AS

Electrodes for Non-Ferrous Metals

Electrodes for Aluminium and its alloys

Electrodes for Copper and its alloys

Product Name	AWS A5.3	DIN 1732	Page
AS AlSi - 5	E 4043	EL-AlSi 5	77
AS AlSi - 12	-	EL-AlSi 12	78

Product Name	AWS A5.6	DIN 1733	Page
AS Bronz	E CuSn-C	EL-CuSn 7	79

Electrodes for Aluminium and Its Alloys

Product Name	Al	Si	Mn	Fe	Mg	AWS A5.3	DIN 1732
AS AlSi - 5	balance	4.7 - 5.3	max 0.05	max 0.2	max 0.05	E 4043	EL-AlSi 5
AS AlSi - 12	balance	11.0 - 12.0	max 0.1	max 0.4	max 0.05	-	EL-AlSi 12

Electrodes for Copper and Its Alloys

Product Name	Cu	Si	Mn	Fe	Sn	AWS A5.6	DIN 1733
AS Bronz	balance	0.5	1.0	0.2	7.0	E CuSn-C	EL CuSn 7

DC (+)		X	X	
DC (–)				

Aluminium & Its Alloys

BASE METAL / PRODUCT		AS AlSi - 5	AS AlSi - 12	
3.1325	AlCuMg 1	✲		
3.1355	AlCuMg 2	✲		
3.2151	G-AlSi 6 Cu 4		✲	
3.2161	G-AlSi 8 Cu 3		✲	
3.2315	AlMgSi 1	✲		
3.2341	G-AlSi 5 Mg	✲	✖	
3.2381	G-AlSi 10 Mg		✸	
3.2383	G-AlSi 10 Mg (Cu)		✸	
3.2581	G-AlSi 12		✸	
3.2583	G-AlSi 12 (Cu)		✲	
3.3241	G-AlMg 3 Si	✲		
3.3261	G-AlMg 5 Si	✲		
3.3206	G-AlMg Si 0.5	✲		
3.4345	AlZnMgCu 0.5	✲		
3.4365	AlZnMgCu 1.5	✲		

✸) No restriction.
✲) Mechanical properties should be considered.
✖) Can be used if corrosion resistance is considerable.

DC (+)		X	
DC (–)			

Copper & Its Alloys (Bronze)

BASE METAL / PRODUCT		AS Bronz	
2.1016	CuSn 4	✱	
2.1020	CuSn 6	✱	
2.1030	CuSn 8	✱	
2.0220	CuZn 5	✲	
2.0240	CuZn 15	✲	
2.0250	CuZn 20	✲	
2.0265	CuZn 30	✲	
2.0360	CuZn 40	✲	
2.0460	CuZn 20 Al 2	✲	
2.0510	CuZn 37 Al 1	✲	
2.0530	CuZn 38 Sn 1	✲	
2.0540	CuZn 35 Ni 2	✲	
2.0550	CuZn 40 Al 2	✲	
2.0572	CuZn 40 Mn 2	✲	
2.1090	G-CuSn 7 ZnPb	✖	
2.1093	G-CuSn 6 ZnNi	✖	

✱) No restriction.
✲) Mechanical properties should be considered.
✖) Corrosion resistance should be considered.

AS AlSi - 5

AS AlSi-5 is an aluminium electrode with 5 % Si. It is used for joining and repair welding of 5 % Si containing rolled aluminium and cast aluminium parts. It is used on DC positive pole.

Classification and Typical Weld Metal Composition (%)

DIN 1732 : EL-AlSi 5
AWS A5.3 : E 4043

Al	Si	Mn	Fe	Mg
balance	4.7 - 5.3	max 0.05	max 0.2	max 0.05

Approvals

GOST , SEPRO

Mechanical Properties of the Weld Metal, Typical

Yield Strength	[N/mm²]	: 80 - 90
Tensile Strength	[N/mm²]	: 150 - 160
Elongation (L=5d)	[%]	: 15

Applications

It is an ideal electrode particularly used for the welding of 5 % Si containing rolled aluminium parts and for aluminium pipes and plates. It should not be used in the welding of aluminium alloys having high magnesium, copper or zinc content. As the weld pool metal is very fluid, parts should be welded in horizontal position. During welding, electrode should be vertical to the work piece and it should not be oscillated. Arc length should be short.

Preheating to 100-300°C should be applied with respect to the thickness of the part to be welded. The slag should be removed completely after welding, since it is corrosive (the slag might be removed with water as the piece cools).

Rolled Aluminium :	AlMgSi 0.5 AlMgSi 0.7 AlMgSi 0.8 AlMgSi 1 AlMg 1 Si Cu	Cast Aluminium :	G-AlSi 5 G-AlSi 6 Cu 4

Current Type : [DC (+)]

Diameter [mm]	Length [mm]	Current [A]	Weight (100 pcs) [g]
2.50	350	60 - 90	900
3.25	350	90 - 110	1320
4.00	350	100 - 140	2040

Welding Positions

AS AlSi - 12

AS AlSi-12 is an aluminium electrode with 12 % Si. It is particularly used for joining and repair welding of cast aluminium and Si-alloyed aluminium parts. It is also an ideal electrode for the removal of cast defects and for the fill up of cast cavities. It is used only on DC positive pole.

Classification and Typical Weld Metal Composition (%)

DIN 1732 : EL-AlSi 12

Al	Si	Mn	Fe	Mg
balance	11 - 12	max 0.1	max 0.4	max 0.05

Approvals

GOST , SEPRO

Mechanical Properties of the Weld Metal, Typical

Yield Strength	[N/mm²]	: 70 - 80
Tensile Strength	[N/mm²]	: 170 - 180
Elongation (L=5d)	[%]	: 4 - 6
Hardness	[HB]	: 150 - 170

Applications

It is an ideal electrode for the welding of 12 % Si containing cast aluminium parts. It should not be used in the welding of aluminium alloys having high magnesium, copper or zinc content.

The special covering removes oxide layer on the surface during welding and enables a stable arc. As the weld pool metal is very fluid, parts should be welded in horizontal position. During welding, electrode should be vertical to the work piece and it should not be oscillated.

Arc length should be short. Preheating to 100-300°C should be applied with respect to the thickness of the part to be welded. The slag should be removed completely after welding, since it is corrosive (the slag might be removed with water as the piece cools).

Cast Aluminium :	G-AlSi 11	G-AlSi 9 Mg
	G-AlSi 12	G-AlSi 10 Mg
	G-AlSi 12 (Cu)	G-AlSi 10 Mg (Cu)
	G-AlSi 6 Cu 4	G-AlSi 9 Cu 3
	G-AlSi 7 Mg	G-AlMg 3 Si

Current Type : [DC (+)]

Diameter [mm]	Length [mm]	Current [A]	Weight (100 pcs) [g]
2.50	350	60 - 90	980
3.25	350	80 - 110	1320
4.00	350	110 - 140	1960

Welding Positions

AS Bronz

AS Bronz is especially designed for the welding of bronze and brass materials. It gives a filler metal of the tin-bronze type. It is possible to weld in all positions except overhead and vertical upwards.

Classification and Typical Weld Metal Composition (%)

DIN 1733 : EL CuSn 7
Werkstoff-Nr : 2.1025
AWS A5.6 : E CuSn-C

Mn	P	Sn	Cu
0.5	0.10	7	balance

Approvals

GOST , SEPRO

Mechanical Properties of the Weld Metal, Typical

Yield Strength	[N/mm²]	: 160
Tensile Strength	[N/mm²]	: 260
Elongation (L=5d)	[%]	: 20
Hardness	[HB]	: 90

Applications

It is used for the joining and build up welding of copper and its alloys; for the joining of copper and bronze materials with steels and joining of steel casts with cast irons. It is ideal for the copper plating of cast iron and steel parts. If machinability is not considered after welding, it should also be used for the welding of cast iron parts.

It is suitable for the build up welding and joining of machine parts; especially turbine and centrifugal vanes, ship propellers, valve seats, couplings, piston arms and gears. Electrode should be nearly vertical to the work piece and the arc length should be short. To attain the best possible joining, a preheating of 300°C should be applied to copper and bronze parts.

2.1016 - CuSn 4
2.1020 - CuSn 6
2.1030 - CuSn 8

2.0220 - CuZn 5
2.0240 - CuZn 15
2.0250 - CuZn 20
2.0265 - CuZn 30
2.0360 - CuZn 40

2.0460 - CuZn 20 Al 2
2.0510 - CuZn 37 Al 1
2.0530 - CuZn 38 Sn 1
2.0540 - CuZn 35 Ni 2
2.0572 - CuZn 40 Mn 2

Current Type : [DC (+)]

Diameter [mm]	Length [mm]	Current [A]	Weight (100 pcs) [g]
2.50	300	60 - 90	1460
3.25	350	90 - 130	2910
4.00	350	130 - 160	5180
5.00	350	160 - 240	6600

Welding Positions

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AS Pik

Electrodes for Welding Cast Irons

Electrodes for Cutting and Gouging

Product Name	AWS A5.15	DIN 8573	Page
AS Pik - 55	E NiFe-CI	E NiFe1-BG 33	84
AS Pik - 65	E NiCu-B	E NiCu-BG 33	85
AS Pik - 98 Super	E Ni-CI	E Ni-BG 22	86

Product Name	-	-	Page
AS Oluk Açma	-	-	87
AS Kesme	-	-	88
STARWELD KARBON			89

Electrodes for Welding Cast Irons

Product Name	C	Si	Mn	Fe	Ni	Cu	AWS A5.15	DIN 8573
AS Pik - 55	1	-	-	43	balance	-	E NiFe-CI	E NiFe1-BG 33
AS Pik - 65	0.5	0.4	1	3	balance	30	E NiCu-B	E NiCu-BG 33
AS Pik - 98 Super	1	-	-	-	balance	-	E Ni-CI	E Ni-BG 22

AC / DC (+)			X	X	
AC / DC (–)		X			

Cast Irons

BASE METAL / PRODUCT		AS Pik - 98 Super	AS Pik - 55	AS Pik - 65	
0.6010	GG-10	✱		✖	
0.6015	GG-15	✱		✖	
0.6020	GG-20	✱		✖	
0.6025	GG-25	✱		✖	
0.6030	GG-30	✱		✖	
0.6035	GG-35	✱		✖	
0.7033	GGG-35.3		✱	✖	
0.7040	GGG-40		✱	✖	
0.7043	GGG-40.3		✱	✖	
0.7050	GGG-50		✲	✲	
0.7060	GGG-60		✲	✲	
0.7070	GGG-70		✲	✲	
0.7080	GGG-80		✲	✲	
0.8035	GTW-35-04	✱			
0.8040	GTW-40-05	✱			
0.8045	GTW-45-07	✲			
0.8135	GTS-35-10	✱	✱	✖	
0.8145	GTS-45.06	✲	✲	✲	
0.8155	GTS-55.04	✲	✲	✲	
0.8165	GTS-65.02	✲	✲	✲	
0.8170	GTS-70-02	✲	✲	✲	

✱) No restriction.
✲) Mechanical properties should be considered.
✖) Welding applications for cast irons should be considered.

AS Pik - 55

AS Pik-55 is a nickel cored electrode. It is used for the welding of all types of cast irons and particularly for the joining of austenitic alloyed cast irons; called Ni-resist. It gives a very stable arc and a negligible amount of slag that can easily be removed. Weld metal can be easily machined and it has the same color with that of the cast iron. It has excellent mechanical properties and it is very resistant to cracking.

Classification and Typical Weld Metal Composition (%)

DIN 8573 : E NiFe1-BG 33
AWS A5.15 : E NiFe-CI

C	Fe	Ni
1	43	balance

Approvals

GOST , SEPRO

Mechanical Properties of the Weld Metal, Typical

Yield Strength	[N/mm²]	: 320 - 360
Tensile Strength	[N/mm²]	: 430 - 470
Elongation (L=5d)	[%]	: 10
Hardness	[HB]	: 160 - 200

Applications

AS Pik-55 is particularly used for the joining and build up welding of gray cast iron, nodular cast iron and malleable cast iron parts. It is an ideal electrode for the joining of cast iron pieces to stainless steel or steel parts. On the other hand, it can also be used for filling up cavities in castings, or cavities that might form after machining.

It is also an ideal electrode for the welding of parts, exposing to high dynamic forces, that are found in heavy machinery base and body.

When welding cast iron without preheat, the smallest possible electrode diameter and the lowest possible welding current should be selected to limit the width of the heat effected zone that might occur due to excess heating. When welding thick pieces, a preheating to 150-200°C and slow cooling is recommended.

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0.8135 - GTS 35-10	**0.7040** - GGG 40
0.8145 - GTS 45-06	**0.7050** - GGG 50
0.8155 - GTS 55-04	**0.7060** - GGG 60
0.8165 - GTS 65-02	**0.7070** - GGG 70
0.8170 - GTS 70-02	**0.7080** - GGG 80

Current Type : [AC min. 50 V / DC (+)]

Diameter [mm]	Length [mm]	Current [A]	Weight (100 pcs) [g]
2.50	300	45 - 80	1670
3.25	300	60 - 120	2730
4.00	350	90 - 140	4750

Welding Positions

AS Pik - 65

AS Pik-65 is a Ni-Cu alloyed monel cored electrode. It is used for the welding of all types of cast irons. It gives a minimum amount of spatter and a very stable arc. The slag is easy to remove. Heat effected zone is very narrow. Porosity free weld metal can be easily machined. Filler metal has the same color with that of the work piece.

Classification and Typical Weld Metal Composition (%)

DIN 8573 : E NiCu-BG 33
AWS A5.15 : E NiCu-B

C	Si	Mn	Fe	Cu	Ni
0.5	0.4	1	3	30	65

Approvals

GOST , SEPRO

Mechanical Properties of the Weld Metal, Typical

Yield Strength	[N/mm²]	: 260 - 280
Tensile Strength	[N/mm²]	: 400 - 420
Elongation (L=5d)	[%]	: 15
Hardness	[HB]	: 140 - 160

Applications

AS Pik-65 is particularly used for the joining and build up welding of parts made from gray cast iron, nodular cast iron, malleable cast iron and of parts whose analysis is not known. Monel alloy core has 65 % Ni / 30 % Cu. It is an ideal electrode for the joining of cast iron pieces to monel alloys, stainless and ordinary steels. It can also be used for filling up cavities in castings, or cavities that might form after machining.

When welding cast iron without preheat, the smallest possible electrode diameter and the lowest possible welding current should be selected to limit the width of the heat effected zone that might occur due to excess heating. When welding thick pieces, a preheating to 100-200°C and slow cooling is recommended.

0.6010 - GG 10	**0.8135** - GTS 35-10	**0.7040** - GGG 40
0.6015 - GG 15	**0.8145** - GTS 45-06	**0.7050** - GGG 50
0.6020 - GG 20	**0.8155** - GTS 55-04	**0.7060** - GGG 60
0.6025 - GG 25	**0.8165** - GTS 65-02	**0.7070** - GGG 70
0.6035 - GG 35	**0.8170** - GTS 70-02	**0.7080** - GGG 80

Current Type : [AC min. 50 V / DC (+)]

Diameter [mm]	Length [mm]	Current [A]	Weight (100 pcs) [g]
2.50	300	65 - 90	1580
3.25	300	85 - 130	2650
4.00	400	110 - 160	5470

Welding Positions

AS Pik - 98 Super

AS Pik-98 Süper is a nickel cored electrode. It enables welding with drop arc metal transfer. It is used for the welding of all types of cast irons. It gives a very stable arc and a negligible amount of slag that can easily be removed. Heat effected zone is very narrow. Porosity free weld metal can be easily machined. It has excellent resistant to cracking.

Classification and Typical Weld Metal Composition (%)

DIN 8573 : E Ni-BG 22
AWS A5.15 : E Ni-CI

C	Ni
1	balance

Approvals

GOST , SEPRO

Mechanical Properties of the Weld Metal, Typical

Yield Strength	[N/mm²]	: 300
Tensile Strength	[N/mm²]	: 380
Elongation (L=5d)	[%]	: 8 - 10
Hardness	[HB]	: 120 - 140

Applications

AS Pik-98 Süper is particularly used for the joining and build up welding of gray cast iron, nodular cast iron and malleable cast iron parts. It is an ideal electrode for the joining of cast iron pieces to monel alloys, stainless and ordinary steels. It can also be used for filling up cavities in castings, or cavities that might form after machining.

When welding cast iron without preheat, the smallest possible electrode diameter should be selected to limit the width of the heat effected zone that might occur due to excess heating. When welding thick pieces, a preheating to 150-300°C and slow cooling is recommended.

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0.6010 - GG 10
0.6015 - GG 15
0.6020 - GG 20
0.6025 - GG 25
0.6035 - GG 35

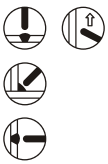
0.8135 - GTS 35-10
0.8145 - GTS 45-06
0.8155 - GTS 55-04

0.8035 - GTW 35-04
0.8040 - GTW 40-05
0.8045 - GTW 45-07

Current Type : [AC min. 40 V / DC (-)]

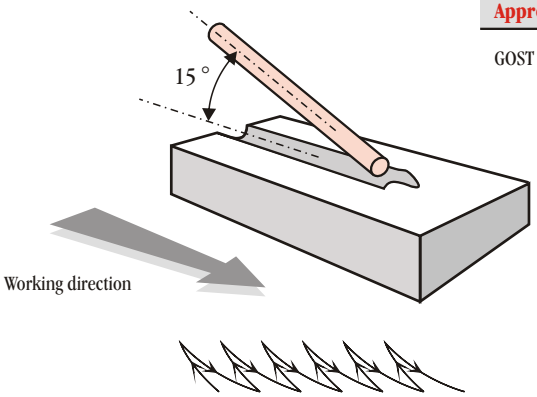
Diameter [mm]	Length [mm]	Current [A]	Weight (100 pcs) [g]
2.50	300	65 - 100	1810
3.25	300	90 - 130	2830

Welding Positions



AS Oluk Açma

AS Oluk Açma is an ideal electrode for gouging in and joint preparation of all types of steel, cast iron and non-ferrous metal. It is a general purpose electrode especially used before repair and maintenance welding applications.



Approvals

GOST , SEPRO

Functions of the Coating / The Usage and Application of the Electrode

The special coating performs several functions:

1 - To form a concentrated powerful arc,
2 - To form a stable arc and to reduce the fast melting of the electrode,
3 - To produce a strong gas jet to blow away the melted material.

The angle between the electrode and the work piece should be 15°.

It is used for beveling, weld preparation of cracks and for gouging of armour steels, air hardenable steels, stainless steels, cast irons, hard metals, work hardenable and difficult to machine materials. The surface is clean and seldom requires further dressing. Metal removal speed depends on the electrode diameter, ampere selected and to the thickness of the piece. It is recommended to work with a quality power source for best results.

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Current Type : [DC (-) / AC min. 70 V]

Diameter [mm]	Length [mm]	Current [A]	Weight (100 pcs) [g]
3.25	350	190 - 220	3560
4.00	350	220 - 280	5170
5.00	350	260 - 350	8080

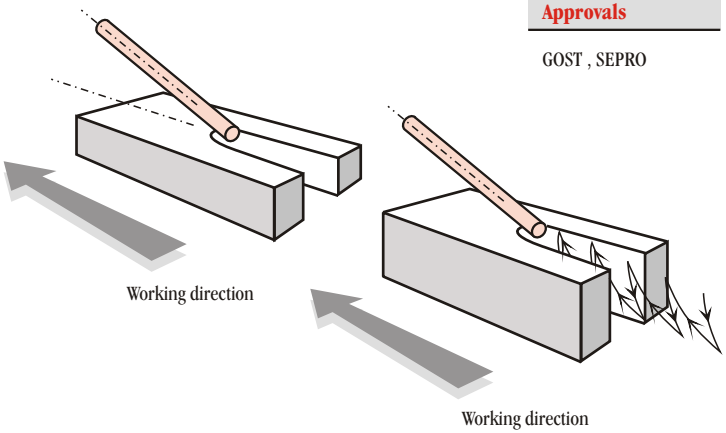
Welding Positions

AS Kesme

AS Kesme is an ideal electrode for cutting and piercing of all types of steel, cast iron and non-ferrous metal. It is a general purpose electrode especially used before and during repair and maintenance welding applications.

Approvals

GOST , SEPRO



Functions of Coating / The Usage and Application of the Electrode

Due to the physical properties of the coating material, core wire has a higher melting rate than the coating material. Therefore, 3 to 5 mm crater formation occurs at the tip of the electrode. Particularly in cutting and piercing applications, this crater formation enables the operation of the electrode penetrating into the melting piece without short circuit.

Pieces up to a thickness of 10 mm can be easily cut with this electrode. For thicker pieces (10 mm), electrode should be moved up and down in the direction of material being cut to move away the melted material. In piercing applications, electrode should be perpendicular to the work piece.

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It is used for beveling, weld preparation of cracks and for gouging of armour steels, air hardenable steels, stainless steels, cast irons, hard metals, work hardenable and difficult to machine materials. The surface is clean and seldom requires further dressing. Metal removal speed depends on the electrode diameter, ampere selected and to the thickness of the piece. It is recommended to work with a quality power source for best results.

Current Type : [DC (-) / AC min. 70 V]

Diameter [mm]	Length [mm]	Current [A]	Weight (100 pcs) [g]
3.25	450	180 - 210	4750
4.00	450	210 - 275	6810
5.00	450	250 - 300	9860

Welding Positions