

STAINLESS STEEL WELDING ARTICLES PRODUCT SAFETY INFORMATION SHEET (SIS) EXHAUST® F1

This information is provided in accordance with European Parliament and Council Regulation 1907/2006/EEC "REACH" and with reference to :

- Regulation EC N°1272/2008 Classification, Labeling and Packaging (EU-GHS / CLP)
- Regulation EC N°790/2009 of 10 August 2009, ATP 1 of EC N°1272/2008 (including Ni and Ni compounds classification)
- Delegated Regulation EC N°217/2020, ATP 14 of EC N°1272/2008 (including Co classification update)

Important foreword

Products supplied by UGITECH are considered as articles within the scope of REACH in accordance with the EUROFER position papers on steel articles (*) and welding wires (**). According to REACH-article 33, Safety Data Sheets as described in article 31 are not required for such products. Nevertheless UGITECH is willing to provide thorough safety information to its customers. For an easier reading, the format of this information is similar to Materials Safety Data Sheets commonly available for chemical mixture (or preparations) in Europe and in other parts of the world (16 headings document in accordance with GHS recommendations).

Disclaimer

The information in this document was obtained from sources which we believe are reliable. However, the information is provided without any warranty, expressed or implied regarding the accuracy or correctness. The conditions of use, handling storage and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we will not assume any responsibility and disclaim liability for damage or expense connected with the handling, storage, use or disposal of the product. This document shall not be considered as a reference manual for safety purposes.

(*) EUROFER position paper determining the borderline between preparations/articles for steel and steel products, 28 October 2008

<https://www.eurofer.eu/assets/publications/position-papers/reach-position-papers/EUROFER-position-paper-determining-the-borderline-between-preparations-and-articles-for-steel-and-steel-products.-28-October-2008.pdf>

(**) EUROFER position paper on steel welding wire, January 2010

<https://www.eurofer.eu/assets/publications/position-papers/reach-position-papers/EUROFER-position-paper-on-steel-welding-wire.-7-January-2010.pdf>

Applicability

This Product Safety Information Sheet is valid for articles made of stainless steels grades suitable for welding applications and designated according to European and/or ISO practices.

Stainless steel grades within the scope of this document are alloys containing Cr and Ni as the main alloying elements (content in weight of Cr+Ni larger than any other constitutive element, content in Cr exceeds 10,5% as required for all so called stainless steels).

For applications such as welding, the articles supplied by UGITECH may be covered or shipped with specific surface preparation or coatings made from different substances such as wax.

The information in this document refers to the bare stainless steel article.

1. Identification of products and company

Brand name More specifically, this SIS is valid for the following UGITECH commercial designation: **EXHAUST® F1** and with reference to the following international standard(s): **ISO 14343-A G/W 18 L Nb** including composition range information. More precise analysis of the specific batch may be given when an analysis certificates has been requested and issued.

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2. Composition - Information on substances in stainless steel articles

Ni content depends on specific grade and will range from 0 to 30% Nickel (Ni) (CAS 7440-02-0)
max. 25% Chromium (Cr) (CAS 7440-47-3)
max. 5% Manganese (Mn) (CAS 7439-96-5)
max. 6% Molybdenum (Mo) (CAS 7440--)
max. 0.6% Cobalt (Co) (CAS 7440-48-4)

Other elements may be present, such as Silicon (Si), Copper (Cu), Titanium (Ti). These are not classified as hazardous, or are below the concentration levels for classification of the stainless steel alloys as hazardous.

More precise composition information can be obtained from the specific designation and/or certificate (see paragraph 1).

3. Hazard classification

The only substances important for hazard classification of stainless steel in the solid form are Ni and potentially Co.

In accordance with (EC) Regulations 1272/2008 (CLP) and 790/2009 (CLP-ATP1), nickel is classified as a carcinogen category 2, Specific Target Organ Toxicity Repeated Exposure 1 and skin sensitizer 1. The CPL Regulation has introduced changes in the classification of nickel when compared with the Dangerous Substance and Dangerous Preparations Directives, which it superseded for mixtures starting 2015 june 1st.

As a result, stainless steels containing above 10%Ni, if considered as mixtures are classified as carcinogen category 2.

According to EC Regulation 1272/2008, alloys containing nickel are classified for skin sensitisation when the release rate of 0,5µg Ni/cm²/week, as measured by the European Standard reference test method EN 1811, is exceeded.

Description of hazards

According to Delegated EC Regulation 217/2020 (CLP-ATP14), alloys containing Cobalt are classified for skin sensitisation and as respiratory sensitiser when the Co content is above 1,0%. The alloys containing above 0,10%Co will be classified as CMR 1B after October 1st 2021.

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. Dust and fume quantity as well as composition depend on specific practice, on parent and welding material. Different alloying elements (including Cr and Ni) may be found under various oxidized forms in welding fumes. Welding or allied processes should only be performed by trained workers. Guidance such as American National Standard Z49.1 and German BGR-220 give valuable information on Safety in Welding and Cutting.

4. First Aid Measures

Inhalation	Not applicable to stainless steels in the massive form. Inhalation of dust and/or fume from grinding, cutting : operations is unlikely to generate the need for specific first aid.
Skin and eye contact	There are no special symptoms or effects associated with stainless steels. 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. Stainless steel particles may not always respond strongly to a magnet placed over the eye. In such cases seek hospital treatment.
Ingestion	Does not apply to stainless steels in the massive form.

5. Firefighting measures

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

Unusual fire or explosion hazard may rise from finely divided, suspended particulates in the presence of heat, sparks or flames. Such unstable atmosphere have been reported in sand blasting. The use of water should be avoided as it may cause explosive hydrogen gas generation.

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. 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 stacking narrow coils.

8. Exposure controls/Personal protection

Occupational exposure limits

There are no specific occupational exposure limits for stainless steel articles.

Occupational exposure limits (OEL) apply to some constituent elements (Ni, Cr, Mn, Cu, Mo, ...) and certain of their compounds. There is no worldwide definition of exposure (short term, time-weighted average, ceiling limits, permissible values, recommended values) and the OEL limits are set to slightly different values in the different parts of the World (countries and even states or provinces within a country).

Table A shows limits acceptable according to current legislation in France (10) and Germany.

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Substance	France Average Value (VME) mg/m ³	France Max. value (VLCT) mg/m ³	Germany Average Value mg/m ³	Germany Max. value mg/m ³
Chromium (metallic and CrIII)	2		-	-
Chromium VI, measured as Cr (**)	0,001	0,005	0,05 (E)	0,2
Copper (dust), measured as Cu	1	2	1 (E)	4
Copper (fumes)	0,2		0,1 (A)	0,4
Iron oxide (Fe ₂ O ₃) measured as Fe	5			
Manganese (fumes), measured as Mn	1		0,5 (E)	2
Molybdenum (soluble compounds) en Mo	5	10	5 (E)	20
Nickel (metallic)	1		0,5 (E)	2
Nickel (oxide), measured as Ni	1		0,5 (E)	2

((E) = einatembar – (A) = alveolengängig) – (**) Cr VI classified as CMR

Table B shows exposure limits of a few elements and compounds according to the current legislation or recommendations in the United States of America (*).

Substance	US- OSHA Average (TWA) mg/m³	US-OSHA Ceiling value mg/m³	US-NIOSH Average (TWA) mg/m³	US-NIOSH Ceiling value mg/m³
Chromium (metallic)	1,0		0,5	-
Chromium (trioxide), measured as Cr	0,5		0,5	-
Chromium VI, measured as Cr (**)	0,05		0,005	
Cobalt (metallic)	0,1		0,05	
Copper (dust), measured as Cu	1 (0,1 fumes)		1 (0,1 fumes)	
Iron (Fe ₂ O ₃) (fumes), measured as Fe	10		5 (fume and dust)	
Manganese (fumes), measured as Mn		5	1	3
Molybdenum (soluble compounds) en Mo	15 (5)			
Nickel (metallic)	1		0,015	

(*) *legal values are different in the different States.* (**) *Cr VI considered occupational carcinogen*

The above tables are to be considered as indicative and in case of welding of stainless steels, the user should locally refer to the local applicable values.

Exposure controls

In the processing of all metallic materials, exposure to fume and dust must be kept below any legally imposed limits in each country or state. Limits may strongly vary depending on local legislation.

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.

Hand protection equipment such as gloves is also important to avoid direct skin contact as skin sensitiser elements are present in the Ni containing stainless steels.

9. Physical and chemical properties

Appearance: Solid - metallic grey, ranging from dull to bright polish. Occasionally supplied with oxidised, blue/black surfaces.

Odour: odourless

Water solubility: insoluble

Melting: 1325°C to 1530°C

Density: 7,7 – 8,3 kg/dm³

10. Stability and reactivity

Stainless steels are stable and non-reactive under normal ambient atmospheric conditions. They may react in contact with strong acids to release 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, grinding or melting operations).

11. Toxicological data

Chronic toxicity, oral or inhalation

Specific stainless steels may contain above 10% nickel. Ni has been classified according to CLP-ATP1 as a suspect carcinogenic substance, Category 2 (i.e. "causing concern for man... but available information is not adequate for making a satisfactory assessment"). When considered as mixture, some stainless steels might be classified as Carcinogenic Cat 2. However, in this case, the exposure route of concern is inhalation.

These Ni containing stainless steels are in massive form, not capable of being inhaled.

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.

In the case of stainless steels, welding and flame cutting fumes may contain chromium oxides and hexavalent chromium compounds. Studies have shown that some hexavalent chromium compounds can cause cancer.

Dermatological toxicity

Nickel is classified as a skin sensitizer. It causes skin sensitisation in susceptible individuals through prolonged intimate contact with the skin (e.g. jewellery including piercing items).

According to REACH Regulation, Ni containing alloys shall not be used:

(a) in all 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/cm²/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, 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/cm²/week.

The standards EN 1811 adopted by the European Committee for Standardisation (CEN) shall be used as the test method.

Some stainless steels having high Ni content or with above 0,10%S may not be appropriate for such uses. In such cases, testing of the final article is required.

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 nickel containing alloys including stainless steels.

Recycling routes are well-established, and recycling is therefore the preferred disposal route. Disposal to landfill may not be harmful to the environment, but it is a waste of resources and therefore less desirable than recycling.

For dust and welding residues, recycling could be managed as well as waste treatment but disposal should be avoided.

14. Transport data



No special precautions required.

15.Regulatory references

Classification and labelling requirements



Nickel (CLP entry-028-002-00-7, CAS-No7440-02-0, EINECS-No231-111-4)

Table below provides a direct comparison of the hazard classification of nickel provided by these items of legislation. In accordance with CLP, stainless steels with Ni<1% are not classified and those containing above 1%Ni are classified as Carc Cat 2.

Hazard according to EU Regulation 1272/2008 (CLP) and 790/2009	Hazard Statement according to CLP	CLP pictogram (*)	
Carc Cat 2	H351	 (GHS08)	H351: Suspected of causing cancer (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard) : inhalation route
Skin Sens 1	H317	 (GHS07)	H317: May cause an allergic skin reaction
STOT RE 1	H372		H372 : Causes damage to organs(state all organs affected, if known) through prolonged or repeated exposure (state route of exposure if it is conclusively proven that no other routes of exposure cause the hazard)

(*) labelling is not necessary in Europe in the massive form

Cobalt (CLP entry-027-001-00-9, CAS-No7440-48-4, EINECS-No231-158-0)

Hazard according to EU Regulation 1272/2008 (CLP)	Hazard Statement according to CLP	CLP pictogram	
Resp. Sens. Cat 1	H334	 (GHS08)	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
Skin Sens. Cat 1	H317	 (GHS07)	H317: May cause an allergic skin reaction
Aquatic Chronic Cat 4	H413	no pictogram	H413: May cause long lasting harmful effects to aquatic life

The above classifications of Co do not apply to stainless steels as their Co content is below 1%.

No cobalt is intentionally added to stainless steels. Due to the fact however that cobalt is present in raw materials stainless steel inevitably contains at least trace amounts of cobalt. Depending on the grade this can amount up to 0.6%. This has been the case for the past decades without any associated health risk.

Cobalt does not have a harmonised classification today that would affect stainless steel classification. In vivo studies conducted with pure cobalt powder revealed a carcinogenic potency in cobalt metal powder when inhaled by test animals. The cobalt industry has proactively self-classified cobalt metal (all physical forms) as:

- Carcinogenic category 1B (H351) inhalation only
- Reprotoxic category 2 (H361F) (Provisional self-classification pending future testing)

According to the entry in force of CLP-ATP14 in october 2021, stainless steels containing more than 0,1%Co could become classified in Europe as :

Carcinogenic (C) category 1B (H350), Reprotoxic (R) category 1B (H360F) and Mutagenic (M) category 2 (H341).

According to IARC (International Agency for Research on Cancer), Ni is classified as Cat 1, Cobalt as Cat.2B and Cr as Cat 3.

According to NTP (US National Toxicology Program), Ni is classified as Cat. R.

16. Other information

Food contact materials

The Council of Europe published "Guidelines on metals and alloys used as food contact materials" in April 2013 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 (materials adapted to contact with food). The document includes a section on stainless steels and a paragraph on Ni.

The Swedish laboratory KTH has tested certain stainless steels according to the guidelines and used citric acid as food simulant (9). The use of citric acid in the new test guideline is relevant as it is commonly present in both acidic and alkaline food.

Those studies show that:

- None of the constituent alloying elements of stainless steel are released in amounts exceeding their corresponding release limits (SRLs), stipulated in the CoE protocol.
- Metal release rates decrease with time due to a gradually improved passivation of the stainless steel surface.
- Amounts of released metals diminish upon repeated use

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. Even if this review was written in 1999 it remains an interesting document.

- 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. Manufacture, processing and use of stainless steel: A review of the health effects, EUROFER, 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) WIL Research Laboratories, I. (2002). A 4-week range-finding inhalation toxicity study of nickel metal in albino rats, WIL Research Laboratories, Inc.: 1-319.
- 5) Inhalation carcinogenic study with nickel metal powder in Wistar rats. A.R. Olier et al., Toxicology and Applied Pharmacology 233 (2008) 262-275
- 6) International Agency for Research on Cancer. Chromium, nickel and welding. 'IARC Monograph on the Evaluation of Carcinogenic Risks to Humans'. Lyon: IARC 1990.
- 7) BG rules for occupational health and safety, BGR 220, "welding fumes", jan.2006
- 8) Metals and Alloys used in food contact materials and articles, EDQM, CoE, 2013, 1st Edition, ISBN 978-92-871-7703-2, Specific chapter on Stainless Steels pp165, www.edqm.eu
- 9) Surface changes and metal release in the presence of citric acid for food applications Stainless steel grades 201, 304, 204, 2101, 316L, 430, and EN1.4003, December, 2014, KTH Royal Institute of Technology, Division of Surface and Corrosion Science, Sweden
- 10) INRS outil65, Valeurs limites d'exposition professionnelle établies pour les substances chimiques
[Fichier-VLEP-outil-65](#)

References to European and national legislation

- 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)
- 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
- Regulation (EC) No 790/2009 1st Adaptation to Technical Progress (ATP) to the CLP Regulation
- Delegated Regulation (EC) No 217/2020 14th Adaptation to Technical Progress (ATP) to the CLP Regulation (completely in force after October 4th 2021)
- Art.R44-12 du Code du travail, Décret Français n°2008-244 du 7 mars 2008
- Arrêté français du 30 juin 2004 modifié par l'arrêté du 6 octobre 2007 et par l'arrêté du 9 mai 2012 liste les Valeurs limites réglementaires indicatives

References to standards

- Designation and composition of stainless steels :
 - EN-10088-1:2014 - Stainless steels — Part 1: List of stainless steels
 - EN-10095:1999 – Heat-resisting steels and alloys
 - EN-10302:2008 – Creep resisting steels and alloys
 - EN-ISO-14343 :2017 - Welding consumables -- Wire electrodes, strip electrodes, wires and rods for fusion welding of stainless and heat resisting steels – Classification
 - ISO 15510:2014 - Stainless steels – chemical composition
 - ASTM A959-19 - Standard Guide for specifying harmonized standard grade composition for wrought stainless steels
 - AWS-A5.9/A5.9M :2012 : Specification for Bare Stainless Steel Welding Electrodes and Rods
- EN 1811:2011+A1:2015 Reference test method for release of nickel from products intended to come into direct and prolonged contact with skin.
- NSF/ANSI 51:2019 International Standard for "Food equipment materials"
- AWS/ ANSI Z49.1:2012 American National Standard "Safety in welding, cutting, and allied processes"
<http://www.aws.org/standards/page/ansi-z491>

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.

Terms and definitions (Ref. Guide ISO 51)

Harm:	Physical injury or damage to health of people or damage to property or the environment
Hazard:	Potential source of harm
Risk:	Combination of the probability of occurrence of harm and the severity of that harm
Safety:	Freedom from unacceptable risk