1 Identification

- Product identifier
  - Trade name: UTP 65
  - CAS Number: -
  - EINECS Number: -

- Application of the substance / the mixture
  Shielded Metal Arc Welding Electrode

- Details of the supplier of the safety data sheet

  - Manufacturer/Supplier:
    voestalpine Böhler Welding UTP Maintenance GmbH
    Elsässer Straße 10
    D-79189 Bad Krozingen
    Tel. +49 7633 409 01
    Fax +49 7633 409 227
    welding bk@voestalpine.com

    voestalpine Böhler Welding USA
    1601 Gillingham Suite 110
    Sugar Land, TX 77478
    Telephone: 281-499-1212
    Fax: 832-944-6942
    www.voestalpine.com/welding

  - Information department:
    Quality department
    Mr Wangler Wilfried
    wilfried.wangler@voestalpine.com

    Procurement/Logistics
    Chris Smith
    tel: 281-499-1212
    Mobile: 832-520-9040
    chris.smith@voestalpine.com

  - Emergency telephone number:

    NCEC

    +1 202 464 2554 (USA, Canada)

    +44 1865 407333 (English)

    +44 1235 239670 (English, French, Spain)

(Contd. on page 2)
Trade name: UTP 65

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- Hazard statements Void
- NFPA ratings (scale 0 - 4)

<table>
<thead>
<tr>
<th>Health</th>
<th>Fire</th>
<th>Reactivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- HMIS-ratings (scale 0 - 4)

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>FIRE</th>
<th>REACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

- Other hazards
- Results of PBT and vPvB assessment
- P BT: Not applicable.
- vP vB: Not applicable.

3 Composition/information on ingredients

- Chemical characterization: Mixtures
- Description: Mixture of the substances listed below with nonhazardous additions.

### Dangerous components:

<table>
<thead>
<tr>
<th>CAS: 7440-47-3</th>
<th>chromium</th>
<th>12.5-25%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-157-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 13463-67-7</th>
<th>titanium dioxide</th>
<th>5-12.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 236-675-5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7440-02-0</th>
<th>nickel</th>
<th>5-12.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-111-4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 1344-09-8</th>
<th>Silicic acid, sodium salt</th>
<th>5-12.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 215-687-4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 471-34-1</th>
<th>calcium carbonate</th>
<th>0.1-2.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 207-439-9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7439-96-5</th>
<th>manganese</th>
<th>0.1-2.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 231-105-1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CAS: 7789-75-5</th>
<th>calcium fluoride</th>
<th>0.1-2.5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>EINECS: 232-188-7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4 First-aid measures

- Description of first aid measures
- General information: No special measures required.
- After inhalation: Supply fresh air; consult doctor in case of complaints.
- After skin contact: Generally the product does not irritate the skin.
- After eye contact: Rinse opened eye for several minutes under running water.
- Most important symptoms and effects, both acute and delayed: No further relevant information available.
- Indication of any immediate medical attention and special treatment needed: No further relevant information available.
5 Fire-fighting measures

- **Extinguishing media**
- **Suitable extinguishing agents:** Suitable to surrounding conditions
- **Special hazards arising from the substance or mixture** No further relevant information available.
- **Advice for firefighters**
- **Protective equipment:** No special measures required.

6 Accidental release measures

- **Personal precautions, protective equipment and emergency procedures**
  Ensure adequate ventilation
  Use respiratory protective device against the effects of fumes/dust/aerosol.
- **Environmental precautions:** Do not allow to enter sewers/surface or ground water.
- **Methods and material for containment and cleaning up:** Pick up mechanically.
- **Reference to other sections**
  See Section 7 for information on safe handling.
  See Section 8 for information on personal protection equipment.
  See Section 13 for disposal information.
- **Protective Action Criteria for Chemicals**

<table>
<thead>
<tr>
<th>PAC-1</th>
<th>PAC-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>iron</td>
<td>iron</td>
</tr>
<tr>
<td>chromium</td>
<td>chromium</td>
</tr>
<tr>
<td>titanium dioxide</td>
<td>titanium dioxide</td>
</tr>
<tr>
<td>nickel</td>
<td>nickel</td>
</tr>
<tr>
<td>Silicic acid, sodium salt</td>
<td>Silicic acid, sodium salt</td>
</tr>
<tr>
<td>manganese</td>
<td>manganese</td>
</tr>
<tr>
<td>calcium fluoride</td>
<td>calcium fluoride</td>
</tr>
<tr>
<td>dipotassium oxalate</td>
<td>dipotassium oxalate</td>
</tr>
<tr>
<td>silicon</td>
<td>silicon</td>
</tr>
<tr>
<td>molybdenum</td>
<td>molybdenum</td>
</tr>
<tr>
<td>potassium silicate</td>
<td>potassium silicate</td>
</tr>
<tr>
<td>copper</td>
<td>copper</td>
</tr>
<tr>
<td>phosphorus</td>
<td>phosphorus</td>
</tr>
<tr>
<td>cobalt</td>
<td>cobalt</td>
</tr>
<tr>
<td>carbon</td>
<td>carbon</td>
</tr>
<tr>
<td>vanadium</td>
<td>vanadium</td>
</tr>
</tbody>
</table>
7 Handling and storage

· Handling:
  · Precautions for safe handling Ensure that suitable extractors are available on processing machines

· Information about protection against explosions and fires: No special measures required.

· Conditions for safe storage, including any incompatibilities

· Storage:
  · Requirements to be met by storerooms and receptacles: No special requirements.
  · Information about storage in one common storage facility: Not required.
  · Further information about storage conditions: None.
  · Specific end use(s) No further relevant information available.

8 Exposure controls/personal protection

· Control parameters

Components with limit values that require monitoring at the workplace:
The following constituents are the only constituents of the product which have a PEL, TLV or other recommended exposure limit.
At this time, the remaining constituent has no known exposure limits.

7440-47-3 chromium

PEL | Long-term value: 1 mg/m³

(Contd. on page 5)
### Trade name: UTP 65

<table>
<thead>
<tr>
<th>Substance</th>
<th>REL Long-term value:</th>
<th>TLV Long-term value:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>13463-67-7 titanium dioxide</strong></td>
<td>0.5* mg/m³ metal+inorg.compds.as Cr</td>
<td>0.5** mg/m³ inh. fraction, *as Cr(III),**metal</td>
</tr>
<tr>
<td><strong>7440-02-0 nickel</strong></td>
<td>15* mg/m³ total dust</td>
<td>10 mg/m³</td>
</tr>
<tr>
<td><strong>471-34-1 calcium carbonate</strong></td>
<td>15* 5** mg/m³ total dust **respirable fraction</td>
<td>10* 5** mg/m³ total dust **respirable fraction</td>
</tr>
<tr>
<td><strong>7439-96-5 manganese</strong></td>
<td>5 mg/m³ as Mn</td>
<td>2 mg/L</td>
</tr>
<tr>
<td><strong>7789-75-5 calcium fluoride</strong></td>
<td>2.5 mg/m³ as F</td>
<td>2.5 mg/m³ as F, BEI</td>
</tr>
</tbody>
</table>

### Ingredients with biological limit values:

<table>
<thead>
<tr>
<th>Substance</th>
<th>BEI</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7789-75-5 calcium fluoride</strong></td>
<td>2 mg/L</td>
<td>Fluoride (background, nonspecific)</td>
</tr>
</tbody>
</table>

### Additional information:
The lists that were valid during the creation were used as basis.
Exposure controls

Personal protective equipment:

General protective and hygienic measures:
The usual precautionary measures for handling chemicals should be followed. Wash hands before breaks and at the end of work.

Breathing equipment: Filter P2

Protection of hands:
Leather gloves
Heat protection gloves
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation

Penetration time of glove material
The exact breakthrough time has to be found out by the manufacturer of the protective gloves and has to be observed.

Eye protection:
Wear helmet or use face shield with filter lens. Provide protective screens and flash goggles, if necessary, to shield others. As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go the next lighter shade which gives sufficient view of the weld zone.

Safety glasses

Body protection:
Protective work clothing
Wear hand, head, and body protection which help to prevent injury from radiation, sparks, and electrical shock. See ANSI Z49.1. At a minimum this includes welder's gloves and a protective face shield, and may include arm protectors, aprons, hats, shoulder protection, and well as dark substantial clothing. Train the welder not to touch live electrical parts and to insulate himself from work and ground.

9 Physical and chemical properties

Information on basic physical and chemical properties

General Information

Appearance:
Form: Solid
Color: According to product specification
Odor: Odorless
Odor threshold: Not determined.

pH-value: Not applicable.

Flash point: Not applicable.

Flammability (solid, gaseous): Not determined.

Decomposition temperature: Not determined.

Auto igniting: Product is not selfigniting.

Danger of explosion: Product does not present an explosion hazard.

Explosion limits:
Lower: Not determined.
Upper: Not determined.

Density: Not determined.
Relative density Not determined.
Vapor density Not applicable.
Evaporation rate Not applicable.
Water: Insoluble.
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· Partition coefficient (n-octanol/water): Not determined.
· Dynamic: Not applicable.
· Kinematic: Not applicable.
· VOC content: 0.00 %
· Solids content: 100.0 %
· Other information: No further relevant information available.

10 Stability and reactivity
· Reactivity: No further relevant information available.
· Chemical stability:
· Thermal decomposition / conditions to be avoided:
  No decomposition if used and stored according to specifications.
· Possibility of hazardous reactions: Attacks materials containing glass and silicate.
· Conditions to avoid: No further relevant information available.
· Incompatible materials: No further relevant information available.
· Hazardous decomposition products:
  Reasonably expected fume constituents of this product would include:
  Copper Oxide
  copper oxide.
  Chromoxide.
  Nickel oxide.
  Cobalt oxide.
  Reasonably expected gaseous constituents would include Carbon monoxide and Carbon dioxide.
  Ozone and nitrogen oxides may be formed by the radiation from the arc. One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample from inside the welder's helmet if worn or in the worker's breathing zone. See ANSI/AWS F1.1 and ANSI/AWS F1.2-1992. In order to determine and evaluate of the existing problem areas, the standards EN ISO15011 –parts 1,4 can also be applied.

11 Toxicological information
· Information on toxicological effects:
· Acute toxicity:
  · Primary irritant effect:
    · on the skin: No irritant effect.
    · on the eye: No irritating effect.
  · Sensitization: No sensitizing effects known.
· Additional toxicological information:
  The product is not subject to classification according to internally approved calculation methods for preparations:
  When used and handled according to specifications, the product does not have any harmful effects according to our experience and the information provided to us.
  Workers exposed to hexavalent chrome (CrVI) are at an increased risk of developing lung cancer. It is also possible that occupational exposure to (CrVI) may result in asthma, and damage to the nasal epithelia and skin. To avoid any risk follow the requirements of the OSHA rule for hexavalent chromium published on February 28, 2006 in the U.S. Federal Register, pages:10099-10385 which established an 8-hour time-weighted average (TWA) exposure limit of 5 micrograms of hexavalent chrome per cubic meter of air (5 µg/m³). This is a considerable reduction from the previous PEL of 1 milligram per 10 cubic meters of air (1 mg/10 m³, or 100 µg/m³) reported as Probably Chromium(VI)oxide, which is equivalent to a limit of 52 µg/m³ as (Cr+6)). This rule also contains ancillary provisions.
for worker protection such as requirements for exposure determination, preferred exposure control methods, including a compliance alternative for a small sector for which the new PEL is infeasible, respiratory protection, protective clothing and equipment, hygiene areas and practices, medical surveillance, recordkeeping, and start-up dates that include four years for the implementation of engineering controls to meet the PEL.

- Carcinogenic categories

  - IARC (International Agency for Research on Cancer)
    - 7440-47-3 chromium
    - 13463-67-7 titanium dioxide
    - 7440-02-0 nickel
    - 7789-75-5 calcium fluoride
    - 7440-48-4 cobalt
  
  - NTP (National Toxicology Program)
    - 7440-02-0 nickel
    - 7440-48-4 cobalt
  
  - OSHA-Ca (Occupational Safety & Health Administration)
    None of the ingredients is listed.

12 Ecological information

- Toxicity
  - Aquatic toxicity: No further relevant information available.
  - Persistence and degradability No further relevant information available.
  - Behavior in environmental systems:
    - Bioaccumulative potential No further relevant information available.
  - Mobility in soil No further relevant information available.
  - Additional ecological information:
    - General notes: Water hazard class 1 (Self-assessment): slightly hazardous for water
    - Results of PBT and vPvB assessment
      - PBT: Not applicable.
      - vPvB: Not applicable.
  - Other adverse effects No further relevant information available.

13 Disposal considerations

- Waste treatment methods
  - Recommendation: Must be specially treated adhering to official regulations.
- Uncleaned packagings:
  - Recommendation: Disposal must be made according to official regulations.

14 Transport information

- DOT, ADR, ADN, IMDG, IATA
  - Void
- UN proper shipping name
  - DOT, ADR, ADN, IMDG, IATA
  - Void

(Contd. on page 9)
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- Transport hazard class(es)
  - DOT, ADR, ADN, IMDG, IATA
  - Class Void

- Packing group
  - DOT, ADR, IMDG, IATA Void

- Environmental hazards:
  - Marine pollutant: No

- Special precautions for user
  - Not applicable.

- Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code
  - Not applicable.

- Transport/Additional information:
  - Not dangerous according to the above specifications.

- UN "Model Regulation":
  - Void

15 Regulatory information

- Safety, health and environmental regulations/legislation specific for the substance or mixture
  - No further relevant information available.

- Sara

  - Section 355 (extremely hazardous substances):
    - 7440-47-3 chromium
    - 7723-14-0 phosphorus

  - Section 313 (Specific toxic chemical listings):
    - 7440-47-3 chromium
    - 7440-02-0 nickel
    - 7439-96-5 manganese
    - 7440-50-8 copper
    - 7723-14-0 phosphorus
    - 7440-48-4 cobalt

- TSCA (Toxic Substances Control Act):
  - 7439-89-6 iron
  - 7440-47-3 chromium
  - 13463-67-7 titanium dioxide
  - 7440-02-0 nickel
  - 68476-25-5 Potassium Feldspar
  - 1344-09-8 Silicic acid, sodium salt
  - 7439-96-5 manganese
  - 7789-75-5 calcium fluoride
    - Betonit
  - 68186-90-3 Chromatingelb
  - 583-52-8 dipotassium oxalate
  - 7440-21-3 silicon
  - 7439-98-7 molybdenum
Safety Data Sheet
acc. to OSHA HCS

Trade name: UTP 65

<table>
<thead>
<tr>
<th>CAS No.</th>
<th>Chemical Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>9004-34-6</td>
<td>Cellulose</td>
</tr>
<tr>
<td>1312-76-1</td>
<td>potassium silicate</td>
</tr>
<tr>
<td>7440-50-8</td>
<td>copper</td>
</tr>
<tr>
<td>7723-14-0</td>
<td>phosphorus</td>
</tr>
<tr>
<td>7440-48-4</td>
<td>cobalt</td>
</tr>
</tbody>
</table>

- **TSCA new (21st Century Act) (Substances not listed)**
  - 471-34-1 calcium carbonate

- **Proposition 65**
  - **Chemicals known to cause cancer:**
    - 13463-67-7 titanium dioxide
    - 7440-02-0 nickel
    - 7440-48-4 cobalt
  - **Chemicals known to cause reproductive toxicity for females:**
    None of the ingredients is listed.
  - **Chemicals known to cause reproductive toxicity for males:**
    None of the ingredients is listed.
  - **Chemicals known to cause developmental toxicity:**
    None of the ingredients is listed.

- **Cancerogenity categories**
  - **EPA (Environmental Protection Agency)**
    - 7440-47-3 chromium D
    - 7439-96-5 manganese D
    - 7440-50-8 copper D
    - 7723-14-0 phosphorus D
  - **TLV (Threshold Limit Value established by ACGIH)**
    - 7440-47-3 chromium A4
    - 13463-67-7 titanium dioxide A4
    - 7440-02-0 nickel A5
    - 7789-75-5 calcium fluoride A4
    - 7439-98-7 molybdenum A3
    - 7440-48-4 cobalt A3
  - **NIOSH-Ca (National Institute for Occupational Safety and Health)**
    - 13463-67-7 titanium dioxide
    - 7440-02-0 nickel

- **GHS label elements**
  - Void
- **Hazard pictograms**
  - Void
- **Signal word**
  - Void
- **Hazard statements**
  - Void
- **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

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**16 Other information**

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

(Contd. on page 11)
Additional information:

Recommendations for exposure scenarios, measures for risk management and identification of working conditions under which metals, metal alloys and products made of metal can be safely worked can be found attached.

Detailed information can be found on our webpage www.voestalpine.com (Environment, REACH at voestalpine).

Recommendations for Exposure Scenarios, Risk Management Measures and to identify Operational Conditions under which metals, metal alloys and products made of metal can be safely worked

Welding/Grazing produces fumes which can affect human health and the environment. Fumes are a varying mixture of airborne gases and fine particles which, if inhaled or swallowed, constitute a health hazard. The degree of risk will depend on the composition of the fume, concentration of the fume and duration of exposure. The fume composition is dependent upon the material being worked, the process and consumables being used, coatings on the work such as paint, galvanizing or plating, oil or confinements from cleaning and degreasing activities. A systematic approach to the assessment of exposure is necessary, taking into account the particular circumstances for the operator and auxiliary worker that can be exposed.

Considering the emission of fumes when welding, brazing or cutting of metals, it is recommended to (1) arrange risk management measures through applying general information and guidelines provided by this exposure scenario and (2) using the information provided by the Safety Data Sheet, issued in accordance with REACH by the welding consumable manufacturer.

The employer shall ensure that the risk from welding fumes to the safety and health of workers is eliminated or reduced to a minimum. The following principle shall be applied:

1. Select the applicable process/material combinations with the lowest class, whenever possible.
2. Set welding process with the lowest emission parameter.
3. Apply the relevant collective protective measure in accordance with class number. In general, the use of PPE is taken into account after all other measures are applied.
4. Wear the relevant personal protective equipment in accordance with the duty cycle.

In addition, compliance with the National Regulations regarding the exposure to welding fumes of workers and related personnel shall be verified.

In the table "Risk Management Measures for individual process/material combinations" below, reference is made to the following standards:

1. ISO 4002: 2001
2. EN ISO 10512-1:2004
4. EN 149:2001
5. EN 13035:2000
6. EN 12487:1996
7. EN 142:2006
9. BGR 190
10. TRGS 526

Schweiztechnische Arbeiten (Technische Regeln für Gefahrstoffe)

Also in the table "Risk Management Measures for individual process/material combinations", reference is made to footnotes.

The description of these footnotes:

1. Class: approximate ranking to mitigate risk by selecting process/material combinations with the lowest value.
2. Personal Protective Equipment (PPE) required avoiding exceeding the National Exposure Limit Value (NC: Daily exposure expressed on 8 hours).
3. General Ventilation (GV) Low. When local/Exhaust Ventilation is used and extracted air in the outside, the GV value is reduced by 1/10 of the original requirement.
4. General Ventilation (GV) Medium (double compared to Low)
5. Filtering half mask (FF02)
6. When an allowed consumable is used, measures from "Class Y" are required
7. Local Exhaust Ventilation LEV Low extraction at source (includes table, hood, arm or torch extraction)
8. Local Exhaust Ventilation LEV Medium extraction at source (includes table, hood, arm or torch extraction)
9. Local Exhaust Ventilation LEV High extraction at source (includes table, hood, arm or torch extraction)
10. Helmet with powered filters (TH2P02), or helmet with external air supply (LD2H)
11. Helmet with powered filters (TH2P02), or helmet with external air supply (LD2H)
12. Face shield or visor with a flat, non-convex surface.
13. Improved helmet, designed to avoid direct flow of welding fumes inside

US

(Contd. of page 10)
### Risk Management Measures for Individual Process / base material combinations

<table>
<thead>
<tr>
<th>Class</th>
<th>Process (according to ISO 9001)</th>
<th>Base Materials</th>
<th>Remarks</th>
<th>Ventilation / Extraction / Filtration</th>
<th>PPE</th>
<th>HO=1%</th>
<th>PPE</th>
<th>HO=1%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>GTAW</td>
<td>All</td>
<td>Except Aluminum</td>
<td>GV low(^a)</td>
<td>n.r.</td>
<td>n.r.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MMAW</td>
<td>All</td>
<td>Except Sn, Mn, Ni-alloys and Stainless</td>
<td>GV low(^a)</td>
<td>LEV low(^a)</td>
<td>FFP2(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FCAW 126/137</td>
<td>All</td>
<td>Except stainless and Fe-alloys</td>
<td>GV low(^a)</td>
<td>Improved helmet(^b)</td>
<td>FFP2(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>GMAW 137/135</td>
<td>All</td>
<td>Except Cu, Sn, V, Fe-alloys</td>
<td>GV low(^a)</td>
<td>LEV low(^a)</td>
<td>FFP2(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Powder Plasma Arc 152</td>
<td>All</td>
<td>Except Sn, Mn, Ni-alloys and Stainless</td>
<td>GV low(^a)</td>
<td>LEV low(^a)</td>
<td>FFP2(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>All processes class I</td>
<td>Painted / coated</td>
<td>No Pb containing primer</td>
<td>GV low(^a)</td>
<td>LEV low(^a)</td>
<td>FFP5, THOR(^a) or LDH(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>All processes class II</td>
<td>Painted / coated</td>
<td>No Pb containing primer</td>
<td>GV low(^a)</td>
<td>LEV low(^a)</td>
<td>FFP5, THOR(^a) or LDH(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>MMAW</td>
<td>Stainless, Ni, Be- and V-alloys</td>
<td>n.a</td>
<td>LEV high(^a)</td>
<td>THOR(^a) or LDH(^a)</td>
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<td></td>
<td>FCAW 126/137</td>
<td>Stainless, Mn- and Ni-alloys</td>
<td>n.a</td>
<td>Reduced (negative) pressure area</td>
<td>THOR(^a) or LDH(^a)</td>
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<td></td>
<td>GMAW 137</td>
<td>Cu-alloys</td>
<td>n.a</td>
<td>Reduced (negative) pressure area</td>
<td>THOR(^a) or LDH(^a)</td>
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<td>Stainless, Mn- and Ni-alloys</td>
<td>n.a</td>
<td>Reduced (negative) pressure area</td>
<td>THOR(^a) or LDH(^a)</td>
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<td>VI</td>
<td>GMAW 137</td>
<td>Sn- and V-alloys</td>
<td>n.a</td>
<td>Reduced (negative) pressure area</td>
<td>THOR(^a) or LDH(^a)</td>
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<tr>
<td>VII</td>
<td>Self Shielded FCAW 114</td>
<td>Un-, Hg- and glass or steel covered wire</td>
<td>Reduced (negative) pressure area</td>
<td>LEV medium(^a)</td>
<td>THOR(^a) or LDH(^a)</td>
<td></td>
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<tr>
<td></td>
<td>Self Shielded FCAW 114</td>
<td>Un-, Hg- and glass or steel covered wire</td>
<td>Reduced (negative) pressure area</td>
<td>LEV high(^a)</td>
<td>THOR(^a) or LDH(^a)</td>
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</tr>
<tr>
<td></td>
<td>All</td>
<td>Painted / coated</td>
<td>Painted / Primer containing Pb</td>
<td>n.a</td>
<td>n.a.</td>
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<td></td>
<td>Air gouging and Cutting</td>
<td>All</td>
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<td>n.a</td>
<td>n.a.</td>
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<td>Thermal Spray</td>
<td>All</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a.</td>
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<tr>
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<td>Gases Breathing</td>
<td>Cu-alloys</td>
<td>n.a</td>
<td>n.a</td>
<td>n.a.</td>
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</table>

### Closed system or Confined space

| I     | Laser Welding                    | All            | Closed system | GV medium\(^a\) | n.a. | n.a.  |
|       | Laser Cutting                    | All            | Closed system | LEV high\(^a\) | External air supply | LDH\(^a\) |
|       | Erosion Beem 57                  | All            | Confined space | LEV high\(^a\) | External air supply | LDH\(^a\) |

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**Department issuing SDS:**
Quality assurance department
Procurement/Logistics

**Contact:**
Wilfried Wangler
Chris Smith

**Date of preparation / last revision:** 09/12/2018 / 22
Abbreviations and acronyms:

NCEC - National Chemical Emergency Centre (=Carechem24)
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
TRGS: Technische Regeln für Gefahrstoffe (Technical Rules for Dangerous Substances, BAuA, Germany)
VOC: Volatile Organic Compounds (USA, EU)
PBT: Persistent, Bioaccumulative and Toxic
vPvB: very Persistent and very Bioaccumulative
NIOSH: National Institute for Occupational Safety
OSHA: Occupational Safety & Health
TLV: Threshold Limit Value
PEL: Permissible Exposure Limit
REL: Recommended Exposure Limit
BEI: Biological Exposure Limit
Skin Corr. 1C: Skin corrosion/irritation – Category 1C
Eye Dam. 1: Serious eye damage/eye irritation – Category 1
Skin Sens. 1: Skin sensitisation – Category 1
Carc. 2: Carcinogenicity – Category 2
STOT SE 3: Specific target organ toxicity (single exposure) – Category 3
STOT RE 1: Specific target organ toxicity (repeated exposure) – Category 1

* Data compared to the previous version altered.