Ugitech

Member of Swiss Steel Group

Ugitech SA
CS 90100 - Avenue Paul Girod - 73403 UGINE CEDEX

NI-BASED ALLOY ARTICLES
PRODUCT SAFETY INFORMATION SHEET (SIS)

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) No 790/2009 of 10 August 2009, ATP1 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 paper on steel articles (*).

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 and environmental information to its customers.

For ease of reading, the format of this information is similar to the safety data sheets commonly available for chemical preparations in Europe and other parts of the world (16 headings according to the recommendations of the Globally Harmonised System of Classification and Labelling of Chemicals).

Disclaimer

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(*) 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

Applicability

This Product Safety Information Sheet is valid for articles made of Ni-based alloys grades listed in ANNEX 1 and designated according to European and/or ISO practices.

Ni-based alloys within the scope of this document are alloys containing Ni in which Ni is the main alloying elements (content in weight larger than any other constitutive element).

For some applications such as cold heading or for special deliveries, the articles supplied by UGITECH may be covered or shipped with specific surface preparation or coatings made from different substances (oil, specific salts, metallic coating).

The information in this document refers to the Ni-based alloys articles.

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1. Identification of products and company

Brand name

UGITECH commercial designation is given in ANNEX 1 associated with relevant composition information. References to international standards are included to allow an easy access to a wider information on the composition. More precise analysis of the specific batch may be given when an analysis certificates has been requested and issued

Manufacturer Importer Supplier

UGITECH SA
Avenue Paul Girod
FR 73 403 Ugine CEDEX
ugitech.com

Department supplying information

Pierre-Michel BONE

REACH Manager
UGITECH SA
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2. Composition - Information on substances in Ni-base alloy articles

Ni-based alloys with more than 30% Nickel (Ni) (CAS 7440-02-0)
max. 25% Chromium (Cr) (CAS 7440-47-3)
max. 5% Manganese (Mn) (CAS 7439-96-5)
max. 20% Molybdenum (Mo) (CAS 7440--)
max. 1%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 Ni-based alloys as hazardous.

Note that the approximate content of elements in concentration higher than 1% can be appreciated from the alphanumeric designation in ANNEX 1 - table 2.

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3. Hazard classification

The only substances important for hazard classification of Ni-based alloys in the solid form are Ni and potentially Co.

In accordance with (EC) Regulations 1272/2008 (CLP) and 790/2009 (CLP-ATP1), Ni 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 Ni when compared with the Dangerous Substance and Dangerous Preparations Directives, which it superseded for mixtures starting 2015 june 1st.

As a result, Ni-based alloys, all containing above 10%Ni, if considered as mixtures are classified as carcinogen category 2.

According to EC Regulation 1272/2008, alloys containing Ni 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.

Since 1 October 2021, Co is classified as Carcinogenic (C) category 1B (H350), Reprotoxic (R) category 1B (H360F) and Mutagen (M) category 2 (H341). Marketed substances and mixtures (excluding articles) must comply with CLP requirements. As such, the labelling and the Safety Data Sheet must mention them as soon as the mass/mass concentration is greater than or equal to 0.1%.

Concerning articles, Co is not classified in the ECHA list of SVHC at the date of issue of this document. As such, the downstream communication obligation does not apply when the concentration is greater than or equal to 0.1% mass/mass.

Since 1 October 2021, Co metal and its alloys in concentration greater than 0.1% weight by weight are no longer permitted to the non-professional public. However, articles containing Co metal are not subject to this restriction, nor is the supply of Co metal and its alloys for strictly professional use.
In addition, the regulation specific to devices for medical use imposes for some of them containing Co in a concentration equal to or higher than 0.1% mass/mass to comply with the new requirements of EU regulation 2017/745. Consequently, for these applications, Ugitech's sales department should be contacted to select the appropriate grades. As a reminder, table 1 in the appendix is intended to specify the average chemical element content, particularly residual, of the various Ni-based alloys.

Description of hazards

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 implementation on parent and w Ni-based alloys elding material. Different alloying elements (including Cr for Cr-containing Ni-based alloys) 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.

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4. First Aid Measures

Inhalation

Not applicable to Ni-based alloys in the massive form.

Inhalation of dust and/or fume from welding, grinding, and cutting or any other abrasive process does not require specific first aid measures.

Skin and eye contact

There are no special symptom or effect associated with Ni-based alloys.

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. Ni-based alloys particles may not always respond strongly to a magnet placed over the eye. In such cases seek hospital treatment

Ingestion

Does not apply to Ni-based alloys in the massive form.

5. Firefighting measures

Ni-based alloys are not combustible in massive form. There are no special hazards or precautions associated with Ni-based alloys 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 Ni-based alloys. 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.
- Some 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.

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8. Exposure controls/Personal protection

Occupational exposure limits

There are no specific occupational exposure limits for Ni-based alloys 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 sligthly 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 and Germany.

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 Chromium III)	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_2O_3) measured as Fe	5			
Manganese (fumes), measured as Mn	1		0,5 (E)	2
Molybdenum (soluble compounds) as Mo	5	10	5 (E)	20
Nickel (metallic)	1		0,5 (E)	2
Nickel (oxide), measured as Ni	1		0,5 (E)	2

(E) = inhalant – (A) = alveolar – (**) Cr VI classified as CMR

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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-NIOSH Average (REL-TWA) mg/m³	US-NIOSH Ceiling value (STEL-TWA) 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_2O_3) (fumes), measured as Fe	10	5 (fumes and dust)	
Manganese (fumes), measured as Mn	5 *(PEL-C)*	1	3
Molybdenum (soluble compounds) as 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 Ni-based alloys, the user should locally refer to the local 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.

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-based alloys.

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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

Ni-based alloys 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

Ni-based alloys steels according to ANNEXE 1 table 1 contain above 10% Ni - which has been classified in EC CLP as a suspect carcinogenic substance, Category 2 (i.e. ”causing concern for man... but available information is not adequate for making a satisfactory assessment”) - should also classified as Carcinogenic Cat 2.

However, the exposure route of concern is inhalation. These Ni-based alloys products are in massive form, not capable of being inhaled.

During mechanical working, flame cutting or welding, Ni-based alloys 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 Ni powders and dusts and fumes generated in the production of Ni-based alloys have not indicated a respiratory cancer hazard.

In the case of Ni-based alloys containing Cr, welding and flame cutting fumes may contain hexavalent chromium compounds. Studies have shown that some hexavalent chromium compounds can cause cancer.

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Dermatological toxicity

Ni is classified as a skin sensitizer. It causes skin sensitisation in susceptible individuals through prolonged intimate contact with the skin (e.g. wearing of jewellery).

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 Ni 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 Ni 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.

Most Ni-based alloys may not be appropriate for such uses in particular those with low Cr content. 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) Ni-based alloys is valuable and in demand for the production of prime new Ni 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.

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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 Ni provided by these items of legislation.

Ni-based alloys are classified as Carc Cat 2

Hazard according to EU Regulation 1272/2008 (CLP) and 790/2009	CLP pictogram (*)	Hazard Statement according to CLP
Carc Cat 2	 (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	 (GHS07)	H317: May cause an allergic skin reaction
STOT RE 1		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

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

Hazard according to EU Regulation 1272/2008 (CLP)	**CLP pictogram**	**Hazard Statement according to CLP**
Carcinogenic category 1B	 (GHS08)	H350 : May cause cancer
Mutagen category 2	 (GHS08)	H341 : Suspected of causing genetic defects
Reprotoxic category 1B	 (GHS08)	H360F : May damage fertility
Resp. Sens. Cat 1	 (GHS08)	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
Skin Sens. Cat 1	 (GHS07)	H317: May cause an allergic skin reaction
Aquatic Chronic Cat 4	no pictogram	H413: May cause long lasting harmful effects to aquatic life

From 1 October 2021, Co is classified as Carcinogenic (C) category 1B (H350), Reprotoxic (R) category 1B (H360F) and Mutagen (M) category 2 (H341). Marketed substances and mixtures (excluding articles) must comply with CLP requirements. As such, the labelling and the Safety Data Sheet must mention them as soon as the mass/mass concentration is greater than or equal to 0.1%.
Concerning articles, Co is not classified in the ECHA list of SVHC at the date of issue of this document. As such, the downstream communication obligation does not apply when the concentration is greater than or equal to 0.1% mass/mass. However, the regulation specific to medical devices requires some of them containing Co in a concentration higher than 0.1% mass/mass to comply with the new requirements of EU regulation 2017/745. Consequently, for these applications, Ugitech's sales department should be contacted to select the appropriate grades. As a reminder, table 1 in the appendix is intended to specify the average chemical element content, particularly residual, of the various Ni-based alloys.

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16. Other information

Materials for food contact

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 Ni-based alloys 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 Ni-based alloys 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 Ni-based alloys surface.
- Amounts of released metals diminish upon repeated use

Materials for medical devices

If Co content is a requirement for your market applications, you should specify this in the consultation and our Quality Metallurgy Department will propose a grade to meet your requirements in accordance with Regulations

- (EU) 2020 / 217 of 4 October 2019 which came into force on 1 October 2021 for Co
- (EU) 745 / 2017 of 5 April 2017 which came into force for Co on 26 May 2021.

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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 and is not completely relevant for Ni-based alloys, mainy of them containing cr and Fe, 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) 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
- Art.R44-12 du Code du travail, Decret Français n°2008-244 du 7 mars 2008
- Arreté français du 30 juin 2004 modifié par l'arreté du 6 octobre 2007 et par l'arreté du 9 mia 2012 liste les Valeurs limites règlementaires indicatives
- Delegated Regulation (EC) No 217/2020 14th Adaptation to Technical Progress (ATP) to the CLP Regulation (completely in force after October 4th 2021)

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References to standards

- 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 51:2012 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
- AWS-A5.14/A5.14M :2011 : Specification for Nickel and Ni-Alloy Bare Welding Electrodes and Rods
- EN ISO 18274:2011 Welding consumable – Solid wire electrodes, solid strip electrodes, solid wires and solid rods for fusion welding of nickel and nickel alloys.
- EN-10302:2008 – Creep resisting steels and alloys
- NACE M0175 – Materials for use in H2S containing environments in oil and gas production
- AMS 5662 - ALLOY BARS, FORGINGS, AND RINGS, CORROSION AND HEAT RESISTANT Nickel Base - 19Cr - 3.1Mo - 5.1(Cb + Ta) - 0.90Ti - 0.50Al Consumable Electrode or Vacuum Induction Melted, Solution
- AMS 5962 – NICKEL ALLOY, CORROSION AND HEAT RESISTANT, BARS AND WIRE 52.5Ni - 19Cr - 3.0Mo - 5.1Cb - 0.90Ti - 0.50Al - 19Fe Consumable Electrode or Vacuum Induction Melted 1775 °F (968 °C) Solution Treated and Cold Worked Precipitation Hardenable
- EN 10269: Steels and nickel alloys for fasteners
- AMS 5698 - Alloy wire , corrosion and heat resistant Nickel base – 15.5Cr - 7Fe - 2.3Ti - 1(Cb+Ta) – 0.7Al
- AMS 5699 - Nickel Alloy, Corrosion and Heat-Resistant, Wire, 72Ni - 15.5Cr - 0.95Cb - 2.5Ti - 0.70Al - 7.0Fe, Spring Temper, Precipitation Hardenable
- ASTM B168: Standard specification for Ni-Fe-Cr Alloy
- ASTM F1684 – Standard Specification for Iron-Nickel and Iron Nickel Cobal Alloys for Low Thermal Expansion applications

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:	Not acceptable risk

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ANNEX 1 : List of grades used for UGITECH Ni-based alloys articles

All Ni-based alloys have a carbon content less than 0,1wt% and a silicon content lower than 0,7wt%

TABLE 1 – Information on composition (in weight %)

UGITECH trade mark	Ni	Cr	Mo	Fe	Co	Cu	Others
UGIALLOY® 22	≥ 49,0	21,0 – 22,5	12,5 – 14,5	2,0 – 5,0	≤ 2,5	≤ 0,5	W ≤ 2,5 – 3,5 V ≤ 0,3
UGIALLOY® 59	≥ 56,0	22,0 - 24,0	15,0 - 16,5	≤ 1,5	< 0,3	≤ 0,5	Ti ≤ 0,5 Al: 0,1 - 0,4 V ≤ 0,3
UGIALLOY® 55	54,0 - 56,0			Balance		≤ 0,5	
UGIALLOY® 61	≥ 94,0			≤ 1,0		≤ 0,25	Ti: 2,5 - 3,5 Al ≤ 0,1 / Mn ≤0,7
UGIALLOY® 82	≥ 67,0	18,0 - 22,0		≤ 3,0		≤ 0,5	(Nb+Ta): 2,0 - 3,0 Mn: 2,5 - 3,5 Ti ≤ 0,5
UGIALLOY® 182	≥ 61,0	15,0 - 18,0		5,0 - 6,0		≤ 0,3	(Nb+Ta): 1,5 - 2,5 Ti ≤ 0,5
UGIALLOY® 200	≥ 99,2				< 1,0	≤ 0,25	
UGIALLOY® 276	≥ 50,0	15,0 - 16,5	15,0 – 17,0	4,0 – 7,0	≤ 1,0	≤ 0,5	W: 3.2 – 4.2 V ≤ 0,35
UGIALLOY® 413	29,0 - 32,0			0,4 - 0,75	< 1,0	Balance	Ti: 0,2 - 0,5 Pb ≤ 0,01
UGIALLOY® 418	64,0 - 67,0			≤ 0,6		28,0 - 32,0	Ti: 1,6 - 2,5 Al ≤ 0,5 Mn: 3,0 – 4,0
UGIALLOY® 617	≥ 44,0	21,0 – 24,0	8,5 – 9,5	≤ 1,0	11,0 – 13,0	≤ 0,5	Al: 1,0 – 1,5 Ti ≤ 0,6
UGIALLOY® 625	≥ 58,0	20,0 - 23,0	8,0 – 10,0	≤ 5,0		≤ 0,5	(Nb+Ta) : 3,2 – 4,0
UGIALLOY® 686	≥ 49,0	19,0 - 23,0	15,0 - 17,0	≤ 5,0		≤ 0,5	W: 3,0 - 4,4 Al ≤ 0,5 / Ti ≤ 0,25
UGIALLOY® 718	50,0 - 55,0	17,0 - 21,0	2,8 - 3,3	≤ 24,0		≤ 0,3	(Nb+Ta): 4,8 - 5,5 Ti: 0,7 - 1,1 Al: 0,2 - 0,8
UGIALLOY® 825	38,0 - 46,0	19,5 - 23,5	2,5 - 3,5	≥ 22,0		1,5 / 3,0	Ti: 0,6 - 1,2 Al ≤ 0,2

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TABLE 1 – Information on composition (in weight %)

UGITECH trade mark	Ni	Cr	Mo	Fe	Co	Cu	Others
UGIALLOY® NCW	≥ 58,0	21,0 – 23,0	9,0 – 11,0	≤ 2,0	≤ 0,2	≤ 0,5	W: 2,5 – 3,5 Al ≤ 0,4 / Ti ≤ 0,4
UGIALLOY® 4	65 (a)	16 (a)	15 (a)	2 (a)	< 1,0		Ti0,7
UGIALLOY® 600	≥ 70,0	14,0 – 17,0		6,0 – 10,0		≤ 0,5	(Nb+Ta): 1,5 – 3,0
UGIALLOY® 601	58,0 – 63,0	21,0 – 25,0		≤ 20,0		≤ 0,5	Al 1,0 – 1,7
UGIALLOY® 750-1	73 (a)	15,5 (a)		7 (a)	< 1,0		Ti 2,5 Al 07 /Nb 0,9
UGIALLOY® 80A	75 (a)	19,5 (a)		< 1,5	< 1,0		Ti 2,3 Al 1,4
UGIALLOY® INVAR	36 (a)	< 1	< 1	Balance	< 1,0		
UGIALLOY® N52	50,5 (a)	< 1	< 1	Balance	< 1,0		
UGIALLOY® SUP50	47,5 (a)	< 1	< 1	Balance	< 1,0		
UGIALLOY® HT400	≥ 62			1,0 – 2,5	< 1,0	28 - 34	Si ≤ 0,5 / Al ≤ 0,5
UGIALLOY® HT825	38,0-46,0	19.5-23.5	2,5-3,5	Balance	< 1,0	1,5-3,0	Ti :0,60-1,20
UGIALLOY® N42	40,0-41,0	≤ 0,1	≤ 0,1	Balance	≤ 0,5	≤ 0,1	

(a)Typical value

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NI-BASED ALLOY ARTICLES
PRODUCT SAFETY INFORMATION SHEET (SIS)

ANNEX 1 : List of grades used for UGITECH Ni-based alloys articles
TABLE 2

Most of the supplied articles correspond to standard grades than can be found in the referenced standards. The table below gives a list of several widely known standard designations with close correspondance.

TABLE 2 – Information on composition and correspondence with standards

UGITECH trade mark	UNS	EN number	EN Symbol	AWS A5.14	ISO 18274	Type
UGIALLOY® 55	W82002	2.4472 / 2.4560	NiFe 45	* ERNiFeCI		Fe-Ni
UGIALLOY® 59	N06059	2.4607	NiCr23Mo16	ERNiCrMo-13	Ni 6059	Ni-Cr-Mo alloy
UGIALLOY® 61	N02061	2.4155	NiTi3	ERNi-1	Ni 2061	Ni
UGIALLOY® 82	N06082	2.4806	NiCr20Mn3Nb	ERNiCr-3	Ni 6082	Ni-Cr-alloy
UGIALLOY® 182	N06082	2.4620	NiCr16FeMn	** ENiCrFe-3		Ni-Cr-alloy
UGIALLOY® 200	N02200	2.4066	Ni 99,2			Ni
UGIALLOY® 413	C71581	2.0837		*** ERCuNi		Cu-Ni-alloy
UGIALLOY® 418	N04060	2.4377	NiCu30Mn3Ti	ERNiCu-7	Ni 4060	Ni-Cu-alloy
UGIALLOY® 625	N06625	2.4831	NiCr22Mo9Nb	ERNiCrMo-3	Ni 6625	Ni-Cr-Mo alloy
UGIALLOY® 686	N06686	2.4606	NiCr21Mo16W4	ERNiCrMo-14	Ni 6686	Ni-Cr-Mo alloy
UGIALLOY® 718	N07718	2.4667	NiFe19Cr19Nb5Mo3	ERNiFeCr-2	Ni 7718	Ni-Cr-Fe alloy
UGIALLOY® 825	N08825	2.4858	NiFe30Cr21Mo3	ERNiFeCr-1	Ni 8065	Ni-Cr-Fe alloy
UGIALLOY® NCW			NiCr22Mo10W3	ERNiCrMo-20	Ni 6660	Ni-Cr-Mo alloy

* *Nuance référencée dans la norme AWS A5.15*
** *Nuance référencée dans la norme AWS A5.11*
*** *Nuance référencée dans la norme AWS A5.7*

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NI-BASED ALLOY ARTICLES
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TABLE 2 – Information on composition and correspondence with standards

UGITECH trade mark	UNS	EN number	EN Symbol	AWS A5.14	ISO 18274	Type
UGIALLOY® 4	N06455	2.4610	NiMo16Cr16Ti			Ni-Cr-alloy
UGIALLOY® 600	N06600	2.4816	NiCr15Fe			Ni-Cr-alloy
UGIALLOY® 601	N06601	2.4851	NiCr23Fe			Ni-Cr-alloy
UGIALLOY® 750-1	N07750	2.4669	NiCr15Fe7Ti2Al			Ni-Cr-alloy
UGIALLOY® 80A	N07080	2.4631/2.4952	NiCr20TiAl			Ni-Cr-alloy
UGIALLOY® INVAR	K93600	1.3912	Ni 36			Fe-Ni
UGIALLOY® N52	N14052	2.4478	NiFe 47			Fe-Ni
UGIALLOY® SUP50	none	none	none			Fe-Ni
UGIALLOY® HT400	N04400	2.4360	NiCu30Fe			Ni-Cu alloy
UGIALLOY® HT825	N08825	2.4858	NiCr21Mo			Ni-Cr-alloy
UGIALLOY® N42	K94100	1.3917	NiFe42			Fe-Ni

(EN) : European designation of steel is set according to EN10027 standard and includes an EN number (starting with "1." for steels and with "2." for other alloys) and an EN Symbol. The symbol allows a fast identification of the major elements. For instance : UGIALLOY 625 is compatible with alloy registered as 2.4831 (EN number) / NiCr22Mo9Nb: this indicates that it is a Ni-based alloy containing around 22wt%Cr, around 9% wt Mo, and containing volontary Nb addition below 1%.
Other elements are impuritis and at levels below 1%.