

# SAFETY INFORMATION DATASHEET\* (SIS) FOR CARBON STEELS AND LOW ALLOYED STEELS

Issue of October 2012

## 1. Identification of substance and company

### 1.1. Product identifier

Product name Carbon steels and Low alloyed steels.

The steels are in the massive product forms: semi-finished products, strip, bar, rod, wire and tube. The products are marketed under Sandvik's trademarks and grade designations, such as Sandvik Finemac™, Sandvik 20C, Sanbar® 20, Sanbar® 23, Sanbar® 61 and Sanbar® 64, and when applicable, also with designations according to various international and national standards.

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

The products are used extensively in the most varying applications, especially where there are demands on e.g. high strength, high fatigue resistance, good wear resistance and good machinability. However, these products have limited resistance against wet corrosion and high temperature corrosion in gases. This means that these Sandvik products are used in many different industrial applications, such as in the automotive industry, in articles with small dimensions and high tolerances in electric and electronic instruments and in watches as well as components in rock drilling operations.

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

Manufacturer, supplier

AB Sandvik Materials Technology including any of its producing subsidiaries.

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#### 1.4. Emergency information

In case of emergency, contact your local authority advisor.

## 2. Hazards identification

### 2.1. Classification of the mixture

Some low alloy steels contain nickel as an 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.

**Table 1 The corresponding classification according to EC regulations EC 1272/2008 Annex V 3.1 and EC Directive 67/548/EEC:**

EC 1272/2008	EC Directive 67/548/EEC	
Hazard Class and Category Code	Hazard statement Code	
Carc. 2	H351	Carc. Cat 3, R40
STOT RE 1*	H372	T;R48/23
Skin Sens. 1	H317	R43

\* Low alloy steels containing 1-10 % Ni are classified as STOT RE2. Low alloy steels containing less than 1 % Ni are not classified.

### 2.2. Label elements

Since these products are alloys, labelling is not required

### 2.3. Other hazards

There are no hazards of concern for man or the environment from carbon steels and low alloyed steels in the forms supplied. However, if an individual is already sensitized to nickel, prolonged skin contact with low alloyed steels containing nickel may result in an allergic dermatological reaction. If prolonged

skin contact is involved in the processing of this product, please contact the supplier for advice. No carcinogenic effects resulting from exposure to these carbon steels and low alloyed 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.

### 3. Composition/information on ingredients

**Table 2**

Element	CAS number	EINECS	Concentration, wt-%	Classification (EC 1272/2008 Annex VI Table 3.1.)	EC Directive 67/548/EE
Nickel	7440-02-0	231-111-4	<4	Carc2; H351, STOT RE; H372, Skin Sens. 1; H317	Carc. Cat 3 T;R48/23 R43
Chromium	7440-47-3	231-157-5	<4	-	
Molybdenum	7439-98-7	231-107-2	<1	-	
Manganese	7439-96-5	231-105-1	<2	-	
Iron	7439-89-6	231-096-4	balance	-	

### 4. First aid measures

#### 4.1. Description of first aid measures

There are no specific first aid measures developed for carbon steels and low alloyed steels. Medical attention should be sought in case of an excessive inhalation of dust, a physical injury to the skin or to the eyes.

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

No relevant information has been identified.

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

No relevant information has been identified.

## 5. Firefighting measures

### 5.1. Extinguishing media

Carbon steels and low alloyed steels in massive form are not combustible. However, care should be taken to avoid exposing fine process dust (e.g. from grinding and blasting operations) to high temperatures as it may present a potential fire hazard.

### 5.2. Special hazards arising from the mixture

None identified.

### 5.3. Advice for firefighters

None identified.

## 6. Accidental release measures

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

Not applicable.

### 6.2. Environmental precautions

Not applicable

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

Not applicable

### 6.4 Reference to other sections

None.

## 7. Handling and storage

### 7.1. Precautions for safe handling

There are no special technical measures involved for handling 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. Coils and bundled products (e.g. sections, rods, bars etc.) 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 stocking narrow coils.

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

The product is stable in storage. However, it should be kept in mind that the products may display sharp edges and a sufficiently robust place capable of carrying the significant weight of the products should be used for storage.

### 7.3. Specific end uses

None identified.

## 8. Exposure controls/personal protection

### 8.1. Control parameters

There are no occupational exposure limits for carbon steels and low alloyed steels. Occupational exposure limits apply to some constituent elements (Ni, Cr, Mn, Mo) and certain of their compounds. Table 3 shows limits according to current legislation in Sweden.

**Table 3. Occupational Exposure Limits, NGV, (mg/m<sup>3</sup>) IN SWEDEN.**

Element and compounds		TD
Iron oxide, fume	as Fe	
Manganese & its inorganic compounds	as Mn	0.2
Chromium	as Cr	0.5
Copper and its compounds	as Cu	1
Nickel	as Ni	0.5
Molybdenum & its insoluble compounds	as Mo	10

NGV = Nivågränsvärde (One working day exposure)

RD = Respirable Dust acc. to EN 481; TD = Total Dust.

### 8.2. Exposure controls

### 8.2.1. Appropriate engineering 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.

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

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, welding heat radiation or contact with oils during processing.

The process of welding should only be performed by trained workers with the personal protective equipment in accordance with the laws of each member state relating to safety.

### 8.2.3. Environmental exposure controls

Emissions from ventilation or equipment in the work place should be controlled in order to assure that environmental legislation is fulfilled.

## 9. Physical and chemical properties

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

Appearance: Solid; metallic grey, ranging from dull to bright polished.

Occasionally supplied with oxidized, blue/black surfaces.

Odour: Odorless

Water solubility: Insoluble

Melting: 1300°C – 1520°C

Density: 7.6 – 8.0 g/cm<sup>3</sup>

Thermal expansion (mean value 20-100°C): 11 – 13 x 10<sup>-6</sup> °C<sup>-1</sup>

Thermal conductivity (RT): 30 – 75 W/m°C

Magnetic: Carbon steels and low alloyed steels are steels are ferromagnetic.

### 9.2. Other information

Thermal conductivity at 20°C, 30-75 W/(m K), depending on specific grade.  
Not explosive.

## 10. Stability and reactivity

### 10.1. Reactivity

Carbon steels and low alloyed steels are stable and non-reactive under normal ambient atmospheric conditions.

### 10.2. Chemical stability

Carbon steels and low alloyed steels are relatively stable and non-reactive under normal ambient atmospheric conditions. However, they can corrode (rust) with a rate that increases with increasing humidity and temperature. The consequences of any corrosion must be taken into account and the need for any surface treatment, e.g. painting or galvanizing, should be considered. In sufficiently corrosive environments, e.g. in the presence of chlorides or acids, alternative materials, such as stainless steels should be selected.

### 10.3. Possibility of hazardous reactions

May react in contact with acids, releasing gaseous acid decomposition products, e.g. hydrogen, oxides of nitrogen.

### 10.4. Conditions to avoid

When heated to very high temperatures fumes may be produced (e.g. by cutting, welding or melting operations).

### 10.5. Incompatible materials

May react in contact with acids, releasing gaseous acid decomposition products, e.g. hydrogen, oxides of nitrogen.

### 10.6. Hazardous decomposition products

See section 10.3. and 10.5.

## 11. Toxicological information

### 11.1. Information on toxicological effects

#### *Acute toxicity*

Carbon steels and low alloyed steels are not acute toxic.

### *Irritation*

The exposure route of concern is inhalation. These steel products are in massive form and not possible to inhale.

### *Corrosivity*

Carbon steels and low alloyed steels are not corrosive to skin.

### *Sensitization*

Nickel is classified as a skin sensitizer. It causes skin sensitization in susceptible individuals through prolonged intimate contact with the skin (e.g. wearing of jewelery). The requirements of EC regulation EC 1272/2008 Annex VI Table 3.1 are such that alloys with 1% or more of nickel must, by default, also be classified as skin sensitizers.

The uses of products that contain Ni and which come into direct and prolonged contact with the skin are limited by 2004/96/EC. Posts inserted into pierced ears and other parts of the body during epithelization of the wound must not contain more than 0,050 % Ni. Other Ni-containing products in direct and prolonged contact with the skin must release no more than 0,5 mg/cm<sup>2</sup>/week of Ni as defined in EN 1811.

### *Repeated dose toxicity*

During mechanical working, flame cutting or welding, 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.

### *Carcinogenicity*

Carbon steels and low alloyed steels may contain nickel, which has been classified, see section 2, Hazards identification. The exposure route of concern is inhalation. These steel products are in massive form, not capable of being inhaled.

The requirements of EC regulation EC 1272/2008 Annex VI Table 3.1 are such that all 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 nickel alloys 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, alloys with up to 40 % nickel caused no significant increase in cancer.

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 chromium containing steels, compared with the slightly increased risk when welding steels that do not contain chromium.

#### *Mutagenicity*

Carbon steels and low alloyed steels are not classified as mutagenic.

#### *Toxicity for reproduction*

Carbon steels and low alloyed steels are not toxic for reproduction.

## 12. Ecological information

### 12.1. Toxicity.

Not ecotoxic.

### 12.2. Persistence and degradability

Not relevant.

### 12.3. Bioaccumulative potential

None.

### 12.4. Mobility in soil

Not soluble in water. Immobile.

### 12.5. Results of PBT and vPvB assessment

Not relevant.

## 12.6. Other adverse effects

No known harmful effects. No special precautions are required.

## 13. Disposal considerations

### 13.1 Waste treatment methods

Surplus and scrap (waste) carbon steels and low alloyed steels are valuable commodity and in demand for the production of prime stainless steel.

Recycling routes are well-established, and recycling is therefore the preferred disposal route. Disposal to landfill is a waste of resources and therefore less desirable than recycling.

## 14. Transport information

No special precautions required.

The product is not classified as hazardous for transport.

## 15. Regulatory information

### 15.1. Safety, health and environmental regulation/legislation specific for the mixture

Steels containing 1% or more of nickel are classified in the same way as nickel, see section 2. Hazards classification, in this document. However, in recognition of their essentially non-hazardous nature, these steels in the massive form are not required to be labelled as hazardous.

### 15.2. Chemical safety assessment

No chemical safety assessment has been published.

## 16. Other information

EC 1272/2008			EC Directive 67/548/EEC	
Hazard Class and Category Code	Hazard statement Code	Hazard statement in full text	Code	Full text
Carc. 2	H351	Suspected of causing cancer	Carc. Cat 3, R40	Limited evidence of a carcinogenic effect.
STOT RE 1*	H372	Causes damage to organs through prolonged or repeated exposure	T;R48/23	Toxic: danger of serious damage to health by prolonged exposure through inhalation.

Skin Sens. 1	H317	May cause an allergic skin reaction	R43	May cause sensitization by contact.
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\*Steels containing 1-10 % Ni are classified as STOT RE2. Steels containing less than 1 % Ni are not classified.

### 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 regulation EC 1935/2004. The document includes one sections on iron and one on stainless steel.

### 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.
5. Santonen, Stockman -Juvala, Zitting:  
Review on toxicity of stainless steel, Finnish Institute of Occupational Health, ISBN 978-952-261-039-3, 2010-11-17

### References to national regulations

#### *SWEDEN*

AFS 2011:18 Hygieniska gränsvärden och åtgärder mot luftföroreningar.  
(Hygienic limit values and measures against air pollutants)

KIFS 2005:7 Klassificering och märkning av kemiska produkter. (Classification and labelling of chemical products)

KIFS 2008:2 Kemiska produkter och biotekniska organismer. (Chemical products and biotechnical organisms)

### *UK*

Health & Safety Executive Guidance Notes

EH26: Occupational Skin Diseases Health and Safety Precautions

EH40: Occupational Exposure Limits 2002

EH42: Monitoring Strategies for Toxic Substances

EH44: Dust in the Workplace: General Principles of Protection 1990

EH54: Assessment of Exposure to Fume from Welding and Allied Processes

EH55: The Control of Exposure to Fume from Welding, Brazing and Similar Processes.

### *Finland*

HTP Haitallisiki tunnetut pitoisuudet 2000 ([www.occuphealth.fi](http://www.occuphealth.fi))

### *EU*

The steel products according to section 1 in this SIS, conform to requirements, regulations or guidance given in:

- Reach regulation EC 1907/2006
- Classification, Labelling and Packaging regulation EC 1272/2008.
- EU Directive 67/548/EEC, Directive on Dangerous Substances
- EU Directive 2006/122/EG, i.e. the 30th amendment of the Directive 76/769/EEG of the 12th of December 2006. The directive 76/769/EEG is used for controlling the risks for human health and the environment caused by hazardous substances.
- EU Directive 2011/65/EU of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment. (RoHS).
- EN 1811: Reference test method for release of nickel from products intended to come into direct and prolonged contact with skin.

AB Sandvik Materials Technology is third party certified according to the Environmental Management System, ISO 14 001:2004.

This certification requires full compliance with national and EU legislation within our area of business.

Declaration

The information given in this safety information 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.

#### Trademarks

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\* Previous designation: Material safety datasheet (MSDS)