

Safety Datasheet

ALUMINIUM

in accordance with 95/155/EEC

Rev. 21/08/2002

1. **Material and company designation**

- **Material:** aluminium and aluminium alloys
- **Trade names:**
 - Welding filter materials: DE50, DE51, DE53, DE56, DE57, DE58, DE59, DE60, DE61, DE63, DE64, DE68, DE71, DE76
 - Wires in general, see EN 573-3
Aluminium wrought materials and aluminium alloys:
Alloy designation: The alloy coding consists of a standardised, four-digit, internationally recognised number, possibly with an additional letter to describe the alloy (in accordance with EN 573-3, see also Reference 3).
If necessary, one number determines the metallic status in accordance with EN 515 (see also Reference 1), e.g. 5754 **H13**.
- **Manufacturer / Supplier:** DRAHTWERK ELISENTAL, W Erdmann & Co
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2. Composition / Details on components

Element	CAS* no.	EINECS** no.	EU index	Percentage content	VME***	
					Metal	Smoke
Aluminium (Al)	7429-90-5	231-072-3	013-001-00-6	The percentages vary as a function of the different alloys in accordance with the standards of the Aluminium Association and European Norm EN 573	10mg/m ³	5mg/m ³
Magnesium (Mg)	7439-95-4	231-104-6	012-001-00-3		10mg/m ³	10mg/m ³
Silicon (Si)	7440-21-3	231-130-8				5mg/m ³
Iron (Fe)	7439-89-6	231-096-4				1mg/m ³
Manganese (Mn)	7439-96-5	213-105-1				5mg/m ³
Zinc (Zn)	7440-90-5	231-175-3	030-001-00-1			5mg/m ³
Magnesium oxide (MgO)	1309-48-4	215-171-9				
Aluminium oxide (Al ₂ O ₃)	1344-28-1	215-691-6				
Copper (Cu)	7440-50-8	231-159-6				1mg/m ³
Chromium (Cr)	7440-47-3	231-157-5				0.5 mg/m ³
Zinc oxide (ZnO)	1314-13-2	215-222-5				5mg/m ³
Titanium (Ti)	7440-32-6	231-142-3				
Zirconium (Zr)	7440-67-7	231-176-9	040-001-00-3			5mg/m ³
Vanadium (V)	7440-62-2	231-171-1				0.05 mg/m ³

- * **CAS** Chemical Abstracts Services
 ** **EINECS** European Inventory of Existing Commercial Chemical Substances
 *** **VME** Valeurs maximales d'exposition (maximum exposure values); these values are purely indicative and not to be construed as regulatory

3. Potential risks

Main risks

- If molten aluminium comes into contact with water or certain chemicals, especially ones with high oxygen content, there is the risk of spraying, explosion or fire.
- There is the risk of explosion, fire or spraying if fine aluminium particles, aluminium powder or aluminium swarf are produced and released during processing.
- There is the risk of burning on contact with hot or molten metals.
- There is a risk of cuts and injuries on contact with the sharp edges of swarf, pieces of wire, drawn wires, rods, etc.
- There is the risk of eye injuries during any work which produces and releases fine aluminium particles, aluminium powder or aluminium swarf.
- There is particular risk when welding aluminium products (see also Chapter 8).
- There is the risk of electric shock on contact, as aluminium is a metal and therefore a good conductor of electricity.
- There are risks in conjunction with the releases of hydrogen, for example during surface treatment involving chemical and electrochemical processes (etching, polishing, anodising, etc.).
- There are risks involved in the handling and storage of large and heavy coils of wire, rods and bars.

Specific risks: Not indicated

4. **First aid measures**

- **If inhaled (powder or smoke):** If the patient feels unwell, he or she should be taken to a well-ventilated area. If symptoms persist, a doctor should be consulted.
- **On contact with the eyes (powder, smoke, swarf):** if irritated, the eyes should be rinsed out with plenty of water. If symptoms persist, a doctor should be consulted.
- **On contact with the eyes (wires, rods, bars, solid products):** If the eye is injured, a doctor should be consulted.
- **If consumed (eaten):** Not indicated
- **On contact with the skin:** For burns caused by hot or molten metal, cool the wound and consult a doctor. For a cut or other injury, consult a doctor.

5. **Fire-fighting methods**

Precautions:

- In its solid form (bars, pieces, wire rods, drawn wires), the product is not flammable and normally represents no risk in terms of fire or explosion.
- Aluminium powder can explode, especially at critical concentrations and when kept in sealed rooms or areas.
 - Avoid sparks and prevent electrostatic charges. Do not smoke.
 - Remove fine particles of aluminium produced by processing and metalwork (turning, sawing, polishing, etc.) using a suitable ventilation system (see also Reference).
 - Avoid uncontrolled production and distribution of particles. Make sure that the equipment and the rooms are regularly cleaned.
 - Avoid contact with water, air humidity and reactive gases.
- Finely distributed aluminium can generate hydrogen on contact with air humidity. There is a risk of explosion. Therefore, avoid the uncontrolled production of finely distributed aluminium (powder, swarf, etc.) in an enclosed area with no ventilation or suitable extraction systems (suction line curves, filters, extraction containers, machine tool extraction).
- Use suitable methods to remove dust, which reduces the proportion of finely distributed particles in the environment to non-critical levels.

Suitable extinguishers

- The product is not combustible in the form in which it is supplied. A fire caused by aluminium powder and swarf must only be tackled with dry sand or Class D fire extinguishing agents approved for this purpose.
- Avoid causing particles to blow around if you are trying to extinguish a powder fire.
- As an aluminium powder fire can last a long time, once it appears to be extinguished, make sure that there is no hidden core still burning.

Extinguishers which are unsuitable for safety reasons

Do not use water or fire extinguishers that contain halogen.

Particular risks of released chemicals

Aluminium powder, dust and vapours represent a low risk when inhaled. They are neither irritating to the skin or toxic if swallowed.

Special equipment for fire-fighters

If necessary, protective gear and respiratory protection masks should be worn. The local fire brigade can advise you on risks and fire fighting.

6. Measures on unintentional release

Personal precautions

Avoid contact with hot metal. Avoid inhaling vapours and smoke released during metal working and processing.

Precautions to protect the surrounding area

Do not allow liquid aluminium to seep into the waste water system. Do not throw swarf or powder down the drains.

Cleaning methods

- Molten metal: Wait until hard, and then remove the metal.
- Powder and swarf: Clear up substance with a broom or explosion-protected suction box without releasing dust into the atmosphere.

7. Handling and storage

Handling:

- **Risk of burns:** Hot aluminium is the same colour as cold aluminium. Take precautions to prevent accidents caused by hot metals.
- **Risk of cuts:** All products can have hard or sharp edges and therefore represent a risk of cuts. It is advisable to wear protective gloves.
- **Specific risk from bars, wire rods and drawn wires:** There is a risk of facial injury. Therefore, goggles should be worn.
- **Specific risk from finely distributed metal:** There is a risk of explosion and eye injury. Wear goggles. Only work in dry, well ventilated areas. Do not smoke. Prevent fires by avoiding flames and hot areas. Do not carry out maintenance work without checking the fire safety regulations. Avoid static electricity. Use suitable electronic equipment.
- **Specific risk from coiled products:** Make sure that the wire does not jump out. There is a risk of injury. Wear goggles and protective gloves.

- **Specific risk from stacked rings or coils:** There is a risk of jumping out as soon as the holding straps are removed. Avoid getting cut by the holding straps. Wearing suitable gloves and goggles is recommended.
- **Specific risk from wire coils:** Because the core of a wire coil or roll can sometimes be concealed by packaging, there is a risk of it falling into the roll when walking the product along.

Storage:

- Cylindrical products that can roll (bars, rings, coils of wire and bundles of wire rods) must be properly secured, e.g. using a chock or safety straps.
- Aluminium waste must be stored in a dry place in order to prevent the risk of explosions caused by humidity when it is melted again.
- Powder and fine aluminium particles must be stored in a well-ventilated, dry place away from direct heat and static electricity. Do not store them right next to flammable products or reactive media (e.g. oxidants).

8. Limiting exposure and personal protective gear

Medical supervision

There are not specific medical supervision procedures for exposure to aluminium. In France and the USA, there is no biological exposure indicator. In Germany, there is a biological exposure index defined by the Deutsche Forschungsgemeinschaft (DFG ≈ German Research Association) that allows maximum aluminium content in the urine of 0.2 mg/l.

Respiratory protection:

A suitable ventilation system must be used in order to remove fine aluminium particles produced by processing the product (sawing, polishing, etc.), by melting the metal or by welding work.
If there is a risk of the maximum workplace concentration values being exceeded, use suitable respiratory protection.

Protective clothing

Welding work, especially where it involves handling liquid metal, requires appropriate protective clothing.

Hand protection:

Always wear protective gloves if:

- You are handling molten metal, hot metal, swarf or powder.
- You are handling wire rods, drawn wire of any products with sharp edges or cut edges.
- You are handling packing straps.

Eye protection

Use suitable eye protection in the following situations (goggles, visor, etc.):

- When handling or close to molten metal.
- When handling wire, wire rods and bars.
- When handling aluminium powder.
- During any work which produces fine aluminium powder (e.g. stripping, sawing, drilling, polishing, etc.).
- During any work which releases aluminium vapours (e.g. melting, welding, etc.).
- When welding aluminium products.
- When handling packing straps.

Welding:

Welding aluminium products can generate vapours, ozone, nitrous gases and ultra-violet rays. Not using protective gear can cause nausea, headaches, sometimes lung problems and serious damage to the eyes. It is important to use appropriate respiratory and eye protection.

9. Physical and chemical properties

- **Form:** solid metal
- **Colour:** grey to silvery grey
- **Odour:** odourless
- **Status and status change:**
 - **Boiling point:** around 2300°C (pure aluminium) in protective atmosphere
 - **Melting point:** 543°C to 660°C, depending on the alloy
 - **Ignition temperature:** not indicated
 - **Solubility in water:** insoluble
 - **Density:** 2.5 to 2.9 g/cm³
 - **Explosion risk:** see Chapter 3
 - **pH value:** not indicated

10. Stability and reactivity

- **Thermal decomposition:** not applicable
- **Stability:** solid aluminium is largely stable. However, fine aluminium particles can be highly reactive.
- **Caustic product:** no
- **Random polymerisation:** impossible
- **Corrosive product:** not reactive
- **Hazardous mixture segregation products:** none known
- **Circumstances to be avoided:** accumulation of powder and dust
- **Materials to be avoided:** for molten aluminium and finely distributed aluminium powder: water, mineral acids, halogenated products, bromides, iodides, sulphates, ammonium nitrates and their compounds.

11. Information on toxicology

- **Toxicity (acute, if swallowed or inhaled or on contact with the skin):** no acute toxicity
- **Chronic toxicity:** aluminium powder and dust have little effect on the lungs and are harmless and will not damage the body if the maximum values are not exceeded. During melting and welding, vapours and smoke gases are produced which represent only a slight risk to health, providing the specific guidelines and procedures for these processing methods are adhered to.
- **Risk of cancer:** Aluminium is not on the list of carcinogenic substances produced by the IARC (International Agency for Research on Cancer). There is no evidence of mutations or toxic effects on the human gene.

12. Information on ecology

Aluminium is the third most common element in the earth's crust. Alloy elements and alloy-specific contaminations are not normally released from aluminium produced using metallurgical methods.

- **Mobility:** Aluminium does not move freely, providing it does not come into contact with a humid environment with a pH value of under 5.5 or over 8.5.
- **Effects on the human body:** Current evidence suggests that effects are minimal because aluminium is not absorbed by the body.
- **Effects on the environment:** The toxic effects of aluminium on dolphins, daphnia and algae had been tested using OECD testing methods. No effects were revealed.

13. Notes on disposal

Waste material and leftovers:

- Metallic aluminium can be recycled by melting it down again.
- The presence of organic coatings can necessitate special treatment prior to melting down again.
- Fine aluminium particles can be reactive: therefore, special precautions have to be taken before they are removed. No other incompatible waste must be present.
- Metal waste to be melted down again must be stored in a dry place (see also Chapter 5 on the risks of humidity locked into aluminium components).

12. Information on transport

International regulations:

The products covered by this datasheet are subject to national and international regulations on hazardous products:

- **On land:**

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road

- **On rivers:**

ADNR: Ordinance on the Carriage of Dangerous Goods on the Rhine.

- **On water:**

IMO: International Maritime Organization
IMDG: International Maritime Dangerous Goods

- **In the air:**

IATA: International Air Transport Association

All types of transport involve the following risks:

- Handling-related risks (see also Chapter 7)
- Risks relating to handling or transporting improperly secured goods; if part or all of the load can move, this can result in road traffic accidents or severe injuries to the personnel unloading the goods.
- Risks relating to improperly chocked goods, e.g. when transporting goods by ship. It is therefore recommended that appropriate means of transport be selected when carrying heavy products (rolls) (e.g. specialist trailers for land transport).

Note:

Do not forget that products to be melted down again must be kept dry during transport, loading, unloading and storage to prevent the ingress of water or snow.

15. Regulations

Aluminium and aluminium alloys are categorised as non-hazardous by the European Union. There are no hazard symbols, hazard documents or recommended precautions for aluminium.

Aluminium is not affected by directive 90/394/EEC of 28/06/1990 (protection against carcinogenic substances).

16. Other information

Literature:

- **Reference 1:** EN 515 “Aluminium and aluminium products – Wrought products – Temper designations”
- **Reference 2:** “Registration Record of International Alloy Designations and Chemical Composition Limits for Wrought Aluminium and Wrought Aluminium Alloys”, issued by The Aluminium Association, 900 19th Street N.W., Washington DC 20006.
- **Reference 3:** EN – 573-3 “Aluminium and aluminium alloys – Part 3: Chemical Composition and Form of Wrought Products”
- **Reference 4:** “Guidelines for Handling Molten Aluminium,” published by The Aluminium Association, 900 19th Street N.W., Washington DC 20006
- **Reference 5:** Hazardous material information system from the commercial trade units (GESTIS material database from the Berufsgenossenschaftliche Institut für Arbeitssicherheit BIA [Trade Union Industrial Safety Institution])

This list of references should not be construed as exhaustive.

This safety datasheet should not be construed as a replacement for existing technical handbooks, merely as a complement to them. The information in this datasheet is based on our knowledge and the product at the given point in time. It aims to describe the product and its relationship to health, safety and spatial conditions. This datasheet contains no guarantee as to specific product properties. It also aims to highlight the risks of failing to treat the product or parts thereof as required.

This datasheet was produced in accordance with ISO 11014-1 and directive 91/155/EEC. It does not absolve the consumer from his obligations and the statutory regulations. The consumer is solely liable for taking safety precautions relating to this product.

All the guidelines mentioned above, particularly those in Chapter 15, are designed to assist the consumer fulfil his role in using and/or processing the product dealt with in this datasheet.

This datasheet should not be construed as exhaustive and does not absolve the reader from the obligation of checking whether there are further statutory regulations which affect him, but which are not noted in this document. The consumer himself is responsible for the ownership, handling, processing and finishing in accordance with the applicable regulations.