PHOENIX
WELDING WIRES
Melt Away Your Worries...

COMPANY PROFILE & PRODUCT CATALOGUE

info@phoenixweldingwires.com
www.phoenixweldingwires.com
+91 820020 7299

CONTENT

ABOUT COMPANY

Phoenix Welding Wires, one of the leading welding consumables Manufacturer located in Kapadwanj, Gujarat, India. Phoenix Welding Wires has a state of art fully equipped facility that is spread over 35,000 sq.ft. of land. More then 75% machinery is Imported and equipped with latest technological capabilities.

We started our journey with small unit of Welding Electrodes in 2014. In the year 2019 we install our first MIG Wire plant. We installed three more MIG Wire Plants in year 2021, 2023 & 2024. The combined production capacity of 400 Mt/mo.

In the year 2022 we Install plant to manufacture SAW Wire and TIG Wire. Currently we have 100 Mt/mo. production capacity of SAW Wire and TIG Wire.

Considering the market demand, and taking new challenges, in the year 2023 we launched our special product Flux Cored Wire in the Indian Market. For FCW Production we imported high tech machinery and technology for better quality and efficient production. Currently we manufacturing more then 6 grades of Flux Cored Wire. We have 250 Mt/mo. production capacity of Flux Cored Wire.

In the Year 2024, We started our own Manufacturing of SAW flux and Installed Drum/Pail Packaging Machine to provide more range to the market.

OUR STORY SO FAR...

2014

UNIQUE ELECTRODES

Started Company as a small unit of Welding Electrode production.

2019

REALITY

Mig wire production was stared in April 2019, 2019 is the founding year of this company in real sense.

2022

NEW PRODUCTS

In 2022 we add up SAW wire and TIG Wire in to our product range.

2023

FCW

We accepted the challenge, one more important venture as FCW Manufacturing.

2018

MIG WIRE

Keeping in view the demand of MIG Wire in the rapidly growing Indian Market. it was decided to start its Production

2021

EXPANSION

We expand our MIG Wire production from 100 MT/month to 175 MT/month

2023

REAL SUCCESS

2023 Year is when we have reached the target of 300MT/month MIG production.

2024

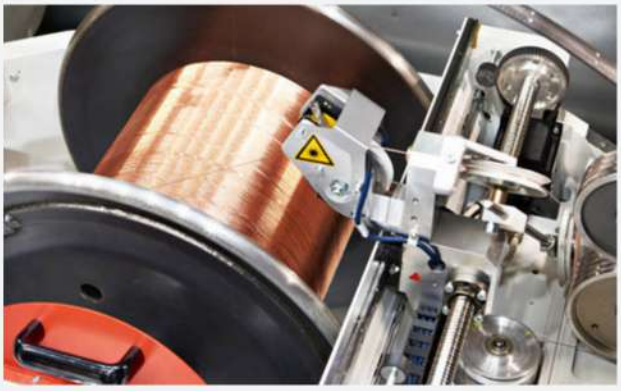
DRUM PACKING

This year we introduce our products in Drum Packaging and also started our own manufacturing of SAW Flux

TO BE CONTINUED...

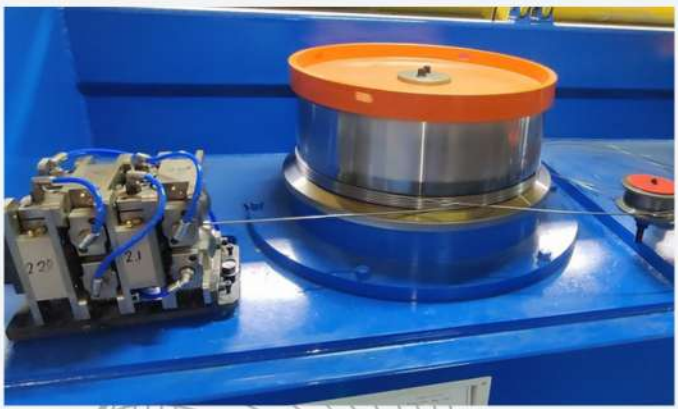
MANUFACTURING FACILITY

We pride ourselves at having a state of art fully equipped facility that is spread over 35,000 sq.ft. land. We have endowed our facility with advance mechanism and ultra modern technology that enables us to handle bulk order. Our facility has different departments that include production unit, testing unit, quality control department, marketing unit and many more.



Phoenix has modern machines that produce very efficient and quality material. We have developed our practice to minimize rejection and maximize production. We have in house facility for machine manufacturing, so we can built and modify machine on our own way.

For Our special product Flux Cored Wire We have high tech imported Machinery, in which we use modern cassette roller technology to ensure smooth wire surface and better joint. Machine also has infrared sensors for accurate flux filling.



VISION AND DEVELOPMENT

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Currently we are India's leading welding consumables manufacturer, but we want to be at global level. Our aim is to be offer every welding consumable and its full range to the market.

We maintain a close awareness of future consumable needs to support new alloys and changing technical requirements. Our company has its own development team with all necessary resources to design new product and improve existing products to meet the requirement of fabrication industry.

QUALITY ASSURANCE

Our company never compromises in terms of quality. We have reckoned for high standard and unmatched quality. We source top grade raw materials from trusted vendors to ensure finished products are optimum quality.

Our entire range of products are tested in our internal laboratory to ensure the quality of products and these products are available at very reasonable prices in market.

Phoenix has own facility of Chemical Lab & Physical Lab equipped with all the necessary testing equipment and also we have our own Spectrometer for accurate results.

ISI

CERTIFIED ISO 9001:2015 COMPANY

CE

THERMAX

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PRODUCT CATALOGUE

We Offer wide range of Welding Consumables such as MIG Wire, Flux Cored Wire, SAW Wire, TIG Wire and Welding Flux.

PRODUCT LIST

MIG WIRE

- Phoenix 70S_6 AWS SFA 5.18 ER70S_6
- Phoenix 70S_G AWS SFA 5.18 ER70S_G
- Phoenix 70S_2 AWS SFA 5.18 ER70S_2

FLUX CORED WIRE

- Phoenix 71T1 AWS SFA 5.20 E71T_1C
- Phoenix 71T12 AWS SFA 5.20 E71T_1C/T12-C
- Phoenix 71T_5 AWS SFA 5.20 E71T_5C
- Phoenix Ni1 AWS SFA 5.29 E81T1_Ni1C
- Phoenix Ni2 AWS SFA 5.29 E81T1_Ni2C
- Phoenix K2M AWS SFA 5.29 E81T1_K2C/M
- Phoenix K2 AWS SFA 5.29 E91T1_K2C

SAW WIRE

- Phoenix EL8 AWS SFA 5.17 EL8
- Phoenix EM12K AWS SFA 5.17 EM12K
- Phoenix EH14 AWS SFA 5.17 EH14
- Phoenix EA2 AWS SFA 5.17 EA2
- Phoenix EA4 AWS SFA 5.17 EA4

SAW FLUX

- Phoenix SAW FLUX AWS SFA 5.17 F7A0EM12K
- Phoenix SAW FLUX AWS SFA 5.17 F7AZEL8

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PHOENIX MIG WIRE

PHOENIX 70S_6

Grade :- AWS SFA 5.18 ER70S_6
EN ISO 14341-A G42 2 C1 4Si1
G46 5 M21 4Si1

Phoenix 70s_6 is a wire with a high deoxidizer content, made of low carbon steel, for welding steels with moderate amounts of scale or rust. Compared to other carbon steel welding wires, Type ER70S-6 wire has a higher deoxidizer content. This wire is suitable for welding steel with a moderate amount of scale or rust.

When using ER70S-6 in combination with gas shielded metal arc welding , use pure CO_2 or a mixture of argon +CO_2.

It is a good choice for welding pressure vessels. It is an excellent choice for pressure vessels, structural steel, piping, steel buildings, and automotive repair.

Sizes (mm) :- 0.60, 0.80, 1.00, 1.20, 1.60

Packaging :- 15kg/12.5kg Plastic Spool & Wire Spool
100 kgs and 250 kgs Drum Pack

Approvals :-

Welding Positions :-

Notes on Usage :-

- Pay attention to the gas purity and mixture ratio.
- Keep the gas flow rate between 15 ~ 25 L / Min.
- The extension length keep between 15 to 20mm.
- Clear the oil, rust, moisture, dust and other debris of the welded parts.
- Keep the welding hood clean and unobstructed.

MECHANICAL PROPERTIES & CHEMICAL COMPOSITION OF ALL WELD METAL OF PHOENIX 70S_6

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Diameter mm :- 1.20mm

Flow Rate (l/min.) :- 20

Amp./Volt. :- 280/30

Stick Out (mm) :- 20-25

Interpass Temp. (C) :- 150 ± 15

Polarity :- DC (+)

Typical Chemical Composition of Weld Metal						
Shilding Gas	C	Mn	Si	S	P	Mo
Ar + 20%	0.08	1.45	0.859	0.006	0.015	0.001
CO_2	0.08	1.4	0.80	0.006	0.015	0.001

All Weld Mechanical Propertes				
Shilding Gas	UTS (MPA)	YS (MPA)	EL	CVN Impact Value Joule at -30◦C
Ar + 20% CO_2	620	510	27%	110
CO_2	520	450	29%	92

Welding Position	Wire Dia (mm)		
	0.80mm	1.00mm	1.20mm
F & HF	150-300 Amp	150-310 Amp	150-330 Amp
Vertical Up	150-200 Amp	150-200 Amp	150-220 Amp

PHOENIX 70S_G

Grade :- AWS SFA 5.18 ER70S_G

Phoenix 70S_G is a low carbon steel wire that contains higher levels of manganese and silicon than other standard grades of MIG wire, producing high quality welds when used on dirty, oily or rusty steels. It is designed for flat and fillet welding and is to be used with a high current welding with Ar + Co2 mixed shielding Gas. This filler wire is typically used to weld low-alloy steels, such as those that contain molybdenum or chromium. It is often used in the construction of pressure vessels, storage tanks, and other structures that require high strength and good toughness.

Sizes (mm) :- 0.80, 1.00, 1.20, 1.60, 2.00, 2.50, 3.15, 3.50
Packaging :- 15kg/12.5kg Plastic Spool & Wire Spool,
Above 1.60mm sizes 1Mtr. Cut length, Packed in 5 Kgs Plastic Tube
Welding Positions :- H, F, VU, OH

Typical Chemical Composition of Weld Metal						
Elements %	C	Mn	Si	S	P	Mo
Typical	0.08	1.00	0.38	0.008	0.015	0.001

All Weld Mechanical Properties					
Properties	UTS (MPA)	YS (MPA)	EL	CVN Impact Value Joule at 0◦C	CVN Impact Value Joule at -30◦C
Typical	555	475	27%	150	100

Welding Position	Wire Dia (mm)		
	1.20mm	1.40mm	1.60mm
F & HF	80-350 Amp	150-400 Amp	200-500 Amp
Vertical Up	80-150 Amp	-	-
Over Head	80-150 Amp	-	-

PHOENIX 70S_2

Grade :- AWS SFA 5.18 ER70S_2
EN ISO 14341-B G49A 3 C1 S2

Phoenix 70s_2 is a triple deoxidized copper coated mild steel GMAW wire, available in bright finish, gives smooth flow, stable arc and spatter free under optimum welding conditions. Because of the de-oxidizers (Ti, Zr, Al) ER70S-2 can be used on mild steels that are rusty or dirty. The as-welded filler metal deposit exhibits adequate strength and hardness. It gives radiographic quality welds. Normal applications include structural steel, carbon steel plate, pipe, fittings, castings, and forgings.

Sizes (mm) :- 0.80, 1.00, 1.20, 1.60, 2.00, 2.50, 3.15, 3.50
Packaging :- 15kg/12.5kg Plastic Spool & Wire Spool,
Above 1.60mm sizes 1Mtr. Cut length, Packed in 5 Kgs Plastic Tube
Welding Positions :- H, F, VU, OH

Typical Chemical Composition of Weld Metal											
C	Mn	Si	S	P	Ti	Zr	Al	Cu	Ni	Cr	Mo
0.05	1.25	0.55	0.02	0.02	0.1	0.09	0.09	0.06	0.10	0.10	0.10

Typical All Weld Mechanical Properties				
Properties	UTS (MPA)	YS (MPA)	EL	CVN Impact Value Joule at -30◦C
Typical	530	440	28%	60

	Wire Dia (mm)		
	0.80mm	1.20mm	1.60mm
Current (A)	170-200	260-290	330-360
Volt (V)	28-32	27-31	26-30

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PHOENIX FLUX CORED WIRE

PHOENIX 71T1

Grade :- AWS SFA 5.20 E71T_1C
EN ISO 17632-A T42 2 P C1 1

Phoenix 71T1, features lower spatter and fume emissions than conventional products in this class. The slag coverage is complete and designed for easy removal with fewer fumes, minimal spatter in flat and horizontal positions. This electrode is intended for single and multiple pass welding of carbon and certain low alloy steels in all positions, particularly in the overhead and vertical up positions.
Phoenix 71T1 is used where a minimum tensile strength of 70,000 psi is required in the deposited weld metal.

Phoenix 71T1 electrodes are classified with CO_2 shielding gas by this specification. However, gas mixtures of argon-CO_2 are also used to improve usability, especially for out of position applications. Decreasing amounts of CO_2 in the argon-CO_2 mixture will increase manganese and silicon in the deposit and may improve the impact properties.

These electrodes are designed for single and multiple pass welding.

Phoenix 71T1 is characterized by a spray transfer, low spatter loss, flat to slightly convex bead configuration, and a moderate volume of slag which completely covers the weld bead.

Phoenix using high tech imported machinery which precisely calculated its flux filling ratio and using of Cassette Roller wire joining is very fine so wire does not absorb moisture from environment.

Sizes (mm) :- 1.20, 1.40, 1.60

Packaging :- 15 Kg/12.5 Kg Plastic Spool with Vacuumed Aluminum foil bag

Approvals :-

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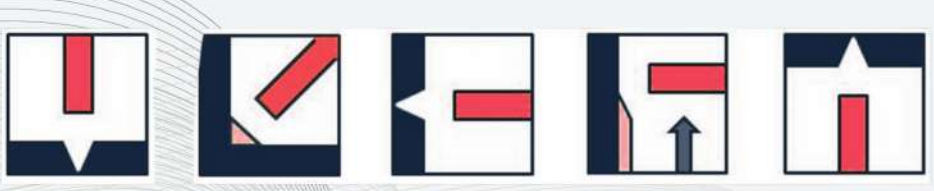
Welding Positons :-



Notes on Usage :-

- **Use 100% CO_2 Gas.**
- **For preheating guidlines, please refer to your local standards and codes relative to your best practices**
- **One-Side Welding defects such as hot cracking may occur with wrong welding perameter such as high welding speed.**

MECHANICAL PROPERTIES & CHEMICAL COMPOSITION OF ALL WELD METAL OF PHOENIX 71T_1

Shielding Gas :- 100 % CO_2

Welding Position :- 1G(PA)

Flow Rate (l/min.) :- 20

Stick Out (mm) :- 20-25

Pre Heat (C) :- R.T.

Interpass Temp. (C) :- 150 +- 15

Polarity :- DC (+)

Chemical Composition of Weld Metal					
Elements %	C	Mn	Si	S	P
Typical	0.12 Max	1.75 Max	0.90 Max	0.03 Max	0.03 Max
1.20 mm	0.035	1.25	0.50	0.011	0.010
1.60 mm	0.03	1.30	0.55	0.010	0.010

Typical All Weld Mechanical Properties					
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -20◦C	CVN Impact Value Joule at -30◦C
As Welded	490-670	390 Min	22% Min	27 Min	27 Min
1.20 mm	575	550	28	90	65
1.60 mm	585	550	27	95	60

DEPOSITION RATE & WELDING EFFICIENCY

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Size	Welding Conditions		Wire Feed Speed m/Min	Deposition Efficiency %	Deposition Rate kg/hr
	Amp. (A)	Volt. (V)			
1.20 mm	200	26	10.2	84-87	3.4
	250	28	11.5	85-88	4.5
	300	33	15.3	86-88	5.2
1.40 mm	250	28	7.6	85-87	3.9
	300	32	10.2	85-88	4.8
	330	36	12.8	86-89	5.8
1.60 mm	280	31	6.4	85-88	4.2
	330	33	7.6	86-88	4.8
	350	34	8.1	87-89	5.3
	400	38	9.2	87-90	5.7
Remarks				Deposition efficiency = (Deposited metal weight/Wire weight used) x 100	Deposition Rate = (Deposited metal weight/ welding time,min.) x 60

Welding Position	Wire Dia (mm)		
	1.20mm	1.40mm	1.60mm
F & HF	120-300 Amp	150-350 Amp	200-500 Amp
Vertical Up	120-260 Amp	140-270 Amp	160-280 Amp
Over Head	200-300 Amp	220-320 Amp	250-300 Amp

PHOENIX 71T12

Grade :- AWS/SFA 5.20 E71T-1C/T12-C
EN ISO 17632-B T492T1 1CA K

Phoenix 71T12_C is all position mild steel flux cored wire designed for optimum performance when using 100% CO_2 Shielding Gas. The slag coverage is complete and designed for easy removal with fewer fumes, minimal spatter in flat and horizontal positions. Weld metal is radiographic quality.

Sizes (mm) :- 1.20, 1.60

Packaging :- 15 Kg/12.5 Kg Plastic Spool with Vacuumed Aluminum foil bag

Welding Positons :- H, F, VU, OH

Chemical Composition of Weld Metal									
Elements %	C	Mn	Si	S	P	Ni	Cr	V	Cu
Typical	0.15 Max	1.60 Max	0.90 Max	0.03 Max	0.04 Max	0.50 Max	0.20 Max	0.08 Max	0.40 max
As Welded	0.05	1.40	0.48	0.009	0.015	0.02	0.015	0.01	0.008

Typical All Weld Mechanical Properties				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -20◦C
Typical	510 Min	350 Min	26% Min	47 Min
As Welded	550	485	29 %	63

Welding Position	Wire Dia (mm)			
	1.20mm		1.60mm	
F & HF	160-260 Amp	24-28	180-300 Amp	24-28
Vertical Up	100-160 Amp	20-22	110-200 Amp	20-22
Over Head	100-160 Amp	22-25	110-200 Amp	22-25

PHOENIX 71T_5

Grade :- AWS/SFA 5.20 E71T-5C
EN ISO 17632-B T493T1 1CA K

Phoenix 71T_5 is specially developed basic flux cored wire for all position welding, which gives radiographic weld metal quality with low hydrogen. It gives superior strength and impact properties. Arc is stable. Low spatter loss with easy slag removal. Using 80%Ar/Balance CO_2 or 100% CO_2 as the shielding gas.

Sizes (mm) :- 1.20, 1.60

Packaging :- 15 Kg/12.5 Kg Plastic Spool with Vacuumed Aluminum foil bag

Welding Positons :- H, F, VU, OH

Chemical Composition of Weld Metal									
Elements %	C	Mn	Si	S	P	Ni	Cr	V	Cu
Typical	0.12 Max	1.75 Max	0.90 Max	0.03 Max	0.03 Max	0.50 Max	0.20 Max	0.08 Max	0.35 max
As Welded	0.06	1.25	0.40	0.015	0.02	0.02	0.015	0.01	0.008

All Weld Mechanical Properties				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -40◦C
Typical	490-670	390 Min	22% Min	27 Min
As Welded	525	425	25 %	50

Welding Position	Wire Dia (mm)			
	1.20mm		1.60mm	
F & HF	160-260 Amp	24-28	180-300 Amp	24-28
Vertical Up	100-160 Amp	20-22	110-200 Amp	20-22
Over Head	100-160 Amp	22-25	110-200 Amp	22-25

PHOENIX Ni1

Grade :- AWS/SFA 5.29 E81T1-Ni1C
EN ISO 17632-B T553T1 1CA N2

Phoenix Ni1 is a titania slag formulation flux cored wire for single or multi-pass flat or fillet welds on medium and heavy thickness 1% nickel steel plate used in petro-chemical construction, mining and earth-moving equipment, and for weathering steels where color-match is not required. Phoenix Ni1 is noted for its high disposition rates, low spatter generation, ease of slag removal, and excellent weld bead appearance. The wire sets low diffusible hydrogen content (<4ml/100gm) in the weld metal. Phoenix Ni1 is used extensively in the fabrication, erection, and repair of structural fabrication of higher strength.

Sizes (mm) :- 1.20, 1.60

Packaging :- 15 Kg/12.5 Kg Plastic Spool with Vacuumed Aluminum foil bag

Welding Positons :- H, F, VU, OH

Chemical Composition of Weld Metal									
Elements %	C	Mn	Si	S	P	Ni	Cr	V	Al
Typical	0.12 Max	1.50 Max	0.80 Max	0.03 Max	0.03 Max	0.80 - 1.10	0.15 Max	0.05 Max	1.8 max
As Welded	0.05	1.26	0.46	0.015	0.02	1.0	0.1	0.001	0.02

All Weld Mechanical Properties				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -40◦C
Typical	550-690	470 Min	19% Min	27 Min
As Welded	625	525	22 %`	55

Welding Position	Wire Dia (mm)			
	1.20mm		1.60mm	
F & HF	160-260 Amp	24-28	180-300 Amp	24-28
Vertical Up	100-160 Amp	20-22	110-200 Amp	20-22
Over Head	100-160 Amp	22-25	110-200 Amp	22-25

PHOENIX Ni2

Grade :- AWS/SFA 5.29 E81T1-Ni2C

Phoenix Ni2 is a flux cored wire designed for single or multi pass using CO_2 shielding gas welding having a smooth spray-type transfer commonly used on low alloy steels. This all position wire normally used in applications which will produce a chemical composition of 2-2.5% nickel yielding strengths ranging from 80-100 ksi. Steels commonly welded with this grade would include weathering steels (where color match is not required), shipbuilding, off shore platform rigging and fabrication, erection, and repair of structural fabrication of higher strength. Phoenix Ni2 is noted for its smooth arc and minimum spatter. When used for horizontal fillet joints the weld bead has

Sizes (mm) :- 1.20, 1.60

Packaging :- 15 Kg/12.5 Kg Plastic Spool with Vacuumed Aluminum foil bag

Welding Positons :- H, F, VU, OH

Chemical Composition of Weld Metal						
Elements %	C	Mn	Si	S	P	Ni
Typical	0.12 Max	1.50 Max	0.80 Max	0.03 Max	0.03 Max	1.75-2.75
As Welded	0.055	1.26	0.45	0.015	0.02	1.97

All Weld Mechanical Properties				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -40◦C
Typical	530-690	470 Min	19% Min	25 Min
As Welded	625	520	22 %`	45

Welding Position	Wire Dia (mm)			
	1.20mm		1.60mm	
F & HF	160-260 Amp	24-32	180-300 Amp	24-32
Vertical Up	100-160 Amp	22-27	110-200 Amp	22-27
Over Head	100-160 Amp	22-28	110-200 Amp	22-28

PHOENIX K2M

Grade :- AWS/SFA 5.29 E81T1-K2C/M
EN ISO 17632-B T553T1 1MA N3

Phoenix K2M is an alloy steel Flux Cored Wire containing nickel and few micro-alloying elements. The wire is suitable for welding of moderate strength (Yield strength > 50 kgf/mm^2), fine grained steels to meet sub-zero impact resistance property down to -30C. The Wire is suitable for all position Welding application, results easy slag removal and has excellent welders appeal suitable with CO_2/Ar+ CO_2 gas Shilding. Weld bead is smooth & Uniform and satisfies the requirements of radiographic quality. This wire is used for fabrication of penstock pipelines, pressure vessels & valves, refineries, off-shore structures and similar kind of applications, etc.

Sizes (mm) :- 1.20, 1.60

Packaging :- 15 Kg/12.5 Kg Plastic Spool with Vacuumed Aluminum foil bag

Welding Positons :- H, F, VU, OH

Chemical Composition of Wire									
Elements %	C	Mn	Si	S	P	Ni	Cr	V	Al
Typical	0.15 Max	0.50-1.75	0.80 Max	0.03 Max	0.03 Max	1.00-2.00	0.15 Max	0.05 Max	1.8 max
As Welded	0.045	1.45	0.50	0.014	0.020	1.50	0.1	0.02	0.02

All Weld Mechanical Properties				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -30◦C
Typical	550-690	470 Min	19% Min	27 Min
As Welded	640	540	22 %`	60

Welding Position	Wire Dia (mm)			
	1.20mm		1.60mm	
F & HF	160-260 Amp	24-28	180-300 Amp	24-28
Vertical Up	100-160 Amp	20-22	110-200 Amp	20-22
Over Head	100-160 Amp	22-25	110-200 Amp	22-25

PHOENIX K2

Grade :- AWS/SFA 5.29 E91T1-K2C
EN ISO 17632-B T572T1 1CA N3

Phoenix K2 is an alloy steel Flux Cored Wire designed for welding of moderate strength, fine grained steels to meet sub-zero impact resistance property down to -18◦C. The Wire is suitable for all position Welding application, results easy slag removal and has excellent welders appeal suitable with 100% CO_2 as shielding gas. Weld bead is smooth & Uniform and satisfies the requirements of radiographic quality. This wire is used for fabrication of penstock pipelines, pressure vessels & valves, refineries, off-shore structures and similar kind of applications, etc.

Sizes (mm) :- 1.20, 1.60

Packaging :- 15 Kg/12.5 Kg Plastic Spool with Vacuumed Aluminum foil bag

Welding Positons :- H, F, VU, OH

Chemical Composition of Wire									
Elements %	C	Mn	Si	S	P	Ni	Cr	V	Al
Typical	0.15 Max	0.50-1.75	0.80 Max	0.03 Max	0.03 Max	1.00-2.00	0.15 Max	0.05 Max	1.8 max
As Welded	0.050	1.50	0.55	0.015	0.020	1.75	0.11	0.02	0.02

All Weld Mechanical Properties				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -20◦C
Typical	620-760	540 Min	17% Min	27 Min
As Welded	705	590	21 %`	40

Welding Position	Wire Dia (mm)			
	1.20mm		1.60mm	
F & HF	160-260 Amp	24-28	180-300 Amp	24-28
Vertical Up	100-160 Amp	20-22	110-200 Amp	20-22
Over Head	100-160 Amp	22-25	110-200 Amp	22-25

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PHOENIX SAW WIRE

PHOENIX EM12K

Grade :- AWS SFA 5.17 EM12K

Submerged arc welding wire AWS EM12K, is a medium manganese, medium silicon type wire. It is used with medium manganese and medium silicon type welding flux. It is insensitive to rust stains on the base metal. It has excellent bead forming and slag removal properties.

EM12K submerged arc welding wire has a higher carbon, manganese and silicon content than EL12. the increased carbon content gives this wire greater tensile strength, while the increased manganese and silicon content improves deoxidation properties. EM12K will produce weld deposits with minimal porosity, even on rust and oxide skins that may be present on the base material. This wire is primarily used for single-pass butt and fillet welds on low-carbon and low-alloy steel plates up to 1/2 inch thick.

Single and multi-pass welding with recommended fluxes, unalloyed and fine-grain steels, general fabrication, structural components, heavy equipment components, railcar frames, wheel fabrication, storage tanks, boilers, pressure vessels, ship plates, pipe double joints, wind towers

Sizes (mm) :- 1.60, 2.00, 2.50, 3.15

Packaging :- 25 Kg Metallic Ring Packed in Corrugated Box
100 Kg and 250 Kg Drum

Chemical Composition of Solid Wire						
Elements %	C	Mn	Si	S	P	Cu
Range	0.05-0.15	0.80-1.25	0.10-0.35	0.030 Max	0.030 Max.	0.35 Max.
Typical	0.09	0.95	0.25	0.025	0.024	0.18

Chemical Composition of Undiluted Weld Metal (Flux :- Phoenix F7A0EM12K)						
Elements %	C	Mn	Si	S	P	Cu
Typical	0.075	1.20	0.50	0.029	0.025	0.15

All Weld Mechanical Propertes				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -20◦C
Typical	420	510	25%	40

PHOENIX EL8

Grade :- AWS SFA 5.17 EL8

Phoenix EL8 is copper coated low-manganese general purpose solid wire. Wire is used with Phoenix neutral or semi basic flux for welding of general purpose fabrication, off-shore platform, medium and high tensile structural steels, ships, boiler and pressure vessels applications etc. The product easily removable residue, good seam forming and highly efficient deposition. The seam surface us smooth and welding quality is guaranteed. they facilitate mechanical and automatic welding process.

Sizes (mm) :- 1.60, 2.00, 2.50, 3.15

Packaging :- 25 Kg Metallic Ring Packed in Corrugated Box
100 Kg and 250 Kg Drum

Chemical Composition of Solid Wire						
Elements %	C	Mn	Si	S	P	Cu
Range	0.10 Max	0.25 - 0.60	0.07 Max	0.030 Max.	0.030 Max.	0.35 Max.
Typical	0.075	0.50	0.04	0.025	0.020	0.20

Chemical Composition of Undiluted Weld Metal (Flux :- Phoenix F7AZEL8)						
Elements %	C	Mn	Si	S	P	Cu
Typical	0.05	1.15	0.38	0.025	0.030	0.15

All Weld Mechanical Propertes				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at 0∘C
Typical	410	500	26%	30

PHOENIX EH14

Grade :- AWS SFA 5.17 EH14
EN ISO 14171-B SU41

Phoenix EH14 is copper coated Medium-manganese solid wire. Wire is used with Phoenix neutral or semi basic flux for welding of general purpose fabrication, off-shore platform, medium and high tensile structural steels, ships, boiler. It is not sensitive to the rust on the base metal. It has excellent bead molding and slag detachability. The wire can be applied single or dual feeding with AC/DC.

Sizes (mm) :- 1.60, 2.00, 2.50, 3.15

Packaging :- 25 Kg Metallic Ring Packed in Corrugated Box
100 Kg and 250 Kg Drum

Chemical Composition of Solid Wire						
Elements %	C	Mn	Si	S	P	Cu
Range	0.10-0.20	1.70-2.20	0.10 Max	0.030 Max	0.030 Max.	0.35 Max.
Typical	0.15	1.75	0.07	0.027	0.026	0.21

Chemical Composition of Undiluted Weld Metal (Flux :- Phoenix F7A2EH14)						
Elements %	C	Mn	Si	S	P	Cu
Typical	0.16	1.75	0.40	0.029	0.026	0.15

All Weld Mechanical Propertes				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -29°C
Typical	535	420	26%	75

PHOENIX EA2

Grade :- AWS SFA 5.17 EA2
EN ISO 14171-B SU2M3

Phoenix EA2 is copper coated low alloy solid wire to be used with basic flux for welding of high tensile fine grain steel as well as steel which required high ductility. The weld metal has good elevated temperature properties and improved corrosion resistance.

Sizes (mm) :- 1.60, 2.00, 2.50, 3.15

Packaging :- 25 Kg Metallic Ring Packed in Corrugated Box
100 Kg and 250 Kg Drum

Chemical Composition of Solid Wire							
Elements %	C	Mn	Si	S	P	Mo	Cu
Range	0.05-0.17	0.95-1.35	0.20 Max	0.025 Max	0.025 Max	0.45-0.65	0.35 Max.
Typical	0.12	1.15	0.15	0.020	0.022	0.50	0.20

Chemical Composition of Undiluted Weld Metal (Flux :- Phoenix F7A2EA2)							
Elements %	C	Mn	Si	S	P	Mo	Cu
Typical	0.10	1.40	0.60	0.020	0.022	0.50	0.15

All Weld Mechanical Propertes				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -29◦C
Typical	615	525	27%	85

PHOENIX EA4

Grade :- AWS SFA 5.17 EA4
EN ISO 14171-B SU2M31

Phoenix EA2 is copper coated Manganese alloy solid wire to be used with non alloying or slightly alloying fluxes for welding of medium & high strength structural steels. The weld metal has good elevated temperature properties and improved corrosion resistance.

Sizes (mm) :- 1.60, 2.00, 2.50, 3.15

Packaging :- 25 Kg Metallic Ring Packed in Corrugated Box
100 Kg and 250 Kg Drum

Chemical Composition of Solid Wire							
Elements %	C	Mn	Si	S	P	Mo	Cu
Range	0.05-0.15	1.20-1.70	0.20 Max	0.025 Max	0.025 Max	0.45-0.65	0.35 Max.
Typical	0.78	1.50	0.025	0.015	0.015	0.50	0.18

Chemical Composition of Undiluted Weld Metal (Flux :- Phoenix F7A2EA4)							
Elements %	C	Mn	Si	S	P	Mo	Cu
Typical	0.075	1.55	0.50	0.019	0.020	0.49	0.15

All Weld Mechanical Propertes				
	UTS (MPA)	YS (MPA)	YS (MPA)	CVN Impact Value Joule at -30◦C
Typical	608	530	27%	88

PHOENIX SAW FLUX

Phoenix SAW Flux is an alumina-rutile type acidic flux to weld medium tensile structural steels. The slag is easily removable and bead finish is smooth & shiny. Weld deposit is of rediographic Quality.

Phoenix SAW Flux is suitable for single and multi layer winding of various structural & Pressure vessel, machine building and fabrication of earthmoving equipment, crain griders, ships, locomotives, etc.

Grade :- AWS SFA 5.17 F7A0EM12K, F7AZEL8

Grain Size :- 0.35

Re-Drying Conditions :- 300-350°C for 2 Hr

Packaging :-

25 Kgs Bag with Linner bag

Steel Drum :- 200 kgs

All Weld Analysis, WT%					
Elements %	C	Mn	Si	S	P
Specification	0.05	1.10	0.35	0.027	0.028

All Weld Mechanical Propertes			
UTS (MPA)	0.2% YS (MPA)	YS (MPA)	CVN Impact Value Joule at 0◦C
500	410	26 %	30

Shelf Life, Storage, and Reconditioning of PHOENIX MIG Wire, Tig Wire, FCW Wire, SAW Wire and SAW Flux.

SHELF LIFE

The useful shelf life of welding filler metals is highly dependent on the conditions under which they are stored.

The shelf lives given below assume that:

- products in hermetically sealed containers are stored unopened under conditions that protect them from direct contact with water
- products in other containers are stored unopened under conditions where they are protected from direct contact with water and the temperature and humidity are kept relatively steady i.e. the temperature is kept between 50°F – 90°F (10°C – 32°C) and the relative humidity is kept at 50% or less.

Shelf life may be substantially less under other storage conditions.

Filler Metal	Package	Shelf Life
Phoenix MIG Wire	Vacuum Bags Package	3 yr
	Standard Spool Package	1 yr
	Drum Packaging	1 yr
Phoenix TIG Wire	5 Kg Tube Packaging	1 yr
Phoenix Submerged Arc Welding Wire	25 Kg Box Packaging	1 yr
	Drum Packaging	1 yr
Phoenix Flux Cored Wire	Vacuum Bags	3 yrs
	Other Packages	1 yr
Phoenix Fluxes	Bags	2 yrs
	Hermetically Sealed Steel Buckets	5 yrs

In some cases, it may be possible to restore Solid Wire, Cored Wires, and Flux to usable conditions by putting them through a reconditioning process. See Storage and Reconditioning on the next page.

STORAGE AND RECONDITIONING

MIG, TIG And SAW

Storage:

The standard package of a spool or coil within a plastic bag and a carton will provide acceptable protection for MIG, TIG and SAW when they are stored under proper conditions, i.e., conditions where temperature is maintained at 50°F – 90°F (10°C – 32°C) and where humidity is less than 50% R.H.

For best results, it is recommended that MIG, TIG and SAW products be used within one week after opening. When use within one week is not possible, the user may extend the product's usable condition somewhat longer by:

- Storing wire on spools and coils in a climate-controlled space maintained either as recommended for unopened product, or not less than 90°F (32°C) and not greater than 70% relative humidity when not in active use.
- Storing wire on plastic spools at a maximum storage temperature of 125°F (52°C) and 300°F (150°C) for wire on other packages. If climate-controlled storage is not possible, place wire not in active use into an undamaged plastic bag and close to bag with a twist tie, cable tie, or similar.

Reconditioning:

In some condition broken plastic spools of MIG wire can be rewinding. In case of rusting MIG, TIG and SAW Wires are not possible to reconditioning or re copper coating.

Flux Cored Wire (FCAW)

Storage:

The standard package of a spool or coil within a plastic bag and a carton will provide acceptable protection for Flux Cored Wires when they are stored under proper conditions, i.e., conditions where temperature is maintained at 50°F – 90°F (10°C – 32°C) and where humidity is less than 50% R.H.

For best results, it is recommended that FCAW products be used within one week after opening. When use within one week is not possible, the user may extend the product's usable condition somewhat longer by:

- Storing wire on spools and coils in a climate-controlled space maintained either as recommended for unopened product, or not less than 90°F (32°C) and not greater than 70% relative humidity when not in active use.
- Storing wire on plastic spools at a maximum storage temperature of 125°F (52°C) and 300°F (150°C) for wire on other packages. If climate-controlled storage is not possible, place wire not in active use into an undamaged plastic bag and close to bag with a twist tie, cable tie, or similar.
- Replacing the lid on wire in drums and Marathon Pacs when the wire is not in active use.

When weld metal hydrogen level must be guaranteed, the product must be packaged in aluminized vacuum sealed bags. All Flux Cored Wire products classified with hydrogen designators (H4 or H8) will have a low weld metalhydrogen level in the as-manufactured condition, but only the vacuum sealed packaging will prevent moisture pickup after extended storage and protect it from environmental contamination. Once the vacuum sealed bag is opened, unused productmay be stored in dry rod ovens at temperatures not to exceed 300°F (150°C) for coils and wire spool baskets and 125°F (52°C) for plastic spools. Plastic bags should always be removed when storing at elevated temperatures to allow excess moisture to escape.

Reconditioning:

Generally, flux cored wires exhibiting weld metal porosity or "worm tracks" due to moisture absorption by the core ingredients can be reconditioned by re-baking. Products on coils or wire baskets may be re-baked at 300°F (150°C) for 6 – 8 hours. However, product on plastic spools cannot be reconditioned. Always remove the plastic bag when re-baking.

STORAGE AND RECONDITIONING OK SUBMERGED ARC FLUX

Storage:

Fluxes should not be stored longer than 3 years. Unopened flux bags must be stored in maintained storage conditions as follows: 50°F – 90°F (10°C – 32°C) and where humidity is less than 50% R.H.

The content of unheated flux hoppers must after an 8 hour shift be placed in a drying cabinet or heated flux hopper at a temperature of 300°F +/- 45°F (150°C +/- 25°C).

Remaining flux from opened bags must be stored at a temperature of 300°F +/- 45°F (150°C +/- 25°C).

Recycling:

Moisture and oil must be removed from the compressed air used in the recycling system. Addition of new flux must be done with the proportion of at least one part new to one part recycled flux. Foreign materials such as mill scale and slag must be removed by using a suitable system such as sieving or magnetic separator.

Re-Drying:

When handled and stored as above, PHOENIX fluxes can normally be used straight from the bag.

In severe applications, stipulated by the applicable material specification, re-drying of the flux is recommended. Furthermore, if somehow the flux picked up moisture, re-drying can return the flux to its original as manufactured moisture content 525°F – 615°F (275°C – 325°C).

Re-drying must be done either in equipment that turns the flux so that the moisture can evaporate easily or in an oven on shallow plates with a flux height not exceeding 2 in. (5 cm). Re-dried flux not immediately used must be stored at 300°F +/- 45°F (150°C +/- 25°C).

MATERIAL SAFETY DATA SHEET
MIG Wire And TIG Wire

1. PRODUCT AND COMPANY DESIGNATION

Product Name: CARBON STEEL WELDING WIRES AND RODS
Product Specification: AWS SFA 5.18 (EN 440)
Product Classification and Brands: The following wires and rods are covered by this MSDS:
ER 70S-6 Tig 70S-2
Recommended use: Gas Shielded Arc Welding of plain carbon steels
Supplier: Phoenix Welding Wires
Address: C4, C5, C6, Radhe Industrial Estate, Kapadwanj
Telephone number: 8780950131
Email ID.: info@phoenixweldingwires.com

2. DETAILS OF COMPOSITION

These products consist of a solid carbon steel wire, (with or without a copper protective coating), either continuously wound on reels, spools or in bulk packs, or supplied in straight cut lengths. Specific details of the composition of the wires and rod types covered by this data sheet are given below.

TABLE 1: COMPOSITION DATA (WT %)

AWS Classification	Iron	Carbon	Manganese	Silicon	Copper[1]	Ti	Zr	Al
ER70S-2	>97	0.07	0.90 to 1.40	0.40 to 0.70	<0.5	0.05 to 0.15	0.02 to 0.12	0.05 to 0.15
ER70S-6	>96	0.07 to 0.15	1.40 to 1.85	0.80 to 1.15	<0.5	-	-	-

[1] Includes copper coating.

3. HAZARDS IDENTIFICATION

There are no recognized hazards associated directly with unused welding consumables prior to welding. Packaged consumables may be heavy, and should be handled and stored with care. FOLLOW MANUAL HANDLING REGULATIONS.
Wire wound on reels or spools, or supplied in bulk packages can be coiled under tension. Take care to avoid the wire uncoiling rapidly when released. WEAR GLOVES AND EYE PROTECTION.
When using these wires and rods as part of the welding process additional potential hazards are likely. These are:

- Electric shock from the welding equipment or electrode. This can be fatal.
- Hot metal spatter and heat, which can cause burns to the hand and body, and may cause fire if in contact with combustible materials.
- UV, IR and light radiation from the arc, which can produce 'arc eye' and possible eye damage to unprotected eyes. WEAR SUITABLE PROTECTIVE EQUIPMENT.
- Fumes produced from the welding consumable, material being welded, and the arc radiation. These consist of:
  - Particulate fume such as complex metal oxides, fluorides, and silicates from the weld materials
  - Gaseous fume such as ozone and nitrogen oxides from the action of arc radiation on the atmosphere, and carbon monoxide and dioxide from the oxidation of carbon in the components and from the shielding gas.

  SHORT TERM INHALATION OF THESE FUMES AND GASES MAY LEAD TO IRRITATION OF THE NOSE, THROAT AND EYES.
  LONG TERM OVEREXPOSURE OR INHALATION OF HIGH LEVELS OF FUMES MAY RESULT IN HARMFUL EFFECTS TO THE RESPIRATORY SYSTEM, CENTRAL NERVOUS SYSTEM AND LUNGS.
  LOCAL EXTRACTION AND /OR VENTILATION SHOULD BE USED TO ENSURE THAT ALL HAZARDOUS INGREDIENTS IN THE FUME ARE KEPT BELOW THEIR INDIVIDUAL OCCUPATIONAL EXPOSURE STANDARDS IN THE WELDER'S AND OTHER WORKERS' BREATHING ZONES.

NOTE; If welding is performed on plated or coated materials such as galvanized steel, excessive fume may be produced which contains additional hazardous components, and may result in metal fume fever and other health effects.

4. FIRST AID MEASURES

No first aid measures should be required for the unused wire or rod consumables. During welding:
Inhalation
If breathing is difficult, bring the patient in fresh air; breathe in fresh air deeply.

[1] Copper content includes coating

For skin burns
Submerge affected area in cold water until burning sensation ceases and refer for immediate medical attention.
For eye effects such as arc eye and dusts
Irrigate eye with sterile water, cover with damp dressing and refer for immediate medical attention if irritation persists.
Ingestion
Ingestion is considered unlikely due to product form. However, if swallowed do not induce vomiting. Seek medical attention. Advice to doctor: treat symptomatically.
Electric shock
If necessary, resuscitate and seek immediate medical attention.

5. FIRE PREVENTION MEASURES

No specific measures required for the welding consumable prior to welding.
During welding:
Welding should not be carried out in the presence of flammable materials, vapors, tanks, cisterns and pipes and other containers which have held flammable substances unless these have been checked and certified safe.

6. MEASURES IN CASE OF UNINTENTIONAL RELEASE

No specific actions for welding consumable prior to use.
Welding in proximity to stored or used halogenated solvents may produce toxic and irritant gases. Prohibit welding in areas where these solvents are used.

7. HANDLING AND STORAGE (FOR SAFETY)

No special precautions are required for these welding consumables.
Welding wires and rods are dense materials and can give rise to a handling hazard when reels, spools, bulk packs or multiple packages are lifted or handled incorrectly or with poor lifting posture.
Good practice for handling and storage should be adopted to prevent physical injuries.

8. EXPOSURE PREVENTION/CONTROLS/PERSONAL PROTECTION

Exposure Prevention
Welders should not touch live electrical parts, and should insulate themselves from the work and the ground. Manufacturer's guidelines for the use of electrical welding machines should be observed at all times.
Welders and co-workers should be educated about the health hazards associated with welding fume, and trained to keep their heads out of the fume plume.
During welding, fumes and gases will be produced and emitted from the welding process. The content of the fume is dependent on the welding consumables, shielding gas and base materials being welded. The amount and concentration of fume generated is dependent on factors such as current, voltage, welding practices and number of welders in a given area. By following recommended welding practices, fume production can sometimes be minimized.
For the carbon steel solid wires and rods covered in this Data Sheet, the main constituents of the fume will be iron and manganese, mainly in the form of complex oxides and silicates. There will also be smaller amounts of other complex metal oxides and silicates.
Gaseous ozone, nitrogen oxides, carbon monoxide and carbon dioxide are also formed by the effect of the arc on the atmosphere and the shielding gas. In some cases, ozone levels can be high and additional controls may be needed.
The shielding gas used will also affect the fume formation rate, and higher levels of particulate fume will be generated as the percentage of carbon dioxide and oxygen is increased in the shielding gas.
Typical fume composition data for copper-coated and bare carbon steel wires is given below.

TABLE 2: FUME COMPOSITION DATA

GMAW	Solid Wire	Shielding Gas	Iron %	Manganese %	Silicon %	Copper %[2]	Ozone (ppm)[3]
	Bare	CO_2	45 to 63	5 to 12	1 to 6.0	0.1 to 0.3	0.1 to 1.4[4]
	Copper Coated	Argon/CO_2 Argon/O_2	45 to 55	6 to 12		1.1 to 1.8	0.1 to 0.5[5]

[2] % by weight
[3] ppm = part per million
[4] at 250A and 300mm from arc non-breathing zone
[5] at 250A and 600mm from non-breathing zone

[2] % by weight
[3] ppm = parts per million
[4] at 250 amps and 300mm from arc non-breathing zone
[5] at 250 amps and 600mm from arc non-breathing zone

Additional fume composition data for a solid carbon steel wire welded with different shielding gases are also given below, and the individual exposure limits for the constituents (when specified) are also given.
Fume exposure should be controlled to below the recognized exposure limit for each of the individual constituents, and to below 5 mg/m3 for the total particulate fume.

TABLE 3: FUME COMPOSITION DATA (WT %)
PARTICULATE FUME COMPOSITION FOR A RANGE OF SHIELDING GASES AND AWS A5.18 ER70S-6 TYPE WIRE (COPPER COATED)

Shielding Gas	Current Amps	Fe %	Mn %	Cr %	Ni %	Cu %
Carbon Dioxide	180	48.5	9.7	0.08	0.06	1.48
	300	52.1	7.6	0.05	0.06	1.45
Light	180	62.1	7.2	0.11	0.10	1.80
	300	51.8	6.1	0.06	0.05	1.25
Universal	180	45.5	9.2	0.06	0.08	0.29[6]
	270	51.6	5.8	0.06	0.06	0.12
Heavy	180	51.9	6.9	0.14	0.09	1.74
	300	52.0	6.4	0.05	0.05	1.51

[6] Bare wire, same type

TABLE 4: HAZARDOUS FUME COMPONENTS

Welding fume component	CAS No.	OEL 8hr TWA	STEL 15min TWA
Total Welding Fume (particulate)		5	
Iron oxide fume (as Fe)	1309-37-1	5	10
Manganese and its inorganic compounds (as Mn)	7439-96-5	1.0	3
Chromium VI compounds (as Cr)		0.05	
Chromium III compounds (as Cr)		0.05	
Nickel and its inorganic compounds		1	
Water soluble		0.1	
Water insoluble		0.2	
Copper Fume	7440-50-8	0.2	
Nitrogen dioxide	10102-44-0	5.6	9.4
Nitrogen monoxide	10102-43-9		
Ozone	10028-15-6	0.2	
Carbon dioxide	124-38-9	9000	54000
Carbon monoxide	630-08-0	57	458
Aluminum	1344-28-1	5	
Inhalable			
Respirable dust			

Units are in mg/m^3, except when stated otherwise.

The fume analyses for the carbon steel wires and rods covered by this data sheet, when used for welding clean, uncoated plain carbon steels, indicate that as long as the 5 mg/m3 total fume exposure limits are met, fume levels of the other constituents will generally be below their respective exposure limits.
The exceptions are manganese, ozone and nitrogen dioxide, as these have low exposure limits and additional controls may be required.
THE FUME LEVELS GIVEN ABOVE WERE GENERATED UNDER LABORATORY CONDITIONS WHEN WELDING CLEAN, PLAIN CARBON STEEL UNDER THE MANUFACTURERS RECOMMENDED WELDING PARAMETERS, AND ARE INDICATIVE OF REASONABLY EXPECTED FUME LEVELS. ACTUAL FUME LEVELS WILL VARY IN PRACTICE, DEPENDING ON THE WELDING PARAMETERS AND OTHER CONDITIONS, AND MAY BE HIGHER OR LOWER THAN THOSE LISTED ABOVE.
Additional fume may arise when these WIRES AND RODS are used to weld contaminated base materials, coated or plated steels, other metals and alloys, OR WHEN INCORRECT WELDING CONDITIONS ARE USED.
THE ONLY ACCURATE WAY TO DETERMINE THE COMPOSITION AND QUANTITY OF FUMES AND GASES TO WHICH WORKERS ARE EXPOSED IS TO TAKE AIR SAMPLES FROM INSIDE THE WELDERS HELMET, IF WORN, OR IN THE WORKER'S BREATHING ZONES.
Individual fume measurements should be made in these cases using recognized sampling and analysis standards. Based on the results of these measurements, additional fume controls may be required to ensure that all the fume constituents are controlled below their exposure limits.

Controls

Good general ventilation, and/or local fume extraction at the arc should be used to control the fumes and gases produced during welding to below their individual recognized exposure limits when measured in the welder's and co-workers' breathing zone. In addition, the ventilation and extraction should also be sufficient to ensure that the total particulate fume levels are reduced below 5mg/m3 when measured in the breathing zone.
In confined spaces where ventilation is not adequate, an air fed breathing system should be used. All precautions for working in confined space should be observed. Refer to OHSAct No.85 of 1993 General Safety Regulation 9.
For further information see the American National Standard Z49.1 Safety in Welding and Cutting and SABS 0238 (SANS 10238) Welding and Thermal Cutting Processes – Health and Safety.
Where fume levels exceed the recognized exposure limits, respiratory protection may be required in the form of a Class P2 (metal fume) respirator.

Personal Protection

Welders and co-workers in the vicinity should wear protective clothing and eye protection appropriate to arc welding as specified by local standards.

Protection of Body and Skin

Suitable clothes for welding should be worn such as non-light reflective fireproof overalls, leather apron, welding helmet, leather boots spats and gloves.

Protection of Hands

Welders should wear suitable hand protection such a welding gloves or gauntlets of a suitable standard. Co-worker should also wear suitable hand protection against hot metal, sparks and spatter.

Eye Protection

Welders should wear a welding helmet fitted with the appropriate optical welding filter for the operation. Suitable protective welding screens and goggles should be provided, and used by others working in the same area.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	Solid
Color	Generally black/grey, or copper colored when coated.
Form	Metal wire or rod
Odor	Odorless
pH	Not available
Vapor pressure	Not relevant
Vapor Density	Not relevant
Boiling point/ range	Not relevant
Melting Point	~1500°C
Solubility in water	Insoluble
Density	Not available
Explosive/ignition point	Nonflammable. No fire or explosion hazard exists

10. STABILITY AND REACTIVITY

There are no stability or reactivity hazards from welding wires and rods as supplied.
Hazardous decomposition products such as metal oxide fumes and gases (see Section 8) are produced during welding.

11. TOXICITY DATA

Welding fumes if inhaled can potentially produce several differing health effects caused by the metal containing particles and the gases produced during the welding process, both of which are present in the 'fumes. The exact nature of any likely health effect is dependent on the consumable, material being welded, weld process, all of which affect fume quantity and composition, as well as the use of adequate ventilation, respirators, or breathing equipment as circumstances require.
Inhalation of the fumes/gases produced during welding may lead to irritation to the nose throat and eyes. The range of health effects include respiratory effects with symptoms such as asthma, impaired respiratory and lung function, chronic bronchitis, metal fume fever, pneumoconiosis, possible emphysema and acute pulmonary oedema.
Other potential health effects at elevated levels of exposure include central nervous effects possible lung cancer, bone disease, skin and fertility effects.
Which of these health effects is potentially likely is related to the fume composition, and this needs to be consulted with the specific toxicity data below to assess the health risk when using any particular welding process.
Unprotected skin exposed to UV and IR radiation from the welding arc may burn or redden, and UV radiation is potentially a carcinogen. UV radiation can affect the unprotected eye by producing an acute condition known as 'arc eye'.
Specific effects relevant to major particulate and gaseous fume constituents produced when welding with these wires and rods.

Iron

The chief component of fume generated by welding carbon steels is iron oxide. Iron oxide is generally considered a nuisance material and unlikely to cause any significant health effects. The fume particles however accumulate in the lungs and lead to a benign pneumoconiosis called siderosis.

Manganese

Manganese compounds are also found in carbon steel welding fumes.
Manganese is mainly a systemic chronic toxin, although exposure to high particulate concentrations can cause some respiratory irritation.
Overexposure or inhalation of excessive amounts of manganese has been shown to affect pulmonary function, blood and may cause irreversible central nervous system damage (manganism) which resembles Parkinsons disease. Symptoms of manganism include tremors, impaired speech, facial expression changes, slow clumsy movements and eventually impaired walking. The symptoms are typically not apparent for several years.

Copper

Copper is one of the main causes of any metal fume fever observed during welding. Metal fume fever is a delayed respiratory effect produced by inhalation of fume. Symptoms include sweating, chills, fever, muscle aches and high temperature. These acute symptoms normally alleviate within 24-48 hours.

Ozone and Nitrogen oxides

These gases are formed due to interactions of the arc with the surrounding air. Both gases can produce eye, respiratory and lung irritation and also can produce longer term lung effects such as decreased lung capacity, chronic bronchitis, and emphysema. Of particular concern with both gases is that exposure to high levels (eg due to build up in confined spaces) can result in acute lung effects such as delayed pulmonary oedema.

Carbon monoxide and carbon dioxide

Carbon monoxide (CO) is a chemical asphyxiant and its toxicity is due to its affinity for oxygen carrying blood hemoglobin causing fatigue, weakness, dizziness and eventual unconsciousness and possible death. Carbon dioxide (CO_2) is mainly an asphyxiant but can exert some toxic properties by increasing pulse and heart rate. These gases are mainly formed through decomposition of some electrodes' components, or from oxidation of any carbon in the wires and rods, or from the shielding gas.

[6] Bare wire, same type

12. ECOLOGICAL DATA

The welding process produces particulate fumes and gases which may cause long term adverse effects in the environment if released directly into the atmosphere. Welding fumes from the arc processes which use the wires and rods covered by this data sheet can produce carbon dioxide gas, which is dangerous to the ozone layer.

13. DISPOSAL DATA

Packaging and wire and rod scrap should be disposed of as general waste or recycled. No special precautions are required for this product.

14. TRANSPORT INFORMATION

No special requirements are necessary in transporting these products.

15. REGULATIONS

- OHSAct No 85 of 1993 General Safety Regulation 9.
- SABS 0238 (SANS 10238) Welding and Thermal Cutting Processes – Health and Safety.

16. OTHER INFORMATION

The customer should provide this Materials Safety Data Sheet to any person involved in the materials use or further distribution. Afrox requests the users (or distributors) of this product to read this Materials Safety Data Sheet carefully before usage. Further information can be obtained from the American National Standard Z49.1 Safety in Welding and Cutting.

The information contained in this Material Safety Data Sheet relates only to the specific materials designated and may not be valid for such material used in combination with any other material or in any process.

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PHOENIX WELDING WIRES

C4,C5,C6 Radhe Industrial Estate,
Tayyabpura, Kapadwanj (387 620)
Gujarat, India.

+91 820020 7299

info@phoenixweldingwires.com
phoenixweldingwires@gmail.com

www.phoenixweldingwires.com

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