



## Material Safety Data Sheet (MSDS)

| <b>SECTION 1      PRODUCT INFORMATION</b>  |   |
|--|---|
| PRODUCT NAME:                              | Armor-Edge® n2e joint portion   |
| PRODUCT TYPE:                              | Cold rolled steel bars  |
| COMPANY CONTACT:                           | PNA Construction Technologies, Inc.<br>9 Dunwoody Park, Suite 111<br>Atlanta, GA 30338<br>800.542.0214  |
| <b>SECTION 2      GENERAL INFORMATION</b>  |   |
| TRADE NUMBER                               | Cold Finished Carbon, Stainless and Alloy Steels  |
| CAS NUMBER                                 | Not applicable  |
| SYNONYMS                                   | Steels  |
| USE/DESCRIPTION                            | Cold Finish Steel Products  |
| <b>SECTION 3    HAZARDS IDENTIFICATION</b> |   |
| EMERGENCY OVERVIEW                         | Warning! Welding, sawing, brazing, grinding, and machining may cause dusts and/or fume to be released. May be harmful if inhaled. May irritate the eyes, skin and respiratory tract. Molten material may cause thermal burns.   |
| POTENTIAL HEALTH EFFECTS                   | Note: Steel products in their solid state under normal conditions, do not present an inhalation, ingestion or skin hazard. However, operations resulting in fume or particulate formation such as welding, sawing, brazing, grinding and machining may present health hazards. Molten steel also is hazardous.  |
| EYE CONTACT                                | Dusts or particulates may cause mechanical irritation including pain, tearing and redness. Scratching of the cornea can occur if the eye is rubbed. Fumes may be irritating. Contact with the heated material may cause thermal burns.  |
| SKIN CONTACT                               | Dusts or particulates may cause mechanical irritation due to abrasion. Coated steel may cause skin irritation in sensitive individuals (see Section 16 for additional information.) Some components in this product are capable of causing an allergic reaction, possibly resulting in burning, itching and skin eruptions. Contact with heated material may cause thermal burns.   |
| INHALATION                                 | Dusts may cause irritation of the nose, throat and lungs. Excessive inhalation of metallic fumes and dusts may result in metal fume fever, an influenza-like illness. It is characterized by a sweet or metallic taste in the mouth, accompanied by dryness and irritation of the throat, cough, shortness of breath, pulmonary edema, general malaise, weakness, fatigue, muscle and joint pains, blurred vision, fever and chills. Typical symptoms last from 12 to 48 hours. |



## Material Safety Data Sheet (MSDS)

|   |   |
|---|---|
| INGESTION                                 | Not expected to be acutely toxic via ingestion on the physical and chemical properties of the product. Swallowing of excessive amounts of the dust may cause irritation, nausea and diarrhea.   |
| CHRONIC OR SPECIAL TOXIC EFFECTS          | Repeated exposure to fine dusts may inflame the nasal mucosa and cause changes to the lung. In addition, a red-brown pigmentation of the eye and/or skin may occur.   |
| TARGET ORGANS                             | Overexposure to specific components of this product that are generated in dusts or fumes may cause adverse effects to the following organs or systems: eyes, skin, liver, kidney, central nervous system, cardiovascular system, respiratory system.  |
| MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE | Diseases of the skin such as eczema may be aggravated by exposure. Also, disorders of the respiratory system including asthma, bronchitis and emphysema. Long-term inhalation exposure to agents that cause pneumoconiosis (e.g. dust) may act synergistically with inhalation of oxide fumes or dusts of this product. |



## Material Safety Data Sheet (MSDS)

| <b>SECTION 4 HAZARDS IDENTIFICATION</b> |           |             |                   |   |                  |  |
|---|-----------|-------------|-------------------|---|------------------|--|
| Components                              | CAS #     | %<br>Weight | Exposure Limits   |   |                  |  |
|   |           |             | ACGIH TLV (mg/M3) |   | OSHA PEL (mg/M3) |  |
| <u>Base Metal:</u><br>Iron              | 7439-89-6 | Balance     | 5                 | Oxide Dust/Fume                                     | 10               | Oxide Dust/Fume                              |
| <u>Alloying Elements:</u><br>Aluminum   | 7429-90-5 | 0-0.1       | 10<br>5           | Dust<br>Fume  | 15<br>5          | Dust<br>Respirable fraction                  |
| Antimony                                | 7440-36-0 | <0.9        | 0.5               | As Antimony   | 0.5              | As Antimony                                  |
| Arsenic                                 | 7440-38-2 | <0.9        | 0.01              | As Arsenic (A1 Carcinogen)                          | 0.01             | As Arsenic                                   |
| Beryllium                               | 7440-41-7 | <0.9        | 0.002<br>0.01     | As Beryllium (A1 Carcinogen)<br>As Beryllium (STEL) | 0.002<br>0.005   | As Beryllium<br>As Beryllium (Ceiling)       |
| Boron                                   | 7440-42-8 | <0.9        | 10                | Oxide Dust  | 15               | Oxide Dust                                   |
| Cadmium                                 | 7440-43-9 | <0.9        | 0.01<br>0.002     | As Cadmium (A2 Carcinogen)<br>Respirable fraction   | 0.005<br>0.0025  | As Cadmium<br>As Cadmium (Action Level)      |
| Calcium                                 | 1305-78-8 | <0.9        | 2                 | Oxide Dust  | 5                | Oxide Dust                                   |
| Carbon                                  | 7440-44-0 | 0.04-0.95   |                   | Not Established                                     |                  | Not Established                              |
| Chromium                                |           |             |                   |   |                  |  |
| Alloy grades                            | 7440-47-3 | 0.01-1.6    | 0.5               | Metal   | 1                | Metal  |
| Stainless grades                        | 7440-47-3 | 4-20        | 0.5               | Metal   | 1                | Metal  |
| Carbon grades                           | 7440-47-3 | 0.01-1.0    | 0.5               | Metal   | 1                | Metal  |
| Cobalt                                  | 7440-48-4 | <0.09       | 0.02              | As Cobalt (A3 Carcinogen)                           | 0.1              | Metal/Dust/Fume                              |
| Copper                                  | 7440-50-8 | 0.04-1      | 1<br>0.2          | Dust<br>Fume  | 1<br>0.1         | Dust<br>Fume                                 |
| Lead                                    | 7439-92-1 | 0-0.09      | 0.05              | Dust/Fume (A3 Carcinogen)                           | 0.05             | Dust/Fume                                    |
| Magnesium                               | 7439-95-4 | <0.9        |                   | Not Established                                     |                  | Not Established                              |
| Manganese                               | 7439-96-5 | 0.2-2       | 0.2               | Elements Mn & Inorg Cmpds                           | 5                | Fume(Ceiling)                                |
| Molybdenum                              | 7439-96-7 | 0.01-0.5    | 10                | Insoluble Cmpds                                     | 15               | Insoluble Cmpds                              |
| Niobium                                 | 7440-03-1 | <0.9        |                   | Not Established                                     |                  |  |
| Nickel                                  | 7440-02-0 | 0.01-1      | 1.5               | Metal   | 1                | Metal & Insoluble Cmpds                      |
| Nitrogen                                | 7727-37-9 | <0.9        |                   | Simple Asphyxiant                                   |                  | Simple Asphyxiant                            |
| Phosphorous                             | 7723-14-0 | <0.9        | 0.1               | Phosphorous   | 0.1              | Phosphorous                                  |
| Selenium                                | 7782-49-2 | <0.9        | 0.2               | Selenium  | 0.2              | Selenium                                     |
| Silicon                                 | 7440-21-3 | <0.9        | 10                | Dust  | 15               | Dust   |
| Sulfur                                  | 7704-34-9 | <0.9        | 5.2<br>13         | Sulfur Dioxide<br>Sulfur Dioxide (STEL)             | 13               | Sulfur Dioxide                               |
| Tin                                     | 7723-14-0 | <0.9        | 2                 | Metal, Oxide & Inorganic<br>Cmpds                   | 2                | Inorganic Cmpds                              |
| Titanium                                | 7440-32-6 | <0.9        |                   | Not Established                                     |                  | Not Established                              |
| Tungsten                                | 7440-33-7 | <0.9        | 5<br>10           | Insoluble Cmpds as W<br>Insoluble Cmpds as W (STEL) |                  | Not Established                              |
| Vanadium                                | 7440-62-2 | <0.9        | 0.05              | Oxide Dust/Fume                                     | 0.5<br>0.1       | Oxide Dust (Ceiling)<br>Oxide Fume (Ceiling) |
| Zinc                                    | 7440-66-6 |             | 10<br>5<br>10     | Oxide Dust<br>Oxide Fume<br>Oxide Fume (STEL)       | 5<br>10          | Oxide Fume<br>Oxide Dust                     |



## Material Safety Data Sheet (MSDS)

| <b>SECTION 5 FIRST AID MEASURES</b> |   |
|-------------------------------------|---|
| EYE CONTACT                         | In case of overexposure to dusts or fumes, immediately flush eyes with plenty of water for at least 15 minutes occasionally lifting the eye lids. Get medical attention if irritation persists. Thermal burns should be treated as medical emergencies.   |
| SKIN CONTACT                        | In case of overexposure to dusts or particulates, wash with soap and plenty of water. Get medical attention if irritation develops or persists. If thermal burn occurs, flush area with cold water and get immediate medical attention.   |
| INHALATION                          | In case of overexposure to dusts or fumes, remove to fresh air. Get immediate medical attention if symptoms described in this MSDS develop.   |
| INGESTION                           | Not considered an ingestion hazard. However, if excessive amounts of dust or particulates are swallowed, treat symptomatically and supportively. Get medical attention.   |
| NOTES TO PHYSICIAN                  | Inhalation of metal fume or metal oxides may produce an acute febrile state with cough, chills, weakness and general malaise, nausea, vomiting, muscle cramps and remarkable leukocytosis. Treatment is symptomatic and condition is self-limited in 24-48 hours. Chronic exposure to dusts may result in pneumoconiosis of mixed type. |

| <b>SECTION 6 FIRE FIGHTING MEASURES</b> |  |
|---|--|
| FLASH POINT (°C)<br>N/A                 | AUTOIGNITION TEMPERATURE<br>N/A  |
| FLAMMABILITY LIMIT IN AIR (% BY VOL)    | Lower N/A  |
|   | Upper N/A  |
| EXTINGUISHING MEDIA                     | For molten metal, use dry powder or sand.  |
| SPECIAL FIRE FIGHTING PROCEDURES        | Do not use water on molten metal. Firefighters should not enter confined spaces without wearing NIOSH/MSHA approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.                      |
| UNUSUAL FIRE AND EXPLOSION HAZARDS      | Steel products do not present fire or explosion hazards under normal conditions. Fine metal particles such as produced in grinding or sawing can burn. High concentrations of metallic fines in the air may present an explosion hazard. |



## Material Safety Data Sheet (MSDS)

| <b>SECTION 7 ACCIDENTAL RELEASE MEASURES</b>   |  |
|--|--|
| PRECAUTIONS IF MATERIAL IS SPILLED OR RELEASED | Emergency response is unlikely unless in the form of dust. Avoid inhalation, eye or skin contact of dusts by using appropriate precautions outlined in this MSDS (see Section 9). Fine turnings and small chips should be swept or vacuumed and placed into appropriate disposable containers. Keep fine dust or powder away from sources of ignition. Scrap should be reclaimed for recycling. Prevent materials from entering drains, sewers or waterways. |
| ENVIRONMENTAL PRECAUTIONS                      | Some grades of steel may contain reportable quantities of alloying elements. See Section 16 for additional information.  |
| WASTE DISPOSAL METHODS                         | Dispose used or unused product in accordance with applicable Federal, State and local regulations.   |

| <b>SECTION 8 HANDLING AND STORAGE</b>           |  |
|---|--|
| STORAGE TEMPERATURES                            | Stable under normal temperatures and pressures   |
| PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING | Store away from strong oxidizers. Dusts or powders may form explosive mixtures with air. Avoid breathing dusts or fumes. |

| <b>SECTION 9 EXPOSURE CONTROLS/PERSONAL PROTECTION</b>  |   |
|---|---|
| Operations with potential for generating high concentrations of airborne particulates or fumes should be evaluated and controlled as necessary. |   |
| EYE PROTECTION  | Use safety glasses. Dust resistant safety goggles are recommended under circumstances where particles could cause mechanical injury such as grinding or cutting. Face shield should be used when welding or cutting.  |
| SKIN  | Appropriate protective gloves should be worn as necessary. Good personal hygiene practices should be followed including cleansing exposed skin several times daily with soap and water and laundering or dry cleaning soiled work clothing.   |
| RESPIRATORY PROTECTION  | NIOSH/MSHA approved dust/fume/mist respirator should be used to avoid excessive exposure. See Section 4 for component material information exposure limits. If such concentrations are sufficiently high that this respirator is inadequate or high enough to cause oxygen deficiency, use a positive pressure self-contained breathing apparatus (SCBA). Follow all applicable respirator use, fitting and training standards and regulations. |
| VENTILATION   | Provide general and/or local exhaust ventilation to control airborne levels of dust or fumes below exposure limits.   |



## Material Safety Data Sheet (MSDS)

|                     |   |
|---------------------|---|
| EXPOSURE GUIDELINES | No permissible exposure limits (PEL) or threshold limit values (TLV) exist for steel. See Section 4 for component materials. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts. |
|---------------------|---|

| <b>SECTION 10            PHYSICAL DATA</b> |   |
|--|---|
| APPEARANCE AND ODOR                        | Red, grey or other color steel panels, pulins and built-up joists and trusses.. |
| BOILING POINT                              | N/A   |
| MELTING POINT                              | Approximately 2800°F  |
| pH   | N/A   |
| SPECIFIC GRAVITY (AT 15.6°C)               | N/A   |
| DENSITY (AT 15.6°C)                        | N/A   |
| VAPOR PRESSURE                             | N/A   |
| VAPOR DENSITY                              | N/A   |
| % VOLATILE, BY VOLUME                      | N/A   |
| SOLUBILITY IN WATER                        | Insoluble   |
| EVAPORATION RATE (BUTYL ACETATE = 1)       | N/A   |
| OTHER PHYSICAL AND CHEMICAL DATA           | None  |

| <b>SECTION 11            STABILITY AND REACTIVITY</b> |   |
|---|---|
| STABILITY   | Stable  |
| CONDITIONS TO AVOID                                   | Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume.                          |
| HAZARDOUS POLYMERIZATION                              | Will not occur  |
| INCOMPATIBILITY (MATERIALS TO AVOID)                  | Reacts with strong acids to form hydrogen gas. Do not store near strong oxidizers.  |
| HAZARDOUS DECOMPITION PRODUCTS                        | Metallic fumes may be produced during welding, burning, grinding and possibly machining or any situation with the potential for thermal decomposition. Refer to ANSI Z49.1yes |



## Material Safety Data Sheet (MSDS)

### SECTION 12 TOXICOLOGICAL INFORMATION

The primary component of this product is Iron. Long-term exposure to iron dusts or fumes can result in a condition called siderosis which is considered to be a benign pneumoconiosis. Symptoms may include chronic bronchitis, emphysema and shortness of breath upon exertion. Penetration of iron particles in the skin or eye may cause an exogenous or ocular siderosis which may be characterized by a red-brown pigmentation of the affected area. Ingestion overexposure to iron may affect the gastrointestinal, nervous and hermatopoietic system and the liver. Iron and steel founding, but not iron or iron oxide has been listed as potentially carcinogenic by IARC.

When this product is welded, fumes are generated. Welding fumes may be different in composition from the original welding product, with the chief component being ordinary oxides of the metal being welded. Chronic health effects (including cancer) have been associated with the fumes and dusts of individual component metals (see above) and welding fumes as a general category have been listed by IARC as a carcinogen (Group 2B). There is also limited evidence that welding fumes may cause adverse reproductive and fetal effects. Evidence is stronger where welding materials contain known reproductive toxins, e.g., lead which may be present in the coating of material of this product.

Breathing fumes or dusts of this product may result in metal fume fever, which is an illness produced by inhaling metal oxides. These oxides are produced by heating various metals including cadmium, zinc, magnesium, copper, antimony, nickel, cobalt, manganese, tin, lead, beryllium, silver, chromium, aluminum, selenium, iron and arsenic. The most common agents involved are zinc and copper.

This product may contain small amounts of manganese. Prolonged exposure to manganese dusts or fumes is associated with "manganism", a Parkinson-like syndrome characterized by a variety of neurological symptoms including muscle spasms, gait disturbances, tremors and psychoses.

This product may contain small amounts of cadmium. Primary target organs for cadmium overexposure are the lung and the kidney. Because of its cumulative nature, chronic cadmium poisoning can cause serious disease which takes many years to develop and may continue to progress despite cessation of exposure. Progression of the disease may not reflect current exposure conditions. It is also capable of causing a painful osteomalacia called "Itai-Itai" in postmenopausal women, and have caused developmental effects and/or reproductive effects in male and female animals. Cadmium is listed carcinogenic by NTP, OSHA and IARC (Group 1).

This product may contain small amounts of chromium. Prolonged and repeated overexposure to chromium dusts or fumes may cause skin ulcers, nasal irritation and ulceration, kidney damage and cancer of the respiratory system. Chromium is a skin sensitizer. Cancer is generally attributed to the hexavalent (+6) form of chromium which is listed as a carcinogen by NTP and IARC (Group 1)

This product may contain small amounts of nickel. Prolonged and repeated contact with nickel may cause sensitization dermatitis. Inhalation of nickel compounds has caused lung damage as well as sinus, nasal and lung cancer in laboratory animals. Nickel is a listed carcinogen by NTP and IARC (Group 1).

This product may contain small amounts of vanadium. Adverse effects from dermal, inhalation or parenteral exposure to various vanadium compounds have been reported. The major target for vanadium pentoxide toxicity is the respiratory tract. Fumes or dust can cause severe eye and respiratory irritation and systematic effects. Chronic bronchitis, green tongue, conjunctivitis, pharyngitis, rhinitis, rales, chronic productive cough and tightness of the chest have been reported following overexposure. Allergic reactions resulting from skin and inhalation exposures have also been reported. A statistical association between vanadium air levels and lung cancer have also been suggested, but vanadium currently is not reported as a human carcinogen.



## Material Safety Data Sheet (MSDS)

This product may contain small amounts of lead. Lead can accumulate in the body. Consequently, exposure to fumes or dust may produce signs of polyneuritis, diminished vision and peripheral neuropathy such as tingling and loss of feeling in fingers, arms and legs. Lead is a known reproductive and developmental toxin. It is also associated with central nervous system disorders, anemia, kidney disfunction and neurobehavioral abnormalities. The brain is a major target organ for lead exposure. Elemental lead is listed as an IARC 2B carcinogen.

The product may contain small amounts of copper. Copper dust and fume can irritate the eyes, nose and throat causing coughing, wheezing, nosebleeds, ulcers and metal fume fever. Other effects from repeated inhalation of copper fume include a metallic or sweet taste and discoloration of skin, teeth or hair. Copper also may cause an allergic skin reaction. Overexposure to copper can effect the liver.

| <b>SECTION 13                    ECOLOGICAL INFORMATION</b> |  |
|---|--|
| AQUATIC ECOTOXICOLOGICAL DATA                               | No specific information available on this product. |
| ENVIRONMENTAL FATE DATA                                     | No specific information available on this product. |

| <b>SECTION 14                    DISPOSAL CONSIDERATION</b> |
|---|
|---|

Recovery and reuse, rather than disposal, should be the ultimate goal of handling efforts. Dispose in accordance with Federal, State and Local health and environmental regulations. Prevent materials from entering drains, sewers or waterways.

| <b>SECTION 15                    TRANSPORT INFORMATION</b> |               |
|--|---------------|
| DOT PROPER SHIPPING NAME                                   | Not regulated |
| DOT HAZARD CLASSIFICATION                                  | Not regulated |
| UN/NA NUMBER   | N/A           |
| DOT PACKING GROUP  | N/A           |
| LABELING REQUIREMENTS                                      | N/A           |
| PLACARDS   | N/A           |
| DOT HAZARDOUS SUBSTANCE                                    | N/A           |
| DOT MARINE POLLUTANT                                       | N/A           |





## Material Safety Data Sheet (MSDS)

| <b>SECTION 16 REGULATORY INFORMATION</b>  |   |
|---|---|
| This product is not hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200. However, dusts and fumes from this product may be hazardous. |   |
| CALIFORNIA PROPOSITION 65   | This product contains chemicals (antimony [oxide], arsenic, beryllium, chromium [hexavalent], cobalt, cadmium, lead, nickel) known to the State of California to cause cancer and chemicals (cadmium, lead) known to the State of California to cause birth defects or other reproductive harm.                   |
| REGULATORY LISTS  | Some components of this product may be specifically listed by individual states; other product-specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements, you should contact the appropriate agency in your state. |
| TOXIC SUBSTANCES CONTROL ACT (TSCA)   | Components of this product are listed on the TSCA inventory.  |
| COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA)   | Steel is not reportable, however, it contains hazardous substances that may be reportable if released in pieces with diameters less than or equal to 0.004 inches (RQ marked with a "**").  |
| <u>CHEMICAL NAME</u>  | <u>REPORTABLE QUANTITY (IN LB)</u>  |
| ANTIMONY  | 5000*   |
| ARSENIC   | 1*  |
| BERYLLIUM   | 10*   |
| CADMIUM   | 10*   |
| CHROMIUM  | 5000*   |
| COPPER  | 5000*   |
| LEAD  | 10*   |
| NICKEL  | 100*  |
| PHOSPHOROUS   | 1   |
| SELENIUM  | 100*  |
| ZINC  | 1000*   |



## Material Safety Data Sheet (MSDS)

|   |  |
|---|--|
| <p><b>SUPERFUND ADMENDMENTS AND<br/>REAUTHORIZATION ACT OF 1986 (SARA),<br/>TITLE III</b></p> | <p><b>SECTION 311/312 HAZARD CATEGORIES; Immediate Health Effect, Delayed Health Effect. This product contains the following EPCRA Section 313 chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right –To-Know Act of 1986 (40 CFR 372):</b></p> |
|---|--|

| <u>Chemical Name</u>     | <u>CAS #</u> | <u>Concentration<br/>(% by weight)</u> | <u>Reportable</u> |
|--------------------------|--------------|--|-------------------|
| Aluminum                 | 7429-90-5    | <0.01                                  | No - < 1%         |
| Antimony                 | 7440-36-0    | <0.9                                   | No - < 1%         |
| Arsenic                  | 7440-38-2    | <0.09                                  | No - < 0.1%       |
| Beryllium                | 7440-43-9    | <0.09                                  | No - < 0.1%       |
| Cadmium                  | 7440-43-9    | <0.09                                  | No - < 0.1%       |
| Chromium                 | 7440-47-3    | 0.01-1.0                               | Yes - > 0.1%      |
| Cobalt                   | 7440-48-4    | <0.09                                  | No - < 0.1%       |
| Copper                   | 7440-50-8    | <1.0                                   | No - < 1%         |
| Lead                     | 7439-92-1    | 0.0-0.09                               | No - < 0.1%       |
| Lead (leaded steel only) | 7439-92-1    | 0.15-0.35                              | Yes - > 0.1%      |
| Manganese                | 7439-96-5    | 0.2-2                                  | Yes - > 1%        |
| Nickel                   | 7440-02-0    | 0.01-0.1                               | Yes - > 0.1%      |
| Phosphorus               | 7723-14-0    | <0.9                                   | No - < 1%         |
| Selenium                 | 7782-49-2    | <0.9                                   | No - < 1%         |
| Vanadium                 | 7440-62-2    | <0.9                                   | No - < 1%         |
| Zinc                     | 7440-66-6    | <0.9                                   | No - < 1%         |

|  |
|--|
| <b>SECTION 17      OTHER INFORMATION</b> |
|--|

This product may be coated with a variety of materials, including oils, paints, galvanization, etc. that are not included in this MSDS. During welding precautions should be taken for airborne contaminants that may originate from components of the welding rod. Arc or spark generated when welding or burning could be a source of ignition or combustible and flammable materials. The information in this Material Safety Data Sheet (MSDS) was obtained from sources which we believe are reliable; however, the information is provided without any representation of 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 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 the handling, storage, use or disposal of this product.

The information contained herein is based on the data available to us and is believed to be correct. However, PNA Construction Technologies, Inc. makes no warranty, expressed or implied, regarding the accuracy of this data or the results to be obtained from the use thereof. PNA Construction Technologies, Inc. assumes no responsibility for the use of the product described herein.

©COPYRIGHT 2007 by PNA Construction Technologies, Inc. Diamond Dowel® is a registered trademark of PNA Construction Technologies, Inc.



## Material Safety Data Sheet (MSDS)

### TAPERED PLATE DOWEL – 1/2" & 3/8

**SECTION 26 GENERAL INFORMATION**

IDENTITY                      Hot Rolled Bars  
 FAMILY                        Inorganic Compounds

**SECTION 27 HAZARDOUS CONSTITUENTS**

| <u>Constituent</u>   | <u>OSHA PEL</u><br>(mg/M3) | <u>ACGIH TLV</u><br>(mg/M3) | <u>%</u><br><u>Range</u> | <u>CAS #</u> |
|----------------------|----------------------------|-----------------------------|--------------------------|--------------|
| Aluminum:            |                            |                             |                          |              |
| Fume                 | 5.0                        | 5.0                         | .001-.100                | 7429-90-5    |
| As dust              | 5.0                        | ---                         |                          |              |
| Carbon:              |                            |                             |                          |              |
| Not Listed           | ---                        | ---                         | .01-1.10                 | 7440-44-0    |
| Chromium:            | 0.5                        | 0.5                         | .05-.90                  | 7440-47-3    |
| Soluble Cr salts     | 1.0                        | 0.5                         |                          |              |
| Copper (metal):      |                            |                             |                          |              |
| As dust              | 1.0                        | 1.0                         | .10-1.0                  | 7440-50-8    |
| As Fume              | 0.1                        | 0.2                         |                          |              |
| Iron:                |                            |                             |                          |              |
| Iron Oxide Fume      | 10.0                       | ---                         | 98-99                    | 7439-89-6    |
| Molybdenum:          |                            |                             |                          |              |
| Fume                 | 0.1                        | 0.2                         | .01-.15                  | 7439-98-7    |
| Nickel (metal):      | 1.0                        | 1.0                         | .05-.75                  | 7440-02-0    |
| Soluble Ni compounds | 1.0                        | 1.0                         |                          |              |
| Manganese:           |                            |                             |                          |              |
| Fume                 | 1.0                        | 1.0                         | .25-1.65                 | 7439-96-5    |
| Phosphorus (yellow)  | 0.1                        | ---                         | .06 max                  | 7723-14-0    |
| Silicon:             |                            |                             |                          |              |
| Dust                 | 15.0                       | ---                         | .08-.50                  | 7440-21-3    |
| Sulfur:              |                            |                             |                          |              |
| Sulfur Dioxide       | 13.0                       | 5.0                         | .001-.08                 | 7446-09-5    |

**SECTION 28 PHYSICAL AND CHEMICAL CHARACTERISTICS**

|                     |                             |
|---------------------|-----------------------------|
| APPEARANCE AND ODOR | Dark gray, odorless, metal. |
| BOILING POINT       | ±5000°F                     |



## Material Safety Data Sheet (MSDS)

|                                      |                         |
|--------------------------------------|-------------------------|
| MELTING POINT                        | Approximately 2500°F    |
| pH                                   | N/A                     |
| SPECIFIC GRAVITY                     | (H2O = 1) 2-8.2 (mm Hg) |
| DENSITY (AT 15.6°C)                  | N/A                     |
| VAPOR PRESSURE                       | N/A                     |
| VAPOR DENSITY                        | N/A                     |
| % VOLATILE, BY VOLUME                | N/A                     |
| SOLUBILITY IN WATER                  | Insoluble               |
| EVAPORATION RATE (BUTYL ACETATE = 1) | N/A                     |
| OTHER PHYSICAL AND CHEMICAL DATA     | None                    |

| <b>SECTION 29 FIRE AND EXPLOSION DATA</b> |                                 |     |
|---|---------------------------------|-----|
| FLASH POINT (°C)<br>N/A                   | AUTOIGNITION TEMPERATURE<br>N/A |     |
| FLAMMABILITY LIMIT IN AIR (% BY VOL)      | Lower                           | N/A |
|   | Upper                           | N/A |
| EXTINGUISHING MEDIA                       | N/A                             |     |
| SPECIAL FIRE FIGHTING PROCEDURES          | N/A                             |     |
| UNUSUAL FIRE AND EXPLOSION HAZARDS        | N/A                             |     |

| <b>SECTION 30 STABILITY AND REACTIVITY</b> |              |
|--|--------------|
| STABILITY                                  | Stable       |
| CONDITIONS TO AVOID                        | N/A.         |
| HAZARDOUS POLYMERIZATION                   | N/A          |
| INCOMPATIBILITY (MATERIALS TO AVOID)       | Strong acids |



## Material Safety Data Sheet (MSDS)

|                                  |              |
|----------------------------------|--------------|
| HAZARDOUS DECOMPOSITION PRODUCTS | Hydrogen gas |
|----------------------------------|--------------|

| <b>SECTION 31 HAZARDS IDENTIFICATION</b>            |   |
|---|---|
| EFFECTS OF OVEREXPOSURE                             | No toxic effects would be expected from inert solid form. Inhalation of metal dust and fumes may result from further processing of the material by the user, particularly during welding, burning, cutting, grinding and machining activities |
| ACUTE   | Short-term intensive exposure to dust may result in irritation to eyes, mucous membranes and respiratory tract. Steel recently produced may be extremely hot.   |
| CHRONIC   | Sever pneumonitis, pulmonary disease  |
| CARCINOGENIC  | NTP: nickel, chromium<br>IARC: nickel, chromium<br>OSHA: none   |
| SIGNS AND SYMPTOMS OF EXPOSURE                      | Nausea, tightness of chest, fever, irritation of eyes, nose, throat and skin.   |
| MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE | Chronic lung disease, allergic conditions.  |
| EMERGENCY AND FIRST AID PROCEDURES                  | Standard first aid procedures – remove to fresh air.  |

| <b>SECTION 32 PRECAUTIONS FOR SAFE HANDLING AND USE</b> |   |
|---|---|
| STEPS TO BE TAKEN IN CASE OF RELEASE OR SPILL           | N/A   |
| WASTE DISPOSAL METHOD                                   | Material should be reclaimed for re-use; follow local, State and Federal solid waste disposal requirements. |

| <b>SECTION 33 CONTROL MEASURES</b>     |   |
|--|---|
| RESPIRATORY PROTECTION                 | Dust/fume respirator.   |
| LOCAL EXHAUST                          | As required to meet PEL.  |
| PROTECTIVE GLOVES                      | As needed based on operations   |
| EYE PROTECTION                         | As needed   |
| OTHER PROTECTIVE CLOTHING OR EQUIPMENT | May be needed for grinding. Heat resistant face protection, clothing, boots and/or gloves may be necessary. |

The information contained herein is based on the data available to us and is believed to be correct. However, PNA Construction Technologies, Inc. makes no warranty, expressed or implied, regarding the accuracy of this data or the results to be obtained from the use thereof. PNA Construction Technologies, Inc. assumes no responsibility for the use of the product described herein.

©COPYRIGHT 2007 by PNA Construction Technologies, Inc. Armor-Edge® is a registered trademark of PNA Construction Technologies, Inc.



## Material Safety Data Sheet (MSDS)

|                  |                            |
|------------------|----------------------------|
| <b>SECTION 1</b> | <b>PRODUCT INFORMATION</b> |
|------------------|----------------------------|

PRODUCT NAME: Armor-Edge® n2e steel form portion  
 PRODUCT TYPE: Hot rolled steel bars  
 COMPANY CONTACT: PNA Construction Technologies, Inc.  
 9 Dunwoody Park, Suite 111  
 Atlanta, GA 30338  
 800.542.0214

|                  |                            |
|------------------|----------------------------|
| <b>SECTION 2</b> | <b>GENERAL INFORMATION</b> |
|------------------|----------------------------|

IDENTITY: Hot Rolled Bars  
 FAMILY: Inorganic Compounds

|                  |                               |
|------------------|-------------------------------|
| <b>SECTION 3</b> | <b>HAZARDOUS CONSTITUENTS</b> |
|------------------|-------------------------------|

| Constituent          | OSHA PEL<br>(mg/M3) | ACGIH TLV<br>(mg/M3) | %<br>Range | CAS #     |
|----------------------|---------------------|----------------------|------------|-----------|
| Aluminum:            |                     |                      |            |           |
| Fume                 | 5.0                 | 5.0                  | .001-.100  | 7429-90-5 |
| As dust              | 5.0                 | ---                  |            |           |
| Carbon:              |                     |                      |            |           |
| Not Listed           | ---                 | ---                  | .01-1.10   | 7440-44-0 |
| Chromium:            | 0.5                 | 0.5                  | .05-.90    | 7440-47-3 |
| Soluble Cr salts     | 1.0                 | 0.5                  |            |           |
| Copper (metal):      |                     |                      |            |           |
| As dust              | 1.0                 | 1.0                  | .10-1.0    | 7440-50-8 |
| As Fume              | 0.1                 | 0.2                  |            |           |
| Iron:                |                     |                      |            |           |
| Iron Oxide Fume      | 10.0                | ---                  | 98-99      | 7439-89-6 |
| Molybdenum:          |                     |                      |            |           |
| Fume                 | 0.1                 | 0.2                  | .01-.15    | 7439-98-7 |
| Nickel (metal):      | 1.0                 | 1.0                  | .05-.75    | 7440-02-0 |
| Soluble Ni compounds | 1.0                 | 1.0                  |            |           |
| Manganese:           |                     |                      |            |           |
| Fume                 | 1.0                 | 1.0                  | .25-1.65   | 7439-96-5 |
| Phosphorus (yellow)  | 0.1                 | ---                  | .06 max    | 7723-14-0 |
| Silicon:             |                     |                      |            |           |
| Dust                 | 15.0                | ---                  | .08-.50    | 7440-21-3 |
| Sulfur:              |                     |                      |            |           |
| Sulfur Dioxide       | 13.0                | 5.0                  | .001-.08   | 7446-09-5 |

|                  |  |
|------------------|--|
| <b>SECTION 4</b> | <b>PHYSICAL AND CHEMICAL CHARACTERISTICS</b> |
|------------------|--|

|                     |                             |
|---------------------|-----------------------------|
| APPEARANCE AND ODOR | Dark gray, odorless, metal. |
| BOILING POINT       | ±5000°F                     |



## Material Safety Data Sheet (MSDS)

|                                      |                         |
|--------------------------------------|-------------------------|
| MELTING POINT                        | Approximately 2500°F    |
| pH                                   | N/A                     |
| SPECIFIC GRAVITY                     | (H2O = 1) 2-8.2 (mm Hg) |
| DENSITY (AT 15.6°C)                  | N/A                     |
| VAPOR PRESSURE                       | N/A                     |
| VAPOR DENSITY                        | N/A                     |
| % VOLATILE, BY VOLUME                | N/A                     |
| SOLUBILITY IN WATER                  | Insoluble               |
| EVAPORATION RATE (BUTYL ACETATE = 1) | N/A                     |
| OTHER PHYSICAL AND CHEMICAL DATA     | None                    |

| <b>SECTION 5 FIRE AND EXPLOSION DATA</b> |                              |
|--|------------------------------|
| FLASH POINT (°C) N/A                     | AUTOIGNITION TEMPERATURE N/A |
| FLAMMABILITY LIMIT IN AIR (% BY VOL)     | Lower N/A                    |
|  | Upper N/A                    |
| EXTINGUISHING MEDIA                      | N/A                          |
| SPECIAL FIRE FIGHTING PROCEDURES         | N/A                          |
| UNUSUAL FIRE AND EXPLOSION HAZARDS       | N/A                          |

| <b>SECTION 6 STABILITY AND REACTIVITY</b> |              |
|---|--------------|
| STABILITY                                 | Stable       |
| CONDITIONS TO AVOID                       | N/A          |
| HAZARDOUS POLYMERIZATION                  | N/A          |
| INCOMPATIBILITY (MATERIALS TO AVOID)      | Strong acids |
| HAZARDOUS DECOMPOSITION PRODUCTS          | Hydrogen gas |



## Material Safety Data Sheet (MSDS)

| <b>SECTION 7 HAZARDS IDENTIFICATION</b>             |   |
|---|---|
| EFFECTS OF OVEREXPOSURE                             | No toxic effects would be expected from inert solid form. Inhalation of metal dust and fumes may result from further processing of the material by the user, particularly during welding, burning, cutting, grinding and machining activities |
| ACUTE   | Short-term intensive exposure to dust may result in irritation to eyes, mucous membranes and respiratory tract. Steel recently produced may be extremely hot.   |
| CHRONIC   | Sever pneumonitis, pulmonary disease  |
| CARCINOGENIC  | NTP: nickel, chromium<br>IARC: nickel, chromium<br>OSHA: none   |
| SIGNS AND SYMPTOMS OF EXPOSURE                      | Nausea, tightness of chest, fever, irritation of eyes, nose, throat and skin.   |
| MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE | Chronic lung disease, allergic conditions.  |
| EMERGENCY AND FIRST AID PROCEDURES                  | Standard first aid procedures – remove to fresh air.  |

| <b>SECTION 8 PRECAUTIONS FOR SAFE HANDLING AND USE</b> |   |
|--|---|
| STEPS TO BE TAKEN IN CASE OF RELEASE OR SPILL          | N/A   |
| WASTE DISPOSAL METHOD                                  | Material should be reclaimed for re-use; follow local, State and Federal solid waste disposal requirements. |

| <b>SECTION 9 CONTROL MEASURES</b>      |   |
|--|---|
| RESPIRATORY PROTECTION                 | Dust/fume respirator.   |
| LOCAL EXHAUST                          | As required to meet PEL.  |
| PROTECTIVE GLOVES                      | As needed based on operations   |
| EYE PROTECTION                         | As needed   |
| OTHER PROTECTIVE CLOTHING OR EQUIPMENT | May be needed for grinding. Heat resistant face protection, clothing, boots and/or gloves may be necessary. |

The information contained herein is based on the data available to us and is believed to be correct. However, PNA Construction Technologies, Inc. makes no warranty, expressed or implied, regarding the accuracy of this data or the results to be obtained from the use thereof. PNA Construction Technologies, Inc. assumes no responsibility for the use of the product described herein.

©COPYRIGHT 2007 by PNA Construction Technologies, Inc. Armor-Edge® is a registered trademark of PNA Construction Technologies, Inc.





## Material Safety Data Sheet (MSDS)

|                  |                            |
|------------------|----------------------------|
| <b>SECTION 1</b> | <b>PRODUCT INFORMATION</b> |
|------------------|----------------------------|

PRODUCT NAME: Armor-Edge® n2e steel transition portion  
 PRODUCT TYPE: Hot rolled steel bars  
 COMPANY CONTACT: PNA Construction Technologies, Inc.  
 9 Dunwoody Park, Suite 111  
 Atlanta, GA 30338  
 800.542.0214

|                  |                            |
|------------------|----------------------------|
| <b>SECTION 2</b> | <b>GENERAL INFORMATION</b> |
|------------------|----------------------------|

IDENTITY: Hot Rolled Bars  
 FAMILY: Inorganic Compounds

|                  |                               |
|------------------|-------------------------------|
| <b>SECTION 3</b> | <b>HAZARDOUS CONSTITUENTS</b> |
|------------------|-------------------------------|

| Constituent          | OSHA PEL<br>(mg/M3) | ACGIH TLV<br>(mg/M3) | %<br>Range | CAS #     |
|----------------------|---------------------|----------------------|------------|-----------|
| Aluminum:            |                     |                      |            |           |
| Fume                 | 5.0                 | 5.0                  | .001-.100  | 7429-90-5 |
| As dust              | 5.0                 | ---                  |            |           |
| Carbon:              |                     |                      |            |           |
| Not Listed           | ---                 | ---                  | .01-1.10   | 7440-44-0 |
| Chromium:            | 0.5                 | 0.5                  | .05-.90    | 7440-47-3 |
| Soluble Cr salts     | 1.0                 | 0.5                  |            |           |
| Copper (metal):      |                     |                      |            |           |
| As dust              | 1.0                 | 1.0                  | .10-1.0    | 7440-50-8 |
| As Fume              | 0.1                 | 0.2                  |            |           |
| Iron:                |                     |                      |            |           |
| Iron Oxide Fume      | 10.0                | ---                  | 98-99      | 7439-89-6 |
| Molybdenum:          |                     |                      |            |           |
| Fume                 | 0.1                 | 0.2                  | .01-.15    | 7439-98-7 |
| Nickel (metal):      | 1.0                 | 1.0                  | .05-.75    | 7440-02-0 |
| Soluble Ni compounds | 1.0                 | 1.0                  |            |           |
| Manganese:           |                     |                      |            |           |
| Fume                 | 1.0                 | 1.0                  | .25-1.65   | 7439-96-5 |
| Phosphorus (yellow)  | 0.1                 | ---                  | .06 max    | 7723-14-0 |
| Silicon:             |                     |                      |            |           |
| Dust                 | 15.0                | ---                  | .08-.50    | 7440-21-3 |
| Sulfur:              |                     |                      |            |           |
| Sulfur Dioxide       | 13.0                | 5.0                  | .001-.08   | 7446-09-5 |

|                  |  |
|------------------|--|
| <b>SECTION 4</b> | <b>PHYSICAL AND CHEMICAL CHARACTERISTICS</b> |
|------------------|--|

|                     |                             |
|---------------------|-----------------------------|
| APPEARANCE AND ODOR | Dark gray, odorless, metal. |
| BOILING POINT       | ±5000°F                     |



## Material Safety Data Sheet (MSDS)

|                                      |                         |
|--------------------------------------|-------------------------|
| MELTING POINT                        | Approximately 2500°F    |
| pH                                   | N/A                     |
| SPECIFIC GRAVITY                     | (H2O = 1) 2-8.2 (mm Hg) |
| DENSITY (AT 15.6°C)                  | N/A                     |
| VAPOR PRESSURE                       | N/A                     |
| VAPOR DENSITY                        | N/A                     |
| % VOLATILE, BY VOLUME                | N/A                     |
| SOLUBILITY IN WATER                  | Insoluble               |
| EVAPORATION RATE (BUTYL ACETATE = 1) | N/A                     |
| OTHER PHYSICAL AND CHEMICAL DATA     | None                    |

| <b>SECTION 5 FIRE AND EXPLOSION DATA</b> |                              |
|--|------------------------------|
| FLASH POINT (°C) N/A                     | AUTOIGNITION TEMPERATURE N/A |
| FLAMMABILITY LIMIT IN AIR (% BY VOL)     | Lower N/A                    |
|  | Upper N/A                    |
| EXTINGUISHING MEDIA                      | N/A                          |
| SPECIAL FIRE FIGHTING PROCEDURES         | N/A                          |
| UNUSUAL FIRE AND EXPLOSION HAZARDS       | N/A                          |

| <b>SECTION 6 STABILITY AND REACTIVITY</b> |              |
|---|--------------|
| STABILITY                                 | Stable       |
| CONDITIONS TO AVOID                       | N/A          |
| HAZARDOUS POLYMERIZATION                  | N/A          |
| INCOMPATIBILITY (MATERIALS TO AVOID)      | Strong acids |
| HAZARDOUS DECOMPOSITION PRODUCTS          | Hydrogen gas |



## Material Safety Data Sheet (MSDS)

| <b>SECTION 7 HAZARDS IDENTIFICATION</b>             |   |
|---|---|
| EFFECTS OF OVEREXPOSURE                             | No toxic effects would be expected from inert solid form. Inhalation of metal dust and fumes may result from further processing of the material by the user, particularly during welding, burning, cutting, grinding and machining activities |
| ACUTE   | Short-term intensive exposure to dust may result in irritation to eyes, mucous membranes and respiratory tract. Steel recently produced may be extremely hot.   |
| CHRONIC   | Sever pneumonitis, pulmonary disease  |
| CARCINOGENIC  | NTP: nickel, chromium<br>IARC: nickel, chromium<br>OSHA: none   |
| SIGNS AND SYMPTOMS OF EXPOSURE                      | Nausea, tightness of chest, fever, irritation of eyes, nose, throat and skin.   |
| MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE | Chronic lung disease, allergic conditions.  |
| EMERGENCY AND FIRST AID PROCEDURES                  | Standard first aid procedures – remove to fresh air.  |

| <b>SECTION 8 PRECAUTIONS FOR SAFE HANDLING AND USE</b> |   |
|--|---|
| STEPS TO BE TAKEN IN CASE OF RELEASE OR SPILL          | N/A   |
| WASTE DISPOSAL METHOD                                  | Material should be reclaimed for re-use; follow local, State and Federal solid waste disposal requirements. |

| <b>SECTION 9 CONTROL MEASURES</b>      |   |
|--|---|
| RESPIRATORY PROTECTION                 | Dust/fume respirator.   |
| LOCAL EXHAUST                          | As required to meet PEL.  |
| PROTECTIVE GLOVES                      | As needed based on operations   |
| EYE PROTECTION                         | As needed   |
| OTHER PROTECTIVE CLOTHING OR EQUIPMENT | May be needed for grinding. Heat resistant face protection, clothing, boots and/or gloves may be necessary. |

The information contained herein is based on the data available to us and is believed to be correct. However, PNA Construction Technologies, Inc. makes no warranty, expressed or implied, regarding the accuracy of this data or the results to be obtained from the use thereof. PNA Construction Technologies, Inc. assumes no responsibility for the use of the product described herein.

©COPYRIGHT 2007 by PNA Construction Technologies, Inc. Armor-Edge® is a registered trademark of PNA Construction Technologies, Inc.