TMX is a Division of Thyssen Inc., N.A.
MATERIAL SAFETY DATA SHEET

SECTION I. MATERIAL IDENTIFICATION

COMPANY
Thyssen Inc. N.A./TMX Division
400 Renaissance Center, Suite 1800
Detroit, Michigan 48243

RE-ISSUE DATE
1-May-99

IDENTIFICATION NUMBER
N/A

TRADE NAME
Nickel Base Alloy

EMERGENCY PHONE NUMBER
(313) 567-5282

PREPARED BY:
L. J. Swital

CHEMICAL NAME
Nickel

FORMULA
N/A

DOT IDENTIFICATION NO.
N/A

SECTION II. HAZARDOUS INGREDIENTS

<table>
<thead>
<tr>
<th>MATERIAL OR COMPONENT</th>
<th>% COMPOSITION</th>
<th>OSHA-PEL</th>
<th>OSHA-mg/m3</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASE METAL</td>
<td>CAS NUMBER</td>
<td>BY WEIGHT</td>
<td></td>
</tr>
<tr>
<td>NICKEL</td>
<td>7440-02-0</td>
<td>30-99</td>
<td>NICKEL FUME</td>
</tr>
</tbody>
</table>

NOT ALL OF THE ELEMENTS LISTED BELOW ARE PRESENT IN ALL ALLOYS OF NICKEL

<table>
<thead>
<tr>
<th>ALLOYING ELEMENTS</th>
<th>% COMPOSITION</th>
<th>OSHA-PEL</th>
<th>OSHA-mg/m3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARBON</td>
<td>7440-44-0</td>
<td>.01-2.0</td>
<td>AS CARBON</td>
</tr>
<tr>
<td>MANGANESE</td>
<td>7439-96-5</td>
<td>.01-5.0</td>
<td>AS MANGANESE</td>
</tr>
<tr>
<td>IRON</td>
<td>7439-89-6</td>
<td>.01-4.4</td>
<td>IRON OXIDE FUME</td>
</tr>
<tr>
<td>BORON</td>
<td>7440-42-8</td>
<td>.001-004</td>
<td>AS DUST/FUME</td>
</tr>
<tr>
<td>SILICON</td>
<td>7440-21-3</td>
<td>.01-2.0</td>
<td>AS SILICON DUST/FUME</td>
</tr>
<tr>
<td>TITANIUM</td>
<td>7440-32-6</td>
<td>.01-5.0</td>
<td>AS DUST/FUME</td>
</tr>
<tr>
<td>COBALT</td>
<td>7440-48-4</td>
<td>.01-13</td>
<td>AS DUST/FUME</td>
</tr>
<tr>
<td>TANTALUM</td>
<td>7440-25-7</td>
<td>.01-5.0</td>
<td>AS TANTALUM</td>
</tr>
<tr>
<td>NI OB IUM</td>
<td>7440-03-1</td>
<td>.01-5.0</td>
<td>AS NIOBIUM DUST</td>
</tr>
<tr>
<td>CHROMIUM</td>
<td>7440-47-3</td>
<td>.01-48</td>
<td>SOLUBLE CHROMIC/SALTS</td>
</tr>
<tr>
<td>YITTRIUM</td>
<td>7440-65-5</td>
<td>.00-1.0</td>
<td>AS YITTRIUM DUST</td>
</tr>
<tr>
<td>TUNGSTEN</td>
<td>7440-33-7</td>
<td>.00-5.0</td>
<td>AS TUNGSTEN DUST</td>
</tr>
<tr>
<td>MOLYBDENUM</td>
<td>7439-98-7</td>
<td>.01-16</td>
<td>SOLUBLE MOLY. COMPOUNDS</td>
</tr>
<tr>
<td>COPPER</td>
<td>7440-50-8</td>
<td>.01-45</td>
<td>AS COPPER DUST</td>
</tr>
<tr>
<td>ALUMINUM</td>
<td>7429-90-5</td>
<td>.00-5.0</td>
<td>AS ALUMINUM</td>
</tr>
</tbody>
</table>

PEL=Permissible Exposure Limit
(1) % of Alloying Material Varies with Grade of Material. Other trace elements of <1% May be Present.

SECTION III. PHYSICAL DATA

MATERIAL (At Normal Conditions)
SOLID

APPEARANCE AND ODOR
Silver to grayish black color. No Odor

MELTING POINT
>2300 Deg. F (1260 Deg. C)

SPECIFIC GRAVITY
About 7.6-7.8

SECTION IV. FIRE AND EXPLOSIVE

SPECIAL FIRE FIGHTING PROCEDURES
Nickel Products In Their Solid State Present No Fire Or Explosive Hazard

SECTION V. REACTIVITY DATA

STABILITY
Stable

CONDITIONS TO AVOID
Reacts with strong acid to form hydrogen gas.

HAZARDOUS DECOMPOSITION PRODUCTS
Metalic Dust Or Fumes May Be Produced During Welding, Burning, Grinding And Possibly Machining. Refer To ANSI Z49.1

SECTION VI. Environmental

SPILL OR LEAK PROCEDURES
N/A

WASTE DISPOSAL METHODS
Disposal must comply with applicable Federal, State and Local disposal and discharge laws.
SECTION VII. HEALTH HAZARD DATA

NOTE: NICKEL PRODUCTS IN THEIR NATURAL STATE DO NOT PRESENT AN INHALATION OR CONTACT HAZARD, HOWEVER OPERATIONS SUCH AS BURNING, WELDING, SAWING, BRAZING AND GRINDING MAY RELEASE FUMES AND/OR DUST WHICH MAY PRESENT HEALTH HAZARDS.

EFFECTS OF OVEREXPOSURE:

Acute: Dust or fume may cause irritation to the eyes, nose, or throat and may leave a metallic taste in the mouth. Inhalation of oxides of Manganese, or Copper may be manifested as flu-like symptoms commonly known as "metal fume fever". Phosphorous dust is considered a nuisance dust.

Chronic: Tantalum dust and fume can be toxic when inhaled.

Aluminum: Inhalation of Aluminum Oxide fume or an accumulation of Silicon in the lungs may result in benign pneumoconiosis.

Cobalt: Lung inflammation and damage, and diffuse pulmonary fibrosis from inhalation. Classified as a carcinogen by IARC.

Chromium: May enter and affect the body through inhalation, ingestion, or skin contact. The National Toxicology Program (NTTP) and the Internal Agency for Research on Cancer (IARC) report they possess sufficient evidence to establish a causal relationship for human cancer from Chromium.

Copper: Inhalation may cause nose and throat irritation and prolonged contact may cause dermatitis.

Iron: Inhalation of Iron Oxide fume or dust may result in a condition known as siderosis.

Titanium: Inhalation may cause Fibrosis of the Lungs. Has caused lung cancer in animals.

Tungsten: Inhalation or contact may cause irritation of eyes, skin and respiratory system, and cause changes in the blood.

Manganese: Inhalation may result in symptoms such as headache, restlessness, neurological dysfunction, or muscular weakness.

Nickel: Inhalation may result in inflammation of the respiratory tract and fever. The National Toxicology Program (NTTP) and the International Agency for Research on Cancer (IARC) report they possess limited evidence for human cancer from Nickel and Nickel compounds.

Molybdenum: Slight irritation of senses. Animal studies suggest digestive disturbances and development of pneumoconiosis, anemia, and gout.

SECTION VIII. EMERGENCY AND FIRST AID PROCEDURES

Inhalation: In the event of excessive exposure to dust or fume, remove the employee to fresh air. If breathing is difficult administer artificial respiration or oxygen. Obtain immediate medical assistance.

Skin: Abrasions and cuts should be washed and closed by a clean compress and be immediately medically treated. Should skin irritation occur, wash affected area with mild soap and rinse with clean warm water.

Eyes: Depending on the type and nature of exposure, relief may be obtained by fresh air or rinsing the eyes with clean water. Obtain medical assistance.

Medical Conditions Aggravated by Exposure:

Persons with a predisposition to respiratory disorders may be adversely affected by particulates or respiratory irritants generated during the mfg. process.

SECTION IX. SPECIAL PROTECTION INFORMATION & CONTROL MEASURES

Note: Consult your regional codes or Code of Federal Regulations, Title 29, Part 1910, Subpart G-Occupational Health and Environmental Control, Subpart I Personal Protective Equipment, Subpart P-Welding, Cutting, and Brazing, and Subpart Z-Toxic and Hazardous Substances. Certain welding type activities may produce hazardous substances such as carbon monoxide, ozone, phosgene in the presence of certain chemicals, or produce inert suffocating atmospheres in addition to the production of ultraviolet radiation and/or noise.

Ventilation: Local exhaust or ventilation systems sufficient to maintain exposure levels to contaminants below prescribed limits may be required. When inhalation controls are not sufficient to reduce the exposure below the applicable exposure limit then use OSHA/NIOSH approved respiratory protection within the use limitations of the respirator.

Personal: To avoid contact use appropriate protective gloves or clothing to protect against cutting edges. Appropriate heat shielding garments should be used for activities using or generating heat. Eyes should be protected by using safety glasses, goggles, helmet, face shield as appropriate to the operation.

Precautions to be taken in handling and storage:

Be alert to sharp edges and unsecured lifts.

SECTION X. OTHER INFORMATION

SARA Section 313 Toxic Chemical List, de minimis Concentrations

> 1.0%: Copper, Aluminum, and Manganese

> 0.1%: Chromium and Nickel

California Proposition 65

The state of California lists chromium (hexavalent compounds) as chemicals known to cause cancer and reproductive toxicity. Cadmium, cadmium compounds, and lead may be present as impurities of the manufacturing process. Chromium (hexavalent compounds) may be generated during certain manufacturing processes.

The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any representation or warranty, expressed or implied, regarding the accuracy or correctness. The conditions or methods of handling, storage, use, and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with handling, storage, use or disposal of the product. Data sheets of individual manufacturers are available upon request.