

## zinc nickel bismuth alloys for hot dip galvanizing

### SECTION 1: Identification of the substance/mixture and of the company/undertaking

#### 1.1. Product identifier

**Product name** : zinc nickel bismuth alloys for hot dip galvanizing  
**Synonyms** : Technigalva; Technigalva plus; zinc bismuth alloy; zinc nickel alloy; zinc nickel bismuth alloys; ZnBi; ZnNi; ZnNiBi  
**Registration number REACH** : Not applicable (mixture)  
**Product type REACH** : Mixture/alloy

#### 1.2. Relevant identified uses of the substance or mixture and uses advised against

##### 1.2.1 Relevant identified uses

Metal industry: hot dip galvanizing

##### 1.2.2 Uses advised against

No uses advised against known

#### 1.3. Details of the supplier of the safety data sheet

##### Supplier of the safety data sheet

Nyrstar Belgium N.V. on behalf of Nyrstar Sales & Marketing A.G.  
Zinkstraat 1  
B-2490 Balen  
☎ +32 14 44 95 00  
☎ +32 14 81 05 31  
infoSDS@nyrstar.com

Nyrstar Budel B.V. on behalf of Nyrstar Sales & Marketing A.G.  
Hoofdstraat 1  
6024 AA Budel-Dorplein  
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infoSDS@nyrstar.com

Nyrstar France S.A.S. on behalf of Nyrstar Sales & Marketing A.G.  
Rue Jean Jacques Rousseau  
F-59950 Aubry  
☎ +32 14 44 96 80  
☎ +33 3 27 88 39 48  
infoSDS@nyrstar.com

##### Manufacturer of the product

Nyrstar Sales & Marketing SA  
1 Rue de Jargonnant  
CH-1207 Geneva  
infoSDS@nyrstar.com

#### 1.4. Emergency telephone number

24h/24h (Telephone advice: English, French, German, Dutch) :  
+32 14 58 45 45 (BIG)

### SECTION 2: Hazards identification

#### 2.1. Classification of the substance or mixture

Not classified as dangerous according to the criteria of Regulation (EC) No 1272/2008

#### 2.2. Label elements

Not classified as dangerous according to the criteria of Regulation (EC) No 1272/2008

##### Supplemental information

EUH208 Contains: nickel. May produce an allergic reaction.

#### 2.3. Other hazards

The melting down of moist metal leads to explosion risk  
Heated product causes burns

# zinc nickel bismuth alloys for hot dip galvanizing

## SECTION 3: Composition/information on ingredients

### 3.1. Substances

Not applicable

### 3.2. Mixtures

Name REACH Registration No	CAS No EC No	Conc. (C)	Classification according to CLP	Note	Remark	M-factors and ATE
zinc 01-2119467174-37	7440-66-6 231-175-3	99.5%< C< 99.8%		(2)(10)	Constituent	
bismuth	7440-69-9 231-177-4	0.00% =<C<2.45%			Constituent	
nickel	7440-02-0 231-111-4	0.00% =<C<0.55%	Carc. 2; H351 Skin Sens. 1; H317 STOT RE 1; H372	(1)(2)(10)	Constituent	
tin	7440-31-5 231-141-8	0.0% =<C<0.2% %		(2)(10)	Constituent	

- (1) For H- and EUH-statements in full: see section 16  
(2) Substance with a Community workplace exposure limit  
(10) Subject to restrictions of Annex XVII of Regulation (EC) No. 1907/2006

## SECTION 4: First aid measures

### 4.1. Description of first aid measures

#### General:

Check the vital functions. Unconscious: maintain adequate airway and respiration. Respiratory arrest: artificial respiration or oxygen. Cardiac arrest: perform resuscitation. Victim conscious with laboured breathing: half-seated. Victim in shock: on his back with legs slightly raised. Vomiting: prevent asphyxia/aspiration pneumonia. Prevent cooling by covering the victim (no warming up). Keep watching the victim. Give psychological aid. Keep the victim calm, avoid physical strain. Depending on the victim's condition: doctor/hospital.

#### After inhalation:

After inhalation of fume: Remove the victim into fresh air. Respiratory problems: consult a doctor/medical service.

#### After skin contact:

In case of burns: Wash immediately with lots of water (15 minutes)/shower. Remove clothing while washing. Do not tear off solidified product from the skin. Do not remove clothing if it sticks to the skin. Cover wounds with sterile bandage. Consult a doctor/medical service. If burned surface > 10%: take victim to hospital.

#### After eye contact:

Rinse immediately with plenty of water for 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Take victim to an ophthalmologist.

#### After ingestion:

Not applicable.

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

#### 4.2.1 Acute symptoms

##### After inhalation:

AFTER INHALATION OF DUST: Irritation of the nasal mucous membranes. Dry/sore throat. Coughing. AFTER INHALATION OF FUME: Feeling of weakness. Metal fume fever. Vomiting. Nausea.

##### After skin contact:

IF MELTING: Burns.

##### After eye contact:

IF MELTING: Burns.

##### After ingestion:

Not applicable.

#### 4.2.2 Delayed symptoms

No effects known.

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

If applicable and available it will be listed below.

## SECTION 5: Firefighting measures

### 5.1. Extinguishing media

#### 5.1.1 Suitable extinguishing media:

Small fire: Dry sand, Quick-acting D powder extinguisher.

#### 5.1.2 Unsuitable extinguishing media:

Small fire: Quick-acting CO2 extinguisher, Water, Foam, Quick-acting ABC powder extinguisher, Quick-acting BC powder extinguisher.

Major fire: Water, Foam.

### 5.2. Special hazards arising from the substance or mixture

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2 / 17

# zinc nickel bismuth alloys for hot dip galvanizing

On burning: formation of metal oxides (nickel oxides, zinc oxide). In molten state: violent to explosive reaction with water (moisture).

## 5.3. Advice for firefighters

### 5.3.1 Instructions:

Dilute toxic gases with water spray. In case of metal bath fire: add metal blocks. When cooling/extinguishing: no water in the substance.

### 5.3.2 Special protective equipment for fire-fighters:

Gloves (EN 374). Protective clothing (EN 14605 or EN 13034). Heat/fire exposure: self-contained breathing apparatus (EN 136 + EN 137).

## SECTION 6: Accidental release measures

### 6.1. Personal precautions, protective equipment and emergency procedures

No naked flames.

#### 6.1.1 Protective equipment for non-emergency personnel

See section 8.2

#### 6.1.2 Protective equipment for emergency responders

Gloves (EN 374). Protective clothing (EN 14605 or EN 13034).

Suitable protective clothing

See section 8.2

### 6.2. Environmental precautions

No data available

### 6.3. Methods and material for containment and cleaning up

If melted: allow liquid to solidify before taking it up. Pick-up the material. Wash clothing and equipment after handling.

### 6.4. Reference to other sections

See section 13.

## SECTION 7: Handling and storage

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

### 7.1. Precautions for safe handling

Avoid raising dust. Keep away from naked flames/heat. Observe strict hygiene. On (re)melting down: dry and preheat installation before use. Add only dry material to the metal bath.

### 7.2. Conditions for safe storage, including any incompatibilities

#### 7.2.1 Safe storage requirements:

Storage temperature: Temperature above dew point. Store in a dry area. Store at ambient temperature. Meet the legal requirements.

#### 7.2.2 Keep away from:

Heat sources, (strong) acids.

#### 7.2.3 Suitable packaging material:

No data available

#### 7.2.4 Non suitable packaging material:

No data available

### 7.3. Specific end use(s)

If applicable and available, exposure scenarios are attached in annex. See information supplied by the manufacturer.

## SECTION 8: Exposure controls/personal protection

### 8.1. Control parameters

#### 8.1.1 Occupational exposure

##### a) Occupational exposure limit values

If limit values are applicable and available these will be listed below.

#### EU

Tin (inorganic compounds as Sn)	Time-weighted average exposure limit 8 h (Indicative occupational exposure limit value)	2 mg/m <sup>3</sup>
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#### Belgium

Etain (métal)	Time-weighted average exposure limit 8 h	2 mg/m <sup>3</sup>
Nickel (composés insolubles inorganiques) (en Ni)	Time-weighted average exposure limit 8 h	0.2 mg/m <sup>3</sup>
Nickel (métal)	Time-weighted average exposure limit 8 h	1 mg/m <sup>3</sup>
Zinc (oxyde de) (fraction alvéolaire)	Time-weighted average exposure limit 8 h	2 mg/m <sup>3</sup>
	Short time value	10 mg/m <sup>3</sup>

#### The Netherlands

Tin (anorganische verbindingen als Sn)	Time-weighted average exposure limit 8 h (Public occupational exposure limit value)	2 mg/m <sup>3</sup>
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#### France

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Revision number: 0300

BIG number: 49014

3 / 17

## zinc nickel bismuth alloys for hot dip galvanizing

Nickel (métal)	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	1 mg/m <sup>3</sup>
Nickel (oxyde de), en Ni	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	1 mg/m <sup>3</sup>
Zinc (oxyde de, fumées)	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	5 mg/m <sup>3</sup>
Zinc (oxyde de, poussières)	Time-weighted average exposure limit 8 h (VL: Valeur non réglementaire indicative)	10 mg/m <sup>3</sup>

### Germany

Nickelmetall	Time-weighted average exposure limit 8 h (TRGS 900)	0.006 mg/m <sup>3</sup>
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### Austria

Nickel (Stäube von Nickelmetall, Nickelsulfid und sulfidischen Erzen, Nickeloxide, Nickelchromat und Nickel- carbonat) und Stäube von Nickelverbindungen und Nickellegierungen	Tagesmittelwert (TRK)	0.5 mg/m <sup>3</sup>
	Kurzzeitwert 15(Miw) 4x (TRK)	2 mg/m <sup>3</sup>

### UK

Nickel metal	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.5 mg/m <sup>3</sup>
Nickel, insoluble inorganic compounds (as Ni)(except nickel tetracarbonyl)	Time-weighted average exposure limit 8 h (Workplace exposure limit (EH40/2005))	0.5 mg/m <sup>3</sup>

### USA (TLV-ACGIH)

Nickel and inorganic compounds including Nickel subsulfide, as Ni: Elemental	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	1.5 mg/m <sup>3</sup> (I)
Nickel and inorganic compounds including Nickel subsulfide, as Ni: Insoluble inorganic compounds (NOS)	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	0.2 mg/m <sup>3</sup> (I)
Tin and inorganic compounds, excluding Tin hydride and Indium tin oxide, as Sn	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	2 mg/m <sup>3</sup> (I)
Zinc oxide	Time-weighted average exposure limit 8 h (TLV - Adopted Value)	2 mg/m <sup>3</sup> (R)
	Short time value (TLV - Adopted Value)	10 mg/m <sup>3</sup> (R)

(I): Inhalable fraction  
(R): Respirable fraction

### b) National biological limit values

If limit values are applicable and available these will be listed below.

### USA (BEI-ACGIH)

Nickel and inorganic compounds; after exposure to elemental Nickel and poorly soluble compounds (Nickel)	Urine: post-shift at end of workweek	5 µg/L	Background
Nickel and inorganic compounds; after exposure to soluble compounds (Nickel)	Urine: post-shift at end of workweek	30 µg/L	

### 8.1.2 Sampling methods

Product name	Test	Number
Bismuth	OSHA	ID121
Nickel (Elements on wipes)	NIOSH	9102
Nickel (Elements)	NIOSH	7300
Nickel (Elements, aqua regia ashing)	NIOSH	7301
Nickel (Elements, hot block/HCl/HNO3 digestion)	NIOSH	7303
Nickel (Ni)	NIOSH	7302
Nickel (Ni)	NIOSH	7304
Nickel (Ni)	NIOSH	7306
Nickel (Ni)	NIOSH	8005
Nickel (Ni)	NIOSH	8310
Nickel	OSHA	1006
Nickel	OSHA	ID 121
Nickel	OSHA	ID 125G
Tin (Elements)	NIOSH	7300
Tin (Elements, aqua regia ashing)	NIOSH	7301
Tin (Elements, hot block/HCl/HNO3 digestion)	NIOSH	7303
Tin (Sn)	NIOSH	7302
Tin (Sn)	NIOSH	7306
Tin (Sn)	NIOSH	8310
Tin	OSHA	ID 121

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Date of revision: 2021-10-29

Revision number: 0300

BIG number: 49014

4 / 17

## zinc nickel bismuth alloys for hot dip galvanizing

Product name	Test	Number
Tin	OSHA	ID 206
Zinc & Cpds (as Zn)	NIOSH	7030
Zinc (Elements on wipes)	NIOSH	9102
Zinc (Elements)	NIOSH	7300
Zinc (Elements, aqua regia ashing)	NIOSH	7301
Zinc (Elements, hot block/HCl/HNO3 digestion)	NIOSH	7303
Zinc (Zn)	NIOSH	8005
Zinc (Zn)	NIOSH	8310
Zinc Oxide	NIOSH	7030
Zinc Oxide	NIOSH	7502
Zinc Oxide	OSHA	ID 121
Zinc Oxide	OSHA	ID 143
Zinc	NIOSH	7030
Zinc	OSHA	1006
Zinc	OSHA	ID 105
Zinc	OSHA	ID 121
Zinc	OSHA	ID 125G

### 8.1.3 Applicable limit values when using the substance or mixture as intended

If limit values are applicable and available these will be listed below.

### 8.1.4 Threshold values

#### DNEL/DMEL - Workers

zinc

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects dermal	83 mg/kg bw/day	
	Long-term systemic effects inhalation	5 mg/m <sup>3</sup>	

bismuth

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	13.1 mg/m <sup>3</sup>	

nickel

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	0.05 mg/m <sup>3</sup>	
	Long-term local effects inhalation	0.05 mg/m <sup>3</sup>	
	Acute local effects inhalation	11.9 mg/m <sup>3</sup>	
	Long-term local effects dermal	0.035 mg/cm <sup>2</sup>	

tin

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	71 mg/m <sup>3</sup>	
	Long-term systemic effects dermal	10 mg/kg bw/day	

#### DNEL/DMEL - General population

zinc

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects oral	0.83 mg/kg bw/day	
	Long-term systemic effects dermal	83 mg/kg bw/day	
	Long-term systemic effects inhalation	2.5 mg/m <sup>3</sup>	

bismuth

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects oral	13.3 mg/m <sup>3</sup>	

nickel

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	60 ng/m <sup>3</sup>	
	Long-term local effects inhalation	60 ng/m <sup>3</sup>	
	Acute local effects inhalation	0.8 mg/m <sup>3</sup>	
	Long-term local effects dermal	0.035 mg/cm <sup>2</sup>	
	Long-term systemic effects oral	0.011 mg/kg bw/day	
	Acute systemic effects oral	0.37 mg/kg bw/day	

tin

Effect level (DNEL/DMEL)	Type	Value	Remark
DNEL	Long-term systemic effects inhalation	17 mg/m <sup>3</sup>	
	Long-term systemic effects dermal	80 mg/kg bw/day	
	Long-term systemic effects oral	5 mg/kg bw/day	

#### PNEC

zinc

Compartments	Value	Remark
Fresh water	20.6 µg/l	
Marine water	6.1 µg/l	
STP	100 µg/l	
Fresh water sediment	117.8 mg/kg sediment dw	
Marine water sediment	56.5 mg/kg sediment dw	
Soil	35.6 mg/kg soil dw	

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Revision number: 0300

BIG number: 49014

5 / 17

## zinc nickel bismuth alloys for hot dip galvanizing

bismuth

Compartment	Value	Remark
STP	17.5 mg/l	

nickel

Compartment	Value	Remark
Fresh water	7.1 µg/l	
Marine water	8.6 µg/l	
Fresh water (intermittent releases)	< 0.01 µg/l	
Marine water (intermittent releases)	< 0.01 µg/l	
STP	0.33 mg/l	
Fresh water sediment	109 mg/kg sediment dw	
Marine water sediment	109 mg/kg sediment dw	
Soil	29.9 mg/kg soil dw	
Oral	0.12 mg/kg food	

### 8.1.5 Control banding

If applicable and available it will be listed below.

### 8.2. Exposure controls

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

#### 8.2.1 Appropriate engineering controls

Avoid raising dust. Keep away from naked flames/heat. Measure the concentration in the air regularly. Carry operations in the open/under local exhaust/ventilation or with respiratory protection.

#### 8.2.2 Individual protection measures, such as personal protective equipment

Observe strict hygiene. Do not eat, drink or smoke during work.

##### a) Respiratory protection:

Dust production: dust mask with filter type P2.

##### b) Hand protection:

Gloves, On heating: heat insulating gloves (EN 407).

Materials	Remark
leather	Good resistance

##### c) Eye protection:

On (re)melting down: face shield.

##### d) Skin protection:

Protective clothing (EN 14605 or EN 13034). Protective clothing against molten metal splash (EN 9185). Protective clothing for workers exposed to heat (EN 11612). On (re)melting down: heatproof clothing (EN 11612).

#### 8.2.3 Environmental exposure controls:

See sections 6.2, 6.3 and 13

## SECTION 9: Physical and chemical properties

### 9.1. Information on basic physical and chemical properties

Physical form	Solid
	Metal
	Physical state depending on the production process
Odour	Odourless
Odour threshold	Not applicable
Colour	Metallic blue-grey
Particle size	No data available (test not performed)
Explosion limits	No data available (test not performed)
Flammability	Not classified as flammable
Log Kow	Not applicable (inorganic)
Dynamic viscosity	No data available (test not performed)
Kinematic viscosity	No data available (test not performed)
Melting point	No data available (test not performed)
Boiling point	No data available (test not performed)
Relative vapour density	Not applicable (solid)
Vapour pressure	No data available (test not performed)
Solubility	Water ; insoluble
Relative density	No data available (test not performed)
Absolute density	No data available (test not performed)
Decomposition temperature	No data available (test not performed)
Auto-ignition temperature	No data available (test not performed)
Flash point	Not applicable (solid)
pH	Not applicable (non-soluble in water)

### 9.2. Other information

No data available

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6 / 17

# zinc nickel bismuth alloys for hot dip galvanizing

## SECTION 10: Stability and reactivity

### 10.1. Reactivity

No data available.

### 10.2. Chemical stability

Stable under normal conditions.

### 10.3. Possibility of hazardous reactions

In molten state: violent to explosive reaction with water (moisture). Oxidizes slowly in moist air.

### 10.4. Conditions to avoid

#### Precautionary measures

Avoid raising dust. Keep away from naked flames/heat.

### 10.5. Incompatible materials

(strong) acids.

### 10.6. Hazardous decomposition products

Reacts with (some) acids: release of highly flammable gases/vapours (hydrogen). On burning: formation of metal oxides (nickel oxides, zinc oxide).

## SECTION 11: Toxicological information

### 11.1. Information on hazard classes as defined in Regulation (EC) No 1272/2008

#### 11.1.1 Test results

#### Acute toxicity

zinc nickel bismuth alloys for hot dip galvanizing

No (test) data on the mixture available

#### zinc

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	Equivalent to OECD 401	> 2000 mg/kg bw		Rat	Experimental value	
Dermal	LD50	Equivalent to OECD 402	> 2000 mg/kg bw	24 weeks (daily, 5 days / week)	Rat	Read-across	
Inhalation	LC50	Equivalent to OECD 403	> 5.41 mg/l	4 weeks (daily, 5 days / week)	Rat	Experimental value	
Inhalation (ZnO, metal oxides)	LC50	Equivalent to OECD 403	> 5.7 mg/l	4 weeks (daily, 5 days / week)	Rat	Experimental value	

#### bismuth

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	OECD 401	> 2000 mg/kg bw		Rat (male / female)	Experimental value	
Dermal						Data waiving	
Inhalation						Data waiving	

#### nickel

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	Equivalent to OECD 401	> 9000 mg/kg		Rat (male / female)	Experimental value	
Dermal						Data waiving	
Inhalation (aerosol)	NOAEC		≥ 10.2 mg/l	1 h	Rat (male / female)	Experimental value	

#### tin

Route of exposure	Parameter	Method	Value	Exposure time	Species	Value determination	Remark
Oral	LD50	Equivalent to OECD 423	> 2000 mg/kg bw		Rat (male / female)	Experimental value	
Skin	LD50	OECD 402	> 2000 mg/kg bw		Rat (male / female)	Experimental value	
Inhalation (dust)	LC50	OECD 403	> 4.75 mg/l air	4 h	Rat (male / female)	Experimental value	

#### Conclusion

Not classified for acute toxicity

#### Corrosion/irritation

zinc nickel bismuth alloys for hot dip galvanizing

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7 / 17

## zinc nickel bismuth alloys for hot dip galvanizing

No (test)data on the mixture available

### zinc

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Moderately irritating	Equivalent to OECD 405			Rabbit	Experimental value	
Eye	Not irritating	Equivalent to OECD 405			Rabbit	Experimental value	
Dermal	Not irritating	Equivalent to OECD 404			Rabbit	Weight of evidence	
Dermal (ZnO, metal oxides)	Not irritating	Equivalent to OECD 404			Guinea pig	Read-across	
Dermal	Not irritating	Human observation			Human	Read-across	
Dermal (ZnO, metal oxides)	Not irritating	Human observation			Human	Literature study	
Inhalation (ZnO, metal oxides)	Not irritating					Literature study	

### bismuth

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Not irritating	OECD 405		1; 24; 48; 72 hours	Rabbit	Read-across	
Not applicable (in vitro test)	Not irritating	RHE-model test	15 minutes		Reconstructed human epidermis	Read-across	

### nickel

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Not irritating	OECD 405	168 h	48 hours	Rabbit	Read-across	
Skin	Slightly irritating	OECD 404	4 h		Rabbit	Experimental value	

### tin

Route of exposure	Result	Method	Exposure time	Time point	Species	Value determination	Remark
Eye	Not irritating	OECD 405		24; 48; 72 hours	Rabbit	Experimental value	
Skin	Not irritating	OECD 404	4 h	24; 72 hours	Rabbit	Experimental value	

### **Conclusion**

Not classified as irritating to the skin  
 Not classified as irritating to the eyes  
 Not classified as irritating to the respiratory system

### **Respiratory or skin sensitisation**

#### zinc nickel bismuth alloys for hot dip galvanizing

No (test)data on the mixture available

### zinc

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Dermal	Negative	Equivalent to OECD 429			Mouse	Read-across	
Dermal (ZnO, metal oxides)	Negative	Guinea pig maximisation test			Guinea pig	Experimental value	
Dermal (ZnO, metal oxides)	Negative	Human observation			Human		
Inhalation	Negative					Inconclusive, insufficient data	

### bismuth

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Skin	Not sensitizing	OECD 429			Mouse (female)	Read-across	

### nickel

Route of exposure	Result	Method	Exposure time	Observation time point	Species	Value determination	Remark
Dermal	Sensitizing	Patch test			Human	Experimental value	

### **Conclusion**

Not classified as sensitizing for skin  
 Not classified as sensitizing for inhalation

### **Specific target organ toxicity**

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8 / 17



## zinc nickel bismuth alloys for hot dip galvanizing

### zinc nickel bismuth alloys for hot dip galvanizing

No (test)data on the mixture available

#### zinc

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral	NOAEL	Equivalent to OECD 408	13.3 mg/kg bw/day	Blood	No effect	90 weeks (daily, 5 days / week)	Rat (male / female)	Read-across
Oral	NOAEL	Human observation study	50 mg/kg bw/day		No effect		Human (male / female)	Weight of evidence
Inhalation (ZnO, metal oxides)	NOAEL	Equivalent to OECD 409	2.7 mg/m <sup>3</sup>	Lungs	No effect	5 day(s)	Guinea pig	Experimental value
Inhalation (ZnO, metal oxides)		Human observation		General	No effect		Human	Literature study

#### bismuth

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (stomach tube)	NOAEL	Subacute toxicity test	1000 mg/kg bw/day		No effect	28 days (1x / day)	Rat (male / female)	Experimental value
Dermal								Data waiving
Inhalation								Data waiving

#### nickel

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral (stomach tube)	NOAEL	OECD 451	2.2 mg/kg bw/day		No effect	104 weeks (daily)	Rat (male / female)	Experimental value of similar product
Oral (stomach tube)	LOAEL	OECD 451	6.7 mg/kg bw/day	General	Body weight reduction	104 weeks (daily)	Rat (male / female)	Experimental value of similar product
Dermal								Data waiving
Inhalation (aerosol)	LOAEC	Equivalent to OECD 451	0.1 mg/m <sup>3</sup> air	Respiratory tract	Respiratory difficulties	2 year(s) (6h / day, 5 days / week)	Rat (male / female)	Experimental value

#### tin

Route of exposure	Parameter	Method	Value	Organ	Effect	Exposure time	Species	Value determination
Oral	NOEL	OECD 407	> 1000 mg/kg bw/day			28 day(s)	Rat (male / female)	Experimental value

### **Conclusion**

Not classified for subchronic toxicity

### **Mutagenicity (in vitro)**

#### zinc nickel bismuth alloys for hot dip galvanizing

No (test)data on the mixture available

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

#### zinc

Result	Method	Test substrate	Effect	Value determination	Remark
Negative	OECD 471	Bacteria (S.typhimurium)		Read-across	

#### bismuth

Result	Method	Test substrate	Effect	Value determination	Remark
Negative with metabolic activation, negative without metabolic activation	OECD 476	Mouse (lymphoma L5178Y cells)		Read-across	
Negative with metabolic activation, negative without metabolic activation	Equivalent to OECD 471	Bacteria (S.typhimurium)		Read-across	

#### tin

Result	Method	Test substrate	Effect	Value determination	Remark
Negative	OECD 471	Bacteria (S.typhimurium)		Experimental value	

### **Mutagenicity (in vivo)**

#### zinc nickel bismuth alloys for hot dip galvanizing

No (test)data on the mixture available

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

Reason for revision: 3

Publication date: 2010-10-22

Date of revision: 2021-10-29

Revision number: 0300

BIG number: 49014

9 / 17

## zinc nickel bismuth alloys for hot dip galvanizing

zinc

Result	Method	Exposure time	Test substrate	Organ	Value determination
Negative	Equivalent to OECD 474		Rat		Read-across

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

### Conclusion

Not classified for mutagenic or genotoxic toxicity

### Carcinogenicity

zinc nickel bismuth alloys for hot dip galvanizing

No (test)data on the mixture available

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

zinc

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Oral		Other		51 weeks (daily, 5 days / week)	Rat	No neoplastic effects	General	Literature study
Oral		Human observation study		204 weeks (daily, 5 days / week)	Human	No neoplastic effects	General	Literature study

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

bismuth

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation								Data waiving
Dermal								Data waiving
Oral								Data waiving

nickel

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Inhalation (aerosol)	NOAEC	OECD 451	0.4 mg/m <sup>3</sup> air	2 year(s) (6h / day, 5 days / week)	Rat (male / female)	No carcinogenic effect	Respiratory tract	Experimental value
Inhalation			category 2					Annex VI
Dermal			category 2					Annex VI
Oral	NOAEL	OECD 451	11 mg/kg bw/day	104 weeks (daily)	Rat (male / female)	No carcinogenic effect		Read-across
Oral			category 2					Annex VI

tin

Route of exposure	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Oral		Carcinogenic toxicity study			Rat (male / female)	No carcinogenic effect		Read-across

### Conclusion

Not classified for carcinogenicity

### Reproductive toxicity

zinc nickel bismuth alloys for hot dip galvanizing

No (test)data on the mixture available

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

zinc

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity		Human observation			Human (female)	No effect		Experimental value
	NOAEL	Equivalent to OECD 416	200 mg/kg bw/day	1 days (gestation, daily) - 18 days (gestation, daily)	Rat (female)	No effect		Weight of evidence
Effects on fertility		Human observation			Human (female)	No adverse systemic effects		Experimental value
	NOAEL	Equivalent to OECD 406	200 mg/kg bw/day		Rat (male / female)	No effect		Weight of evidence

The chronic toxicity of the component(s) relates only to the substance in finely divided state and/or in molten state

bismuth

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity								Data waiving
Effects on fertility								Data waiving

Reason for revision: 3

Publication date: 2010-10-22

Date of revision: 2021-10-29

Revision number: 0300

BIG number: 49014

10 / 17

## zinc nickel bismuth alloys for hot dip galvanizing

### nickel

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity (Oral (stomach tube))	NOAEL	Equivalent to OECD 416	≥ 1.1 mg/kg bw/day		Rat	No effect		Experimental value
Maternal toxicity (Oral (stomach tube))	NOAEL	Equivalent to OECD 416	10 mg/kg bw/day		Rat	No effect		Experimental value
Effects on fertility (Oral (stomach tube))	NOAEL	Equivalent to OECD 416	10 mg/kg bw/day		Rat (male / female)	No effect		Experimental value

### tin

	Parameter	Method	Value	Exposure time	Species	Effect	Organ	Value determination
Developmental toxicity	NOEL	OECD 421	> 1000 mg/kg bw/day	54 day(s)	Rat			Experimental value
Effects on fertility	NOEL	OECD 421	> 1000 mg/kg bw/day	54 day(s)	Rat (male / female)			Experimental value

### Conclusion

Not classified for reprotoxic or developmental toxicity

### Toxicity other effects

zinc nickel bismuth alloys for hot dip galvanizing

No (test)data on the mixture available

### Chronic effects from short and long-term exposure

zinc nickel bismuth alloys for hot dip galvanizing

ON CONTINUOUS/REPEATED EXPOSURE/CONTACT: Skin rash/inflammation.

### 11.2. Information on other hazards

No evidence of endocrine disrupting properties

## SECTION 12: Ecological information

### 12.1. Toxicity

zinc nickel bismuth alloys for hot dip galvanizing

No (test)data on the mixture available

Judgement of the mixture is based on the relevant ingredients

## zinc nickel bismuth alloys for hot dip galvanizing

### zinc

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50	ASTM	0.169 mg/l	96 h	Oncorhynchus mykiss	Static system	Fresh water	Read-across
	LC50	Other	0.330 mg/l - 0.780 mg/l	96 h	Pimephales promelas	Static system		Read-across
Acute toxicity crustacea	EC50	US EPA	0.413 mg/l	48 h	Ceriodaphnia dubia	Static system	Fresh water	Experimental value
	EC50	Equivalent to OECD 202	0.530 mg/l	48 h	Daphnia magna	Static system	Fresh water	Read-across
	EC50	Other	0.095 mg/l - 0.530 mg/l	48 h	Ceriodaphnia dubia	Static system	Fresh water	Read-across
	NOEC	Other	201 mg/kg sediment dw	35 day(s)	Gammarus pulex	Semi-static system	Fresh water	Read-across
Toxicity algae and other aquatic plants	IC50	OECD 201	0.136 mg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Experimental value
	EC10	Other	0.0077 mg/l	7 day(s)	Ceramium tenuicore	Static system	Salt water	Experimental value
	EC10	Other	0.6708 mg/l	10 day(s)	Algae	Flow-through system	Salt water	Read-across
Acute toxicity other aquatic organisms	NOEC	ASTM	1135 mg/kg sediment dw	28 day(s)	Tubifex tubifex	Flow-through system	Fresh water	Read-across
	NOEC	Other	0.400 mg/l	10 week(s)	Dreissena polymorpha	Static system	Fresh water	Read-across
Long-term toxicity fish	NOEC	Other	0.440 mg/l	72 day(s)	Oncorhynchus mykiss	Flow-through system	Fresh water	Read-across
	NOEC	Other	0.530 mg/l	36 month(s)	Salvelinus fontinalis	Flow-through system	Fresh water	Read-across
	NOEC	Other	0.025 mg/l	27 day(s)	Clupea harengus	Semi-static system	Salt water	Read-across
Long-term toxicity aquatic crustacea	NOEC	Other	0.037 mg/l	3 week(s)	Daphnia magna	Semi-static system	Fresh water	Read-across
	NOEC	US EPA	0.0056 mg/l	24 day(s)	Invertebrata	Semi-static system	Salt water	Read-across
Toxicity aquatic micro-organisms	EC50	Equivalent to OECD 209	5.2 mg/l	3 h		Static system	Fresh water	Read-across

	Parameter	Method	Value	Duration	Species	Value determination
Toxicity soil macro-organisms	NOEC	Other	1634 mg/kg soil dw	42 day(s)	Lumbricus terrestris	Read-across
	EC10	OECD 220	35.7 mg/kg soil dw	42 day(s)	Enchytraeus albidus	Read-across
Toxicity soil micro-organisms	NOEC	Other	17 mg/kg soil dw	12 week(s)	Soil micro-organisms	Read-across
	EC10	Other	2623 mg/kg soil dw	6 week(s)	Soil micro-organisms	Read-across
Toxicity terrestrial plants	EC10	OECD 208	5855 mg/kg soil dw	21 day(s)	Triticum aestivum	Read-across
	NOEC	OECD 208	32 mg/kg soil dw	25 day(s)	Triticum pratense	Read-across
Toxicity birds	NOEC	Other	> 150 mg/kg bw	28 day(s)	Anas platyrhynchos	Experimental value

### bismuth

	Parameter	Method	Value	Duration	Species	Test design	Fresh/salt water	Value determination
Acute toxicity fishes	LC50	OECD 203	> 100 mg/l	96 h	Danio rerio	Static system	Fresh water	Read-across; GLP
Acute toxicity crustacea	EC50	OECD 202	> 100 mg/l	48 h	Daphnia magna	Static system	Fresh water	Experimental value; GLP
Toxicity algae and other aquatic plants	ErC50	OECD 201	> 100 mg/l	72 h	Pseudokirchneriella subcapitata	Static system	Fresh water	Read-across; GLP
Toxicity aquatic micro-organisms	NOEC	OECD 209	≥ 300 mg/l	3 h	Activated sludge	Static system	Fresh water	Read-across; GLP

### Conclusion

Not classified as dangerous for the environment according to the criteria of Regulation (EC) No 1272/2008

### 12.2. Persistence and degradability

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Publication date: 2010-10-22

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Revision number: 0300

BIG number: 49014

12 / 17

# zinc nickel bismuth alloys for hot dip galvanizing

## Water

Biodegradability: not applicable

### 12.3. Bioaccumulative potential

zinc nickel bismuth alloys for hot dip galvanizing

#### Log Kow

Method	Remark	Value	Temperature	Value determination
	Not applicable (inorganic)			

#### zinc

##### BCF fishes

Parameter	Method	Value	Duration	Species	Value determination
		Not applicable			

##### BCF other aquatic organisms

Parameter	Method	Value	Duration	Species	Value determination
		Not applicable			

#### Log Kow

Method	Remark	Value	Temperature	Value determination
	Not applicable			

#### bismuth

#### Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

#### nickel

##### BCF other aquatic organisms

Parameter	Method	Value	Duration	Species	Value determination
BCF		8 - 45; Fresh weight	≤ 4 week(s)	Cambarus sp.	Experimental value

#### Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

#### tin

#### Log Kow

Method	Remark	Value	Temperature	Value determination
	No data available			

## Conclusion

Does not contain bioaccumulative component(s)

### 12.4. Mobility in soil

No (test)data on mobility of the component(s) available

### 12.5. Results of PBT and vPvB assessment

The criteria of PBT and vPvB as listed in Annex XIII of Regulation (EC) No 1907/2006 do not apply to inorganic substances.

### 12.6. Endocrine disrupting properties

No evidence of endocrine disrupting properties

### 12.7. Other adverse effects

zinc nickel bismuth alloys for hot dip galvanizing

#### Greenhouse gases

None of the known components is included in the list of fluorinated greenhouse gases (Regulation (EU) No 517/2014)

#### Ozone-depleting potential (ODP)

Not classified as dangerous for the ozone layer (Regulation (EC) No 1005/2009)

## SECTION 13: Disposal considerations

The information in this section is a general description. If applicable and available, exposure scenarios are attached in annex. Always use the relevant exposure scenarios that correspond to your identified use.

### 13.1. Waste treatment methods

#### 13.1.1 Provisions relating to waste

##### European Union

Can be considered as non hazardous waste according to Directive 2008/98/EC, as amended by Regulation (EU) No 1357/2014 and Regulation (EU) No 2017/997.

Waste material code (Directive 2008/98/EC, Decision 2000/0532/EC).

11 01 99 (wastes from chemical surface treatment and coating of metals and other materials (for example galvanic processes, zinc coating processes, pickling processes, etching, phosphating, alkaline degreasing, anodising): wastes not otherwise specified). Depending on branch of industry and production process, also other waste codes may be applicable.

#### 13.1.2 Disposal methods

Recycle/reuse. Remove waste in accordance with local and/or national regulations. Do not discharge into surface water (Directive 2000/60/EC, Council Decision 2455/2001/EC).

#### 13.1.3 Packaging/Container

No data available

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Publication date: 2010-10-22

Date of revision: 2021-10-29

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BIG number: 49014

13 / 17

# zinc nickel bismuth alloys for hot dip galvanizing

## SECTION 14: Transport information

### Road (ADR), Rail (RID), Inland waterways (ADN), Sea (IMDG/IMSBC), Air (ICAO-TI/IATA-DGR)

14.1. UN number	Transport	Not subject
14.2. UN proper shipping name		
14.3. Transport hazard class(es)		
	Hazard identification number	
	Class	
	Classification code	
14.4. Packing group		
	Packing group	
	Labels	
14.5. Environmental hazards		
	Environmentally hazardous substance mark	no
14.6. Special precautions for user		
	Special provisions	
	Limited quantities	
14.7. Maritime transport in bulk according to IMO instruments		
	Annex II of MARPOL 73/78	Not applicable

## SECTION 15: Regulatory information

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

#### European legislation:

VOC content Directive 2010/75/EU

VOC content	Remark
	Not applicable (inorganic)

REACH Annex XVII - Restriction

Contains component(s) subject to restrictions of Annex XVII of Regulation (EC) No 1907/2006: restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles.

	Designation of the substance, of the group of substances or of the mixture	Conditions of restriction
· nickel	Nickel and its compounds	1. Shall not be used: (a) in any post assemblies which are inserted into pierced ears and other pierced parts of the human body unless the rate of nickel release from such post assemblies is less than 0,2 µg/cm <sup>2</sup> /week (migration limit); (b) in articles intended to come into direct and prolonged contact with the skin such as: — earrings, — necklaces, bracelets and chains, anklets, finger rings, — wrist-watch cases, watch straps and tighteners, — rivet buttons, tighteners, rivets, zippers and metal marks, when these are used in garments, if the rate of nickel release from the parts of these articles coming into direct and prolonged contact with the skin is greater than 0,5 µg/cm <sup>2</sup> / week. (c) in articles referred to in point (b) where these have a non-nickel coating unless such coating is sufficient to ensure that the rate of nickel release from those parts of such articles coming into direct and prolonged contact with the skin will not exceed 0,5 µg/cm <sup>2</sup> / week for a period of at least two years of normal use of the article. 2. Articles which are the subject of paragraph 1 shall not be placed on the market unless they conform to the requirements set out in that paragraph. 3. The standards adopted by the European Committee for Standardisation (CEN) shall be used as the test methods for demonstrating the conformity of articles to paragraphs 1 and 2. Titles and references of harmonised standards under entry 27 of Annex XVII to REACH (see Commission communication (EU) No 2017/C 011/02)
· nickel	Substances falling within one or more of the following points: (a) substances classified as any of the following in Part 3 of Annex VI to Regulation (EC) No 1272/2008: — carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, but excluding any such substances classified due to effects only following exposure by inhalation — reproductive toxicant category 1A, 1B or 2 but excluding any such substances classified due to effects only following exposure by inhalation — skin sensitiser category 1, 1A or 1B — skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2 — serious eye damage category 1 or eye irritant category 2 (b) substances listed in Annex II to Regulation (EC) No 1223/2009 of the European	Mixtures for tattooing purposes are subject to the restrictions of Regulation (EU) 2020/2081

Reason for revision: 3

Publication date: 2010-10-22

Date of revision: 2021-10-29

Revision number: 0300

BIG number: 49014

14 / 17

## zinc nickel bismuth alloys for hot dip galvanizing

	<p>Parliament and of the Council (c) substances listed in Annex IV to Regulation (EC) No 1223/2009 for which a condition is specified in at least one of the columns g, h and i of the table in that Annex (d) substances listed in Appendix 13 to this Annex. The ancillary requirements in paragraphs 7 and 8 of column 2 of this entry apply to all mixtures for use for tattooing purposes, whether or not they contain a substance falling within points (a) to (d) of this column of this entry.</p>	
· tin	<p>Substances falling within one or more of the following points: (a) substances classified as any of the following in Part 3 of Annex VI to Regulation (EC) No 1272/2008: — carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, but excluding any such substances classified due to effects only following exposure by inhalation — reproductive toxicant category 1A, 1B or 2 but excluding any such substances classified due to effects only following exposure by inhalation — skin sensitiser category 1, 1A or 1B — skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2 — serious eye damage category 1 or eye irritant category 2 (b) substances listed in Annex II to Regulation (EC) No 1223/2009 of the European Parliament and of the Council (c) substances listed in Annex IV to Regulation (EC) No 1223/2009 for which a condition is specified in at least one of the columns g, h and i of the table in that Annex (d) substances listed in Appendix 13 to this Annex. The ancillary requirements in paragraphs 7 and 8 of column 2 of this entry apply to all mixtures for use for tattooing purposes, whether or not they contain a substance falling within points (a) to (d) of this column of this entry.</p>	Mixtures for tattooing purposes are subject to the restrictions of Regulation (EU) 2020/2081
· zinc	<p>Substances falling within one or more of the following points: (a) substances classified as any of the following in Part 3 of Annex VI to Regulation (EC) No 1272/2008: — carcinogen category 1A, 1B or 2, or germ cell mutagen category 1A, 1B or 2, but excluding any such substances classified due to effects only following exposure by inhalation — reproductive toxicant category 1A, 1B or 2 but excluding any such substances classified due to effects only following exposure by inhalation — skin sensitiser category 1, 1A or 1B — skin corrosive category 1, 1A, 1B or 1C or skin irritant category 2 — serious eye damage category 1 or eye irritant category 2 (b) substances listed in Annex II to Regulation (EC) No 1223/2009 of the European Parliament and of the Council (c) substances listed in Annex IV to Regulation (EC) No 1223/2009 for which a condition is specified in at least one of the columns g, h and i of the table in that Annex (d) substances listed in Appendix 13 to this Annex. The ancillary requirements in paragraphs 7 and 8 of column 2 of this entry apply to all mixtures for use for tattooing purposes, whether or not they contain a substance falling within points (a) to (d) of this column of this entry.</p>	Mixtures for tattooing purposes are subject to the restrictions of Regulation (EU) 2020/2081

**National legislation Belgium**  
zinc nickel bismuth alloys for hot dip galvanizing

Reason for revision: 3

Publication date: 2010-10-22

Date of revision: 2021-10-29

Revision number: 0300

BIG number: 49014

15 / 17

## zinc nickel bismuth alloys for hot dip galvanizing

No data available

tin

Résorption peau	Etain (métal); D; La mention "D" signifie que la résorption de l'agent, via la peau, les muqueuses ou les yeux, constitue une partie importante de l'exposition totale. Cette résorption peut se faire tant par contact direct que par présence de l'agent dans l'air.
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### National legislation The Netherlands

zinc nickel bismuth alloys for hot dip galvanizing

Waterbezwaarlijkheid	Z (2); Algemene Beoordelingsmethodiek (ABM)
SZW - Lijst van kankerverwekkende stoffen	nikkeldioxide; Listed in SZW-list of carcinogenic substances

### National legislation France

zinc nickel bismuth alloys for hot dip galvanizing

Catégorie cancérogène	Nickel (oxyde de), en Ni
-----------------------	--------------------------

nickel

Catégorie cancérogène	Nickel (métal); C2
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### National legislation Germany

zinc nickel bismuth alloys for hot dip galvanizing

WGK	nwg; Verordnung über Anlagen zum Umgang mit wassergefährdenden Stoffen (AwSV) - 18. April 2017
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bismuth

TA-Luft	5.2.1
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nickel

TA-Luft	5.2.2/II
TRGS900 - Risiko der Fruchtschädigung	Nickelmetall; Y; Risiko der Fruchtschädigung braucht bei Einhaltung des Arbeitsplatzgrenzwertes und des biologischen Grenzwertes nicht befürchtet zu werden
Sensibilisierende Stoffe	Nickelmetall; Sh; Hautsensibilisierende Stoffe

tin

TA-Luft	5.2.1
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### National legislation Austria

zinc nickel bismuth alloys for hot dip galvanizing

No data available

nickel

Krebserzeugend	Nickel (Stäube von Nickelmetall, Nickelsulfid und sulfidischen Erzen, Nickeloxide, Nickelchromat und Nickel- carbonat) und Stäube von Nickelverbindungen und Nickellegierungen; III A1
Gefahr der Sensibilisierung der Haut	Nickel (Stäube von Nickelmetall, Nickelsulfid und sulfidischen Erzen, Nickeloxide, Nickelchromat und Nickel- carbonat) und Stäube von Nickelverbindungen und Nickellegierungen; Sh
Gefahr der Sensibilisierung der Atemwege	Nickel (Stäube von Nickelmetall, Nickelsulfid und sulfidischen Erzen, Nickeloxide, Nickelchromat und Nickel- carbonat) und Stäube von Nickelverbindungen und Nickellegierungen; Sa

### National legislation United Kingdom

zinc nickel bismuth alloys for hot dip galvanizing

Carcinogen	Nickel, insoluble inorganic compounds (as Ni)(except nickel tetracarbonyl); Carc
Skin absorption	Nickel, insoluble inorganic compounds (as Ni)(except nickel tetracarbonyl); Sk

nickel

Skin absorption	Nickel metal; Sk
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### Other relevant data

zinc nickel bismuth alloys for hot dip galvanizing

TLV - Carcinogen	Nickel and inorganic compounds including Nickel subsulfide, as Ni: Insoluble inorganic compounds (NOS); A1
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nickel

TLV - Carcinogen	Nickel and inorganic compounds including Nickel subsulfide, as Ni: Elemental; A5
IARC - classification	2B; Nickel and nickel compounds

## 15.2. Chemical safety assessment

No chemical safety assessment has been conducted for the mixture.

zinc

A chemical safety assessment has been performed.

## SECTION 16: Other information

### Full text of any H- and EUH-statements referred to under section 3:

H317 May cause an allergic skin reaction.

H351 Suspected of causing cancer.

H372 Causes damage to organs (lungs) through prolonged or repeated exposure if inhaled.

EUH208 Contains a sensitising substance. May produce an allergic reaction.

(*)	INTERNAL CLASSIFICATION BY BIG
ADI	Acceptable daily intake
AOEL	Acceptable operator exposure level
ATE	Acute Toxicity Estimate
CLP (EU-GHS)	Classification, labelling and packaging (Globally Harmonised System in Europe)
DMEL	Derived Minimal Effect Level

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Publication date: 2010-10-22

Date of revision: 2021-10-29

Revision number: 0300

BIG number: 49014

16 / 17



## zinc nickel bismuth alloys for hot dip galvanizing

DNEL	Derived No Effect Level
EC50	Effect Concentration 50 %
Erc50	EC50 in terms of reduction of growth rate
LC50	Lethal Concentration 50 %
LD50	Lethal Dose 50 %
NOAEL	No Observed Adverse Effect Level
NOEC	No Observed Effect Concentration
OECD	Organisation for Economic Co-operation and Development
PBT	Persistent, Bioaccumulative & Toxic
PNEC	Predicted No Effect Concentration
STP	Sludge Treatment Process
vPvB	very Persistent & very Bioaccumulative

The information in this safety data sheet is based on data and samples provided to BIG. The sheet was written to the best of our ability and according to the state of knowledge at that time. The safety data sheet only constitutes a guideline for the safe handling, use, consumption, storage, transport and disposal of the substances/preparations/mixtures mentioned under point 1. New safety data sheets are written from time to time. Only the most recent versions may be used. Unless indicated otherwise word for word on the safety data sheet, the information does not apply to substances/preparations/mixtures in purer form, mixed with other substances or in processes. The safety data sheet offers no quality specification for the substances/preparations/mixtures in question. Compliance with the instructions in this safety data sheet does not release the user from the obligation to take all measures dictated by common sense, regulations and recommendations or which are necessary and/or useful based on the real applicable circumstances. BIG does not guarantee the accuracy or exhaustiveness of the information provided and cannot be held liable for any changes by third parties. This safety data sheet is only to be used within the European Union, Switzerland, Iceland, Norway and Liechtenstein. Any use outside of this area is at your own risk. Use of this safety data sheet is subject to the licence and liability limiting conditions as stated in your BIG licence agreement or when this is failing the general conditions of BIG. All intellectual property rights to this sheet are the property of BIG and its distribution and reproduction are limited. Consult the mentioned agreement/conditions for details.

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17 / 17