

# Safety Information Sheet (SIS)

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## 1. Introductory information

Stainless steel products are considered as *articles* under the European Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), a position adopted by all European stainless steel producers as presented in the EUROFER (European Confederation of Iron and Steel Industries) position paper determining the borderline between *preparations* and *articles* for steel and steel products.

In accordance with REACH and European Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures (CLP), only substances and preparations require a Safety Data Sheet (SDS). While articles under REACH do not require a classic SDS, REACH Article 32 requires articles to be accompanied by sufficient information to permit safe use and disposal. In order to comply with this requirement EUROFER members have worked on the development of this Safety Information Sheet (SIS) which provides information on the safe use of stainless steel and its potential impacts on both human health and environment.

## 2. Article data

### 2.1. Article names and description

Stainless steel semi-finished flat products, in detail:

- Hot and cold rolled strip and sheet of corrosion and heat resisting steels under the trade names NIROSTA® and THERMAX®
- Clear-coated cold rolled strip and sheet of corrosion resisting steels under the trade name NIROSTA® Silver Ice® UV

*Stainless steel* as defined in European Standard EN 10088-2:2005 is the overall term covering corrosion resisting, heat resisting and creep resisting steels.

## 2.2. Article supplier

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## 2.3. Article composition

Substances in stainless steel:

- Chromium (Cr): 6.5 % - 30 %
- Nickel (Ni):  $\leq 38$  %
- Molybdenum (Mo):  $\leq 11$  %
- Carbon (C):  $< 1.2$  %
- Iron (Fe): balance

Other elements such as manganese (Mn), nitrogen (N), niobium (Nb), titanium (Ti), copper (Cu) and silicon (Si) may be present. For more information on the chemical composition of standard stainless steels see EN 10088-1:2005.

## 2.4. Article properties (physical and chemical)

- Physical state: solid
- Colour: silver-grey
- Odour: odourless
- Density: 7.7 - 8.3 g/cm<sup>3</sup>
- Melting point: 1,325 - 1,530 °C
- Water solubility: insoluble

Stainless steels are stable and non-reactive under normal ambient atmospheric conditions, because in solid form all alloying elements are firmly bonded in the metallic matrix. Only when molten or during welding operations (i.e. heated to very high temperatures), fumes may be produced.

None of these substances are intended to be released under normal or reasonably foreseeable conditions for use. Exposure to humans or the environment during normal or reasonably foreseeable conditions of use including disposal is negligible.

### **3. Information of the safe use of stainless steel products**

Heat resisting THERMAX® grades contain a minimum of 6.5 % chromium which enables a high resistance to oxidation in hot gases. Corrosion resisting NIROSTA® grades have at least 10.5 % chromium which ensures the formation of a protective, adherent, nanometric oxide film covering the entire steel surface. Increasing the chromium content beyond the minimum of 10.5% confers still greater corrosion resistance. Corrosion resistance may be further improved and a wide range of properties provided by the addition of other chemical elements (e.g. nickel and molybdenum). Oxidation and corrosion of stainless steel in aggressive media can be avoided by choice of the proper grade in accordance with the relevant European or international standards.

Stainless steels are generally considered non-hazardous to human health or the environment (see 3.2) and regularly applied where safety and hygiene is of utmost importance (e.g. equipment and devices in contact with drinking water and food stuffs, medical equipment, etc).

This Safety Information Sheet (SIS) presents information relevant for downstream users in order to secure proper use of the stainless steel articles supplied.

#### **3.1. Safety information**

##### **3.1.1. Description of hazards**

Nickel is the only substance of major importance with regard to the hazard classification of stainless steels in solid form. In accordance with Regulations (EC) 1272/200 and 729/2009 nickel is classified as Carcinogen Category 2<sup>1</sup>, Specific Target Toxicity Repeated Exposure 1 and Skin Sensitizer Category 1.

Note: Superseding the Dangerous Substances Directive (67/548/EEC) and the Dangerous Preparations (1999/45/EC) Directive the CLP Regulation has introduced changes in the classification of nickel as in Table 1.

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<sup>1</sup> Substance which should be regarded as a cause for concern for humans, owing to possible carcinogenic effects but in respect of which the available information is not adequate for making a satisfactory assessment.

<b>CLP (1972/2008/EC) Hazard:</b>	<b>67/548/EEC &amp; 1999/45/EC Hazard:</b>	<b>Comments</b>
Carc.Cat.2	Carc. Cat. 3 R40	No change
Skin Sens. 1	R43	No change
STOT RE 1	(T; R48/23)	New

Table 1: Hazard classification of nickel metal (massive form)

### Sensitization

Tests conducted in accordance with EN 1811 have determined that corrosion resisting stainless steels release nickel at levels significantly below the criteria set for classification as a skin sensitizer. Thus, corrosion resisting stainless steels in general are suitable for use as piercing posts (where the maximum nickel release rate is 0.2 µg/(cm<sup>2</sup>•week) and for applications involving close and prolonged contact with the skin (where the maximum nickel release rate is 0.5 µg/(cm<sup>2</sup>•week).

However, tests conducted in accordance with EN 1811 have shown that the resulphurised free-machining corrosion resisting stainless steels (containing 0.15-0.30 % sulphur (S)) release nickel at levels close to or above the maximum nickel release rate of 0.5 µg/(cm<sup>2</sup>•week). Resulphurised free-machining corrosion resisting stainless steels are therefore not recommended for use as piercing posts or for applications involving close and prolonged contact with skin (i.e. jewellery, watch backs and watch straps etc.).

Note: Clinical studies have not revealed any risk of allergy among individuals already sensitized to nickel. Thus, frequent intermittent contact with corrosion resisting stainless steels should not pose a problem to downstream users or consumers.

### Specific target organ toxicity

Following the CLP Regulation stainless steels containing more than 10 % nickel should be classified as Specific Target Organ Toxicity (Repeated exposure), Category 1 (STOT RE 1) and stainless steels containing 1-10 % nickel should be classified as STOT RE 2. Stainless steels containing less than 1 % nickel are not classified.

However, a 28-day repeated inhalation study with stainless steel clearly indicates a lack of toxicity (i.e. no adverse effects were seen, even at the highest concentration of stainless steel), whereas the lowest nickel dose (0.0004 mg/l) resulted in clear signs of toxicity in a 28-day nickel inhalation study.

### Carcinogenicity

In accordance with the CLP Regulation stainless steels containing more than 1 % nickel should be classified as carcinogen, Category 2. However, no carcinogenic effects resulting from exposure to stainless steels have been reported, either in epidemiological studies or in tests with animals. In addition, IARC (International Agency for Research on Cancer) has concluded that stainless steel implants are not classifiable as to their carcinogenicity to humans. Stainless steels containing less than 1 % nickel are not classified.

### 3.1.2. Specific process and exposure controls

Dust and fume may be generated during processing, e.g. welding, cutting and grinding. If airborne concentrations of dust and fume are excessive, inhalation over long periods may affect workers' health, primarily of the lungs. Dust and fume quantity and composition depend on specific practice. Oxidized forms of the various alloying elements of stainless steel may be found in welding fumes.

Over long periods inhalation of excessive airborne levels may have long-term health effects, primarily affecting the lungs. Studies of workers exposed to nickel powder, dust and fumes generated in the production of nickel alloys and stainless steels have not indicated a respiratory cancer hazard.

Welding and flame cutting fumes may contain hexavalent chromium compounds. Studies have shown that some hexavalent chromium compounds can cause cancer. However, epidemiological studies amongst workers indicate no extra increased risk of cancer when welding stainless steels, compared with the slightly increased risk when welding steels that do not contain chromium. Chromium in stainless steel is in metallic state (zero valence) and stainless steel does not contain hexavalent chromium.

The process of welding should only be performed by trained workers with the personal protective equipment in accordance with the laws of each EU Member State relating to safety. Guidance on the welding of metals is provided on the EUROFER website ([www.eurofer.org](http://www.eurofer.org)). The guidance document gives background information on health hazards posed by welding processes and appropriate risk management measures.

There are no specific occupational exposure limits for stainless steel. However, specific occupational exposure limits have been established for some constituent elements and compounds.

Users of the Safety Information Sheet (SIS) are strongly advised to refer to the occupational exposure limits set by their EU Member State for the substances in stainless steel and, where relevant, for welding fumes.

#### First aid measures

No specific first aid measures have been developed for stainless steel. Medical attention should be provided in case of an excessive inhalation of dust or a physical injury to the skin or to the eyes.

Note: Austenitic stainless steel particles are non-magnetic or only slightly magnetic and may not respond to a magnet placed over the eye. In such cases seek hospital treatment.

#### Handling and storage

There exist no special measures for the handling of stainless steels. Normal precautions should be taken to avoid physical injuries caused mainly by sharp edges. Personal protective equipment must be applied, e.g. special gloves and eye protection.

- Note:
1. Stainless steels should be stored in a manner that prevents iron contamination. Avoid the placing or storing of stainless steel in uncoated iron or steel racks and protect from iron emissions from cutting or grinding.
  2. Care should be taken to avoid the exposure of fine process dust (e.g. from grinding or blasting) to high temperatures as it may present a potential fire hazard.

### Uses

Stainless steels are present in a wide variety in many areas of life, e.g. industrial processing equipment, transportation, architecture, food and drink industry and domestic appliances.

### **3.2. Environmental information**

There exist no hazards to the environment from stainless steels in the forms supplied.

Stainless steel is part of an integrated life cycle and 100 % recyclable. Thus, stainless steel surplus and scrap (waste) is a valuable resource and in demand for the production of new stainless steel. Recycling routes are well-established and recycling is therefore the preferred mode of disposal. While disposal to landfill is not harmful to the environment, it is a waste of resources and in consequence not favourable.

### **4. References**

1. Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
2. Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures
3. Council Directive 67/548/EEC of 27 June 1967 on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances
4. Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations
5. Directive 2006/121/EC of the European Parliament and of the Council of 18 December 2006 amending Council Directive 67/548/EEC on the approximation of laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous substances in order to adapt it to Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) and establishing a European Chemicals Agency
6. <http://www.eurofer.org/index.php/eng/REACH/Documents-and-useful-web-links/Welding> (on welding)

7. [http://www.ttl.fi/en/publications/Electronic\\_publications/Pages/default.aspx](http://www.ttl.fi/en/publications/Electronic_publications/Pages/default.aspx)  
(Review on toxicity of stainless steel)
8. <http://www.eurofer.org/index.php/eng/News-Publications/Publications>  
(Manufacture, processing and use of stainless steel: A review of the health effects)