

**KOS LIMITED**40-134, HANKANGRO-3KA,  
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IATF Certificate No: 0077623

**May, 2010****MATERIAL SAFETY DATA SHEET (MSDS)**

This MSDS has been compiled according to the guide provided in the EC Directive 93/112/EC.

**[1]. Identification of the company and product.****1-1. Supplying company.****KOS LIMITED**

40-134, HANKANGRO-3KA, YONGSAN-KU, SEOUL, KOREA

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**1-2. Product : Stainless steel wire**

The grade of stainless steel wire varies with its specific chemical composition.

The stainless steel wire is intended primarily for cold forming, including coiling, weaving, heading, stranding and machining.

**[2] Composition/information on ingredients****2-1. The chemical composition of the stainless steel is as follows**

INGREDIENT		CAS NO.	%	TLV
Iron	Fe	7439-89-6	< 90	5 mg/m <sup>2</sup>
Chromium	Cr	7440-47-3	10 -30	5 mg/m <sup>2</sup>
Nickel	Ni	7440-02-0	< 15	1 mg/m <sup>2</sup>
Manganese	Mn	7439-96-5	< 15	1 mg/m <sup>2</sup>
Phosphorus	P	7723-14-0	< 0.05	1 mg/m <sup>2</sup>
Sulfur	S	7704-34-9	< 0.5	5 mg/m <sup>2</sup>
Silicon	Si	7440-21-3	< 5	5 mg/m <sup>2</sup>
Carbon	C	7440-44-0	< 0.3	55 mg/m <sup>2</sup>
Molybdenum	Mo	7439-98-7	< 5	10 mg/m <sup>2</sup>
Titanium	Ti	7440-32-6	< 1	10 mg/m <sup>2</sup>
Cobalt	Co	7440-48-4	< 1	0.05 mg/m <sup>2</sup>
Copper	Cu	7440-50-8	< 5	0.2 mg/m <sup>2</sup>
Aluminum	Al	7429-90-5	< 3	10 mg/m <sup>2</sup>

2-2. Nickel is classified by EC Directive 67/548/EEC as a suspect carcinogen (category 3) and a skin sensitiser.

According to Directive 88/379/EEC all stainless steels containing 1% Ni or more are classified the same way.

Ingredient	Nickel (Ni)
CAS NO	7440-02-0
Hazard Symbol	Xn
R-Phrases	R40 and R43

2-3. Additional hazardous mixtures present

According to the request of the customers or as a results of the manufacturing processes, metallic or non-metallic coatings are present on the surface of the wire. These are usually classified as protective coating or the lubricant such as calcium soap with 2% molybdenum disulphide as extreme pressure additives, with less than 0.1% of total weight of the product. The possibility of this coating presence should be recognized and considered when evaluating exposures and potential hazards during welding, grinding and machining.

[3]. Hazard identification

3-1. Hazard classification : Xn Harmful

3-2. Risk classification : R40 Possible risk of irreversible effects.

R43 May cause sensitization by skin contact.

3-3. There are normally no hazards to man or the environment from the stainless steel wire in the forms supplied. Dust and fume may be generated during fabrication, that is, during welding, cutting and grinding (see section[8]). Dust from dry grinding or machining will have the same composition as the product. Flame cutting or welding fumes will contain also oxides of iron and other constituent metals. If airborne concentrations of dust and fume are exceeded, inhalation over long periods may affect worker's health, primarily of lungs.

Regarding exposure limits, see section [15].

The stainless steel does not normally cause any allergic reaction by skin contact.

[4]. First-aid measures

4-1. Inhalation : In case of large inhalation of dust or fume, remove to the fresh air. Get medical attention if needed.

4-2. Ingestion : Not applicable

4-3. Skin Contact : Not applicable

(Physical injury possible by sharp edges, stored energy in coils, etc)

4-4. Eye contact : Not applicable

(Physical injury possible by sharp edges, stored energy in coils, etc)

[5]. Fire-fighting measures.

The stainless steel is not combustible.

There are no special hazards or precautions associated with the product if in the vicinity of a fire.

[6]. Accidental release measures

Not applicable

[7]. Handling and storage

7-1. Handling

No special measures are necessary. However, normal precautions should be taken in order to avoid physical injury from e.g. sharp edges and stored energy in coils, etc.

7-2. Storage

Store inside sheltered from moisture, storage temperature ranging from -15 to 60 . Storage time : 1 year at least in normal storage conditions.

[8]. Exposure controls/personal protection.

8-1. Exposure limits

There are no exposure limits for this product. Exposure limits apply to same constituent elements and certain of their compounds (Ni, Cr, Mn and Mo) see section. [15].

8-2. Exposure controls

Dust and fume may be generated in use, e.g. by welding, grinding and machining processes, which may contain material subject to exposure limit.

To ensure that these limits are not exceeded, adequate general or local ventilation should be provided.

8-3. Personal protection

In the processing of all metallic materials, exposure to fume and dust has to be kept below legally imposed limits. If ventilation is inadequate, appropriate approved respiratory protection should be provided for those workers at risk of inhalation. Suitable clothes as well as hand protection should be worn where there is a risk of laceration, flying particles, burning or welding radiation or contact with oils during processing. Avoid breathing in fumes formed during welding or machining of the product. When needed, use breathing filters and efficient ventilations /exhaustion. Any dust from the product formed during, e.g. grinding has to be kept away from food and beverages.

Clothes contaminated with dust should be cleaned by washing or suction, do not shake.

No eating, drinking, smoking or snuffing in the working area.

- eye protection : use safety glasses when needed
- skin protection : use clothes which suit the situation
- hand protection : use gloves when needed.

[9]. Physical and chemical properties

\* Appearance : Solid

\* Odour : Odourless

- \* Melting point melting range : 1300-1500 °C
- \* Flash point : Not applicable
- \* Flammability : The substance is not flammable
- \* Auto flammability : The substance is not auto flammable
- \* Explosive properties : The substance is not explosive
- \* Oxidising properties : Not applicable
- \* Vapour pressure : Not applicable
- \* Density at 20 : 7.9-8.0 g/cm<sup>3</sup>
- \* Solubility : Not soluble in water or oil
- \* Thermal expansion per °C X10<sup>-6</sup>
  - from 20 to 100 °C - 17.0
  - 200 °C - 17.5
  - 300 °C - 18.5
- \* Thermal conductivity at 20 °C : 15 W/(m, °C )
- \* Magnetic : Austenitic stainless steels are not ferromagnetic but can show slight ferromagnetism owing to small amounts of ferrite, permeability at 20 °C ,  $\mu_{max} = 5-35$ .
- \* Resistivity at room temperature
  - Approximately 0.8  $\mu\Omega$  m

[10]. Stability and reactivity

The stainless steel is stable and does not react at normal ambient temperature conditions.

- \* At high temperatures

Prolonged service at elevated temperatures may embrittle the stainless steel depending on its specific chemical composition. Contact the supplier for further information.

- \* In contact with acids

The stainless steel can react with acids under certain circumstances.

During these reactions toxic and/or flammable or explosive gases can be formed.

[11]. Toxicological information

The stainless steel contains nickel, which has been classified in EC Directive 67/548/EEC as a carcinogenic substance (category 3. i.e. causing concern for man ... but available information is not adequate for making a satisfactory assessment) by inhalation or ingestion.

The conventions of preparation Directive 88/379/EEC are such that all mixtures, solutions and alloys with at least 1% nickel have to be classified in the same way, by default.

However, to our knowledge, no carcinogenic effects resulting from exposure to the stainless steel have been reported, either in epidemiological studies or in tests with animals. Long term experience of the stainless steel in the most varied applications has demonstrated that these very resistant materials are eminently suitable where hygiene is of paramount interest.

Nickel is also classified as a skin sensitiser, through prolonged intimate contact with the skin of some individuals (e. g. wearing of jewellery).

However, (see also section 3, hazards identification) the stainless steel does not normally cause any allergic reactions. The products are in massive form, not capable of being inhaled or ingested, and as such present no toxic hazard. During mechanical working, flame cutting or welding, stainless steel dust or fumes containing oxides 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, dust and fumes generated in the production of nickel alloys and stainless steels have not indicated a respiratory cancer hazard.

\* Acute toxicity, oral or inhalatory : Not applicable

\* Acute dermatological toxicity : None

\* Acute irritation/causticity, skin and eyes : None

[12]. Ecological data

No known harmful effects. No precautions are required.

The stainless steel is normally inert in aqueous solution.

[13]. Disposal considerations

The stainless steel wires should be recycled to as large extent as possible since it is a valuable raw material in production of stainless steels.

Information can be given by the supplier.

[14]. Transport information

There are no special precautions. Non-dangerous goods

[15]. Regulatory information

There are no exposure limits for stainless steel. Limits are applicable for some constituent elements and the compounds. These elements may be contained in dust or fume during processing of stainless products. Local laws and regulations should carefully be observed and respected.

The stainless steel has been classified as category 3 "suspect carcinogen" according to EC directive 67/548 EEC with the following phrases.

Hazard classification : Xn Harmful

Risk classification : R40 possible risks of irreversible effects

R43 may cause sensitisation by skin contact

Safety classification : S22 Do not breathe dust

S36 Wear suitable protective cloth

Since the stainless steel is in massive form, there is no obstruction to label the product.

[16]. Other information

The data and information given in this MSDS are based on our present knowledge.

However, they shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

This MSDS has been issued by KOS LIMITED. as of May, 2010