SAFETY DATA SHEET
Zinc Oxide

1. SUBSTANCE AND MANUFACTURER IDENTIFICATION

1.1 PRODUCT IDENTIFIER:	
PRODUCT NAME	Zinc Oxide – Any grades.
PRODUCT CODE	CAS number: 1314-13-2. EC Number: 215-222-5. Registration number: 01-2119463881-32-0078.
COMMON, COMMERCIAL NAME, SYNONYMS:	Zinc Oxide – Green Seal, Zinc Oxide – Gold Seal, Zinc Oxide – Silver Seal, Zinc Oxide – Red Seal, Zinc Oxide – Commercial Seal, Zinc Oxide ZO502, Zinc Oxide Code 1011, Zinc Oxide 00252
1.2 RELEVANT IDENTIFIED USES OF THE SUBSTANCE AND USES ADVISED AGAINST:	Chemical reagent or raw material for production of: rubber compounding (activator) and tires, vulcanization or polymerization processes, ceramics, paints (pigment, anti-corrosive and anti-fouling paints), glass, zinc chemicals production (basic chemical for production of organic and inorganic compounds), basic compound for production of additives in lubricants and fuel and fuels, plastics, animal feed (trace element compound), component of fertilizers, plating agents and metal surface treatment, polymers, electronics (basic component for varistors and ferrites), component in batteries, catalysts, pharmaceuticals (API) and cosmetics (UV-absorber) substances, semiconductors, photosensitive agents and photo-chemicals substances, corrosion inhibitors and anti-scaling agents.
1.3 SUPPLIER INFORMATION OF SAFETY DATA SHEET:	
MANUFACTURER	A-ESSE S.p.A. Via Conturli, 33 16042 Carasco GE - ITALY Phone.: 0039 185 350177 - Fax: 0039 185 350863 e-mail: info@a-esse.com - http: //www.a-esse.com
1.4 EMERGENCY TELEPHONE NUMBERS	Phone company numbers: 0039 185 350177-8 A-ESSE S.p.A. (from Monday to Wednesday, from 8.00 am, to 6.00 pm) Phone handler numbers: 0039 348 5831754 A-ESSE S.p.A. Phone emergency numbers: 0039 10 352808 Poison Control Center, S. Martino (hospital)

2. HAZARD IDENTIFICATION

2.1 CLASSIFICATION OF THE SUBSTANCE:	Classification according to Regulation (EC) N° 1272/2008 (CLP/GHS) Hazard pictogram:  GHS09: environment WARNING Aquatic Acute 1 H400 - Very toxic to aquatic life Aquatic Chronic 1 H410 - Very toxic to aquatic life with long lasting effects

2.2 LABEL ELEMENTS:	Labeling according to Regulation (EC) N° 1272/2008 (CLP/GHS)  GHS09: environment Signal word: warning Hazard statements: H410- Very toxic to aquatic life with long lasting effects Precautionary statements: P273 - Avoid release to the environment. P391 - Collect spillage. P501 - Dispose of contents / container in accordance with local / regional / national / international.
2.3 OTHER HAZARDS:	
CRITERIA FOR PBT AND vPvB	Substance meets the criteria for PBT according to Regulation (EC) N° 1907/2006, Annex XIII • No Substance meets the criteria for vPvB according to Regulation (EC) N° 1907/2006, Annex XIII: • No

For more detailed information about effects on health and relevant symptoms, see Section 11.

3. COMPOSITION/INFORMATION ON INGREDIENTS

3.1 SUBSTANCE	Substance
CHEMICAL FORMULATION:	ZnO

COMPONENT NAME:	CAS NUMBER	%	CE NUMBER (EINECS)	CLASSIFICATION
ZINC OXIDE	1314-13-2	> 95	215-222-5	Environment, Attention, Aquatic Acute 1 H400, Aquatic Chronic 1 H410

The occupancy exposure limits are listed in Section 8 - The complete text of R sentences mentioned is given in Section 16.

4. FIRST AID MEASURES

4.1 DESCRIPTION OF FIRST AID MEASURES:	
INHALATION	Take away from exposure source and let breath fresh air. Place the injured person in a position comfortable for breathing. Making, if necessary, shares of first aid by trained personnel only. Consult a doctor if complaint.
SWALLOWING	Wash the mouth with clean water, remove any dentures. drinking water. Do not induce vomiting. Call a surgery, if problems are evidenced.

SKIN CONTACT	Wash the skin immediately with plenty water. Remove clothing and shoes, wash before use. Call a surgery, if irritation occurs.
EYE CONTACT	Wash eyes immediately with plenty water for several minutes. Check for slow, then remove and rinse out with plenty of water. Call a surgery, if problems are evidenced.
4.2 MOST IMPORTANT SYMPTOMS AND EFFECTS, BOTH ACUTE AND DELAYED:	There are no known effects and / or specific symptoms
4.3 INDICATION OF ANY IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT NEEDED:	There are no such situations that require immediate medical consultation. However, in case of symptoms after contact or inhalation or ingestion of the substance, you should consult a physician.

5. FIRE FIGHTING MEASURES

5.1 EXTINGUISHING DEVICES:	Not combustible substance. Apply an extinguishing substance suitable for delimited fires.
5.2 SPECIAL HAZARDS ARISING FROM THE SUBSTANCE OR MIXTURE:	No risk because the substance is not classified as flammable.
5.3 ADVICE FOR FIREFIGHTERS:	
SPECIAL FIRE FIGHTING MEASURES	Dike water used to extinguish the fire because contaminated with this substance and prevent access to waterway, sewer or drain.
PROTECTIVE MEASURES FOR FIRE-EXTINGUISHING PERSONNEL	In the case of a fire nearby, use a breathing apparatus with protection shield on face. Wear suitable protective clothing.

6. ACCIDENTAL RELEASE MEASURES

6.1 PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT AND EMERGENCY PROCEDURES:	Wear suitable protective clothing as described in Section 8. Avoid generating dust. Vacuum up and collect spilled material in appropriate containers.
6.2 ENVIRONMENTAL PRECAUTIONS:	Avoid the dispersion and the formation dust. Prevent entry into waterways and ground water, sewer or water networks. Avoid contamination of soil. Notify authorities if released in large quantities.
6.3 METHODS AND MATERIAL FOR CONTAINMENT AND CLEANING UP:	Vacuum up and collect spilled material in appropriate labelled containers for its recovery or disposal. Dispose of the refusal through company authorized. Avoid dust formation. Prevent entry into waterways and ground water, sewer or water networks.
6.4 REFERENCE TO OTHER SECTIONS:	See section 1 for emergency numbers and section 8 for personal protective equipment. For information on waste disposal refer to section 13.

7. HANDLING AND STORAGE

7.1 PRECAUTIONS FOR SAFE HANDLING:	Wear appropriate personal protective equipment (see sect. 8). Avoid exposure. Avoid generating dust. Wash hands after use. Do not eat, drink or smoke in areas where the material is handled, stored and processed. Remove contaminated clothing and protective equipment before entering areas where you eat.

7.2 CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES:	Keep the product stored in dry, ventilated room, inside closed containers. Store away from acids and bases.
PACKAGING MATERIALS	Store inside the original containers: bags/big bags

8. PERSONAL PROTECTION/EXPOSURE CONTROL

8.1 CONTROL PARAMETERS:	No occupancy safety limits are known - Italy List of approved workplace exposure limits (WELs)/EH40 -Total inhalable dust: TLV-TWA 10 mg/m^3 - Respirable dust: TLV-STEL 2 mg/m^3 <u>Limits DNELs</u> • Oral $DNEL_{oral\ soluble\ Zn}$ = 50 mg_{Zn}/day (i.e., 0.83 mg_{Zn}/kg bw/day); $DNEL_{oral\ insoluble\ Zn}$ = 50 mg_{Zn}/day (i.e., 0.83 mg_{Zn}/kg bw/day); • Dermal $DNEL_{dermal\ soluble\ Zn}$ = 500 mg_{Zn}/day (i.e., 8.3 mg_{Zn}/kg bw/day); $DNEL_{dermal\ insoluble\ Zn}$ = 5000 mg_{Zn}/day (i.e., 83 mg_{Zn}/kg bw/day); • Inhalation - Worker $DNEL_{inhal\ soluble\ Zn\ (worker)}$ = 1 mg_{Zn}/m^3; $DNEL_{inhal\ insoluble\ Zn\ (worker)}$ = 5 mg_{Zn}/m^3; • Inhalation - Consumer $DNEL_{inhal\ soluble\ Zn\ (consumer)}$ = 1.3 mg_{Zn}/m^3; $DNEL_{inhal\ insoluble\ Zn\ (consumer)}$ = 2.5 mg_{Zn}/m^3;
8.2 EXPOSURE CONTROLS:	
8.2.1 APPROPRIATE ENGINEERING CONTROLS:	Cleaning of devices and work equipment. Storage of the substance in dedicated areas. Maintain adequate ventilation of the areas.
8.2.2 INDIVIDUAL PROTECTION MEASURES, SUCH AS PERSONAL PROTECTIVE EQUIPMENT:	
OCCUPATIONAL EXPOSURE CONTROLS	Keep adequate ventilation general. Do not eat, drink or smoke in areas where this material is handled, stored and processed.
RESPIRATORY PROTECTION	No specific protective measures are suggested, but in exceptional cases, that is when high atmospheric pollution occurs, they can be required. In this case, wear a mask provided with dust filter P2.
HAND PROTECTION	Wear suitable protective gloves, of leather, cotton, rubber, to avoid risks of skin contact.
EYE PROTECTION	Wear safety glasses, where eye exposure is reasonably possible.
SKIN PROTECTION	Wear suitable work cloths.
PROTECTIVE EQUIPMENT	 

8.2.3 ENVIRONMENTAL EXPOSURE CONTROLS:	According to the quantity stored the substance is subject to the “Seveso” regulation (Italy - D. lgs. 334/99 and subsequent amendments).

9. PHYSICAL AND CHEMICAL PROPERTIES

9.1 INFORMATION ON BASIC PHYSICAL AND CHEMICAL PROPERTIES:	
PHYSICAL STATE AT 20C° AND 101.3 kPa	Solid (powder or granules).
COLOUR	White
ODOUR	Odourless
pH	7 ÷ 8 (suspended in water) ISO 787/9
MELTING POINT	1970 ÷ 1975 °C
BOILING POINT	Not applicable to solids with a melting point above 300°C or which decompose before reaching the boiling point. The substance decomposes before boiling, (column 2 of Annex VII of the REACH Regulation (EC) n. 1907/2006).
FLASH POINT	Not applicable to inorganic substances (Column 2 of Annex VII of REACH regulation (EC) n. 1907/2006).
FLAMMABILITY	All grades of zinc oxide powder were not to be considered as flammable.
EVAPORATION RATE	Not applicable to solids.
UPPER/LOWER FLAMMABILITY OR EXPLOSIVE LIMITS	Not applicable.
VAPOUR PRESSURE	Not applicable if the melting point is above 300°C (Column 2 of Annex VII REACH regulation (EC) n. 1907/2006).
VAPOUR DENSITY	Not applicable
RELATIVE DENSITY	5.68 g/cm^3
WATER SOLUBILITY	2.9 mg/l
OCTANOL/WATER PARTITION COEFFICIENT	Not applicable if the substance is inorganic (column 2 of Annex VII of the REACH regulation (EC) n. 1907/2006)
AUTO-IGNITION TEMPERATURE	The substance is not auto-flammable.
DECOMPOSITION TEMPERATURE	Not applicable
VISCOSITY	Not applicable
EXPLOSIVE PROPERTIES	Zinc oxide has no flammability, explosive or self-inflammability properties.
GRANULOMETRY	The D_{50} is 1,05 µm, the D_{80} is < 20 µm.

9.2 OTHER INFORMATION:	
MOLE WEIGHT (AT WT)	81.38 uma
SPECIFIC GRAVITY (water = 1)	5.6 @ 20°C

10. STABILITY AND REACTIVITY

10.1 REACTIVITY:	No reactivity in normal conditions.
10.2 CHEMICAL STABILITY:	Stable under normal conditions of storage and use.
10.3 POSSIBILITY OF HAZARDOUS REACTIONS:	No possibility of hazardous reactions if stored away from acids and bases.
10.4 CONDITIONS TO AVOIDED:	Avoid contact with acids and bases.
10.5 INCOMPATIBLE MATERIALS:	Acids and bases.
10.6 DANGEROUS DECOMPOSITION PRODUCTS:	No dangerous decomposition product under normal conditions of storage and use.

11. TOXICOLOGICAL INFORMATION

11.1 INFORMATION ON TOXICOLOGICAL EFFECTS:	
ACUTE TOXICITY- ORAL	LD_{50} (rat) > 15000 mg_{ZnO}/kg - Löser 1972; LD_{50} (ratto) > 5000 mg_{ZnO}/kg - Löser (1977).
ACUTE TOXICITY - SKIN	Not available.
ACUTETOXICITY - INHALATION	LC_{50} (rat - 4 hours) > 5.7 mg_{ZnO}/l - (Klimisch et al. 1982), not leading to classification for acute inhalation toxicity.
SKIN IRRITATION	Not irritating (Löser, 1977; Lansdown, 1991).
EYE IRRITATION	Not irritating (Van Huygevoort, 1999e; Thijssen,1978; Löser,1977)
RESPIRATORY IRRITATION	Non irritante (Klimish et al, 1982)
SENSITIZATION	No sensitizing effects known (Van Huygevoort, 1999 g,h).
GERM CELL MUTAGENICITY	No biologically relevant genotoxic activity, (Chemical Safety report (CSR) zinc oxide. 2010).
CARCINOGENICITY	No experimental or epidemiological evidence exists to justify classification of zinc compounds for carcinogenic activity (Chemical Safety report (CSR) zinc oxide. 2010).
REPRODUCTION TOXICITY	No experimental or epidemiological evidence exists to justify classification of zinc compounds for reproductive or developmental toxicity, (Chemical Safety report (CSR) zinc oxide. 2010).
SPECIFIC TARGET ORGAN TOXICITY(STOT) - SINGLE EXPOSURE	No experimental or epidemiological sufficient evidence for specific target organ toxicity - single exposure (Heydon and Kagan, 1990; Gordon et al., 1992; Mueller and Seger, 1985). (Chemical Safety report (CSR) zinc oxide. 2010)).

SPECIFIC TARGET ORGAN TOXICITY (STOT) - REPEATED EXPOSURE	No experimental or epidemiological sufficient evidence for specific target organ toxicity - repeated exposure (Lam et al, 1985, 1988; Conner et al., 1988). (Chemical Safety report (CSR) zinc oxide. 2010)).
ASPIRATION HAZARD	No data available.

12. ECOLOGICAL INFORMATION

12.1 TOXICITY:	
ACUTE ACQUATIC TOXICITY	EC_{50}: for pH < 7: 0.67 mg_{Zn}/l (based on 48 hr Ceriodaphnia dubia test according to US EPA 821-R-02-012 standard test protocol), (Hyne et al 2005). EC_{50}: for pH > 7÷ 8.5: 0.21 mg_{Zn}/l (based on 72 hr Selenastrum capricornutum test according to US EPA 821-R-02-012 standard test protocol), (Hyne et al 2005).
CHRONIC AQUATIC TOXICITY	Freshwater: 20.6 µg/l, saltwater: 6.1 µg/l.
SEDIMENT TOXICITY	Freshwater sediment $PNEC_{bioav}$: 235.6 mg/kg sediment dry weight, Saltwater sediment $PNEC_{bioav}$: 113 mg/kg sediment dry weight.
SOIL TOXICITY	$PNEC_{bioav}$: 106.8 mg/kg (soil dry weight).
TOXICITY TO MICRO-ORGANISMS IN STP	52 µg/l.
12.2 PERSISTENCE AND BIODEGRADABILITY:	Not applicable to inorganic substances.
12.3 BIOACCUMULATIVE POTENTIAL:	Zinc is a natural, essential element, which is needed for the optimal growth and development of all living organisms, including man. All living organisms have homeostasis mechanisms that actively regulate zinc uptake and absorption/excretion from the body; due to this regulation, zinc and zinc compounds do not bioaccumulate or biomagnify.
12.4 MOBILITY IN SOILS:	Solids-water partitioning coefficient: 158.5 l/kg. (Chemical Safety report (CSR) zinc oxide. 2010).
12.5 RESULTS OF PBT AND vPvB ASSESSMENT:	The substance is not PBT or vPvB.

13. DISPOSAL CONSIDERATIONS

13.1 WASTE TREATMENT METHODS:	The generation of waste should be avoided or minimized. Collect, reprocess, recycle if possible. Dispose of in accordance with the provisions of environmental law and local authorities.

14. TRANSPORT INFORMATION

LAND: Road/Railway	UN Number	Transport Name	Hazard class	Package Group	Labels	Other Information
ADR/RID Classification	UN3077	Environmentally hazardous substance, solid, n.o.s. (zinc oxide)	9 (M7 dangerous substance in the aquatic environment, solid)	III ((E) Tunnel restriction code)		Danger Identification Number 90 Excepted quantities E1 Limited quantities of 5 kg Transport category 3
WATER COURSES: Navigable channels	**UN Number**	**Transport Name**	**Hazard class**	**Package Group**	**Label**	**Other Information**
AND Classification	UN3077	Environmentally hazardous substance, solid, n.o.s. (zinc oxide)	9	III		
SEA:	**UN Number**	**Transport Name**	**Hazard class**	**Package Group**	**Label**	**Other Information**
IMO/IMDG Classification	UN3077	Environmentally hazardous substance, solid, n.o.s. (zinc oxide)	9	III		Marine pollutant : Sì (P) EMS Number: F-A, S-F.
AIR:	**UN Number**	**Transport Name**	**Hazard class**	**Package Group**	**Label**	**Other Information**
IATA Class	UN3077	Environmentally hazardous substance, solid, n.o.s. (zinc oxide)	9	III		Packing instruction: Y911 if gross weight < 30 kg 911 if gross weight ≥ 30 kg

Refer to Sections 7 and 8 for information about precautions for users

15. REGULATORY INFORMATION

15.1 SAFETY, HEALTH AND ENVIRONMENTAL REGULATIONS/LEGISLATION SPECIFIC FOR THE SUBSTANCE OR MIXTURE:	National regulations: in Italy the zinc oxide is not subject to specific regulations (Italy - D.lgs. 81/08 and subsequent amendments). According to the quantity stored the substance is subject to the "Seveso" regulation, (Italy - D.lgs. 334/99 and subsequent amendments; Directive 96/82/EC, Directive 2003/105/EC and Directive 2012/18/EU).
15.2 CHEMICAL SAFETY ASSESSMENT:	Within REACH Cosortium Zinc (IZA-Europe), according to the requirements of the REACH Regulation (EC) No 1907/2006 for the registration of the product, was developed the Chemical Safety Report (CSR) from which have been drawn from the information contained in this safety data sheet.

16. OTHER INFORMATION

LIST OF RELEVANT R-PHRASES / WARNINGS / CAUTIONS:	Reg. (EC) 1272/2008 (CLP/GHS) H400 - Very toxic to aquatic life H410 - Very toxic to aquatic life with long lasting effects Warning: attention.
REGISTRATION NUMBER, REACH REGULATION (EC) n. 1907/2006:	01-2119463881-32-0078
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This Safety Sheet has been adapted to the REACH Regulation (EC) n. 1907/2006, and EC n. 1272/2008 and to ADR 2015.
Information of this Safety Sheet is precise and reliable according to the state of the art as per the publication date. They shall be taken as safety directive for use, handling, disposal, storage, and transport, and cannot be considered as warranty and specification.
The user is responsible for making sure about suitability of the information for the special use foreseen for the material.