MATERIAL SAFETY DATA SHEET

according to Regulation (EC) No 1907/2006 and its updates

ZINC-AIR ALKALINE PRIMARY BATTERY

Revision: 12

Revision date: 05.09.2019

Printing date: 05.09.2019

0. EXPLANATORY NOTE

Iskra produces zinc-air alkaline batteries for road and railway signalization, security system, electric fencers etc. The nominal open-circuit voltage for zinc air-alkaline battery is 1,5 V per cell and Iskra produces batteries with voltage from 1,5 to 15 V and capacity from 25 to 2000 Ah.

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

1.1. Product identifier

PRODUCT NAME: Zinc -air alkaline primary battery.

PRODUCT TYPES: K25, K30, K50, K60, K120, K150, K360, K400, K700, K960.
2X3PFP100, 4PFP25, 4PFP30, 4PFP40, 4PFP100, 5PFP260, 5PFP400.
6PFP40, 6PFP55, 6PFP65, 6PFP75, 6PFP90, 6PFP100, 6PFP120, 6PFP130, 6PFP130_100, 6PFP140, 6PFP145, 6PFP150, 6PFP160, 6PFP165, 6PFP165P, 6PFP170, 6PFP175 and 6PFP200.
8PFP60, 8PFP120, 8PFP330, 10PFP110.

VOLTAGE: 1,5 V – 15 V

ELECTROCHEMICAL SYSTEM: O_2 / KOH / Zn

1.2 Relevant identified uses of the substance and uses advised against

Primary energy source.

1.3 Details of the supplier of the safety data sheet

Iskra, d.o.o. Stegne 21 1000 Ljubljana Slovenia e-mail: info@iskra.eu http://www.iskra.eu	BU Šentvid Šentvid pri Stični 108 SI-1296 Šentvid pri Stični Slovenia Tel.: + 386 1 780 08 00 e-mail: info@iskra.eu

1.4 Emergency telephone

Emergency information services / official advisory body

112 (Slovenia)

Telephone number of the company in case of emergencies

+ 386 1 780 08 00 (Iskra BU Šentvid telephone number)

2. HAZARDS IDENTIFICATION

2.1 Classification of the substance

Not a hazardous substance according to Regulation (EC) No. 1272/2008 (CLP) and its updates.

2.2 Labels elements

The product does not need to be labelled in accordance with EC directives.

2.3 Other hazards

Incorrect handling of the batteries may lead to an accidental release of liquid, overheating or explosion and cause injury to people or damage to equipment. Contents of an open battery can cause serious chemical burns of mouth, esophagus, gastrointestinal tract, respiratory irritation, skin and eye irritation and chemical burns on skin or eye.

3. COMPOSITION/INFORMATION ON INGREDIENTS

IMPORTANT NOTE: The battery should not be opened or burned. Exposure to the ingredients contained within or their combustion products could be harmful:

MATERIAL OR INGREDIENT	Indeks Number	EC Number	CAS Number	Registracijska št.	Razvrst. 127272008	% / wt.
Potassium hydroxide (KOH)	019-002-00-8	215-181-3	1310-58-3	01-2119487136-33	Met. Corr. 1: H290 Acut. Tox. 4: H302 Skin Cor. 1A: H314	8-10
Manganese dioxide (MnO_2)		215-202-6	1313-13-9	01-2119452801-43	Akut. Tok. 4 (H302) Akut. Tok. 4 (H332) STOT Rep. Exp. 2 (H373)	12-15
Zinc (Zn)	030-001-01-9	231-175-3	7440-66-6	01-2119467174-37	Aquatic Acute 1 (H400) Aquatic Chronic 1 (H410)	27-42

*PNOR: Particulates not otherwise regulated.
*PNOC: Particulates not otherwise classified.

NO HAZARDOUS INGREDIENT	PEL (OSHA)	TLV (ACGIH)	% / wt.
Iron (Fe) CAS No. 7439-89-6	None established	None established	4-14
Plastic	None established	None established	11-24
Water, paper and other	None established	None established	Balance

4. FIRST AID MEASURES

4.1 Description of first aid measures

General advice: For consumer use, adequate hazard warnings are included on both the package and on the battery. Potential for exposure should not exist unless the battery leaks, is exposed to high temperatures, is accidentally swallowed or is mechanically, physically, or electrically abused. Contains potassium hydroxide, which is caustic.

Inhalation: Not anticipated. Respiratory and eye irritation may occur if fumes are released due to heat or an abundance of leaking batteries. Remove to fresh air. Contact physician if irritation persists.

Skin contact: Irritation, including caustic burns/injury, may occur following exposure to a leaking battery. Irrigate exposed skin with copious amounts of clear, tepid water for at least 15 minutes. If irritation, injury or pain persists, consult a physician.

Eye contact: Irritation, including caustic burns/injury, may occur following exposure to a leaking battery. If battery is leaking and material contacts eyes, flush with copious amounts of clear, tepid water for 30 minutes. Contact physician at once.

Ingestion: Not anticipated. Irritation, including caustic burns to the internal/external mouth areas, may occur following exposure to a leaking battery. If mouth area irritation/burning have occurred, rinse the mouth and surrounding area with clear, tepid water for at least 15 minutes. If irritation injury or pain persists, consult a physician.

5. FIRE FIGHTING MEASURES

5.1 Extinguishing media
Any extinguishing media will be effective.

5.2 Special hazard arising from the substance
The product is not flammable.
In fires involving large quantities of product, use self-contained breathing apparatus and full protective clothing.

6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures
Notify safety personnel of large spills. Caustic potassium hydroxide may be released from leaking or ruptured batteries. Avoid eye or skin contact and inhalation of vapours. Increase ventilation. Clean-up personnel should wear appropriate protective gear.

6.2 Environmental precautions
Keep spill away from drains, surface, ground water and soil.

6.3 Methods and material for containment and cleaning up
Battery materials should be collected in a leak-proof container. The waste matter produced must be treated in accordance with current legislation.

7. HANDLING AND STORAGE

7.1 Precautions for safe handling
Avoid mechanical or electrical abuse. Do not short-circuiting or install incorrectly (respect the polarity + and -). Batteries may exploze, pyrolize or vent if disassembled, crushed, recharged or exposed to high temperatures. Install batteries in accordance with equipment instructions. Replace all batteries in equipment at the same time. Keep batteries out of children's reach. Do not mix different types of batteries. Do not dismantle the batteries. Do not throw batteries into a fire or incinerate.
Zinc-air alkaline batteries need oxygen from ambient for operation. Do not seal the battery in an airtight or watertight container. This could result in blockage of air access holes and premature battery failure. Batteries normally evolve hydrogen which, when combined with oxygen from the air, can produce a combustible or explosive mixture unless vented. If such a mixture is present, short circuits, high temperature or static sparks can cause an ignition.
This battery is manufactured in a charged state. It is not designed for recharging. Recharging can cause battery leakage or high pressure repture. Inadvertent charging can occur if a battery is installed backwards.

7.2 Conditions for safe storage, including any incompatibilities
Store at room temperature. Elevated temperatures can result in shortened battery life.
Once discharged, store the batteries so that the holes for air are at the top.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

8.1 Control parameters
Housing of the battery is from plastic, but inside it contains a number of chemical products and materials which might be potentially dangerous in the event of accidental release.
INGREDIENT INSIDE THE BATTERY
Potassium hydroxide (KOH):

Exposure limit values (Directive 2000/39 / EC in 2017/164 / EC with all amendments and adjustments) (see NIOSH (RTCS No. TT2100000 for potassium hydroxide CAS) No. 1310-58-3)).
(Official Gazette RS, No. 78/2018): MV for potassium hydroxide in Slovenia are not prescribed.
/ 1 mg / m3 consumer inhalation long lasting local effects / 1 mg / m3
PNEC for potassium hydroxide is not relevant.

	PEL (OSHA)	TLV (ACGIH)
Potassium hydrokside (KOH)	None established	2 mg/m^3 ceiling

Manganese dioxide (MnO_2):

Exposure limit values (Commission Directive 2000/39 / EC and 2017/164 / EC (with all amendments and adaptations)):

Rules on the protection of workers from the risks related to exposure to chemical agents at work (Official Gazette of the Republic of Slovenia, No. 78/2018):

MV for manganese dioxide in Slovenia are not prescribed.

MV (manganese and inorganic manganese compounds) = 0,2 (I) mg / m^3; 0,05 (A) mg / m^3 KTV = 1,6 (I) mg / m^3; 0.4 (A) mg / m^3

Chemical name	Australia	Austria	Belgium	Denmark	European Union
Manganov dioksid (CAS: 1313-13-9)	1 mg/m^3	STEL: 2 mg/m^3 TWA: 0,5 mg/m^3	-	TWA: 0,2 mg/m^3	-
	Latvij+a	France	Finland	Germany	Italy
	TWA: 0,3 mg/m^3	-	TWA: 0,2 mg/m^3 TWA: 0,1 mg/m^3	TWA: 0,2 mg/m^3 TWA: 0,02 mg/m^3 Ceiling / Peak: 1,6 mg/m^3 Ceiling / Peak: 0,16 mg/m^3 TWA: 0,5 mg/m^3	-
	Poland	Portugal	Spain	Switzerland	Nederland
	TWA: 0,3 mg/m^3	TWA: 0,2 mg/m^3	TWA: 0,2 mg/m^3	TWA: 0,5 mg/m^3	-
	Norway	United Kingdom	ACGIH TLV	OSHA PEL	NIOSH IDLH
	TWA: 1 mg/m^3 TWA: 0,1 mg/m^3 STEL: 1 ppm STEL: 0,1 mg/ m^3	TWA: 0,5 mg/m^3	TWA: 0,2 mg/m^3 Mn TWA: 0,1 mg/m^3 Mn	Ceiling: 5 mg/m^3 Ceiling: 5 mg/m^3 Mn	IDLH: 500 mg/m^3 Mn TWA: 1 mg/m^3 Mn STEL: 3 mg/m^3 Mn

Relevant PNEC limit values: environmental values:
No information available
Sweet water: 0.00014 mg / L
Sea water: 0.000014 mg / L
Intermittent releases: 0.00074 mg / L
Freshwater sediment: 0,037 mg / kg sediment dw
Marine sediment: 0.0037 mg / kg sediment dw
Country: 0,028 mg / kg soil dw

Effect on sewage treatment: 100 mg / L

Zinc (Zn):

Exposure limit values (Commission Directive 2000/39 / EC and 2017/164 / EC (with all amendments and adaptations)):

Kemijsko ime	General dust limit	
	WEL-TWA: 10mg/m^3 (inhal. Dust), 4 mg/m^3 (respir. Dust)	

Rules on the protection of workers from the risks related to exposure to chemical agents at work (Official Gazette of the Republic of Slovenia, No. 78/2018): MV for zinc in Slovenia are not prescribed.

8.2 Exposure controls

8.2.1 Appropriate engineering controls

Ventilation requirements: Not necessary under normal conditions.

8.2.2 Individual protection measures, such as personal protective equipment

Hand protection		None required under normal use conditions. Use neoprene, rubber or latex gloves when handling open or leaking batteries.
Eye protection		None required under normal use conditions. Wear safety glasses when handling open or leaking batteries.
Respiratory protection		Not necessary under normal conditions.
Rest of the body		Not necessary under normal conditions.
Health and safety measures		Keep batteries out of children's reach.

8.2.3 Environmental exposure controls

No information available at present.

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 Information on basic physical and chemical properties

Physical state (appearance)	Solid object (cylindrical or rectangular plastic case)
Odour	Odourless
pH-value	Not applicable under normal condition
Boiling point/rate (°C)	Not applicable
Melting point/rate (°C)	MnO_2 breaks down: ca. 535 °C Zn breaks down: ca. 420 °C KOH breaks down: ca. 410 °C

Flash point	Not applicable
Evaporation rate	Not applicable
Flammability	It is not flammable
Autoflammability	Not applicable
Explosion risk	It is not explosive (hermitically sealed product, do not expose to heat sources)
Vapour density	Not applicable
Vapour pressure	Not applicable
Relative density	1,7 – 3 g/cm^3
Solubility Internal components: Water solubility Solubility in other solvents	Insoluble KOH: ca. 1150 g/L Zink: insoluble Not applicable
Distribution coefficient	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature	Not applicable
Viscosity	Not applicable
Explosive properties	Not applicable
Oxidising properties	Not applicable

9.2 Other information

Open circuit voltage: 1,5 V per cell.

10. STABILITY AND REACTIVITY

10.1 Reactivity

It is not reactive under normal condition of use.

See also section 7.

10.2 Chemical stability

It is stable under normal condition of use.

See also section 7.

10.3 Possibility of hazardous reactions

See also section 7.

10.4 Condition to avoid

Avoid short-circuit. To achieve this it is not advisable to mix batteries, bring batteries into contact with yewelry, metal tables or any type of electrical conductor. Avoid crushing, perforating or dismantling.

See also section 7.

10.5 Incompatible materials

See also section 7.

10.6 Hazardous decomposition products

See also subsection 10.4 to 10.6

See also section 5.2

11. TOXICOLOGICAL INFORMATION

Under normal condition of use, zinc-air alkaline batteries are non-toxic. But if battery is opened, its components may cause problems:

MnO_2	**Inhalation:** May be harmful if inhaled. May cause respiratory tract irritation.	Supply fresh air. Consult doctor if symptoms persist.
	Ingestion: Harmful if swallowed.	Do not induce vomiting: call for medical help immediately.
Zinc	**Contact with the skin**: May cause irritation of the skin.	Wash thoroughly using copious water – remove contaminated clothing immediately.

	Contact with the eyes: May cause ocular irritation.	Wash thoroughly for several minutes using copious water. Seek medical help if necessary.
	Ingestion: May cause stomach pains, nausea and vomiting.	Gives copious water to drink – consult doctor immediately.
KOH	**Contact with the skin:** Severe burns and penetrating skin ulcers.	Wash off immediately with plenty of water at least 15 minutes and seek medical assistance.
	Contact with the eyes: Caustic effect to the eyes.	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Consult an eye specialist immediately.
	Ingestion: Burns to the mouth and esophagus.	Clean mouth with water and drink afterwards plenty of water. Never give anything by mouth to an unconscious person. Do not induce vomiting.
	Inhalation: Irritation of the respiratory system.	Remove casualty to fresh air and keep it rest.

12. ECOLOGICAL INFORMATION

12.1 Toxicity
None available regarding product.
12.2 Persistence and degradability
Batteries left outdoors may begin to leak through the aeration holes.
12.3 Bioaccumulative potential
Not expected if used/disposed of correctly.
12.4 Mobility in soil
Not expected if used/disposed of correctly.
12.5 Results of PBT and vPvB assessment
The product is not considered to be a PBT or a vPvB.
12.6 Other adverse effects
Not expected if used/disposed of correctly

13. DISPOSAL CONSIDERATIONS

13.1 Waste treatment methods
Product
Dispose of in accordance with all applicable federal, state and local regulations. Appropriate disposal technologies include incineration and land filling. Do not incinerate, since batteries may explode at excessive temperatures. In Europe they must be managed according to the Directive 2006/66/CE (and all its updates) of the European Parliament and Council, of 6 September 2006 on batteries and accumulators and waste batteries and accumulators.
The residue is catalogued as not dangerous in the European List of Waste (LoW) and has code 16 06 04.
Packaging
Uncontaminated packaging can be recycled.
Dispose of packaging that cannot be cleaned in the same manner as the product.
Pay attention to local and national official regulations.

14. TRANSPORT INFORMATION

All batteries in all forms of transportation (ground, air or ocean) must be packed in a safe responsible manner. Regulatory concerns from all agencies for safe packaging require that batteries must be packed in a manner that prevents short circuits and be contained in strong outer packaging that prevents spillage of contents. All original packaging for Iskra air-alkaline batteries has been designed to be compliant with these regulatory concerns.

Zinc-air alkaline batteries are not listed as dangerous goods under the ADR European Agreement Concerning the

International Carriage of Dangerous Goods by Road, the IMDG International Maritime Dangerous Goods Code, UN Dangerous Good Regulations, IATA Dangerous Goods Regulation, ICAO Technical Instructions and the U.S. hazardous materials regulations (49 CFR). These batteries are not subject to the dangerous goods regulations provided they meet the requirements contained in the following special provisions.

Regulatory body	Special Provisions
UN	Not regulated.
IMDG	Not regulated.
ADR	Not regulated.
US DOT	49 CFR 172.102 Provision 130
ICAO	Not regulated.
IATA	A123

All Iskra zinc-air alkaline batteries are packed in such a way to prevent short circuits or the generation dangerous quantities of heat and meet the special provisions listed above. In addition, the IATA Dangerous Goods Regulations and IACO Technical Instructions require the words “not restricted” and the Special Provision number A123 be provided on the air waybill, when an air waybill is issued.

15. REGULATORY INFORMATION

15.1 Safety, health and environmental regulations/legislation specific for the product

Not a hazardous substance according to Regulation (EC) No. 1272/2008 (CLP) and its updates (for classification and labelling).

REACH (No. 1907/2006 and its updates): Iskra batteries are manufactured articles and no subject to REACH registration requirements. So there is no obligation to generate a safety data sheet. Do not contain any SVCH’s on the ECHA Candidate List.

EU RoHS directive: Iskra batteries are not subject to the RoHS Directive.

EU Battery Directive 2006/66/EC and its updates: Each battery is labelled with the crossed-out wheeled bin and capacity, which is indicated on them in a visible, legible and indelible form. Iskra batteries don’t need to be marked with the chemical symbols for the metal Hg, Pb or Cd. The residue is catalogued as not dangerous in the European List of Waste (LoW) and has code 16 06 04.

15.2 Chemical safety assessment

No information available at present.

16. OTHER INFORMATION

To the best of our knowledge, the information contained in this Material Safety Data Sheet is accurate and reliable on presently available resources. However, neither the seller nor any of its subsidiaries assumes any responsibility or liability whatsoever for the accuracy or completeness of the information contained herein.

This Material Safety Data Sheet shall not constitute a guarantee for any specific product features. Final determination of suitability of this material is the sole responsibility of the user.

All materials may present unknown hazards and should be used and handled with caution and following reasonable safety procedures. Consequently the buyer assumes all risks in connection with the use and handling of this material.