MAGNA 8N12

DESCRIPTION:

Magna 8N12 is the “Missing Link” electrode that eliminates the sigma phase problem in welding and maintaining structures used at elevated temperatures. Magna 8N12 is a nickel-based electrode for welding a wide variety of unusual metal combinations.

VERSATILITY:

Magna 8N12 has proven to be an economical proposition because this one electrode is capable of welding a wide variety of different super alloys, nickel alloys, stainless steels and carbon steels.

Before Magna 8N12, maintenance departments had to stock many different electrodes in order to be in a position to repair the variety of nickel alloys now in wide usage. They now have been able to reduce their nickel and super alloy electrode stock to this one electrode.

Formerly it was necessary to stock nickel electrodes, inconel electrodes, monel electrodes, incoloy electrodes, Hastelloy electrodes, and a wide range of “super alloy” electrodes. Magna 8N12 replaces all these and many others, greatly reducing inventory and the tying up of money in stocking all the many different electrodes. Magna 8N12 is considered the “Common Denominator” since this one electrode welds virtually all of the noble, high alloy, and super alloy base metals as well as combinations of these.

In view of the great usage of a wide range of the higher alloys, this money-saving feature of Magna 8N12 has taken on a great significance.

(a) Austenitic Stainless Steel to Carbon Steel

With stainless steel electrodes, this application was less than satisfactory because of carbon pick-up and dilution from the steel. The carbon caused inter-granular corrosion and the iron dilution caused the deposit of ductile Austenitic structure to become crack-sensitive and brittle martensitic structure. This problem is easily solved with Magna 8N12.

The dilution is almost non-existent and the ultra high alloy content of Magna 8N12 (which is well over 60% nickel) can withstand considerable dilution without going out of the austenitic structure. This electrode contains approximately 2% columbium which stabilizes the carbon and prevents inter-granular corrosion.

(b) Monel to Steel

This has long been considered a problem of welding application. With stainless steel electrodes the weld was highly crack-sensitive and provided practically no strength. With monel electrodes a series of problems occurred, accelerated by the high copper content of monel. Some of these problems were hot and cold cracking, stress corrosion cracking, and the welded tensile strength, as, using a monel electrode the weld seldom exceeds one-half the tensile strength of the steel, and usually is much less.

(c) Monel to Stainless Steel

This is virtually impossible using monel or stainless steel electrodes, but easily accomplished with Magna 8N12. The weld exceeds the properties of either base metal, including corrosion resistance, heat resistance, and mechanical properties in practically every combination.

(d) Magna 8N12 makes it possible to weld an almost endless variety of combinations of metals such as:-

- Wrought to cast high nickel alloys
- Hastelloy to inconel
- Monel to inconel
- Nickel to steel
- Duranickel to stainless steel
- Stellite to steel
- Inconel to inconel
- Stellite to stainless steel
- Hastelloy C to steel
- And many others

MAGNA 8N12 is truly the Common Denominator that takes it possible to join vastly dissimilar metals that have little compatibility with each other.

MECHANICAL PROPERTIES & PHYSICAL CONSTANTS:

Magna 8N12 provides these outstanding mechanical properties at room-temperature:-

	Tensile Strength P.S.I. (kg/mm^2)	**Yield Strength (0.2% Offset) P.S.I. (kg/mm^2)**	**Elongation in 2in. %**	**Hardness Brinell**
Annealed	up to 100,000 (70)	up to 60,000 (42)	Up to 60	120 to 180
As Welded	up to 120,000 (85)	up to 90,000 (63)	Up to 50	140 to 215
Cold Worked	up to 150,000 (105)	up to 120,000 (85)	Up to 30	Up to 300

MACHINABILITY:

The deposit is readily machinable. Even though it contains titanium, it does not form hard, unmachinable, titanium carbides as most titanium-bearing electrodes do. The carbon content of Magna 8N12 is nominally only 0.03% and the high columbium content completely stabilizes the carbon, preventing the formation of titanium carbides and also eliminating carbide precipitation.

CORROSION RESISTANCE:

Magna 8N12 provides outstanding corrosion resistance, even at elevated temperatures. Some examples are:-

(a) Magna 8N12 requires no post-weld heat-treatment to maintain its extraordinary corrosion resistance.

(b) Magna 8N12 resists reducing acids, sea water and sulphuric acid solutions.

(c) Magna 8N12 provides incredible resistance to sulphur.

(d) Magna 8N12 resists cavitation and erosion.

(e) The high or inconsistent sulphur content of many high nickel electrodes greatly increases their cracking tendency, lowers their physical properties, and limits their corrosion resistance. The sulphur content of Magna 8N12 is strictly controlled at 0.012% or less.

SUPER CRACK RESISTANCE:

An outstanding feature of Magna 8N12 is its extraordinary crack resistance. Some examples are:-

(a) Magna 8N12 is virtually immune to chloride-ion stress corrosion cracking.

(b) Magna 8N12 has extraordinary fatigue strength. This remarkable electrode has exceptional resistance to postweld strainage cracking, which is a problem with many nickel alloys.

(c) Magna 8N12 has exceptionally high creep and rupture strengths.

SUPERIOR CRYOGENIC PROPERTIES:

The Charpy V notch values of Magna 8N12 deposits at -320ºF (-196ºC):-
67 to 70 Foot Pounds (4.7 to 4.9 Kilogram Metres).
This electrode performs nobly at extreme low temperatures as well as super high temperatures.

HIGH HEAT RESISTANCE:

Magna 8N12 is resistant to oxidation at temperatures up to 2100ºF (1150ºC) and for short periods of time up to 2200ºF (1204ºC).
Magna 8N12 resists both oxidation and carburization at elevated temperatures.

PREVENTION OF SIGMA PHASE:

The problem of sigma phase, which is an embrittling chromium-iron compound that causes complete weld failure, had been a source of extreme anxiety to two generations of metallurgists. They simply could not make weldments that would not fail in the critical temperature range of 1200ºF (650ºC) to 1600ºF (870ºC). Welds that would be X-Ray perfect in the test laboratory would become brittle and fail when brought to the Sigma Phase danger range of 1200ºF (650ºC) to 1600ºF (870ºC). Many metallurgists feared no solution would ever be found to this problem which limited the use metals industries where heat is a factor, such as steel mills, the glass industry, smelters, foundries, etc.

MAGNA 8N12 has solved this historic problem. Because of special in-built stabilizers of its austenitic structure, the deposits of MAGNA 8N12 represent one of the few metals in the world that do not form the embrittling SIGMA PHASE even after long periods of use in the critical temperature range of 1200ºF (650ºC) to 1600ºF (870ºC).

Examples of specific applications for Magna 8N12:-

Heat Element Housings	Forming Tools
Extrusion Press Parts	Carburizing Baskets / Fixtures
Furnace Nozzles	After Burner Spray Bars
Heat Exchanger Tubing	After Burner Liners
Corrosion Resisting Tanks	Furnace Components

Pickling Hooks

Combustion Systems

Thrust Reverse Assemblies

Turbine Frames

Internal Combustion Engine Valves

Chemical Process Equipment

Phosphoric Acid Evaporators

Heat Resisting Fixtures

Pickling Tank Heaters

Hot Sizing Dies

Steam Service Parts

Extrusion Dies

Deaerating Heaters

High Nickel Pump Shafts and Impellers

Joining parts for Ethylene and Steam Methane Reforming Furnaces

Special High Nickel Molds used in the Glass Industry

Propeller Shafts

APPLICATION:

Magna 8N12 is easily applied in all positions including vertical and overhead. Thin parts do not require bevelling. Bevel all thicknesses over 1/8" (3.2 mm). Preheat is not necessary except when welding on heavy sections of carbon steels.

After arc is established, close the arc gap and maintain the shortest arc possible. At the end of the weld bead, backwhip the crater and extinguish the arc over previously deposited weld metal to avoid leaving a crater. The slag is easily removed with slight impact and should be removed before welding over the previously deposited weld metal.

Magna 8N12 can be used for overlay as well as joining and is often used to clad lower quality metals, such as carbon steels, to improve their heat and/or corrosion resistance. Either stringer beads or a weave may be used because of the high crack resistance of Magna 8N12.

SIZES AVAILABLE:

Metric	Imperial	Gauge	Welding Machine Setting
2.38	3/32”	12	40 - 80 amps
3.17	1/8"	10	60 - 100 amps

SAFETY DATA SHEET

SECTION 1: IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

1.1. Product identifier

Product name: Magna 8N12 TIG

1.2. Relevant identified uses of the substance or mixture and uses advised against

Application: Welding material

1.3. Details of the supplier of the safety data sheet

Supplier: GB importer:

Manufacturer:
ITW PP & F Korea Limited
13th Fl., Unit B, PAX Tower
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Seoul, Korea 06108
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info@trustengineering-eg.com
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1.4. Emergency telephone number

Emergency telephone: Call a Poison Center, emergency number or doctor/physician.
NHS: 111

SECTION 2: HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

CLP: The product is classified:
Skin Sens. 1;H317
Carc. 2;H351
STOT RE 1;H372

2.2. Label elements

Solid metals and alloys do not require a hazard label if they do not present a danger to human health or the environment in the form in which they are placed on the market. The information which would have appeared on the label is shown here.

Danger

Contains: Nickel

H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure.
P201	Obtain special instructions before use.
P260	Do not breathe fume.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective clothing and gloves.
P308 + P313	IF exposed or concerned: Get medical advice/attention.
P405	Store locked up.
P501	Dispose of contents/container in accordance with local regulations.

2.3. Other hazards

PBT/vPvB: This product does not contain any PBT or vPvB substances.

Other: Risk of sensitisation to nickel. Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

3.2. Mixtures

The product contains: metal and fillers.

Only classified substances above threshold limits or substances with an exposure limit are shown.
All substances in the product are either registered or exempt from registration under REACH.

CLP:

%:	CAS-No.:	EC No.:	REACH Reg. No:	Chemical name:	Hazard classification:	Notes:
60-80	7440-02-0	231-111-4	01-2119438727-29-XXXX	Nickel	Carc. 2;H351 STOT RE 1;H372 Skin Sens. 1;H317	S; 7
10-30	7440-47-3	231-157-5	-XXXX	Chromium	-	#
1-5	7439-96-5	231-105-1	01-2119449803-34-XXXX	Manganese	-	#

Notes: #: The substance has been assigned an exposure limit. See section 8.
S: May not require a label.
7: Alloys containing nickel are classified for skin sensitisation, when the release rate of 0,5 µg Ni/cm2/week (EN 1811) is exceeded.

References: The full text for all hazard statements is displayed in section 16.

SECTION 4: FIRST AID MEASURES

4.1. Description of first aid measures

When welding: Seek medical attention for all burns, regardless how minor they may seem.

Inhalation: Inhalation of welding fumes: Move into fresh air and keep at rest. In case of persistent throat irritation or coughing: Seek medical attention and bring these instructions.

Skin contact: Remove contaminated clothes and rinse skin thoroughly with water. If material is hot, treat for thermal burns and get immediate medical attention. In case of eczema or other skin disorders: Seek medical attention and bring these instructions.

Eye contact: Do not rub eye. Rinse with water. Contact physician if discomfort continues.

Ingestion: Not likely, due to the form of the product.

4.2. Most important symptoms and effects, both acute and delayed

Symptoms/effects: See section 11 for more detailed information on health effects and symptoms.

4.3. Indication of any immediate medical attention and special treatment needed

Medical attention/treatments: Treat symptomatically.

SECTION 5: FIREFIGHTING MEASURES

5.1. Extinguishing media

Extinguishing media: Use fire-extinguishing media appropriate for surrounding materials.

5.2. Special hazards arising from the substance or mixture

Specific hazards: During fire, gases hazardous to health may be formed.

5.3. Advice for firefighters

Protective equipment for fire-fighters: Selection of respiratory protection for fire fighting: follow the general fire precautions indicated in the workplace.

SECTION 6: ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Avoid any exposure. When welding: Follow precautions for safe handling described in this safety data sheet.

6.2. Environmental precautions

Environmental precautions: The product should not be dumped in nature but collected and delivered according to agreement with the local authorities.

6.3. Methods and material for containment and cleaning up

Methods for cleaning up: Collect in containers and seal securely.

6.4. Reference to other sections

References: For personal protection, see section 8.
For waste disposal, see section 13.

SECTION 7: HANDLING AND STORAGE

7.1. Precautions for safe handling

Safe handling advice: Avoid prolonged and repeated contact.
When welding: Do not breathe fumes. Observe good chemical hygiene practices.

Technical measures: No special precautions.

Technical precautions: When welding: Mechanical ventilation may be required.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures for safe storage: No special precautions.

Storage conditions: Store in tightly closed original container in a dry, cool and well-ventilated place.
Store locked up.

7.3. Specific end use(s)

Specific use(s): Welding material

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

8.1. Control parameters

Occupational exposure limits:

CAS-No.:	Chemical name:	As:	Exposure limits:	Type:	Notes:	References:
7440-47-3	Chromium	-	0.5 mg/m3	TWA	-	EH40
-	Chromium (VI) compounds	Cr	0.01 mg/m3	TWA	Carc; Sen; BEI	EH40
-	Chromium (VI) compounds (process generated)	Cr	0.025 mg/m3	TWA	Carc; Sen; BEI	EH40
-	Chromium (III) compounds	Cr	0.5 mg/m3	TWA	-	EH40
-	Chromium (II) compounds	Cr	0.5 mg/m3	TWA	-	EH40
-	Manganese and its inorganic compounds, inhalable fraction	Mn	0.2 mg/m3	TWA	-	EH40
-	Manganese and its inorganic compounds, respirable fraction	Mn	0.05 mg/m3	TWA	-	EH40
-	Nickel and water-insoluble nickel inorganic compounds (except nickel tetracarbonyl)	Ni	0.5 mg/m3	TWA	Sk; Carc; Sen	EH40

Notes:
Sk: Can be absorbed through skin.
Carc: Capable of causing cancer and/or heritable genetic damage.
Sen: Capable of causing occupational asthma.
BEI: Biological Exposure Index.
EH40: EH40/2005.

8.2. Exposure controls

Engineering measures:
When welding: Provide adequate ventilation. Observe Occupational Exposure Limits and minimise the risk of inhalation of dust and fumes.
Provide easy access to water supply and eye wash facilities.

Personal protection:
Personal protection equipment should be chosen according to the CEN standards and in discussion with the supplier of the personal protective equipment.
When welding: Use special welding equipment for protection of eyes, skin and respiratory system.

Hygiene measures:
Wash hands after handling. Change contaminated clothing.

Environmental Exposure Controls:
Not available.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

9.1. Information on basic physical and chemical properties

Physical state:	Wire with a flux coating.
Colour:	Silver.
Odour:	Odourless.
Odour threshold:	Not available.
pH:	Not applicable.
Melting point / freezing point:	Not available.
Boiling point:	Not applicable.
Flash point:	Not available.
Evaporation rate:	Not applicable.
Flammability (solid, gas):	Not available.
Explosive limits	Not relevant.
Vapour pressure:	Not applicable.
Vapour density:	Not applicable.
Relative density:	6-9
Solubility:	Insoluble in water
Partition coefficient (n-octanol/water):	Not applicable.
Auto-ignition temperature (°C):	Not available.
Decomposition temperature (°C):	Not available.
Viscosity:	Not applicable.
Explosive properties:	Not available.
Oxidising properties:	Not available.

9.2. Other information

Other data:	Not available.

SECTION 10: STABILITY AND REACTIVITY

10.1. Reactivity

Reactivity: Not reactive.

10.2. Chemical stability

Stability: Stable under normal temperature conditions and recommended use.

10.3. Possibility of hazardous reactions

Hazardous Reactions: None known.

10.4. Conditions to avoid

Conditions to avoid None known.

10.5. Incompatible materials

Incompatible materials: Water, moisture. Avoid contact with acids.

10.6. Hazardous decomposition products

Hazardous decomposition products: None under normal conditions.

SECTION 11: TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

Acute Toxicity (Oral):	Based on available data, the classification criteria are not met.
Acute Toxicity (Dermal):	Based on available data, the classification criteria are not met.
Acute Toxicity (Inhalation):	Based on available data, the classification criteria are not met.
Skin Corrosion/Irritation:	Based on available data, the classification criteria are not met.
Serious eye damage/irritation:	Based on available data, the classification criteria are not met.
Respiratory or skin sensitisation:	May cause an allergic skin reaction.
Germ cell mutagenicity:	Based on available data, the classification criteria are not met.
Carcinogenicity:	Suspected of causing cancer.
Reproductive Toxicity:	Based on available data, the classification criteria are not met.
STOT - Single exposure:	Based on available data, the classification criteria are not met.
STOT - Repeated exposure:	Causes damage to organs through prolonged or repeated exposure.
Aspiration hazard:	Based on available data, the classification criteria are not met.

Inhalation: Heating above the melting point releases metallic oxides which may cause metal fume fever by inhalation. The symptoms are shivering, fever, malaise and muscular pain. Toxic: danger of serious damage to health by prolonged exposure through inhalation.

Skin contact: The molten product can cause serious burns. May cause allergic skin disorders in sensitive individuals.

Eye contact: Particles/fumes in the eyes may cause discomfort/irritation.

Ingestion: Not likely, due to the form of the product.

Specific effects: Risk of sensitisation to nickel. Prolonged or repeated exposure to welding fumes may cause damage to the lungs and respiratory system.

11.2. Information on other hazards

Endocrine disrupting properties: The product does not contain any substance identified as having endocrine disrupting properties.

SECTION 12: ECOLOGICAL INFORMATION

12.1. Toxicity

Ecotoxicity: There are no data on the ecotoxicity of this product.

12.2. Persistence and degradability

Degradability: The product solely consists of inorganic compounds which are not biodegradable.

12.3. Bioaccumulative potential

Bioaccumulative potential: No data available on bioaccumulation.

12.4. Mobility in soil

Mobility: Not considered mobile.

12.5. Results of PBT and vPvB assessment

PBT/vPvB: This product does not contain any PBT or vPvB substances.

12.6. Endocrine disrupting properties

Endocrine disrupting properties: The product does not contain any substance identified as having endocrine disrupting properties.

12.7. Other adverse effects

Other adverse effects: None known.

SECTION 13: DISPOSAL CONSIDERATIONS

13.1. Waste treatment methods

Dispose of waste and residues in accordance with local authority requirements. Waste is classified as hazardous waste.

Waste from residues: EWC-code: 12 01 13

Contaminated packaging: Dispose of contaminated packings as residue.

SECTION 14: TRANSPORT INFORMATION

The product is not covered by international regulation on the transport of dangerous goods (IMDG, IATA, ADR/AND/RID).

14.1. UN number

UN-No: -

14.2. UN proper shipping name

Proper Shipping Name: -

14.3. Transport hazard class(es)

Class: -

14.4. Packing group

PG: -

14.5. Environmental hazards

Marine pollutant: -

Environmentally Hazardous substance: -

14.6. Special precautions for user

Special precautions: None known.

14.7. Transport in bulk according to Annex II of MARPOL and the IBC Code

Transport in bulk: Not relevant.

SECTION 15: REGULATORY INFORMATION

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

Special provisions: As a general rule, persons under 18 years of age are not allowed to work with this product. Users must be carefully instructed in the proper work procedure, the dangerous properties of the product and the necessary safety instructions.

National regulation: UK Statutory Instruments, 2021 No. 904, CONSUMER PROTECTION ENVIRONMENTAL PROTECTION HEALTH AND SAFETY. The REACH etc. (Amendment) Regulations 2021.
Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 with amendments.
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use) (Amendment etc.) (EU Exit) Regulations 2019 (SI 2019 No. 720), as amended.
The Control of Substances Hazardous to Health Regulations 2002 (S.I 2002 No. 2677) with amendments.
EH40/2005, Workplace exposure limits 2005, with amendments.
The Management of Health and Safety at Work Regulations 1999 (SI 1999 No. 3242), with amendments.
The List of Wastes (England) (Amendment) Regulations 2005. (SI 2005 No. 895).

15.2. Chemical Safety Assessment

CSA status: No chemical safety assessment has been carried out.

SECTION 16: OTHER INFORMATION

For restrictions on use see section 15.

The following sections contain revisions or new statements: 1, 2, 3, 4, 7, 8, 9, 11, 12, 13, 14, 15, 16.

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Abbreviations and acronyms used in the safety data sheet:	CSA= Chemical Safety Assessment. PBT = Persistent, Bioaccumulative and Toxic. vPvB = very Persistent and very Bioaccumulative.
Additional information:	Classification according to Regulation (EC) No. 1272/2008: Calculation method.

Wording of H-statements:

H317	May cause an allergic skin reaction.
H351	Suspected of causing cancer.
H372	Causes damage to organs through prolonged or repeated exposure.

The information on this data sheet represents our current data and is reliable provided that the product is used under the prescribed conditions and in accordance with the application specified on the packaging and/or in the technical guidance literature. Any other use of the product which involves using the product in combination with any other product or any other process is the responsibility of the user.

Made by DHI - Environment and Toxicology, Agern Allé 5, DK-2970 Hørsholm, Denmark.
www.dhigroup.com.