	167	178
UCG75-12	12	75	260	168	214

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

Reference	Performance		Dimensions		
	Rated voltage (V)	10hr @1.80V/cell	L (mm)	W (mm)	H (mm)
UCG100-12	12	100	330	173	220
UCG100-12	12	100	330	173	220
UCG100-12	12	100	330	173	233
UCG120-12	12	120	408	177	225
UCG120-12	12	120	408	177	225
UCG150-12	12	150	483	170	238.5
UCG150-12	12	150	483	170	238.5
UCG200-12	12	200	522	240	224
UCG200-12	12	200	522	240	224
UCG250-12	12	250	522	268	226
UCG250-12	12	250	522	268	226
UCG275-12	12	250	522	268	226
UFT150-12	12	150	551	110	287
UCG85-12	12	90	306	168	214
UCG38-12	12	38	196	165	170
UCG40-12	12	38	196	165	170
UC45-12	12	38	196	165	170
UC65-12	12	65	348	167	178
UC75-12	12	75	260	168	214
UC150-12E	12	140	483	170	239
UC200-12E	12	200	522	240	224
UC200-12	12	200	522	240	224
UC200-12	12	250	522	268	226
UHR40-12	12	38	197	165	170
UHR65-12	12	65	348	167	178
UHR100-12	12	100	330	173	220
UHR120-12	12	120	408	177	225
UL65-12	12	65	348	167	178
UC100-12	12	100	330	173	220
UC120-12	12	120	408	177	225
UC250-12E	12	250	522	268	226
UC100-12E	12	100	330	173	220
UC120-12E	12	120	408	177	225
UHR120-12	12	120	408	177	225
UHR150-12	12	150	483	170	238.5
UHR55-12	12	55	229	138	211
UHR155-12	12	155	335	172	278

8. Test reports(2.h).

Ultracell (UK) Limited
Vesty Business Park
Vesty Road
Liverpool
United Kingdom L30 1NY

Tel: +44 (0) 151 523 2777
Fax: +44 (0) 151 523 0855
Email: info@ultracell.co.uk
Web: www.ultracell.co.uk

See attachment 3 for IEC report

Revision history

Rev.	Comment	Date	Approved name
1	Issue	10/12/2024	