

Safety Data Sheet (SDS)

Established Date: 28/Apr/2004

Revised Date: 1/Apr/2020

1. Identification of the Substance and of the Company

Product Identifier:

High-Speed Tool Steel (include the coated or surface treated High-Speed Tool Steel)

Supplier Information:

Company Name: MOLDINO Tool Engineering, Ltd.

Address: Huli Ryogoku Bldg. 8F, 4-31-11, Ryogoku, Sumida-ku, Tokyo

Phone Number: +81-3-6890-5101

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Emergency Phone Number: +81-476-36-2111 (Quality Assurance Div. Narita Office)

Recommended Use and Restrictions on Use of the High-Speed Tool Steel

Cutting tools mainly for metallic materials, wear-resistant tools for plastic forming process, tools for macadam, civil engineering, and urban development, etc.

Attention to the Phase/State of the High-Speed Tool Steel

- High-Speed Tool Steel as solid state like cutting tools is chemically stable and safe at explosive, flammable, combustible, pyrophoric, water-reactive, and oxidizability under normal environment.
- High-Speed Tool Steel is safe for use as the cutting tools (grinding, machining, rolling for metals) under normal condition.
- This SDS informs about the dust, fume or vapor which occur from High-Speed Tool Steel producing process such as raw material powder handling and grinding.

2. Hazard Identification

The GHS Classification

Some data (such as the burning rate test data, etc.) for the dust, fume or vapor which occur from High-Speed Tool Steel producing process are unavailable. Therefore, they are not be classified by GHS.

In here, GHS classification of the each metallic ingredients (cobalt, chromium and manganese) for composing the High-Speed Tool Steel can be disclosed. In addition, other hazards and harmful effects (for health, environment, physical and chemical) which are not listed are unclassifiable or non-applicable by GHS.

GHS classification for the hazards of cobalt alone in below,

(When cobalt is included as ingredients of High-Speed Tool Steel.)

| | | |
|-----------------------|---|---|
| Health Hazard | <ul style="list-style-type: none"> • Respiratory sensitization • Skin sensitization • Carcinogenicity • Reproductive toxicity • Specific target organ toxicity (Single exposure) • Specific target organ toxicity (Repeated exposure) | Category1 Category1 Category2 Category2 Category3 (Respiratory tract irritation) Category1 (Respiratory) |
| Environmental Hazard: | • Hazardous to the aquatic environment | Category4 |

GHS classification for the hazards of chromium alone in below,
(When chromium is included as ingredients of High-Speed Tool Steel.)


| | | |
|---------------|---|--|
| Health Hazard | <ul style="list-style-type: none"> • Serious eye damage • Respiratory sensitization • Skin sensitization • Germ cell mutagenicity • Specific target organ toxicity (Single exposure) • Specific target organ toxicity (Repeated exposure) | Category2B Category1 Category1 Category2 Category2 (Respiratory tract irritation) Category3 (Respiratory) |
|---------------|---|--|

GHS classification for the hazards of manganese alone in below,
(When manganese is included as ingredients of High-Speed Tool Steel.)

| | | |
|-----------------------|---|--|
| Health Hazard | <ul style="list-style-type: none"> • Skin corrosion, irritation • Serious eye damage • Reproductive toxicity • Specific target organ toxicity (Single exposure) • Specific target organ toxicity (Repeated exposure) | Category3 Category2B Category1B Category1 (Respiratory) Category1 (Nervous system , Respiratory) |
| Environmental Hazard: | • Hazardous to the aquatic environment | Category4 |

GHS Label Elements

GHS label elements of the each metallic ingredients (cobalt, chromium and manganese) for composing the High-Speed Tool Steel can be disclosed in below.

| | Cobalt | Chromium | Manganese |
|---------------------|--|--|--|
| Hazard Pictograms : |  | | |
| Signal Words : | Danger | | |
| Hazard Statements : | <ul style="list-style-type: none"> • Risk of causing allergies, asthma or breathing difficulties if inhaled. • Risk of causing an allergic skin reaction. • May cause cancer. • May cause adverse effects on fertility or the unborn child. • Risk of respiratory irritation. • Cause of respiratory failure due to long-term or repetitive exposure. • May be harmful to aquatic life due to long-term effects | <ul style="list-style-type: none"> • Risk of causing allergies, asthma or breathing difficulties if inhaled. • Risk of causing an allergic skin reaction. • Suspected of causing genetic disease • Failure to systemic toxicity • Risk of respiratory irritation. | <ul style="list-style-type: none"> • Mild skin irritation • Eye irritation. • Respiratory disorders. • May cause adverse effects on fertility or the unborn child. • Nervous system and respiratory disorders due to long-term or repetitive exposure. • May be harmful to aquatic life due to long-term effects |

| | |
|-----------------------------------|--|
| <p>Precautionary Statements :</p> | <p>【Prevention】</p> <ul style="list-style-type: none"> • Obtain safety instructions* before use. • Do not handle until all safety precautions have been read and understood. • Use appropriate personal protection and ventilation system keeping away from exposure. • Wear suitable protective gloves. • When insufficient ventilation, wear respirator as required. • Do not breathe dust, fume or vapor. • Do not eat, drink or smoke in handling area. • Wash skin thoroughly after handling. • Do not release into the environment. <p>【Responses】</p> <ul style="list-style-type: none"> • If inhaled, move to fresh air and take a rest with posture easy to breathe. • If respiratory symptoms occurs, contact a doctor. • When feeling ill, get medical advice/attention. • Take off contaminated clothing and wash before reuse. • If on skin, rinse away immediately with a large amount of water and soap. • If skin irritation occurs, contact a doctor and get medical advice/attention. • If exposed or concerned, get medical advice/attention. • If dust is in eyes, immediately wash away with clean water (remove the contact lenses if possible). If irritation persists, get medical advice/attention. • If a large amount of dust is swallowed, get medical advice/attention after ingesting plenty of water to dilute. <p>【Storage】</p> <ul style="list-style-type: none"> • Avoid sudden changes of temperature and high humidity for storage. <p>【Disposal】</p> <ul style="list-style-type: none"> • Dispose of contents/container to an approved waste disposal plant under the laws. |
|-----------------------------------|--|

*For safety instructions, refer to the Japan Cutting & Wear-resistant Tool Association website (<http://www.jta-tool.jp/>) .

3. Composition/Information on Ingredients

- Distinction between substance and mixture: Mixture (alloy)
- High-Speed Tool Steel may be coated or surface treated with the following substances.
Coating materials : CrN, TiAlN, TiC, TiCN, TiN, AlCrN, TiSiN
Surface treatment : Steam treatment (Fe₃O₄), Nitriding treatment (Fe₄N, Fe₂N)
- Ingredients and concentration or concentration range (composition) of the High-Speed Tool Steel.

| Ingredient | Chemical Formula | CAS No | Official Number of Law for PRTR | Official Number of Industrial Safety and Health Law | Composition mass% |
|------------|------------------|-----------|---------------------------------|---|-------------------|
| Iron | Fe | 7439-89-6 | N/A | N/A | |
| Silicon | Si | 7440-21-3 | N/A | N/A | 0-0.7 |
| Manganese | Mn | 7439-96-5 | Class1:412 | Appendix9-550 | 0-0.5 |
| Chromium | Cr | 7440-47-3 | Class1:87 | Appendix9-142 | 3-5 |
| Molybdenum | Mo | 7439-98-7 | Class1:453 | Appendix9-603 | 0-10 |
| Tungsten | W | 7440-33-7 | N/A | Appendix 9-337 | 1-15 |
| Vanadium | V | 7440-62-2 | N/A | N/A | 1-8 |
| Cobalt | Co | 7440-48-4 | Class1:132 | Appendix 9-172 | 0-12 |

*For the details regarding the content of the designated chemical material such as cobalt, chromium, manganese and molybdenum (effective digit: 2), please contact to the above supplier.

*Even if the cemented carbide do not contain cobalt, chromium, manganese as an active ingredient may include cobalt, chromium, manganese as an impurity.

4. First-Aid Measures

If Inhaled

- If the high concentration of dust is inhaled or respiratory symptoms (coughs, gasping, shortness of breath, etc.) are experienced, move to fresh air and take a rest with posture easy to breathe. If breathing difficulties occur, administer oxygen inhalation. If breathing has stopped, immediately administer artificial respiration and get medical advice/attention.
- If irritation or rash persists, get medical advice and attention.

If on Skin

- If dust is contacted with skin, take off contaminated clothing and rinse the affected area with soapy water thoroughly. If irritation or rash persists, get medical advice/attention.

If in Eyes

- If dust is in eyes, immediately wash away with clean water (remove the contact lenses if possible). If irritation persists, get medical advice/attention.

If Swallowed

- If a large amount of dust is swallowed, get medical advice/attention after ingesting plenty of water to dilute.

5. Fire-Fighting Measures

Extinguishing Media

- To extinguish the fire of dust, use dry sand, expanded vermiculite, dilatable perlite, ABC type (general, oil, electric fire) powder extinguishers or water (no water allowed for the dust containing cut powders of light metal such as magnesium and aluminum).

Special Protective Actions for Fire-Fighters

- In fighting a fire, wear a protective clothing, dust-proof respirator or respiratory protective equipment.

6. Accidental Release Measures

Personal Precautions

- It is recommended that someone who cleans dust should wear clothing and respiratory protective equipment to minimize exposure.

Environmental Precautions

- Dispose of dust as industrial wastes and prevent release in water systems.

Containment and Cleanup Methods and Equipment

- If there is dust which occur from High-Speed Tool Steel producing process, isolate the area and remove with a cleaner equipped with a filter which can take up fine particles very efficiently. If appropriate removing methods are not available, sweep with water sprayers or wet mops.

7. Handling and Storage

Handling

- If the disperse of dust containing cobalt or manganese is concerned, provide local exhaust ventilation and use personal protective equipment to minimize exposure to human body.
- Obtain safety instructions before use.
- Do not handle until all safety precautions have been read and understood.
- Do not breathe dust, fume or vapor.
- Do not eat, drink or smoke in handling area.
- Wash skin thoroughly after handling.
- Do not release into the environment.

Storage

- Avoid sudden changes of temperature and high humidity for storage.

8. Exposure Controls/Personal Protection

Exposure Prevention

- Permissible concentration in working environment (reference value)

| Ingredient | Chemical Formula | OSHA* PEL* mg/m ³ | ACGIH* TLV* mg/m ³ | Japan Society for Occupational Health Exposure Limit mg/m ³ |
|------------|------------------|---------------------------------|----------------------------------|--|
| Iron | Fe | N/A | N/A | N/A |
| Silicon | Si | 15 | 10 | N/A |
| Manganese | Mn | 5 | 0.2 | 0.3 |
| Chromium | Cr | 0.5 | 0.5 | 0.5 |
| Molybdenum | Mo | 15 | 10 | N/A |
| Tungsten | W | 5 | 5 | N/A |
| Vanadium | V | N/A | N/A | N/A |
| Cobalt | Co | 0.1 | 0.02 | 0.05 |

*OSHA : Occupational Safety & Health Administration U.S. Department

*PEL : Permissible Exposure Limit

*ACGIH : American Conference of Governmental Industrial Hygienists Inc.

*TLV : Threshold Limit Value

*N/A : Not Applicable

- Facility measures

Provide local exhaust ventilation so that dusts in the air may not exceed the exposure limits in the above table. It is to be noted that management concentration of the cobalt (and its inorganic compounds) and manganese (and its inorganic compounds) are to be 0.02mg/m³ and 0.2mg/m³ respectively in accordance with the working environment assessment standard by Japanese Minister of Health, Labour and Welfare under the

paragraph (2), Article 65-2 of the Industrial Safety and Health Act in Japan.

In addition, cobalt (and its inorganic compounds) and manganese (and its inorganic compounds) in the storage or handling, and that to take the necessary action conforming to the Ordinance on Prevention of Hazards due to Specified Chemical Substances.

Protection Measures

- Respiratory Protection: Dust-proof respirators and respiratory protective equipment are recommended.
- Hand Protection: Protective gloves for dust are recommended.
- Eye Protection: Protective glasses for dust are recommended.
- Skin/Body Protection: Avoid direct skin contact.
Clean up deposited dust on clothing, rags, etc. by washing or absorbing with suitable filters but not by whisking off.
Change the contaminated clothing into clean one.

Hygiene Measure

Wash skin thoroughly after handling.

9. Physical and Chemical Properties

| | |
|-------------------|--|
| Appearance: | Shiny silver color (in case of the coated or surface treated High-Speed Tool Steel, the appearance color is often different.) |
| Odor: | Odorless |
| pH: | No data available |
| Melting Point: | 1200 – 1400 °C |
| Boiling Point: | No data available |
| Flash Point: | No data available |
| Vapor Pressure: | No data available |
| Specific Gravity: | 7 – 9 |
| Solubility: | Insoluble |

10. Stability and Reactivity

A grain of dust which occur from High-Speed Tool Steel producing process is very fine and under the specific conditions in which the dusts are mixed with grinding oil with low flash point, it is possible to become pyrophoric. If dusts under very flammable conditions are dispersed in the air, it is possible to explode.

The each metallic ingredients (cobalt, chromium and manganese) for composing the High-Speed Tool Steel has the following information about stability and reactivity under specific conditions.

Stability and reactivity of cobalt alone in below,

(When cobalt is included as ingredients of High-Speed Tool Steel.)

| | |
|-----------------------------------|---|
| Stability: | Stable to heat and contact with water Ignite spontaneously in air |
| Hazardous reactions: | It reacts with strong oxidizing agents It reacts violently with oxygen, and it poses a risk of fire or explosion It reacts violently with acid to generate hydrogen |
| Conditions to avoid: | Contact with incompatible materials |
| Incompatible materials: | Strong oxidizing agents, acid |
| Hazardous decomposition products: | By combustion, cobalt oxide and fumes of cobalt oxide may occur |

Stability and reactivity of chromium alone in below,

(When chromium is included as ingredients of High-Speed Tool Steel.)

| | |
|-----------------------------------|---|
| Stability: | Stable under normal handling conditions |
| Hazardous reactions: | Reacts violently with strong oxidizing agents such as hydrogen peroxide, it poses a risk of fire or explosion. It reacts with dilute hydrochloric acid and dilute sulfuric acid. |
| Conditions to avoid: | The alkali or alkaline carbonate is Incompatible. When mixed with air in powder or granular form, there is a possibility of dust explosion. |
| Incompatible materials: | Strong oxidizing agents, dilute hydrochloric acid, dilute sulfuric acid, alkali, alkali carbonate |
| Hazardous decomposition products: | During combustion, there can be irritating or toxic fumes and gases. |

Stability and reactivity of manganese alone in below,

(When manganese is included as ingredients of High-Speed Tool Steel.)

| | |
|-----------------------------------|--|
| Stability: | Stable under normal handling conditions. |
| Hazardous reactions: | Toxic fumes occur when heated. Reacts violently with nonmetals (chlorine, fluorine, oxygen, etc.) at high temperature, causing fire and explosion hazard. Reacts violently with hydrogen peroxide, bromine pentafluoride, nitrogen dioxide and aluminum dust, causing fire and explosion hazard. It reacts with boron, carbon, silicon, phosphorus, sulfur, oxidant. It reacts explosively with nitric acid and ammonium nitrate. In the case of powder, it reacts with water or steam to generate hydrogen. When mixed with air in powder or granular form, there is a possibility of dust explosion. |
| Conditions to avoid: | High temperature heating, mixing and contact with incompatible hazardous substances. Strong oxidants, strong acids, hydrogen peroxide, bromine pentafluoride, nitrogen dioxide, nonmetals, aluminum dust, etc. |
| Hazardous decomposition products: | Upon heating, irritating, corrosive, toxic gases and fumes are generated. |

11. Toxicological Information

| | |
|--|--|
| Acute Toxicity: | No data available on High-Speed Tool Steel |
| Skin Corrosion/Irritation: | No data available on High-Speed Tool Steel |
| Serious Eye Damage/Eye Irritation: | No data available on High-Speed Tool Steel |
| Respiratory or Skin Sensitization: | No data available on High-Speed Tool Steel |
| Germ Cell Mutagenicity: | No data available on High-Speed Tool Steel |
| Carcinogenicity: | Group 2A on IARC, as cobalt powder coexisting with tungsten carbide powder. Suspected to be carcinogenic in humans (Ref.1) |
| Reproductive Toxicity: | No data available on High-Speed Tool Steel |
| Specific Target Organ Toxicity/Systemic Toxicity: (Single Exposure) | No data available on High-Speed Tool Steel |
| Specific Target Organ Toxicity/Systemic Toxicity: (Repeated Exposure) | No data available on High-Speed Tool Steel |
| Aspiration Hazard: | No data available on High-Speed Tool Steel |

12. Ecological Information

- The aquatic environment acute hazard**
- Not reported on High-Speed Tool Steel
- The aquatic environment chronic hazard**
- Not reported on High-Speed Tool Steel
- Mobility**
- Not reported on High-Speed Tool Steel

13. Disposal Considerations

Safe and environmentally desirable disposal method

- The main ingredients such as tungsten, cobalt are rare metal. It is desirable to collect and recycle them.
- For disposal, conform to the applicable laws regarding industrial wastes such as 'Waste Disposal and Public Cleansing Law' and relevant local by laws.

14. Transport Information

International Regulations

| | |
|-------------------|----------------|
| UN Number: | Not applicable |
| UN Hazard Class: | Not applicable |
| Marine Pollutant: | Not applicable |

*When transporting a powder of metallic ingredients (cobalt, manganese) for composing the High-Speed Tool Steel, there is a possibility that it is necessary to take appropriate action in accordance with the relevant provisions established by IMO (International Maritime Organization), ICAO (International Civil Aviation Organization), IATA (International Air Transport Association).

Domestic Regulations

| | |
|-----------------------------|----------------|
| Land Regulatory Information | Not applicable |
| UN Number: | Not applicable |
| UN Hazard Class: | Not applicable |
| Marine Pollutant: | Not applicable |

*When transporting a powder of metallic ingredients (cobalt, manganese) for composing the High-Speed Tool Steel, there is a possibility that it is necessary to take appropriate action in accordance with the relevant provisions of Ship Safety Law and the Aviation Law.

Special Safety Measures

When transporting the dust which occur from High-Speed Tool Steel producing process, make sure that there is no damage or corrosion or leakage of the container, to ensure implementation of the prevention of collapse of cargo.

15. Regulatory Information

- Law for Pollutant Release and Transfer Register (PRTR)

Manganese: "Class 1 designated chemical substances", Cabinet Order No.412

Chromium: "Class 1 designated chemical substances", Cabinet Order No.87

Molybdenum: "Class 1 designated chemical substances", Cabinet Order No.453

Cobalt: "Class 1 designated chemical substances", Cabinet Order No.132

- Industrial Safety and Health Law, Ordinance on Prevention of Hazards due to Specified Chemical Substances

Manganese: The substances are defined in the Article 57-2 of the Act, and the manganese is listed by No.550 in Appended Table9 in the Article 18-2 of the Enforcement Order as "Dangerous or Harmful Substances to be notified their names, etc."

Article 2, Paragraph 1, Items 2 and 5 of Ordinance on Prevention of Hazards due to Specified Chemical Substance, Specified chemical substance class 2, Management class 2.

When the content of cobalt and cobalt oxide is less than 1%, the Ordinance on Prevention of Hazards due to Specified Chemical Substance is not covered.

Chromium: The substances are defined in the Article 57-2 of the Act, and the chromium is listed by No.142 in Appended Table9 in the Article 18-2 of the Enforcement Order as "Dangerous or Harmful Substances to be notified their names, etc."

Molybdenum: The substances are defined in the Article 57-2 of the Act, and the molybdenum is listed by No.603 in Appended Table9 in the Article 18-2 of the Enforcement Order as "Dangerous or Harmful Substances to be notified their names, etc."

Tungsten: The substances are defined in the Article 57-2 of the Act, and the tungsten is listed by No.337 in Appended Table9 in the Article 18-2 of the Enforcement Order as "Dangerous or Harmful Substances to be notified their names, etc."

Cobalt: The substances are defined in the Article 57-2 of the Act, and the cobalt is listed by No.172 in Appended Table9 in the Article 18-2 of the Enforcement Order as "Dangerous or Harmful Substances to be notified their names, etc."

Article 2, Paragraph 1, Items 2 and 5 of Ordinance on Prevention of Hazards due to Specified Chemical Substance, Specified chemical substance class 2, Management class 2.

When the content of cobalt and cobalt oxide is less than 1%, the Ordinance on Prevention of Hazards due to Specified Chemical Substance is not covered.

16. Other Information

Other Hazardous Information

The following attention should be paid for dust which occur from High-Speed Tool Steel producing process.

- If a large amount of dust containing cobalt is inhaled, blood, heart, thyroid gland, and spleen disorders may result. (Ref.2)
- It is reported that repeated or prolonged contact with cobalt or chromium may affect skin, respiratory organs, heart, etc. (Ref.3 - 6)
- Contact with molybdenum stimulates skin and eyes. Also, inhalation and swallowing of molybdenum may be harmful. (Ref.7)
- For carcinogenicity of metallic ingredients of High-Speed Tool Steel has the following knowledge.

| | | |
|----------------|---------------------------------------|--|
| Cobalt metal | ACGIH | A3: Confirmed animal carcinogen with unknown relevance to humans. |
| | IARC | 2B: Possibly carcinogenic to humans. |
| | Japan Society for Occupational Health | 2B: The substance has been determined to be possibly carcinogenic to humans (with relatively insufficient evidence). |
| Chromium metal | IARC | 3: Not classifiable as to its carcinogenicity to humans. |

*ACGIH : American Conference of Governmental Industrial Hygienists Inc.

*IARC : International Agency for Research on Cancer

Disclaimer

The contents of this SDS are based on material and information available as of today and may be revised due to knowledge newly obtained. The values of concentration, physical/chemical properties are not guaranteed. In addition, the precautions described herein apply only to normal uses, and thus safety cannot be guaranteed.

Reference URL

- Ministry of Economy, Trade and Industry : <http://www.meti.go.jp/>
- Ministry of the Environment : <http://www.env.go.jp/>
- Ministry of Health, Labour and Welfare : <http://www.mhlw.go.jp/>
- Japan Industrial Safety and Health Assoc. : <http://www.jaish.gr.jp/>
- International Agency for Research on Cancer : <http://monographs.iarc.fr/>
- International Chemical Safety Card : <http://www.nihs.go.jp/ICSC/>
- National Institute of Technology and Evaluation : <http://www.safe.nite.go.jp/ghs/list.html>

Reference Documents

- (1) IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, vol.86 (2006).
- (2) Food & Drug Research Laboratories, study No.8005B (4.11.84).
- (3) T. Shirakawa et al., Chest. 95, 29 (1989).
- (4) International Chemical Safety Cards (cobalt, chromium, nickel).
- (5) The Guide to Chemical Hazards (edited by Japan Industrial Safety & Health Association)
- (6) A. O. Bech et al., Brit. J. Ind., 19, 239 (1962).
- (7) Chemical safety management data book, (The Chemical Daily Co., Ltd.)