

**Material Safety data sheet**

<b>SECTION 1: Chemical product and company identification</b>	
Trade name:	Battery pack
Product model:	RAML1
OEM-Manufacturer:	Gustav Klauke GmbH Auf dem Knapp 46 42855 Remscheid Tel: +0049-2191-907-196 Fax: +0049-2191-907-292
Intended use:	Lithium-ion rechargeable battery pack for power tools.
Specifications:	Rated voltage: 10.8V d.c. Rated capacity: 1500mAH Rated energy: 16.2Wh number / type of cells: 3 / INR18650-15M

<b>SECTION 2: Hazards identification</b>	
Route(s) of Entry	There is no hazard when the measures for handling and storage are followed.
Signs and Symptoms of Exposure	In case of cell damage, possible release of dangerous substances and a flammable gas mixture. OSHA Hazard Communication: This material is not considered hazardous by the OSHA Hazard Communication Standard 29CFR 1910.1200. Carcinogenicity (NTP): Not listed Carcinogenicity (IARC): Not listed Carcinogenicity (OSHA): Not listed
Special hazards for human health and environment	There is no hazard when the measures for handling and storage are followed. In case of cell damage, possible release of dangerous substances and a flammable gas mixture.

## Material Safety data sheet

### SECTION 3: Composition/information on ingredients

#### Hazardous components

CAS No.	Chemical name	Quantity
1307-96-6	Cobalt oxide	< 30 %
1313-13-9	Manganese dioxide	< 30 %
1313-99-1	Nickel oxide	< 30 %
7440-44-0	Carbon	< 30 %
	Electrolyte (*)	< 20 %
24937-79-9	Polyvinylidene fluoride (PVdF)	< 10 %
7429-90-5	Aluminium foil	2 - 10 %
7440-50-8	Copper foil	2 - 10 %
	Aluminium and inert materials	2 - 10 %

Full text of each relevant R phrase can be found in heading 16.

Further Information	<p>For information purposes:</p> <p>(*) Main ingredients: Lithium hexafluorophosphate, organic carbonates</p> <p>Because of the cell structure the dangerous ingredients will not be available if used properly.</p> <p>During charge process a lithium graphite intercalation phase is formed.</p> <p>Mercury content: Hg &lt; 0.1mg/kg          Cadmium content: Cd &lt; 1mg/kg          Lead content: Pb &lt; 10mg/kg</p>
---------------------	--

### SECTION 4: First aid measures

#### General information

The following first aid measures are required only in case of exposure to interior battery components after damage of the external battery casing.

Undamaged, closed cells do not represent a danger to the health.

After inhalation	Ensure of fresh air. Consult a physician.
After contact with skin	In case of contact with skin wash off immediately with plenty of water. Consult a physician.
After contact with eyes	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Seek medical treatment by eye specialist.
After ingestion	Drink plenty of water. Call a physician immediately.

**Material Safety data sheet**

**SECTION 5: Fire fighting measures**

Suitable extinguishing media	Cold water and dry powder in large amount are applicable. Use metal fire extinction powder or dry sand if only few cells are involved.
Special hazards arising from the chemical	May form hydrofluoric acid if electrolyte comes into contact with water. In case of fire, the formation of the following flue gases cannot be excluded: Hydrogen fluoride (HF), Carbon monoxide and carbon dioxide.
Protective equipment and precautions for firefighters	Wear self-contained breathing apparatus and protective suit.
Additional information If possible, remove cell(s) from fire fighting area. If heated above 125°C, cell(s) can explode/vent. Cell is not flammable but internal organic material will burn if the cell is incinerated.	

**SECTION 6: Accidental release measures**

Personal precautions	Use personal protective clothing. Avoid contact with skin, eyes and clothing. Avoid breathing fume and gas.
Environmental precautions	Do not discharge into the drains/surface waters/groundwater. Methods for cleaning up/taking up. Take up mechanically and send for disposal.

**SECTION 7: Handling and storage**

Handling Advice on safe handling	Avoid short circuiting the cell. Avoid mechanical damage of the cell. Do not open or disassemble. Advice on protection against fire and explosion. Keep away from open flames, hot surfaces and sources of ignition.
Storage Requirements for storage rooms and vessel	Storage conditions (suitable, to be avoided): Avoid direct sunlight, high temperature, high humidity. Storage at room temperature (approx. 20°C) at approx. 20~60% of the nominal capacity (OCV approx. 3.6 - 3.9 V/cell). Keep in closed original container. Incompatible products: Conductive materials, water, seawater, strong oxidizers and strong acids Packing material (recommended, not suitable): Insulative and tear proof materials are recommended.

**Material Safety data sheet**

**SECTION 8: Exposure controls/personal protection**

Ingredient	Risk Codes	Safety Description	Hazard	Exposure Controls/Personal Protection
Cobalt oxide	R22, R43, R50/53	S24, S37, S60, S61	Xn (Harmful) N (Dangerous for the environment)	0.1 mg/m <sup>3</sup> (TWA)
Manganese (VI) oxide	R20/22	S25	Xn (Harmful)	<b>Airborne Exposure Limits:</b> - OSHA Permissible Exposure Limit (PEL): 5 mg/m <sup>3</sup> Ceiling for manganese compounds as Mn - ACGIH Threshold Limit Value (TLV): 0.2 mg/m <sup>3</sup> (TWA) for manganese, elemental and inorganic compounds as Mn
Nickel oxide	R43, R49, R53	S45, S53, S61	T (Toxic)	<b>Airborne Exposure Limits:</b> For Nickel, Metal and Insoluble Compounds, as Ni: - OSHA Permissible Exposure Limits (PEL) - 1 mg/m <sup>3</sup> (TWA). For Nickel, Elemental / Metal: - ACGIH Threshold Limit Value (TLV) - 1.5 mg/m <sup>3</sup> (TWA), A5 - Not suspected as a human carcinogen. For Nickel, Insoluble Compounds, as Ni: - ACGIH Threshold Limit Value (TLV) - 0.2 mg/m <sup>3</sup> (TWA), A1 - Confirmed human carcinogen
Carbon	R36/37/38, R36/37, R20, R10	S22, S24/25	F (Highly Flammable) Xn (Harmful) Xi (Irritant)	<b>Airborne Exposure Limits:</b> - OSHA Permissible Exposure Limits (PELs): activated carbon (graphite, synthetic): Total particulate = 15 mg/m <sup>3</sup>
Aluminium foil	R17, R15, R36/38, R10, R67, R65, R62, R51/53, R48/20, R38, R11	S7/8, S43, S26, S62, S61, S36/37, S33, S29, S16, S9	F (Highly Flammable) Xn (Harmful) Xi (Irritant)	<b>Airborne Exposure Limits:</b> -OSHA Permissible Exposure Limit (PEL): 15 mg/m <sup>3</sup> (TWA) total dust and 5 mg/m <sup>3</sup> (TWA) repairable fraction for Aluminum metal as Al -ACGIH Threshold Limit Value (TLV): 10 mg/m <sup>3</sup> (TWA) Aluminum metal dusts
Copper foil	R11, R36, R37, R38	S5, S26, S16, S61, S36/37	F (Highly Flammable) N (Dangerous for the environment) Xn (Harmful) Xi (Irritant)	Copper Dust and Mists, as Cu: - OSHA Permissible Exposure Limit (PEL) - 1 mg/m <sup>3</sup> (TWA) - ACGIH Threshold Limit Value (TLV) - 1 mg/m <sup>3</sup> (TWA) Copper Fume: - OSHA Permissible Exposure Limit (PEL) - 0.1 mg/m <sup>3</sup> (TWA) - ACGIH Threshold Limit Value (TLV) - 0.2 mg/m <sup>3</sup> (TWA)

**Material Safety data sheet**

Polyvinyliden e fluoride (PVdF)		S22, S24/25		
Additional advice on limit values	During normal charging and discharging there is no release of product.			
Occupational exposure controls	No specific precautions necessary.			
Protective and hygiene measures	When using do not eat, drink or smoke. Wash hands before breaks and after work.			
Respiratory protection	Not specific precautions necessary.			
Hand protection	Not specific precautions necessary.			
Eye protection	Not specific precautions necessary.			
Skin protection	Not specific precautions necessary.			

**SECTION 9: Physical and chemical properties**

**Information on basic physical and chemical properties**

Physical state	Solid
Form	Irregular
Colour	Various
Odor	Odourless
Voltage	10.8V d.c.
Capacitance	1500 mAh

**Important health, safety and environmental information**

Test method	
pH value	N/A
Flash point	N/A
Lower explosion limits	N/A
Vapour pressure	N/A
Density	N/A
Water solubility	Insoluble
Auto-ignition temperature	N/A

**Material Safety data sheet**

**SECTION 10: Stability and reactivity**

Stability	Stable
Conditions to avoid	Keep away from open flames, hot surfaces and sources of ignition. Do not puncture, crush or incinerate.
Materials to avoid	No materials to be especially mentioned.
Hazardous decomposition products	In case of open cells, there is the possibility of hydrofluoric acid and carbon monoxide release.
Possibility of hazardous reactions	Will not occur
Additional information	No decomposition if stored and applied as directed.

**SECTION 11: Toxicological information**

Empirical data on effects on humans	If appropriately handled and if in accordance with the general hygienic rules, no damages to health have become known.
-------------------------------------	--

**SECTION 12: Ecological information**

Further information	Ecological injuries are not known or expected under normal use. Do not flush into surface water or sanitary sewer system.
---------------------	--

**SECTION 13: Disposal considerations**

Advice on disposal	For recycling consult manufacturer.
Contaminated packaging	Disposal in accordance with local regulations.

**Material Safety data sheet**

**SECTION 14: Transportation information**

The rechargeable Lithium-Ion battery pack as stated in Appendix are made in compliance to the requirements stated in the latest edition of the IATA Dangerous Goods Regulations Packing Instruction 965 section II such that they can be transported as a NOT RESTRICTED (non-hazardous/non-dangerous) goods. However, if those lithium-ion battery packs are pack with or contained in an equipment, then it is the responsibility of the shipper to ensure that the consignment are packed in compliance to the latest edition of the IATA Dangerous Goods Regulations section II of either Packing Instruction 966 or 967 in order for that consignment to be declared as NOT RESTRICTED (non-hazardous/non-Dangerous).

With regard to transport, the following regulations are cited and considered:

- The International Civil Aviation Organization (ICAO) Technical Instructions, Packing Instruction 965, Section II (2013-2014 Edition),
- The International Air Transport Association (IATA) Dangerous Goods Regulations, Packing Instruction 965, Section II (55th Edition, 2014),
- The International Maritime Dangerous Goods (IMDG) Code (2012 Edition),
- US Harzardous Materials Regulations 49 CFR(Code of Federal Regulations) Sections 173-185 Lithium batterie and cells,
- The UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria 38.3 Lithium batteries, Rev. 5, Amend. 1
- UN No. 3480.

Our products are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to all the applicable international and national governmental regulations, not limited to the above mentioned. We further certify that the enclosed products have been tested and fulfilled the requirements and conditions in accordance with UN Recommendations (T1 – T8) on the Transport of Dangerous Goods Model Regulations and the Manual of Testes and Criteria that can be treated as “Non-Dangerous Goods”.

**Test results of the UN Recommendation on the Transport of Dangerous Goods**

Manual of Test and Criteria (38.3 Lithium battery)		Test results	Remark
No	Test item		
T1	Altitude Simulation	Pass	
T2	Thermal Test	Pass	
T3	Vibration	Pass	
T4	Shock	Pass	
T5	External Short Circuit	Pass	
T6	Impact	Pass	
T7	Overcharge	Pass	For pack and single cell battery only
T8	Forced Discharge	Pass	

**Material Safety data sheet**

**SECTION 15: Regulatory information**

**U.S. Regulations**

<b>National Inventory TSCA</b>	All of the components are listed on the TSCA inventory.
<b>SARA</b>	To the best of our knowledge this product contains no toxic chemicals subject to the supplier notification requirements of Section 313 of the Superfund Amendments and Reauthorization Act (SARA/EPCRA) and the requirements of 40 CFR Part 372.

**Regulatory information EU**

<b>Labelling</b>	Hazardous components which must be listed on the label As an article the product does not need to be labelled in accordance with EC directives or respective national laws.
<b>EU regulatory information</b>	1999/13/EC (VOC): 0%

**SECTION 16: Other information**

<b>Hazardous Materials Information Label (HMIS)</b>	Health: 0 Flammability: 0 Physical Hazard: 0
<b>NFPA Hazard Ratings</b>	Health: 0 Flammability: 0 Reactivity: 0 Unique Hazard: 0
<b>Full text of R-phrases referred to under sections 2 and 3</b>	R10 Flammable. R20/22 Harmful by inhalation and if swallowed. R22 Harmful if swallowed. R34 Causes burns. R40 Limited evidence of a carcinogenic effect. R43 May cause sensitization by skin contact. R48/23 Toxic: danger of serious damage to health by prolonged exposure through inhalation. R49 May cause cancer by inhalation. R50 Very toxic to aquatic organisms. R53 May cause long-term adverse effects in the aquatic environment.



## Material Safety data sheet

### Further information

Data of sections 4 to 8, as well as 10 to 12, do not necessarily refer to the use and the regular handling of the product (in this sense consult package leaflet and expert information), but to release of major amounts in case of accidents and irregularities. The information describes exclusively the safety requirements for the product

(s) and is based on the present level of our knowledge. This data does not constitute a guarantee for the characteristics of the product(s) as defined by the legal warranty regulations. "(n.a. = not applicable; n.d. = not determined)"

The data for the hazardous ingredients were taken respectively from the last version of the sub-contractor's safety data sheet.