SAFETY DATA SHEET

Version: 01
Date of Issue: 28 September 2016
Date of First Issue: 28 September 2016

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ACCORDING TO OSHA HCS (29 CFR 1910.1200)

SECTION 1: IDENTIFICATION

Product identifier used on the label HG-1 Ceramic Cement

Other means of identification None

Recommended use of the chemical and restrictions on use

Recommended use	Bonding strain gages to a component
Restrictions on use	Anything other than the above.

Details of the supplier of the safety data sheet

Supplier	VISHAY MEASUREMENTS GROUP, INC.
Address of Supplier	Post Office Box 27777 Raleigh, NC 27611 USA
Telephone	+1 919-365-3800
Fax	+1 919-365-3945
E-Mail (competent person)	mm.us@vishaypg.com

Emergency telephone number 1-800-424-9300 CHEMTREC (24 hours)

SECTION 2: HAZARD(S) IDENTIFICATION

Classification of the substance or mixture in accordance with paragraph (d) of 29 CFR 1910.1200

Physical hazards	Oxidising Solid, Category 1
Health hazards	Skin corrosion/irritation, Category 2
	Respiratory sensitization, Category 1
	Skin Sensitisation, Category 1
	Germ cell mutagenicity, Category 1B
	Carcinogen, category 1A
	Specific target organ toxicity — repeated exposure, Category 1
	Specific target organ toxicity — single exposure, Category 3
Environmental hazards	Hazardous to the aquatic environment, Chronic , Category 3

Hazard Symbol

Signal Word(s) DANGER

Hazard Statement(s)

May cause fire or explosion; strong oxidiser.
Causes skin irritation.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
May cause an allergic skin reaction.
May cause genetic defects.
May cause cancer.
Causes damage to organs through prolonged or repeated exposure.
May cause respiratory irritation.

	Harmful to aquatic life with long lasting effects.
Precautionary Statement(s)	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Avoid breathing dust/fume/gas/mist/vapours/spray. Wear protective gloves/protective clothing/eye protection/face protection. IF INHALED: Remove person to fresh air and keep comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER/doctor. IF exposed or concerned: Get medical advice/attention.
Other hazards	None known.
Percent of the mixture consists of ingredient(s) of unknown acute toxicity:	0%

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Substances Not applicable

Mixtures Substances in preparations / mixtures

Chemical identity of the substance	%W/W	CAS No.	EC No.	Hazard classification
Quartz (Silica, respirable Crystalline)	42	14808-60-7	238-878-4	Carcinogen, category 1A Specific target organ toxicity — repeated exposure, Category 1 Specific target organ toxicity — single exposure, Category 3
Chromium trioxide	1	1333-82-0	215-607-8	Oxidising Solid, Category 1 Acute toxicity, Category 3 (Oral) Acute toxicity, Category 2 (Dermal) Acute toxicity, Category 2 (Inhalation) Skin corrosion/irritation, Category 1A Respiratory sensitization, Category 1 Skin Sensitisation, Category 1 Germ cell mutagenicity, Category 1B Carcinogen, category 1A Specific target organ toxicity — repeated exposure, Category 1 Hazardous to the aquatic environment, Acute, Category 1 Hazardous to the aquatic environment, Chronic , Category 1 (SCL: ≥ 1% Specific target organ toxicity — single exposure, Category 3)

SECTION 4: FIRST AID MEASURES

Description of first aid measures

Inhalation	IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. Apply artificial respiration if breathing has ceased or shows signs of failing. Get medical advice/attention if you feel unwell.
Skin Contact	IF ON SKIN (or hair): After contact with skin, take off immediately all contaminated clothing, and wash immediately with plenty of soap and water. If irritation (redness, rash, blistering) develops, get medical attention.
Eye Contact	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If irritation develops and persists, get medical attention.
Ingestion	Rinse mouth with water (do not swallow). Do NOT induce vomiting. If vomiting occurs turn patient on side. Do not give milk or alcoholic beverages. Never give anything by mouth to an unconscious person. IF exposed or concerned: Call a POISON CENTER/doctor.
Most important symptoms and effects, both acute and delayed	Causes skin irritation. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause an allergic skin reaction. May cause genetic defects. May cause cancer. May cause respiratory irritation. Causes damage to organs through prolonged or repeated exposure.
Indication of any immediate medical attention and special treatment needed	Treat symptomatically.
Notes to a physician:	IF INHALED: Breathing difficulties may appear with several hours delay. IF SWALLOWED: Allow the patient to drink 5 - 10 g ascorbic acid (not effervescent tablets) dissolved in water. This dose can be repeated several times. IF ON SKIN: If the skin becomes scratched or wounded, dab it with saturated gauze pads or compresses using a freshly made up ascorbic acid solution (10 g in 100 g water).

SECTION 5: FIRE-FIGHTING MEASURES

Extinguishing media	
Suitable Extinguishing Media	As appropriate for surrounding fire. Extinguish preferably with foam, carbon dioxide or dry chemical.
Unsuitable extinguishing Media	Do not use water jet. Direct water jet may spread the fire.
Special hazards arising from the substance or mixture	Not flammable. Reacts violently with strong oxidizing substances. Reaction may be rapid enough to cause ignition. Combustion can be violent. May decompose in a fire giving off toxic fumes. Combustion products: Carbon monoxide, Carbon dioxide, Aldehydes, Ketones, Chromium compounds In confined spaces, sewers, etc., the vapours may collect to form explosive mixtures with air.
Special protective equipment and precautions for fire fighters	Fire fighters should wear complete protective clothing including self-contained breathing apparatus. Do not breathe fumes. Keep containers cool by spraying with water if exposed to fire. Avoid run off to waterways and sewers.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	Use personal protective equipment as required. Wear appropriate personal protective equipment, avoid direct contact. Contaminated clothing should be laundered before reuse. Ensure adequate ventilation. Avoid breathing vapours. Avoid breathing dust. Avoid all contact. Remove all ignition sources. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Isolate the area and allow vapours to disperse. In confined spaces, sewers, etc., the vapours may collect to form explosive mixtures with air.
Large spillages:	Evacuate the area and keep personnel upwind.
Methods and material for containment and cleaning up	Contain spillages with sand, earth or any suitable adsorbent material. Transfer to a container for disposal or recovery.

Large spillages:	Evacuate the area and keep personnel upwind. Notify police and fire brigade as soon as possible.

SECTION 7: HANDLING AND STORAGE

Precautions for safe handling	Ensure operatives are trained to minimise exposures. Ensure adequate ventilation. Wear appropriate personal protective equipment, avoid direct contact. Avoid breathing vapours. Avoid breathing dust. Avoid all contact. In case of insufficient ventilation, wear suitable respiratory equipment. Keep away from: Elevated temperature. Keep good industrial hygiene. Wash hands thoroughly after handling. Contaminated clothing should be thoroughly cleaned. Do not eat, drink or smoke at the work place. Keep from direct sunlight. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
Conditions for safe storage, including any incompatibilities	Keep only in original container. Store in a cool/low-temperature, well-ventilated (dry) place away from heat and ignition sources.
Storage temperature	Store at ambient temperature. 4 – 26 °C
Incompatible materials	Avoid contact with alkali metals. Avoid contact with alkaline earth metals. Combustible with strong oxidising agents. Strong oxidising agents, Acids and Bases

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Occupational Exposure Limits

SUBSTANCE	CAS No.	LTEL (8 hr TWA ppm)	LTEL (8 hr TWA mg/m³)	STEL (ppm)	STEL (mg/m³)	Note
Silica, respirable crystalline	14808-60-7	-	0.05	-	-	NIOSH
		-	30	-	-	OSHA Total Dust
		-	10	-	-	Respirable Dust
		-	0.05	-	-	ACGIH, A2
Chromium compounds	-	-	0.5	-	-	OSHA Chromium and Cr(II); Cr(III) compounds
		-	1	-	-	Chromium metal and insoluble salts
		-	0.05	-	-	ACGIH, A1, BEI Water-soluble Cr VI compounds
		-	0.01	-	-	Insoluble Cr VI compounds

Note: OSHA PELs 1910.1000 TABLE Z-1/ NIOSH RELs / ACGIH TLVs, A2: Suspected Human Carcinogen: Human data are accepted as adequate in quality but are conflicting or insufficient to classify the agent as a confirmed human carcinogen; OR, the agent is carcinogenic in experimental animals at dose(s) , by route(s) of exposure, at site(s), of histological type(s), or by mechanism(s) considered relevant to worker exposure. The A2 is primarily when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals with relevance to humans.
A1: Confirmed Human Carcinogen: The agent is carcinogenic to humans based on the weight of evidence from epidemiological studies.
BEI: Biological Exposure Indices (ACGIH)

Biological Exposure Indices

SUBSTANCE	CAS No.	Determinant	Biological Exposure Indices	Sampling Time	Note
CHROMIUM (VI), Water-Soluble Fume	-	Total chromium in urine	25 µg/l g/g Creatinine 1 µg/l g/g Creatinine	End of shift at end of workweek Increase during shift	ACGIH

Note: Source: BEI: Biological Exposure Indices (ACGIH)

Appropriate engineering controls	Ensure adequate ventilation. Store in a cool/low-temperature, well-ventilated (dry) place away from heat and ignition sources. Atmospheric levels should be

controlled in compliance with the occupational exposure limit. In confined spaces, sewers, etc., the vapours may collect to form explosive mixtures with air.

Individual protection measures, such as personal protective equipment (PPE)

Keep good industrial hygiene. Wear appropriate personal protective equipment, avoid direct contact. Avoid breathing dust. Avoid breathing vapours. Avoid all contact. IF exposed: Wash immediately with water. Wash contaminated clothing before reuse. Do not eat, drink or smoke at the work place.

Eye/face protection

Wear protective eye glasses for protection against liquid splashes. Wear eye protection with side protection.

Skin protection

Hand protection:
Wear impervious gloves. Gloves should be changed regularly to avoid permeation problems. Breakthrough time of the glove material: refer to the information provided by the gloves' producer.

Suitable materials:
Butyl rubber, Fluorinated rubber - FKM

Body protection:
Wear impervious protective clothing, including boots, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Respiratory protection

In case of inadequate ventilation wear respiratory protection. Open system(s): Wear suitable respiratory protective equipment. A suitable dust mask or dust respirator with filter type P may be appropriate.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Brown liquid on top of Green Slurry
Odor	Not established.
Odor Threshold	Not established.
pH	Not established.
Melting Point/Freezing Point	Not established.
Initial boiling point and boiling range	Not established.
Flash Point	Not established.
Evaporation rate (Butyl acetate = 1)	1
Flammability (solid, gas)	Not established.
Upper/lower flammability or explosive limits	Not established.
Vapour pressure	Not established.
Vapour density	Not established.
Relative density	Not established.
Solubility(ies)	Partly soluble in water.
Partition coefficient: n-octanol/water	Not established.
Auto-ignition temperature	Not established.
Decomposition Temperature	Not established.
Viscosity	Not established.

SECTION 10: STABILITY AND REACTIVITY

Reactivity	Stable under normal conditions.
Chemical stability	Stable under normal conditions.

Possibility of hazardous reactions	Can react with - Strong oxidising agents. Contact with combustible hydrocarbons and air may cause fire. Acts as an oxidising agent on organic materials such as wood, paper and fats.
Conditions to avoid	Heat, Keep away from oxidisers, heat, flames or ignition sources.
Incompatible materials	Avoid contact with alkali metals. Avoid contact with alkaline earth metals. Combustible with strong oxidising agents. Strong oxidising agents, Acids and Bases
Hazardous decomposition product(s)	Combustion products: Carbon monoxide, Carbon dioxide, Aldehydes, Ketones, Chromium compounds.

SECTION 11: TOXICOLOGICAL INFORMATION

Information on toxicological effects (Substances in preparations / mixtures)

Acute toxicity - Ingestion	Based upon the available data, the classification criteria are not met. Acute Toxicity Estimate Mixture Calculation: Estimated LC50 > 2000 mg/kg bw/day.
Chromium trioxide:	LD50 (oral) 52 mg/kg bw (OECD 401)
Acute toxicity - Inhalation	Based upon the available data, the classification criteria are not met. Acute Toxicity Estimate Mixture Calculation: Estimated LC50 >20.0 mg/l.
Chromium trioxide:	LD50 (inhalation) 0.217 mg/l air (EPA OTS 798.1150)
Acute toxicity - Skin Contact	Based upon the available data, the classification criteria are not met. Acute Toxicity Estimate Mixture Calculation: Estimated LC50 > 2000 mg/kg bw/day.
Chromium trioxide:	LD50 (dermal) 57 mg/kg bw (OECD 402)
Skin corrosion/irritation	Skin Irrit. 2; Causes skin irritation.
Chromium trioxide:	Test Result: Corrosive (Unnamed, 1979)
Serious eye damage/irritation	Based upon the available data, the classification criteria are not met.
Skin sensitization	Skin Sens. 1; May cause an allergic skin reaction.
Chromium trioxide:	No data. (EU Harmonised Classification)
Respiratory sensitization	Resp. Sens. 1; May cause an allergic respiratory reaction.
Chromium trioxide:	No data. (EU Harmonised Classification)
Germ cell mutagenicity	Muta. 1B; May cause genetic defects.
Chromium trioxide:	Test Result: Positive. (European Chemicals Bureau, 2005)
Carcinogenicity	Carc. 1A; May cause cancer.
Quartz (Silica, respirable Crystalline):	IARC Classification: Group 1. NTP Report on Carcinogens Suspected of causing cancer by inhalation. (Checkoway et al., 1993)(Rice et al., 2001)(Rafnsson V et al, 1997) Route of Exposure: Inhalation into Lungs Causes irritation. Inflammation. Leading to Silicosis and eventually tumour formation. (SIAM 32, 19-21 April 2011)
Chromium trioxide:	Test Result: LOAEL: 57.3 mg/l (Drinking water)(Unnamed, 2007)
Reproductive toxicity	Based upon the available data, the classification criteria are not met.
STOT - single exposure	STOT SE 3; May cause respiratory irritation.
Quartz (Silica, respirable Crystalline):	Irritating to respiratory system. (IARC (1997) and SITTIG (4th, 2002))
Chromium trioxide:	Irritating to respiratory system. (EPA OTS 798.1150)
STOT - repeated exposure	STOT RE 1; Causes damage to organs through prolonged or repeated exposure. Inhalation into Lungs
Quartz (Silica, respirable Crystalline):	Prolonged and/or massive exposure to fine fraction crystalline silica-containing dust may cause silicosis, a nodular pulmonary fibrosis caused by deposition in the lungs of fine respirable particles of crystalline silica. (Ziskind et al., 1976; IARC, 1987)
Chromium trioxide:	Test Result: NOAEL: 62.5 mg/l (Drinking water)(Unnamed, 2007)
Aspiration hazard	Based upon the available data, the classification criteria are not met.

Information on likely routes of exposure

Inhalation	Unlikely – accidental exposure

Ingestion	Unlikely – accidental exposure
Skin Contact	Possible – accidental exposure
Eye Contact	Unlikely – accidental exposure

Early onset symptoms related to exposure None known.

Delayed health effects from exposure Prolonged and/or massive exposure to fine fraction crystalline silica-containing dust may cause silicosis, a nodular pulmonary fibrosis caused by deposition in the lungs of fine respirable particles of crystalline silica.

Other information

NTP Report on Carcinogens

Quartz (Silica, respirable Crystalline):	Yes (Silica, Crystalline (Respirable Size) - Known to be a human carcinogen)
Chromium trioxide:	Yes (Chromium hexavalent compound - Known to be a human carcinogen)

IARC Monographs

Quartz (Silica, respirable Crystalline):	IARC Classification: Group 1.
Chromium trioxide:	IARC Classification: Group 1.

OSHA Designated Carcinogen

Quartz (Silica, respirable Crystalline):	Not listed
Chromium trioxide:	Not listed

SECTION 12: ECOLOGICAL INFORMATION

Ecotoxicity Aquatic Chronic 3; Harmful to aquatic life with long lasting effects.
Estimated Mixture LC50 > 10 to ≤ 100 mg/l (Fish)

Persistence and degradability No data for the mixture as a whole.

Bioaccumulative potential No data for the mixture as a whole.

Mobility in soil The substance is predicted to have low mobility in soil. Slightly soluble in: Water

Other adverse effects None known.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste treatment methods Dispose of this material and its container as hazardous waste Send after pre-treatment to a appropriate hazardous waste incinerator facility according to legislation.

SECTION 14: TRANSPORT INFORMATION

	ADR/RID	IMDG	IATA/ICAO
UN number	UN 1463	UN 1463	UN 1463
UN proper shipping name	CHROMIUM TRIOXIDE, ANHYDROUS	CHROMIUM TRIOXIDE, ANHYDROUS	CHROMIUM TRIOXIDE, ANHYDROUS
Transport hazard class(es)	5.1	5.1	5.1
Packing group	II	II	II
Environmental hazards	Environmentally hazardous substance	Environmentally hazardous substance / Classified as a Marine Pollutant.	Environmentally hazardous substance
Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not applicable	Not applicable	Not applicable
Special precautions for user	See Section: 2		

SECTION 15: REGULATORY INFORMATION

Safety, health and environmental regulations/legislation specific for the substance or mixture

US Federal Regulations

TSCA (Toxic Substance Control Act)	Chromium trioxide: Regulatory Flag R (R indicates a substance that is the subject of a Section 6 risk management rule under TSCA.)

US State Regulations

Proposition 65 (California)	Chromium trioxide: Yes (Chromium (VI) compound - Safe harbor level - NSRL: 0.001 (inhalation) ug/day; MADL: 8.2 (oral) ug/day)

Europe

Substance(s) of Very High Concern (SVHCs)	Chromium trioxide: Substance included on the Candidate List as of 15/12/2010. Reason for inclusion: Carcinogenic and mutagenic (Articles 57a and 57b)
Annex XVII (Restrictions)	Chromium trioxide: Entry 28: Restriction on supply of substances and mixtures to the general public, if classified as Carc. 1A or 1B. Entry 29: Restriction on supply of substances and mixtures to the general public, if classified as Muta. 1A or 1B

Non-Regional

Hong Kong Convention	Chromium trioxide: Material Category: Chromium VI compounds. Appendix 2 - Minimum list of items for the Inventory of Hazardous Materials

SECTION 16: OTHER INFORMATION

The following sections contain revisions or new statements: Not applicable – V1.0

Version	1.0
Revision Date	28 September 2016
Date of First Issue	28 September 2016

References:

Existing Safety Data Sheet (SDS). EU Harmonised Classification(s) for Chromium trioxide (CAS No. 1333-82-0) and the EU Classification and Labelling Inventory for Quartz (CAS No. 14808-60-7). Existing EU ECHA registration(s) for: Chromium trioxide (CAS No. 1333-82-0)

Literature References:

1. Checkoway, H., Heyer, N.J., Demers, P.A. & Breslow, N.E. (1993) Mortality among workers in the diatomaceous earth industry. Br. 1. ind. Med., 50, 586-597
2. Rice, F.L., Park, R., Stayner, L., Smith, R., Gilbert, S., and Checkoway, H. 2001. Crystalline silica exposure and lung cancer mortality in diatomaceous earth industry workers: a quantitative risk assessment. Occup Environ Med, 58(1):38-45.
3. Rafnsson V & Gunnarsdottir H, 1997, Lung cancer incidence among an Icelandic cohort exposed to diatomaceoys earth and cristobalite., Scand J Work Environ Health, 23: 187 – 192. PMID:9243728.
4. INITIAL TARGETED ASSESSMENT PROFILE (Human Health), SIAM 32, 19-21 April 2011, OECD
5. Silica, Some Silicates, Coal Dust and para-Aramid Fibrils, IARC MONOGRAPHS ON THE EVALUATION OF CARCINOGENIC RISKS TO HUMANS, Volume 68 (1997)
6. 13th Report on Carcinogens, National Toxicology Program, 2014
7. Ziskind M, Jones RN, Weill H, 1976, Silicosis. American review of respiratory disease, 113:643–665.
8. Richard P Pohanish; Marshall Sittig, 2002, Sittig's handbook of toxic and hazardous chemicals and carcinogens, Norwich, N.Y., U.S.A. : Noyes Publications, ©2002.

GHS Classification of the substance or mixture	Classification Procedure
Oxidising Solid, Category 1	Expert judgement
Skin corrosion/irritation, Category 2	Threshold Calculation
Respiratory sensitization, Category 1	Threshold Calculation

Skin Sensitisation, Category 1	Threshold Calculation
Germ cell mutagenicity, Category 1B	Threshold Calculation
Carcinogen, category 1A	Threshold Calculation
Specific target organ toxicity — repeated exposure, Category 1	Threshold Calculation
Specific target organ toxicity — single exposure, Category 3	Threshold Calculation
Hazardous to the aquatic environment, Chronic , Category 3	Summation Calculation

LEGEND

ACGIH: American Conference of Governmental Industrial Hygienists
IARC: International Agency for Research on Cancer
NIOSH: National Institute of Occupational Safety and Health
NTP: National Toxicology Program
OSHA: The Occupational Safety & Health Administration
PBT: Persistent, Bioaccumulative and Toxic
PEL: Permissible exposure limit
REL: Recommended exposure limit
STEL: Short Term Exposure Limit
TLV: Threshold Limit value
TWA: Time Weighted Average
TSCA: Toxic Substance Control Act
vPvB: very Persistent and very Bioaccumulative
SCL: Specific Concentration Limit

Training advice: Consideration should be given to the work procedures involved and the potential extent of exposure as they may determine whether a higher level of protection is required.

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