

In accordance with European Commission Directive 93/112/EEC "Safety data sheets" with reference to:

- Directive 67/548/EEC "Dangerous substances"
- Directive 99/45/EC "Dangerous preparations"
- Regulation 1935/2004/EC "Food Contact Materials"
- Directive 76/769/EEC "Restrictions on marketing of dangerous substances"

Date of issue: January 2007.

## 1. Identification of product and company

### Stainless steel

Corrosion, heat and creep resisting grades with ferritic, martensitic, duplex or austenitic microstructure in massive product forms: semi-finished products, plate, sheet, strip, bar, rod, tube, fittings. The products are mainly used for manufacturing of consumer products or applications in process industry, transport, building and construction, power and energy, and food and beverage industry. They are marked with designations according to European standards (e.g. EN10088).

Manufacturer, importer, supplier  
Fagersta Stainless AB  
Box 508, SE-737 25 Fagersta, Sweden  
Tel +46 223 45500, Fax +46 223 45540

Departments supplying information  
Technical Market Support  
Box 508, SE-737 25 Fagersta, Sweden  
Tel +46 223 45500, Fax +46 223 45748

## 2. Composition/information on ingredients

Iron alloy with 10.5 – 30% Cr

max. 38% Ni

max. 11% Mn

max. 8% Mo

Other elements may be present, such as Si, Cu, Ti. These are not classified as hazardous, or are below the concentration levels for classification of these alloys as hazardous.

## 3. Hazard classification of product

Many stainless steels contain nickel as an essential alloying element. Nickel is classified in EC Directive 67/548/EEC as a suspect carcinogen (category 3 – R40) and as a skin sensitizer (R43).

The classification rules of EC Directive 99/45/EC dictate that any preparations with equal to or more than 1% content of nickel must automatically be classified as suspect carcinogens (R40). Stainless steels do not cause nickel sensitization by prolonged skin contact in humans. Nevertheless, all stainless steels with 1% or more nickel are classified as skin sensitizers.

## Description of hazards

There are no hazards of concern for man or the environment from stainless steels in the forms supplied. However, if an individual is already sensitized to nickel, prolonged skin contact with a few types of stainless steel may result in an allergic dermatological reaction. See section 11 for more information. No carcinogenic effects resulting from exposure to stainless steels have been reported, either in epidemiological studies or in tests with animals. Dust and fume may be generated during processing e.g. in 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.

## 4. First aid measures

### Inhalation

Not applicable to stainless steels in the massive form. Inhalation of dust and/or fume from grinding, cutting and welding operations is unlikely to generate the need for specific first aid.

### Skin and eye contact

There are no special symptoms or effects associated to stainless steel. In the event of physical injury to the skin seek appropriate medical attention. In the event of physical injury to the eyes, seek immediate medical attention. 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.

### Ingestion

Do not apply to stainless steel in the massive form.

## 5. Fire fighting measures

Stainless steels are not combustible. There are no special hazards or precautions associated with stainless steels if in the vicinity of a fire.

## 6. Accidental release measures

Not applicable.

## 7. Handling and storage

There are no special technical measures involved for handling stainless steels. Normal precautions should be taken to avoid physical injury from coiled or bundled products, possibly with sharp edges:

- Straps or bands, used to secure some products, should not be used for lifting. Coil and bundled products may spring apart when the banding is removed and the banding itself could cause eye or other injury when tension is released.
- Certain products may, as a result of processing, be brittle or have residual stress that might cause

fracture or significant deformation.

- All products are likely to have sharp edges that could cause lacerations and flying particles may be produced when shearing.
- Suitable protective clothing and equipment, such as hand and eye protection, should be worn and systems of work adopted to take account of any hazards arising from the risk of fracturing or the release of tension when breaking open banding.
- Suitable racks should be used to ensure stability when stacking narrow coils.

## 8. Exposure controls/Personal protection

### Occupations exposure limits

There are no occupational exposure limits for stainless steels. Occupational exposure limits apply to some constituent elements (Ni, Cr, Mn, Mo) and certain of their compounds.

Table 1 shows limits according to current legislation in

Finland, Sweden and UK.

### Exposure controls

In the processing of all metallic materials, exposure to fume and dust must be kept below any legally imposed limits. Dust and fume may be generated in use, e.g. by cutting, grinding and welding processes, which may contain materials subject to exposure limits. To ensure these limits are not exceeded, adequate general or local ventilation or fume extraction should be provided.

### Personal protection

In accordance with European and national health and safety regulations, it is necessary to assess the need for personal protection equipment and appropriate approved respiratory protection should be provided for those workers at risk of inhalation. Suitable hand and eye protection should be worn where there is a risk of laceration, flying particles, burning or welding radiation or contact with oils during processing

Occupational exposure limits (mg/m<sup>3</sup>) in Finland, Sweden and UK

Table 1

Substance	Finland		Sweden, NGV		Limit	UK	
	8h TWA	15 min TWA	TD	RD		8h TWA	15 min TWA
Chromium, & its Cr(II), Cr(III) compounds	as Cr	0.5	0.5		OES	0.5	
Chromium (VI) compounds	as CrO <sub>4</sub>	0.05					
Chromium (VI) compounds	as Cr		0.005	0.015 *		MEL	0.05
Copper & its compounds	as Cu	1	1	0.2			
Copper, fume	as Cu	0.1			OES	0.2	
Iron oxide, fume	as Fe	5			OES	5	10
Manganese and its inorganic compounds	as Mn	0.5	0.2	0.1	MEL	0.5	
Molybdenum & its soluble compounds	as Mo	5			OES	5	10
Molybdenum & its insoluble compounds	as Mo		10	5	OES	10	20
Nickel, metal	as Ni	1	0.5				
Nickel, compounds	as Ni	0.1					
Nickel, soluble compounds	as Ni		0.1		MEL	0.1	
Nickel, insoluble compounds	as Ni				MEL	0.5	
Nickel, carbonyl	as Ni	0.0071	0.021	0.007			
Nickel, subsulfide	as Ni		0.01				

NGV= Nivågränsvärde; TWA= Time Weighted Average; RD= Respirable dust; TD= Total dust; OES= Occupational Exp. Standards; MEL= Maximum Exp. Limit; \* KTV=Korttidsvärde (15 minTWA)

## 9. Physical and chemical properties

Appearance: Solid; metallic grey, ranging from dull to bright polished. Occasionally supplied with oxidized surface. The wire can also be supplied with a surface coating, for example Copper or Graphite.

Odor: Odorless

Water solubility: Insoluble

Melting: 1370°C - 1520°C

Density: 7.7-8.1 kg/dm<sup>3</sup>

Thermal expansion (RT to 100°C): 10-16 x10<sup>-6</sup> m/m°C

Thermal conductivity (RT): 12-30 W/m°C

Magnetic: Austenitic stainless steels are non-magnetic in most supply conditions, but may be para-magnetic in some supply conditions (Permeability 1.005-1.1). Duplex, ferritic and martensitic stainless steels are ferro-magnetic.

## 10. Stability and reactivity

Stainless steels are stable and non-reactive under normal ambient atmospheric conditions. May react in contact with strong acids and emit gaseous acid decomposition products, e.g. hydrogen, oxides of nitrogen. When heated to very high temperatures fumes may be produced (e.g. by cutting, welding or melting operations).

## 11. Toxicological data

### Chronic toxicity, oral or inhalation

Stainless steels may contain nickel, which has been classified in EC Directive 67/548/EEC as a suspect carcinogenic substance, Category 3 (i.e. "causing concern for man.....but available information is not adequate for making a satisfactory assessment"). The exposure route of concern is inhalation. These stainless steel products are in massive form,

not capable of being inhaled. The requirements of EC Directive 99/45 EC are such that all mixtures, solutions and alloys with more than 1% nickel must be classified in the same way as nickel itself, by default. There is no direct evidence of carcinogenic effects of stainless steels in man, nor indirect evidence from animals tested by relevant routes, i.e. inhalation or ingestion.

In other studies, using non-relevant routes in animals, alloy with up to 40% nickel caused no significant increase in cancer.

During mechanical working, flame cutting or welding, stainless steel dust, or fumes containing complex or mixed oxides (spinels) of its constituents, may be formed. Over long periods, inhalation of excessive airborne levels may have long term health effects, primarily affecting the lungs. However, studies of workers exposed to nickel powder and 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 welders 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.

#### **Dermatological toxicity**

Nickel is classified as a skin sensitiser. It causes skin sensitisation in susceptible individuals through prolonged intimate contact with the skin (e.g. wearing of jewellery). The requirements of EC Directive 99/45/EC are that all mixtures, solutions and alloys with 1% or more of nickel must, by default, also be classified as skin sensitisers. Numerous patch tests have established that most stainless steels do not cause sensitisation. However, studies have shown that, in some individuals already sensitised to nickel, close and prolonged skin contact with the re-sulphurised free-machining types of stainless steel with 0.15-0.35% S (EN 1.4105, 1.4523, 1.4305, 1.4570) may cause an allergic reaction.

#### **Other observations**

Long-term experience of stainless steels in the most varied applications has demonstrated that these very resistant materials are eminently suitable where hygiene is of paramount importance (e.g. food processing and food preparation).

The UK Health & Safety Executive's publication "Control of fume arising from electric arc welding of stainless steel" indicates that there is some risk of developing asthma from compounds of chromium VI and nickel in the fume from stainless steel welding. However, stainless steel welding fume did not meet the European Union

classification criteria required for inclusion in as a substance capable of causing asthma.

#### **12. Ecological data**

No known harmful effects. No special precautions are required.

#### **13. Disposal considerations**

Surplus and scrap (waste) stainless steel is valuable and in demand for the production of prime new stainless steel. Recycling routes are well-established, and recycling is therefore the preferred disposal route. Disposal to landfill is not harmful to the environment, but it is a waste of resources and therefore less desirable than recycling.

#### **14. Transport data**

No special precautions required.

#### **15. Regulatory references**

##### **Classification and labeling requirements**

Stainless steels with a specified nickel content less than 1% are not classified "as dangerous for supply" under EC Directive 67/548/EEC. Stainless steels containing 1% or more of nickel are classified in the same way as nickel (Table 2). However, in recognition of their essentially non-hazardous nature, stainless steels in the massive form are not required to be labeled as hazardous.

##### **Other**

The uses of products that contain nickel and which come into direct and prolonged contact with the skin are limited by EC Directive 94/27/EC and Directive 2004/96/EC.

Posts inserted into pierced ears and other parts of the body during epithelization of the wound must not release more than 0.2 µg/cm<sup>2</sup>/week of nickel. Other nickel containing products in direct and prolonged contact with the skin must release no more than 0.5 µg/cm<sup>2</sup>/week of nickel as defined in CEN 1811.

#### **16. Other information**

##### **Food contact materials**

The Council of Europe published "Guidelines on metals and alloys used as food contact materials" in April 2001 as a reference document to ensure that metallic materials used in contact with food comply with the provisions of Article 2.2 of Directive 89/109/EEC. The document includes a section on stainless steels.

**References to key data**

Note that all of the data on the potential health effects of stainless steel, including those which might occur during manufacture and processing, which were available up to 1998 are reviewed in the reference No. 1 below.

1) H J Cross, J Beach, L S Levy, S Sadhra, T Sorahan, C McRoy: Manufacture, processing and use of stainless steel: A Review of the Health Effects. Prepared for Eurofer by the Institute of Occupational Health, University of Birmingham, 1999.

2) N Becker: Cancer mortality among arc welders exposed to fumes containing chromium and nickel. Results of a third follow-up: 1989–1995.

3) Report of the International Committee on Nickel Carcinogenesis in Man: Scand J, Work Environ Health 1990, 16; 1–82

4) International Agency for Research on Cancer. Chromium, nickel and welding. 'IARC Monograph on the evaluation of Carcinogenic Risks to Humans'. Lyon: IARC 1990.

**Classification of nickel**

Table 2

CAS no.	Substance	Danger symbol	Risk phrases	Safety phrases
7440-02-0	Nickel	Xn (Harmful)	R40 limited evidence of carcinogenic effect R43 may cause sensitisation by skin contact	S22 do not breathe dust S36 wear protective clothing

**Reference to national regulations****Sweden**

AFS 2005:17 Hygieniska gränsvärden och åtgärder mot luftföroreningar. [www.av.se](http://www.av.se)

KIFS 2005:7 Klassificering och märkning av kemiska produkter. [www.kemi.se](http://www.kemi.se)

KIFS 1998:8 Kemiska produkter och biotekniska organismer. [www.kemi.se](http://www.kemi.se)

**EU**

EN 1811: Reference test method for release of nickel from products intended to come into direct and prolonged contact with skin

**UK**

EH Health & Safety Executive's publications ([www.hse.gov.uk](http://www.hse.gov.uk))

Health & Safety Executive Information Document

ID 668/29: Control of fume arising from electric arc welding of stainless steel

**Declaration**

The information given in this safety data sheet is based on the present level of our knowledge and experience. The data sheet describes the products with respect to safety requirements. The data given is not intended as a confirmation of product properties and does not constitute a legal contractual relationship, nor should it be used as the basis for ordering these products.