

Section 1: Identification of the substance/mixture and of the company/undertaking**1.1. Product identifier****Product name:** REFRIGERANT R454B**Product code:** R454B**Synonyms:** OPTEON XL55**1.2. Relevant identified uses of the substance or mixture and uses advised against****1.3. Details of the supplier of the safety data sheet**

Company name: National Refrigerants Ltd
4 Watling Close
Sketchley Meadows Business Park
Hinckley
Leicestershire
LE10 3EZ
United Kingdom

Tel: 01455 630790**Fax:** 01455 630791**Email:** sds@nationalref.com**1.4. Emergency telephone number****Emergency tel:** Carechem24 +44 (0)1865 407333**Section 2: Hazards identification****2.1. Classification of the substance or mixture****Classification under CLP:** Flam. Gas 1: H220; Press. Gas: H280**Most important adverse effects:** Extremely flammable gas. Contains gas under pressure; may explode if heated.**2.2. Label elements****Label elements:****Hazard statements:** H220: Extremely flammable gas.

H280: Contains gas under pressure; may explode if heated.

Hazard pictograms: GHS02: Flame

GHS04: Gas cylinder

**Signal words:** Danger**Precautionary statements:** P210: Keep away from heat, hot surfaces, sparks, open flames and other ignition sources.

SAFETY DATA SHEET

REFRIGERANT R454B

Page: 2

No smoking.

P377: Leaking gas fire: Do not extinguish, unless leak can be stopped safely.

P381: Eliminate all ignition sources if safe to do so.

P410+403: Protect from sunlight. Store in a well-ventilated place.

2.3. Other hazards

Other hazards: In use, may form flammable / explosive vapour-air mixture.

PBT: This product is not identified as a PBT/vPvB substance.

Section 3: Composition/information on ingredients

3.2. Mixtures

Hazardous ingredients:

DIFLUOROMETHANE

EINECS	CAS	PBT / WEL	CLP Classification	Percent
200-839-4	75-10-5	Substance with a Community workplace exposure limit.	Flam. Gas 1: H220; Press. Gas: H280	68.900%

2,3,3,3-TETRAFLUOROPROP-1-EN - REACH registered number(s): 01-0000019665-61

-	754-12-1	Substance with a Community workplace exposure limit.	Flam. Gas 1: H220; Press. Gas: H280	31.100%
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Section 4: First aid measures

4.1. Description of first aid measures

Skin contact: Remove all contaminated clothes and footwear immediately unless stuck to skin. Drench the affected skin with running water for 10 minutes or longer if substance is still on skin. Do not use hot water. If frostbite has occurred call a physician.

Eye contact: Bathe the eye with running water for 15 minutes. Consult a doctor.

Ingestion: Not applicable.

Inhalation: Remove casualty from exposure ensuring one's own safety whilst doing so. If unconscious, check for breathing and apply artificial respiration if necessary. Consult a doctor.

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

Skin contact: There may be redness or whiteness of the skin in the area of exposure. Frost-bite may occur causing the affected area to become white and numb.

Eye contact: There may be pain and redness. Corneal burns may occur. May cause permanent damage.

Ingestion: Not applicable.

Inhalation: No symptoms.

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

Immediate / special treatment: Not applicable.

[cont...]

SAFETY DATA SHEET

REFRIGERANT R454B

Page: 3

Section 5: Fire-fighting measures

5.1. Extinguishing media

Extinguishing media: Alcohol resistant foam. Water spray. Carbon dioxide. Dry chemical powder. Suitable extinguishing media for the surrounding fire should be used. Use water spray to cool containers.

5.2. Special hazards arising from the substance or mixture

Exposure hazards: Flammable. In combustion emits toxic fumes. Forms explosive air-vapour mixture.

5.3. Advice for fire-fighters

Advice for fire-fighters: Wear self-contained breathing apparatus. Wear protective clothing to prevent contact with skin and eyes.

Section 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Refer to section 8 of SDS for personal protection details. Eliminate all sources of ignition. If outside keep bystanders upwind and away from danger point.

6.2. Environmental precautions

Environmental precautions: Stop release if safe to do so. Prevent from entering sewers, basements and work pits, or any place where the accumulation can be dangerous.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Do not use equipment in clean-up procedure which may produce sparks. Material evaporates. Ventilate the area, especially low or enclosed places where heavy vapours might collect.

6.4. Reference to other sections

Reference to other sections: Refer to section 8 of SDS.

Section 7: Handling and storage

7.1. Precautions for safe handling

Handling requirements: Smoking is forbidden. Use non-sparking tools. Ensure there is sufficient ventilation of the area. Avoid the formation or spread of mists in the air.

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in a cool, well ventilated area. Keep container tightly closed. Keep away from sources of ignition. Prevent the build up of electrostatic charge in the immediate area. Ensure lighting and electrical equipment are not a source of ignition.

Suitable packaging: Must only be kept in original packaging.

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SAFETY DATA SHEET

REFRIGERANT R454B

Page: 4

7.3. Specific end use(s)

Specific end use(s): No data available.

Section 8: Exposure controls/personal protection

8.1. Control parameters

Hazardous ingredients:

DIFLUOROMETHANE

Workplace exposure limits:

Respirable dust

State	8 hour TWA	15 min. STEL	8 hour TWA	15 min. STEL
UK	1000 ppm	-	-	-

2,3,3,3-TETRAFLUOROPROP-1-EN

EU	500 ppm	-	-	-
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DNEL/PNEC Values

Hazardous ingredients:

DIFLUOROMETHANE

Type	Exposure	Value	Population	Effect
DNEL	Inhalation (developmental tox)	16444 mg/m3	Workers	Systemic
DNEL	Inhalation (developmental tox)	1753 mg/m3	Consumers	Systemic

2,3,3,3-TETRAFLUOROPROP-1-EN

Type	Exposure	Value	Population	Effect
DNEL	Inhalation	273 mg/m3	Workers	-
PNEC	Fresh water	> 0.1 mg/l	-	-
PNEC	Marine water	> 0.01 mg/l	-	-
PNEC	Fresh water sediments	> 1.77 mg/kg	-	-
PNEC	Soil (agricultural)	> 1.54 mg/kg	-	-

8.2. Exposure controls

Engineering measures: Ensure there is sufficient ventilation of the area. Ensure lighting and electrical equipment are not a source of ignition.

Respiratory protection: Respiratory protection not required.

Hand protection: Protective gloves.

Eye protection: Safety glasses with side-shields. Safety goggles. Face-shield. Ensure eye bath is to hand.

Skin protection: Protective clothing.

Section 9: Physical and chemical properties

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SAFETY DATA SHEET

REFRIGERANT R454B

Page: 5

9.1. Information on basic physical and chemical properties

State: Liquified gas

Colour: Colourless

Odour: Characteristic odour

9.2. Other information

Other information: No data available.

Section 10: Stability and reactivity

10.1. Reactivity

Reactivity: Stable under recommended transport or storage conditions.

10.2. Chemical stability

Chemical stability: Stable under normal conditions. Stable at room temperature.

10.3. Possibility of hazardous reactions

Hazardous reactions: Hazardous reactions will not occur under normal transport or storage conditions.

Decomposition may occur on exposure to conditions or materials listed below.

10.4. Conditions to avoid

Conditions to avoid: Heat. Hot surfaces. Sources of ignition. Flames.

10.5. Incompatible materials

Materials to avoid: Strong oxidising agents. Strong acids.

10.6. Hazardous decomposition products

Haz. decomp. products: In combustion emits toxic fumes.

Section 11: Toxicological information

11.1. Information on toxicological effects

Hazardous ingredients:

DIFLUOROMETHANE

GASES	RAT	LD50	520000	ppmV
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2,3,3,3-TETRAFLUOROPROP-1-EN

GASES	RAT	4H LC50	> 400000	ppmV
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Toxicity values: No data available.

Symptoms / routes of exposure

Skin contact: There may be redness or whiteness of the skin in the area of exposure. Frost-bite may occur causing the affected area to become white and numb.

Eye contact: There may be pain and redness. Corneal burns may occur. May cause permanent damage.

[cont...]

SAFETY DATA SHEET

REFRIGERANT R454B

Page: 6

Ingestion: Not applicable.

Inhalation: No symptoms.

Section 12: Ecological information

12.1. Toxicity

Hazardous ingredients:

DIFLUOROMETHANE

ALGAE	96H ErC50	142	mg/l
Daphnia magna	48H EC50	652	mg/l
FISH	96H LC50	1.057	mg/l

2,3,3,3-TETRAFLUOROPROP-1-EN

ALGAE	96H LC50	> 100	mg/l
Daphnia magna	48H EC50	> 83	mg/l
FISH	96H ErC50	>197	mg/l

12.2. Persistence and degradability

Persistence and degradability: Biodegradable.

12.3. Bioaccumulative potential

Bioaccumulative potential: No bioaccumulation potential.

12.4. Mobility in soil

Mobility: Readily absorbed into soil.

12.5. Results of PBT and vPvB assessment

PBT identification: This product is not identified as a PBT/vPvB substance.

12.6. Other adverse effects

Other adverse effects: Negligible ecotoxicity.

Section 13: Disposal considerations

13.1. Waste treatment methods

Disposal operations: Product evaporates.

Recovery operations: Consult manufacturer or supplier for information regarding recovery and recycling of the product. If recovery is not possible, incinerate at a licenced instalation.

Disposal of packaging: Return to supplier.

NB: The user's attention is drawn to the possible existence of regional or national regulations regarding disposal.

Section 14: Transport information

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SAFETY DATA SHEET

REFRIGERANT R454B

Page: 7

14.1. UN number

UN number: UN3161

14.2. UN proper shipping name

Shipping name: LIQUEFIED GAS, FLAMMABLE, N.O.S.
(DIFLUOROMETHANE; 2,3,3,3-TETRAFLUOROPROP-1-EN)

14.3. Transport hazard class(es)

Transport class: 2

14.4. Packing group

14.5. Environmental hazards

Environmentally hazardous: No

Marine pollutant: No

14.6. Special precautions for user

Special precautions: No special precautions.

Tunnel code: B/D

Transport category: 2

Section 15: Regulatory information

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

Specific regulations: Not applicable.

15.2. Chemical Safety Assessment

Chemical safety assessment: A chemical safety assessment has not been carried out for the substance or the mixture by the supplier.

Section 16: Other information

Other information

Other information: This safety data sheet is prepared in accordance with Commission Regulation (EU) No 2015/830.

* indicates text in the SDS which has changed since the last revision.

Phrases used in s.2 and s.3: H220: Extremely flammable gas.

H280: Contains gas under pressure; may explode if heated.

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TECHNICAL SPECIFICATION
FOR
CARBON ZINC BATTERY
TYPE: R03(PVC)

Document No.	TMMQ/GPTD-BPS230	Effective date	2021-11-04
Version	A03	Pages	Total 7 pages
Prepared by		Approved by	

DONGGUAN TIANQIU ENTERPRISE CO., LTD

ADD: TianQiu Industrial Park, Xinji Industrial Zone, Machong Town, Dongguan, GuangDong, P.R.China

(Tel): 020-36322277 (Fax): 020-36323339 (P.C): 510410

(Website): <http://www.tmmq.cn> (Email): office@tmmq.com

1. Scope

This specification is applicable to the CARBON ZINC BATTERY R03 supplied by DONGGUAN TIANQIU ENTERPRISE CO., LTD.

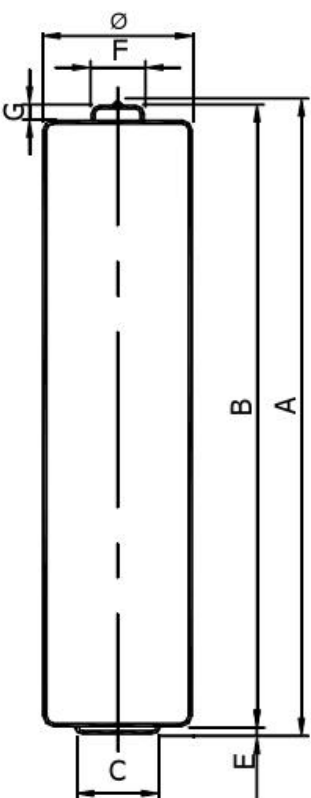
2. Designations

2.1 Defining

At the temperature of $20 \pm 2^{\circ}\text{C}$, the humidity of $60 \pm 15\%$, loading at 75Ω discharge, 4 hour per day, till the voltage down to 0.9V

3. Dimensions

Symbols	Specification (mm)	
	Maximun	Minimun
A	44.5	43.3
B		43.3
C		4.3
E	0.5	
F	3.8	
G		0.8
$\varnothing$	10.5	9.5



Notes:

A maximum overall height of the battery;

B minimum distance between the flats of the positive and negative contacts;

C minimum outer diameter of the negative flat contact surface;

E maximum recess of the negative flat contact surface;

F maximum diameter of the positive contact within the specified projection height;

G minimum projection of the flat positive contact;

$\varnothing$ maximum and minimum diameters of the battery.

4. Technical Specifications

Item	Characteristic
Nominal capacity	330mAh
Nominal voltage	1.5V

Dimensions	maximum height:44.5mm Maximum diameter: Φ10.5mm
Approximate weight	7.75±0.35g

5. Performance

5.1 Test conditions

Unless otherwise specified, the test conditions shall be, as a general rule, at the temperature of $22 \pm 2^{\circ}\text{C}$ and the relative humidity of $60 \pm 15\%$.

5.2 Electrical characteristics

NO.	Item	Test condition	Requirement
5.2.1	storage characteristics	Sampling plan: MIL-STD-105E, General Inspection Lever II, Single Sampling, AQL=0.4 Remark: Load voltage test method: 5.1Ω/0.3S, The initial samples shall be tested within 30 days after delivery	Open Circuit Voltage(V) load voltage(V) Initial: ≥ 1.60 ≥ 1.30 12 months @ RT: ≥ 1.53 ≥ 1.25 24 months @ RT: ≥ 1.52 ≥ 1.20
5.2.2	Service output	Load resistance:3.6Ω; Discharge method:15s/m, 24h/d continuously discharge; End point voltage 0.9V	Initial ≥ 150 cycles 12 months @ RT ≥ 135 cycles 24 months @ RT ≥ 120 cycles
		Load resistance:5.1Ω; Discharge method:4m/h, 8h/d discharge; End point voltage 0.9V	Initial ≥ 60 min 12 months @ RT ≥ 54 min 24 months @ RT ≥ 48 min
		Load resistance:10Ω; Discharge method:1h/d discharge; End point voltage 0.9V	Initial ≥ 120 min 12 months @ RT ≥ 108 min 24 months @ RT ≥ 100 min
		Load resistance:75Ω; Discharge method:4h/d discharge; End point voltage 0.9V	Initial ≥ 21 h 12 months @ RT ≥ 19 h 24 months @ RT ≥ 17 h
5.2.3	Over-discharge	Continuously discharge: 15Ω, End point voltage 0.6V	No leakage, No deformation; N=9, Ac=0, Re=1
5.2.4	High temp. storage	45℃, RH below 70% for 30days	No leakage; N=40 Ac=1, Re=2
5.2.5	Short circuit test	Short circuit for 24 hours	No explosion; N=5, Ac=0, Re=1
5.2.6	Incorrect installation	Four batteries are connected in series with one reversed, then short circuit for 24 hours.	No explosion; N=20, Ac=0, Re=1.

5.2.1&5.2.2 acceptance standard:

- 1) 9 pieces of battery will be tested for each discharging method.
- 2) The average discharging time from each discharging method shall be equal to or greater than the specified figure, and no more than one battery has a service output less than 80% of the specified figure.
- 3) One retest is allowed to confirm the results if the first test didn't meet the requirements.

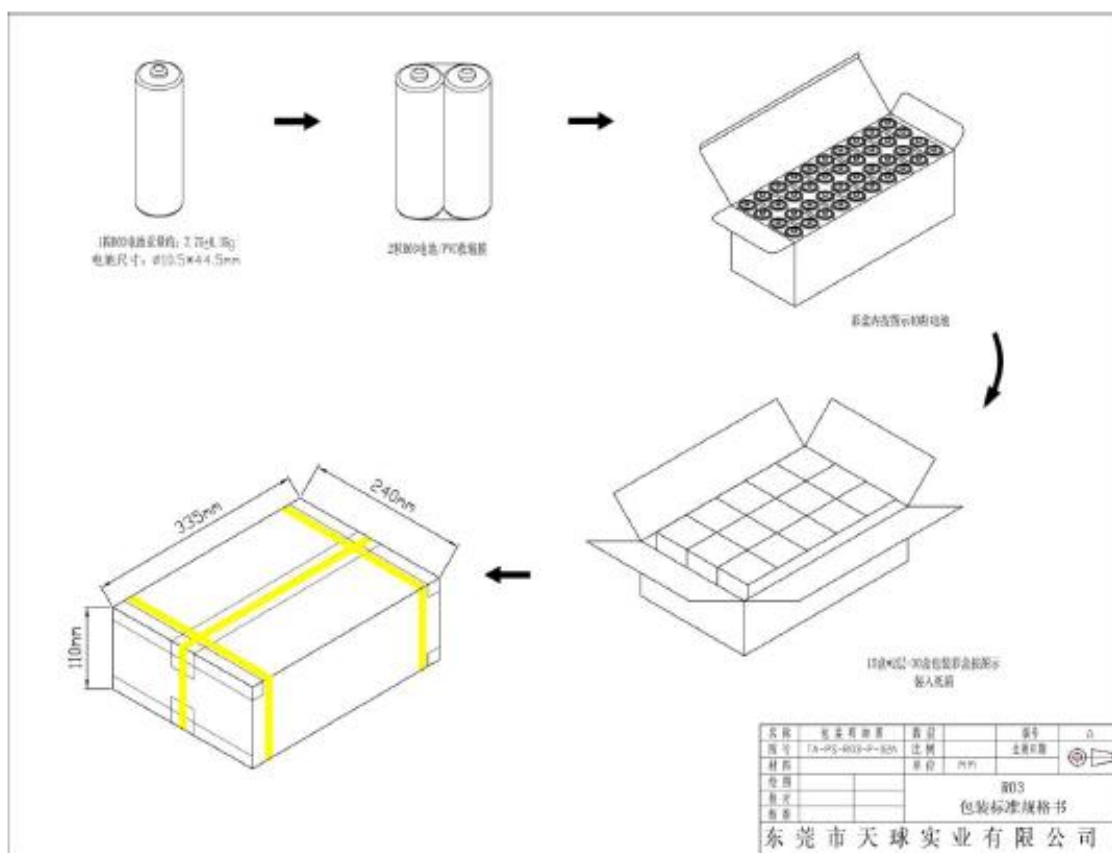
5.3 Expiration date

3 years after delivery under normal storage conditions

6. Packing and Marking

Any specific design and packing requirements will be accommodated as required. But as a general, the following markings will be printed, stamped or impressed on the body of the battery:

- 1) Designation: R03.
- 2) Manufacturer's logo " " and/or its name "TIANQIU".
- 3) Polarity Marking: " + "and /or " - ".
- 4) Caution: DO NOT RECHARGE, IMPROPERLY INSERT OR DISPOSE OF IN FIRE.
- 5) Battery Marking Design
- 6) Packing



7. Caution for Use

- 1) Since the battery is not designed to be charged, there are risks of electrolyte leakage or causing damage to the device if the battery is charged.
- 2) The battery shall be installed with its “+” and “-” polarity in correct position, otherwise may cause the battery to be charged or over-discharged.
- 3) Short-circuiting, heating, disposing of in fire and disassembling the battery are prohibited.
- 4) Battery cannot be forced discharge, which lead to excess internal gas generation and, may result in bulging, leakage and explosion.
- 5) New and used batteries cannot be mix used at the same time, when replaced batteries, it is recommend to replace all and with the same brand type.
- 6) Exhausted batteries should be removed from compartment to prevent over-discharge, which cause leakage and damage to the device.
- 7) Direct soldering is not allowed, which will damage the battery.
- 8) Keep the battery out of the reach of children to prevent swallow, in case of accident should contact physician at once.
- 9) The battery should not be dismantled and deformed.

caution:

- » If a battery is leakage and materials contact eyes, flush immediately with running water for at least 15 minutes. Consult an ophthalmologist at once.
- » If battery emits an odor, fever, discoloration, deformation or any abnormal phenomena appeared in the process of use/storage, removed the battery immediately from the device and dispose of the battery.

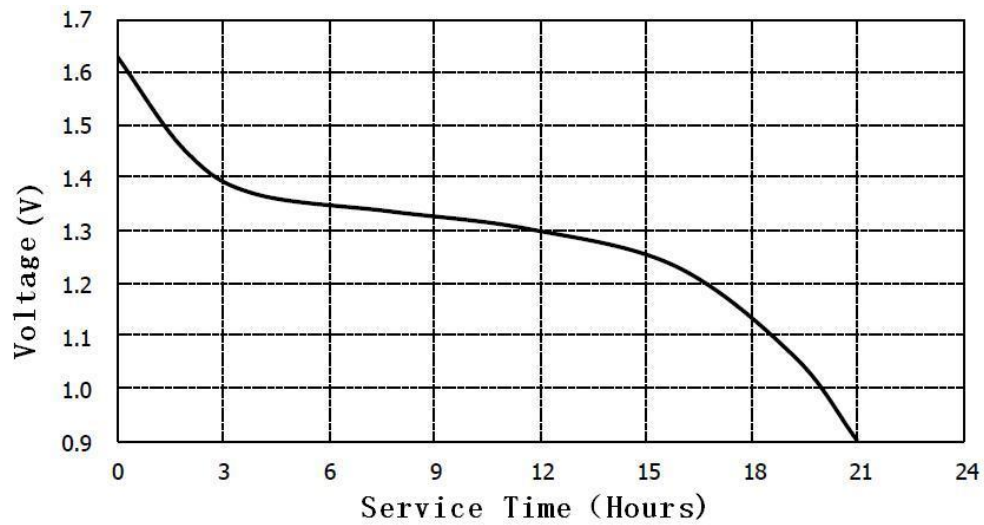
8. Referenced Standards

IEC 60086-1:2021 - Primary Batteries - Part 1: General

IEC 60086-2:2021 - Primary Batteries - Part 2: Physical and electrical specifications

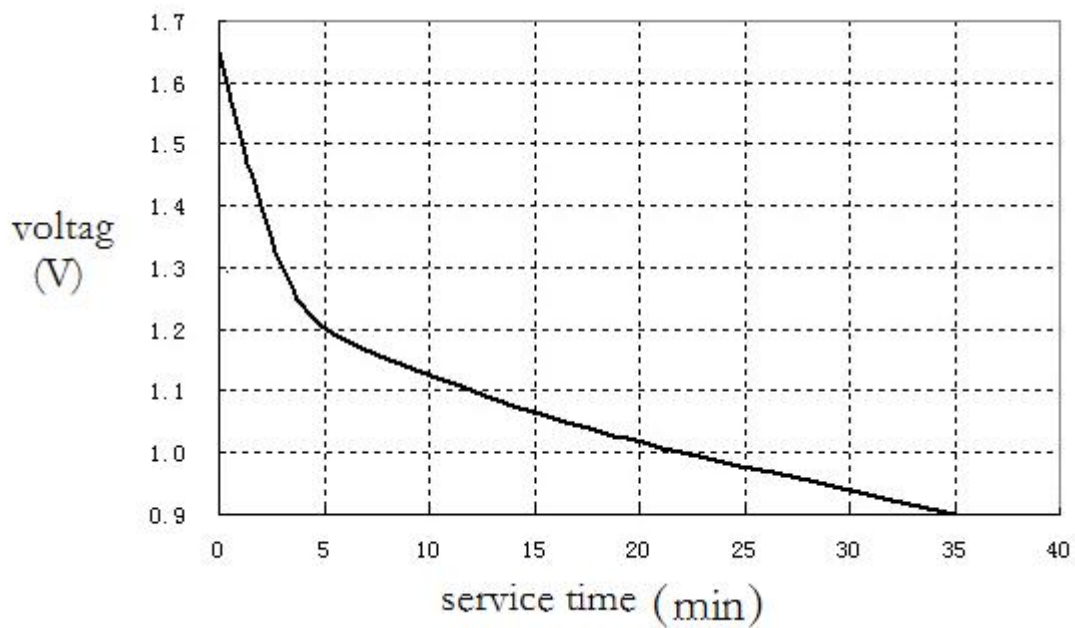
IEC 60086-5:2016 - Primary Batteries - Part 5: Safety of batteries with aqueous electrolyte

9. Discharge Curves



Discharge method: 75Ω, 4 hour/day EV=0.9V

Temperature: 20±2℃



Discharge method: 3.9Ω, 24 hour/day EV=0.9V

Temperature: 20±2℃