



WELDING MANUAL

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CATEGORY 1

CITOFINE-C

LEUCORD-B

LEUCORAPID

ZELCORD

ZELCORD-Fe

ZELCORD-Mo

REX

E-549

FINCORD-M

NAVAL

OVERCORD-S

CITOREX 8

CITOFLEX

FERROCITO-R

FERROCITO 180

FERROCITO 210

A general purpose electrode for simple joining of light gauge sheet-metal work	Citofine-C	Oxidizing type
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International Standards

DIN 1913	AWS: SFA	ISO 2560
E 4300 A2	—	E 430 A15

Applications & characteristics

General-purpose workshop electrode providing neat, slightly concave fillet welds. Also suitable for light gauge sheet-metal work, particularly where poor fit-up conditions exist.

Materials of application

Non-alloyed structural steels St 33, St 34, St 37, St 42.

Weld metal analysis (%) (typical values)

C	Mn	Si
0.05	0.10	<0.05

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
> 430	>360	> 14	> 20

Welding current (type & amperage)

A.C. and D.C. Pole (-)			
Ø 2.0/300	Ø 2.5/350	Ø 3.2/350	Ø4/350
50-60	60-80	100-135	140-165

Welding positions

Horizontal.

A general purpose electrode with smooth arc and easy welding of thin plates	Leucord-B	Rutile-acid type medium-coated
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International Standards

DIN 1913	AWS: SFA-5.1	ISO 2560
E 43 22 A2	E 6013	E 43 2 A 15

Applications & Characteristics

Rutile-acid medium-coated electrode for all general assembly workshop application. Easy striking, stable and smooth electric arc, excellent deslagging, neat and slightly concave fillet welds.

Materials of application

Non-alloyed structural steels St 33, St 34, St 37, St 42.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.08	0.50	0.30	<0.03	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
450-550	>380	> 22	> 60

Welding current (type & amperage)

A.C. and D.C. Pole (-)				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
50-60	60-90	90-140	120-180	160-230

Welding positions

All except vertical down.

Electrode for general fabrication work, with fast deposition and high tensile strength	Leucorapid	Rutile-acid type heavy-coated
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International Standards

DIN 1913	AWS: SFA-5.1	ISO 2560
E 5132 AR 7	E 6013/6020	E 51 3 AR 22

Applications & Characteristics

Rutile-acid, heavy-coated electrode for all general fabrication work, storage vessel and vehicle construction. Clean, spatter-free bead appearance, easy deslagging including fillet welds and constricted joints, with high-tensile strength welding.

Materials of application

Non-alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52.
Boiler plates H-I, H-II, H-III, 17Mn4.
Pipe steels St 35, St 35.4, St 35.8, Si 45, Si 45.4, St 45.8.
Ship building steels A, B, C, D, E.
Cast steels GS-38, GS-45.

Weld metal analysis (%) (typical values)

C	Mn	Si
0.10	0.70	0.40

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
510-650	>380	>24	> 60

Welding current (type & amperage)

A.C. and D.C. Pole (-)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
80-100	115-150	130-210	190-250

Welding positions

Horizontal, vertical-up, overhead.

For roots, hot pass and capping in pipeline welding	Zelcord	Cellulosic type
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International Standards

DIN 1913	AWS: SFA-5.1	ISO 2560
E 43 43 C4	E 6011	E 43 4C 14

Applications & Characteristics

General purpose cellulose electrode for shipbuilding, storage tanks buildings and bridges, specially when a good penetration is required. Easy to weld with A.C. or D.C. Produces a high quality weld metal and is recommended where radiographic requirements must be suitable for vertical-down welding of cross-country pipelines, root bead, hot pass, filler and capping passes.

Materials of application

Pipe steels API 5 L, API 5 LX, X42.

Weld metal analysis (%) (typical values)

C	Si	Mn
0.12	0.16	0.60

Mechanical properties of all-weld metal

Tensile strength (N/mrn ²)	Yield strength (N/mrn ²)	Elongation (L = 5d) (%)
490	400	30
Temperature (°C)	-20	-30
Impact strength Charpy - V (Joule)	70	50

Welding current (type & amperage)

A.C. and D.C. pole (+) or (-)				
	Ø 2.5/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
Root Bead	40-80	80-100	120-150	-
Hot pass	-	100-150	150-200	170-230
Filler and capping passes	-	80-100	130-150	160-180

Welding positions

Horizontal, vertical-up, vertical-down, overhead.

A general purpose cellulose electrode for vertical-down welding	Zelcord Fe	Cellulosic type medium-coated
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International Standards

DIN 1913	AWS: SFA-5.1	ISO 2560
E 4332 C4	E 6010	E 43 3C 14

Applications & Characteristics

Medium-coated cellulosic electrode for welding vertical down in pipeline and storage tank construction. Suitable for root and filler lays in pipeline applications. Arc intensity is such that I-joints on plate up to 8 mm thick can be welded in the vertical down position without difficulty. Recovery is approx. 90%

Materials of application

Non-alloyed structural steels St 33, St 37, St 44, St 52-3.
Boiler plates H I, H II.
Pipe St 35, St 35.4, St 35.8, St 45. St 45.4, St 45.8, St E 210.7 (St 34.7), St E240.7 (St 38.7), St E 290.7 (St 43.7), St E 320.7 (St 47.7), St E 360.7 (St 537).
Steels to API-norm X 42, X 46, X 52.
Shipbuilding steels A, B, D.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.12	0.40	0.15	<0.02	0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
450-550	>360	>24	>80

Welding current (type & amperage)

D.C. Pole (+)			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
50-65	90-120	110-140	140-220

Welding positions

Vertical-down.

High strength cellulose electrode for the vertical down welding of molybdenium alloyed pipelines	Zelcord Mo	Cellulosic type medium-coated
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International Standards

DIN	AWS: SFA-5.5	ISO
-	E 7010 - A1	-

Applications & characteristics

Medium coated cellulosic electrode for vertical-down welding in pipeline and storage tank construction. Suitable for root and filter lays in pipeline applications. Arc intensity is such that I-joints on plate up to 8 mm thick can be welded in the vertical down position without difficulty. Recovery is approx. 90%.

Materials of application

Non-alloyed structural steels St 37, St 44, St 52-3
Boiler plates H II
Pipe steels St 45, St 45.4, St 45.8, St E 21 0.7 (St 34.7), St E 240.7 (St 38.7), St E 290.7 (St 43.7) St E 320.7 (St 47.7), St E 380.7 (St 53.7), St E 41 5.7 (St 60.7)
Steels to API-norm X42, X46, X52, X60

Weld metal analysis (%) (typical values)

C	Mn	Si	Mo	S	P
0.10	0.40	0.15	0.50	<0.02	0.02

Mechanical properties of all-weld metal

Tensile strength (N/mrn ²)	Yield strength (N/mrn ²)	Elongation (L = 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
500-600	>400	>22	>80

Welding current (type & amperage)

D.C. Pole (+)		
Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
80-120	110-140	140-200

Welding positions

Vertical-down.

A cold-running electrode, easy in vertical-down	Rex	Rutile-cellulosic type medium-coated
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International Standards

DIN 1913	AWS: SFA-5.1	ISO 2560
E 4322 R(C)3	E 6012/6013	E 43 2 R 12

Applications & characteristics

Rutile-cellulosic type electrode for container and storage vessel applications also for rolling stock construction. Cold running and therefore suitable for light gauge sheet-metal work. Very suitable for external corner beads and fillet welding in the vertical-down position.

Materials of application

Non-alloyed structural steels St 33, St 37, St 44, St 52-3.
Boiler plates H I, H II.
Pipe steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 52, St 52,4.
Shipbuilding steels A, B, D.
Cast steels GS-38, GS-45, GS-52.

**Weld metal analysis (%)
(typical values)**

C	Mn	Si	S	P
0.08	0.50	0.30	< 0.02	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mrn ²)	Yield strength (N/mrn ²)	Elongation (L = 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
450-550	>360	>22	>60

**Welding current
(type & amperage)**

A.C. and D.C. Pole (+)			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
55-85	90-140	130-180	180-230

Welding positions

Horizontal, vertical-up, vertical-down, overhead.

General purpose electrode even for vertical-down welding	E-549	Rutile-cellulose medium-coated
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International Standards

DIN 1913	AWS: SFA-5.1	ISO 2560
E 5143 R (C) 3	E 6013	E 51 4 R 12

Applications & Characteristics

Medium coating rutile type electrode for welding and surfacing of steels up to St 52.3. All positions weldability especially for down-hand welding, particularly where poor fit-up conditions exist. High welding speed and low amperage. Suitable for boiler construction and ship-building.

Materials of application

Non-alloyed structural steels St 33, St 37, St 44, St 52.3.
Boiler plates H I, H II, H III, 17Mn4.
Pipe steels St 35, St 35.4, St 35.8, St 45. St 45.4, St 45.8, St 52, St 52.4.
Shipbuilding steels A, B, C.
Cast steels GS-38, GS-45.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.10	0.50	0.30	<0.02	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
510-610	>380	>22	>80
Temperature (°C)	+ 20	0	-20
Charpy - V (Joule)	>80	>60	>50

Welding current (type & amperage)

A.C. and D.C. Pole (-)				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
30-50	50-80	80-130	110-170	150-220

Welding Positions

Horizontal, vertical-up, vertical-down, overhead.

A very easy to use AC/DC electrode in all positions with excellent weldability	Fincord-M	Rutile type Medium-coated
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International Standards

DIN 1913	AWS: SPA-5.1	ISO 2560
E 4321 R 3	E 6013	E 432 R 22

Applications & Characteristics

Medium-coated, rutile-type electrode specially suitable for light gauge sheet welding. When fillet welding, the Fincord M electrode can be kept in contact with the work piece with no resultant excess convexity. Automatic striking and restriking. Very little spatter loss. Smooth bead appearance.

Materials of application

Non-alloyed structural steels St 33, St 37, St 44, St 52.3.
Boiler plates H I, H II.
Pipe steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 52, St 52.4.
Shipbuilding steels A, B.
Cast steels GS-38, GS-45.
Light gauge sheet to DIN 1623 p. 1.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.08	0.50	0.35	<0.02	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
450-550	>360	>22	>60

Welding current (type & amperage)

A.C. and D.C. pole (-)				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
50-60	60-90	90-140	120-180	160-230

Welding Positions

Horizontal, vertical-up, vertical-down, overhead.

Grade 3 General Purpose for mild and ship building steels	Navacito	Rutile Medium coated
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**International
Standards**

DIN 1913	AWS: SFA-5.1	ISO 2560
E 5143 R3	E 6013	E 514 R 22

**Applications &
characteristics**

Especially for high quality mild and I C-Mi steel fabrications of higher tensile steel grades. Superior type of electrode within the rutile class, gives a forceful, positive arc especially needed for vertical-up welding on-site where high radiographic standard weld metal must be achieved. Very tolerant to variations in current setting, it can also be used with excellent results in pipe work erection on-site and for the welding of pipes in places where access is a problem.

**Materials
of application**

Non-alloyed structural steels St 33, St 37, St 44, St 52.3.
Boiler plates HI, HII, HIII, 17Mn4.
Pipe steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 52.4.
Shipbuilding steels 40A, B, C and D and 43A, B, C and D to BS.4360:1979 and BS1501 -141, -151, -154, -161 and -164 up to Grade 430.
Cast steels GS-38, GS-45, GS-52.

**Weld metal
analysis (%)
(typical values)**

C	Mn	Si	S	P
0.10	0.71	0.15	<0.02	<0.02

**Mechanical
properties of all-
weld metal**

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
540	430	26	60

**Welding current
(type &
amperage)**

A.C. and D.C. pole (+) or (-)				
Ø 2.5/350	Ø 3.25/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/450
50-90	90-130	120-180	160-240	50-90

Welding Positions

Horizontal, vertical-up, overhead.

An easy to use electrode in AC/DC. Ideal for short welds and light-gauge iron and steel fabrications	Overcord – S	Rutile-type heavy-coated
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International Standards

DIN 1913	AWS: SFA-5.1	ISO 2560
E 5122 RR 6	E 6013	E 512 RR22

Applications & characteristics

Heavy-coated, rutile electrode for light section iron and steel fabrications, car body work, boiler construction, sheet-metal work etc. Regular bead appearance without spatter, automatic striking and restriking characteristics. Ready deslagging.

Materials of applications

Non-alloyed structural steels St 33, St 37, St 44, St 52-3.
Boiler plates H I, H II.
Pipe steels St 35, St 35.4, St 35-8, St 45, St 45.4, St 45.8, St 52, St 52.4.
Shipbuilding steels A, B, D.
Cast steels GS-38, GS-45, GS-52.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.08	0.60	0.45	< 0.02	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
510-610	>380	>22	>80
Temperature (°C)	+ 20	0	-20
Charpy - V (Joule)	>60	>50	>25

Welding current (type & amperage)

A.C. and D.C. pole (+) or (-)				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
50-70	70-100	100-140	140-190	190-240

Welding Positions

Horizontal, vertical-up, overhead.

Strong electrode with thin beads	Citorex 8	Basic-rutile type
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International Standards

DIN 1913	AWS: SFA - 5.1	ISO 2560
E 5143 RR(B) 8	E 6013	E 514 RR 22

Applications & characteristics

Basic-rutile type electrode, especially suitable for roots and positional welds e.g. tube steels, boiler and tank constructions. The weld metal of CITOREX-8 has high-quality mechanical properties. Easy slag removal and thin beads.

Materials of application

Non - alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52.
Boiler plates H I, H II, H III, 17Mn4.
Pipe steels St 35, St 35.4, St 35,8, St 45, St 45.4, St 45.8, St 52, St 52.4, St 34.7, St 38.7, St 43.7, St 47.7, St 53.7.
Shipbuilding steels A, B, C, D, E.
Cost steels GS-38, GS-45, GS-52.
Fine grained steels St E 26, St E 29, St E 32, St E 36.
Thin plates to DIN 1623 bl. 1.

Weld metal analysis (%) (typical values)

C	Mn	Si
0.08	0.70	0.20

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
510-610	>380	>24	> 80

Welding current (type & amperage)

A.C. and D.C. pole (-)				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
50-60	70-95	100-150	140-190	200-250

Welding Positions

Horizontal, vertical-up, overhead.

A fast-running electrode for general constructions with remarkably easy deslagging	Citoflux	Rutile-acid type
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International Standards

DIN 1913	AWS: SFA - 5.1	ISO 2560
E 4333 AR 7	E 6013/6020	E 433 AR 22

Applications & characteristics

Rutile-acid coated, fast running electrode for general fabrication work, storage vessel and vehicle construction. Fast deposition, clean, spatter-free bead appearance, easy deslagging, including fillet welds and constricted joints.

Materials of applications

Non-alloyed structural steels St 33, St 37, St 44, St 52-3.
Boiler plates H I, H II, 17Mn4.
Pipe steels St 35, St 35.4, St 35-8, St 45, St 45.4, St 45.8, St 52, St 52.4.
Shipbuilding steels A, B, D.
Cast steels GS-38, GS-45, GS-52.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.08	0.70	0.20	<0.02	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)	
450-550	>360	>24	>80	
Temperature (°C)	+ 20	0	-20	-40
Charpy - V (Joule)	>80	>70	>50	>25

Welding current (type & amperage)

A.C. and D.C. pole (-)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5/450
80-100	110-150	160-210	220-280

Welding Positions

Horizontal, vertical-up, overhead.

A very fast high efficiency rutile-iron powder electrode	Ferrocito-R	Rutile type with high efficiency (160%)
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International Standards

DIN 1913	AWS: SFA -5.1	ISO 2560
E 5122 RR 11 160	E 7024	E 512 RR 160 32

Applications & characteristics

Heavy coated, rutile high-efficiency electrode with 160% recovery. Suitable for fabrication and vessel construction; filler and capping runs of multilayer welds. Excellent run-out length, low spatter loss, ready deslagging.

Materials of applications

Non-alloyed structural steels St 33, St 37, St 44, St 52-3.
Boiler plates H I, H II, 17Mn4.
Fine grained structural steels St E 255 (St E 26), St E 285 (St E 29), St E 315 (St E32), St E 355 (St E 36).
Shipbuilding steels A, B, D.
Cast steels GS-38, GS-45, GS-52.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.08	0.60	0.35	<0.02	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
510-610	>380	>22	> 60
Temperature (°C)	+ 20	0	-20
Charpy - V (Joule)	>60	>50	>25

Welding current (type & amperage)

A.C. and D.C. pole (-)			
Ø 2.0/300	Ø 2.5/350	Ø 3.25/450	Ø 4.0/450
70-90	90-120	130-160	180-220

Welding Positions

Horizontal.

Very fast electrode with recovery 180%	Ferrocito 180	Rutile type
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International Standards

DIN 1913	AWS: SFA - 5.1	ISO 2560
E 5132 RR 11 180	E 7024	E 51 3 RR 180 42

Applications & characteristics

Rutile type with high strength and high efficiency electrode (approx. 180%). Suitable for saving hard facing, contains iron powder in coating and therefore deposit's speed is double than regular electrodes. The electrode can be worked by touching the base material. Easy deslagging.

Materials of application

Non—alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52.
 Fine grained steels St E 26, Si E 29, Si E 32, St E 36.
 Boiler plates H I, H II, H III, 17Mn4.
 Shipbuilding steels A, B, C, D.
 Cast steels GS-38, GS-45, GS-52.

Weld metal analysis (%) (typical values)

C	Mn	Si
0.08	0.80	0.35

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
510-610	>380	>24	> 60

Welding current (type & amperage)

A.C. and D.C. pole (-)				
Ø 3.25/450	Ø 4.0/450	Ø 5.0/450	Ø 3.25/450	Ø 4.0/450
120-180	180-220	260-310	120-180	180-220

Welding Positions

Horizontal.

Very fast high efficiency electrode. Recovery 210%	Ferrocito 210	Rutile type
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International Standards

DIN 1913	AWS: SFA - 5.1	ISO 2560
E 5132 RR 11 220	E 7024	E 51 3 RR 210 42

Applications & characteristics

Rutile type electrode with high strength and approx. 210% recovery. Saving beads because of high recovery. Good striking and restriking, resistant to high current. Easy deslagging.

Materials of application

Non—alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52.
 Fine grained steels St E 26, St E 29, St E 32, St E 36.
 Boiler plates H I, H II, H III, 17Mn4.
 Shipbuilding steels A, B, C, D.
 Cast steels GS-38, GS-45, GS-52.

Weld metal analysis (%) (typical values)

C	Mn	Si
0.06	0.70	0.30

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
510-610	>380	>24	> 60

Welding current (type & amperage)

A.C. and D.C. pole (-)		
Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
120-180	180-230	230-290

Welding Positions

Horizontal.

CATEGORY 2

SPEZIAL

UNIVERS

ULTRACITO

SUPERCITO

SUPERCITO-D

FEBACITO

FERROVITE-B

Universal basic type electrode for applications involving forging work. Outstanding weldability also in A.C.	Spezial	Basic type, double-coated
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International Standards

DIN 1913	AWS: SFA-5.1	ISO 2560
E 5143 B (R) 10	E 7016	E 5 14 B 26 (H)

Applications & characteristics

Basic type universal electrode for applications involving forging work, fabrication, boiler and pressure vessel constructions. Outstanding welding characteristics in all position, also weldable on a.c. No spatter loss and no undercutting.

Materials of application

Non—alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52, St 50-2*.
 Fine grained steels St E 255 (St E 26), St E 285 (St E 29), St E 315 (St E 32), St E 355 (St E 36), W St E 255 (W St 26), W St E 285 (W St E 29), W St E 315 (W St E 32), W St E 355 (W St E 36).
 Boiler plates H I, H II, H III, 17 M η 4, 19Mn5*.
 Pipe steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 55*, St 55.4*, St 52, St52.4, St E 210.7 (St 34.7), St E 240.7 (St 38.7) St E 290.7 (St 43.7), St E 320 E (St 47.7) St E 360.7 (St 53.7).
 Shipbuilding steels A, B, C, D.
 Cast steels GS-38, GS-45, GS-52.
 * Preheat to 150-300°C depending on plate thickness.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.06	1.00	0.70	<0.02	<0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	510-610	>380	>26	>80
Stress relieved (580°C/15h/oven)	480-580	>380	>26	>80
Normalized	420-520	>290	>28	>80

Welding current (type & amperage)

A.C. and D.C. pole (+)				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
40-60	60-90	90-140	140-190	190-250

Welding Positions

Horizontal, vertical-up, overhead.

A high impact strength basic electrode suitable for rigid and large joint fabrications, even of higher carbon steels.	Univers	Basic type, heavy-coated
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International Standards

DIN 1913	AWS:SFA-5.1	ISO 2560
E 4343 B 10	E 60/7016	E 434 B 20 (H)

Applications & characteristics

Basic type electrode with low tensile strength and excellent toughness values. Suitable for root welds in rigid fabrications and large joint cross-sections. Also for buffer lay applications on higher carbon steels.

Materials of application

Non—alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52, St 50-2*, St 60-2*.
 Fine grained steels St E 255 (St E 26), St E 285 (St E 29), St E 315 (St E 32), St E 355 (St E 36), W St E 255 (W St 26), W St E 285 (W St E 29), W St E 315 (W St E 32), W St E 355 (W St E 36).
 Boiler plates H I, H II, H III, 17 M η 4, 19Mn5*.
 Pipe steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 55*, St 55.4*, St 52, St 52.4.
 Shipbuilding steels A, B, C, D , E.
 Cast steels GS-38, GS-45, GS-52.
 * Preheat to 150-300°C depending on plate thickness.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.06	0.80	0.20	<0.02	<0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	430-530	>360	>26	> 160
Stress relieved (580°C/15h/oven)	400-500	>360	> 26	> 160
Normalized	340-470	>260	> 28	> 180

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
60-90	90-140	140-190	190-250

Welding Positions

Horizontal, vertical-up, overhead.

Easy to weld with high mechanical properties	Ultracito	Thick basic-rutile type
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**International
Standards**

DIN 1913	AWS: SFA - 5.1	ISO 2560
E 5154 B(R)10	E 7018	E 51 4 B23 (H)

**Applications &
characteristics**

Thick rutile-basic coated type electrode with remarkable resistance to moisture pick-up and therefore the weld metal obtained is free from pores. Very easy slag removal and low spatter loss. Very good weldability even with A.C. Suitable for constructions works and repairs e.g. shipbuilding, boilers construction etc.

**Materials of
application**

Non-alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52.3.
Boiler plates H I, H II, H III, 17Mn4.
Pipe steels St 35, St 35.4, St 35,8, St 45, St 45.4, St 45.8, St 52, St 52.4.
Shipbuilding steels A, B, C, D , E.
Cast steels GS-38, GS-45, GS-52.

**Weld metal
analysis (%)
(typical values)**

C	Mn	Si	S	P
0.06	1.20	0.40	<0.02	<0.02

**Mechanical
properties of all-
weld metal**

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
510-610	>380	>22	> 150
Temperature (°C)	+ 20	0	-20
Charpy - V (Joule)	>150	>130	>80

**Welding
current
(type &
amperage)**

A.C. and D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
75-100	120-150	150-190	170-240

Welding Positions

Horizontal, vertical-up, overhead.

A reliable general purpose basic electrode with tough crack resistant weld metal	Supercito	Basic type, with iron powder
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International Standards

DIN 1913	AWS: SFA - 5.1	ISO 2560
E 5155 B 10	E 7018	E 51 5 B 11020 (H)

Applications & characteristics

Basic type electrode with 115% recovery. Suitable for highly crack-resistant and tough joints, including Thomas grade and carbon steels up to 0.4% C. Good all-positional welding characteristics; ready deslagging.

Materials of application

Non—alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52.3, St 50-2*, St 60-2*, St70-2*.
 Fine grained structural steels St E 255 (St E 26), St E 285 (St E 29), St E 315 (St E 32), St E3 55 (St E 36), W St E 255 (W St 28), W St E 285 (W St En 29), W St E 315 (W St E 32), W St E 355 (W St E 36) W St E 255 (TT St E 29), T St E 315 (TT St E 32), T St E 355 (TT St E 36).
 Boiler plates H I, H II, A St 35, A St 41, A St 45, 17Mn4, 19Mn5*.
 Tube Steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 55*, St 55.4*, St 52, St52.4, St E 210.7 (St 34.7), St E 240.7 (St 38.7) St E 290.7 (St 43.7), St E 320.7 (St 47.7), St E 360.7 (St 53.7).
 Shipbuilding steels A, B, D, E.
 Cast steels GS-38, GS-45, GS-52.
 * Preheat to 150-300°C depending on plate thickness.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.06	1.10	0.50	<0.02	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)	
510-610	>380	>24	> 150	
Temperature (°C)	+ 20	0	-20	-40
Charpy - V (Joule)	> 150	> 130	>80	> 60

Welding current (type & amperage)

D.C. pole (+)				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
40-60	60-90	90-140	140-190	190-250

Welding Positions

Horizontal, vertical-up, overhead.

Strong electrode easy welding	Supercito-D	Basic type double coating with iron powder
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International Standards

DIN 1913	AWS: SFA - 5.1	ISO 2560
E 5154 B 10	E 7018	E515B 110 20(H)

Applications & characteristics

Double coating basic electrode. Thanks to the double coating stable arc is providing even on A.C. and low voltage open circuit, as well as with low amperage and therefore excellent vertical up welding. Suitable in heavy construction, pipeline, ship-building works etc. Welding of carbon steel up to 0,4% C. Recovery 115%. Excellent welding characteristics in all positions, easy striking and thanks to the double coating welding without interruption. Easy slag removal.

Materials of application

Non—alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52.3, St 50-2*, St 60-2*, St70-2*.
 Fine grained structural steels St E 26, St E 29, St E 36, W St E 26, W St E 29, W St E 32, W St E 36, TT St E 26, TT St E 29, TT St E 32, TT St E 36 Boiler plates H I, H II, A St 35, A St 41, A St 45, 17Mn4, 19Mn5*.
 Pipe Steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 55*, St 55.4* St 52, St 52.4, St E 210.7 (St 34.7), St E 240.7 (St 38.7), St E 290.7 (St 43.7), St E 320.7 (St 47.7), St E 360.7 (St 53.7).
 Shipbuilding steels A, B, D, E.
 Cast steels GS-38, GS-45, GS-52.
 * Preheat to 150-300°C depending on plate thickness.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.06-0.1	0.8-1.0	0.4-0.6	<0.02	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)	
510-610	>380	>24	> 150	
Temperature (°C)	+ 20	0	-20	-40
Charpy - V (Joule)	> 150	> 130	>80	> 60

Welding current (type & amperage)

D.C. pole (+) and A.C.				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
40-60	60-90	90-140	140-190	190-250

Welding Positions

Horizontal, vertical-up, overhead.

A reliable AC/DC electrode	Febacito	Thick basic-rutile type
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International Standards

DIN 1913	AWS: SFA - 5.1	ISO 2560
E 5154 B (R) 10	E 7018	E 51 4 B23 (H)

Applications & characteristics

Thick rutile-basic coated type electrode with remarkable resistance to moisture pick-up and therefore the weld metal obtained is free from pores. Recovery 120-130%. Very easy stag removal and low spatter loss. Very good weldability even with A.C. Suitable for constructions works and repairs e.g. shipbuilding, boiler construction, car body etc.

Materials of application

Non—alloyed structural steels St 33, St 37, St 44, St 52.3
Boiler plates H I, H II, H III, 17Mn4.
Pipe steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 52, St 52.4.
Shipbuilding steels A, B, C, D , E.
Cast steels GS-38, GS-45, GS-52.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.06	1.20	0.40	<0.02	<0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
510-610	>380	>21	> 140
Temperature (°C)	+ 20	0	-20
Charpy - V (Joule)	>140	>110	>70

Welding current (type & amperage)

A.C. and D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
80-105	130-160	150-195	170-260

Welding Positions

Horizontal, vertical-up, overhead.

Low hydrogen AC/DC high recovery electrode	Ferrovite-B	Basic type
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International Standards

DIN 1913	AWS:SFA-5.1	ISO 2560
E 5143 B 12 160	E 7028	E 51 4 B 150 36

Applications & characteristics

Basic type electrode with low tensile strength and excellent toughness values. Suitable for root welds in rigid fabrications and large joint cross-sections. Also for buffer lay applications on higher carbon steels.

Materials of application

Non—alloyed structural steels St 33, St 34, St 37, St 42, St 46, St 52, St 50*, St 60*, St 70*.

Fine grained structural steels St E 255 (St E 26), St E 285 (St E 29); St E 315 (St E 32), St E 355 (St E 36), W St E 255 (W St E 26), W St E 285 (W St E 29), W St E 315 (W St E 32), W St E 355 (W St E 36).

Boiler plates H I, H II, H III, H IV, 17Mn4, 19Mn5*.

Ship building steels A, B, D, E.

Cast steels GS-38, GS-45, GS-52.

* Preheat to 150-300°C depending on plate thickness.

Weld metal analysis (%) (typical values)

C	Mn	Si
0.08	0.85	0.45

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	510-610	>380	>24	> 100
Stress relieved (580°C/15h/oven)	480-580	>380	> 24	> 100
Normalized	400-500	>290	> 28	> 120

Welding current (type & amperage)

D.C. pole (+) and A.C.			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
50-100	110-160	160-210	200-280

Welding Positions Horizontal.

CATEGORY 3

EXTRA

TENACITO

TENACITO 38

TENACITO 60

TENACITO 70

TENACITO 75

TENACITO 80

TENACITO 100

TENCORD Ti

An extra high-quality low hydrogen AC/DC electrode, with very stable arc even on rust or paint	Extra	Basic type, double-coated
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International Standards

DIN 8529	AWS: SFA - 5.1	ISO 2560
E Y42 53 Mn B	E 7016	E 515 B 26 (H)

Applications & characteristics

Basic type universal electrode meeting the highest quality requirements. Particularly well suited to applications involving fabrication, steel, machinery and vehicle construction. Double coating provides extremely stable arc; suitable for root passes and all-position welding. Not affected by rust or paint on work piece surface.

Materials of application

Non—alloyed structural steels St 33, St 37, St 44, St 52-3, St 50-2*, St 60-2*, St 70-2*.
 Fine grained structural steels St E 255 (St E 26), St E 285 (St E 29), St E 315 (St E32), St E 355 (St E 36), W St E 255 (W St E 26), W St E 285 (W St E 29). W St E 315 (W St E 32) W St E 355 (W St E 36), T St 255 (TT St E 26), T St 285 (TT St E 29), T St 315 (TT St E 32), T St 355 (TT St E 36)
 Boiler plates H I, H II, A St 35, A St 41, A St 45, 17Mn4, 19Mn5*.
 Pipe steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 55*, St 55.4*, St 52, St 52.4, St E 210.7 (St 34.7), St E 240.7 (St 38.7), St E 290.7 (St 43.7) St E 320.7 (St 47.7), St E 360.7 (St 53.7).
 Shipbuilding steels A, B, D, E.
 Cast steels GS-38, GS-45, GS-52.
 * Preheat to 150-300°C depending on plate thickness.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.06	1.20	0.40	<0.02	<0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	520-620	>430	>24	>130
Stress relieved (580°C/15h/oven)	490-590	>400	>24	>130
Normalized	440-540	>290	>26	>130

Welding current (type & amperage)

A.C. and D.C. pole (+)				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
40-60	60-90	90-140	140-190	190-250

Welding Positions

Horizontal, vertical-up, overhead.

A low hydrogen electrode for welding high strength low alloy fine grained structural steels	Tenacito	Basic type high-quality (COD tested)
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International Standards

DIN 8529	AWS: SFA – 5.1	ISO 2560
E SY 42 76 M η B	E 7018-1	E 51 5 B 20

Applications & characteristics

Basic type electrode for high mechanical property requirements and crack resistance. Also suitable for crack resistant joint welds on higher carbon steels. Excellent all-position weldability thanks to the double-coating in diameters up to 3.25 mm, providing very stable arc characteristics. Electrode manipulation in root and overhead positions unproblematic. Low spatter loss, ready slag detachment and regular bead appearance. COD tested for offshore applications.

Materials of application

Non—alloyed structural steels St 33, St 37, St 44, St 52-3, St 50-2*, St 60-2*, St 70-2*.
 Fine grained structural steels St E 255 (St E 26), St E 285 (St E 29), St E 315 (St E 32), St E 355 (St E 36), W St E 255 (W St E 26), W St E 285 (W St E 29), W St E 315 (W St E 32), W St E 355 (W St E 36), T St 255 (TT St E 26), T St 285 (TT St E 29), T St 315 (TT St E 32), T St 355 (TT St E 36).
 Boiler plates H I, H II, A St 35, A St 41, A St 45, 17Mn4, 19Mn5*.
 Pipe steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 52, St 52.4.
 Steels with high impact strength at low temperatures TT St 35 N, TT St 41 N, TT St 45 N.
 Shipbuilding steels A, B, D, E.
 Cast steels GS-38, GS-45, GS-52.
 * Preheat to 150-300°C depending on plate thickness.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
0.06	1.50	0.30	<0.02	<0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	520-620	>430	>26	>140
Stress relieved (580°C/15h/oven)	500-600	>420	>26	>140
Normalized	440-540	>290	>28	>160

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
65-95	90-140	140-185	180-240

Welding Positions

Horizontal, vertical-up, overhead

An extra low-hydrogen electrode with excellent toughness and formability and extremely good impact values down to -40°C	Tenacito 38	Basic type high-quality (COD tested)
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International Standards

DIN 8529	AWS: SFA – 5.5	ISO
E SY 42 76 1Ni BH 5	E 7018-G	-

Applications & Characteristics

Basic type electrode for highly demanding applications. Excellent toughness and formability. Highly crack resistant as H2 level in the weld metal is extremely low. Excellent all-position weldability thanks to the double-coating in diameters up to 3.25 mm, providing very stable arc characteristics. Electrode manipulation in root and overhead positions unproblematic. Low spatter loss, ready slag detachment and regular bead appearance. COD tested for offshore applications.

Materials of application

Fine-grained structural steels with guaranteed min. yield strength < 420 N/mm² as 15 Mn Ni 63 (FG 38 WS, TSB 370, Ark 6-370 RE) and St E 255 (St E 26), St E 285 (St E 29), St E 315 (St E 32), St E 355 (St E 26), St E 380 (St E 39), W St E 355 (W St E 36), W St E 380 (W St E 39), T St E 255 (TT St E 26), T St E 285 (TT St E 29), St E 315 (TT St E 32), T St E 355 (TT St E 36), T St E 380 (TT St E 39).

Weld metal analysis (%) (typical values)

C	Mn	Si	Ni	S	P
0.06	1.20	0.30	0.95	<0.012	<0.012

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	540-640	>460	>25	>180

Yield strength at elevated temperatures (0,2%)

Heat treatment	0.2 limit in +150°C (N/mm ²)	0.2 limit in +350°C (N/mm ²)	0.2 limit in +450°C (N/mm ²)
As welded	>370	>320	>270
Stress relieve 580°C/15 h/oven	>370	>320	>270

Hydrogen content (after redrying)

Diffusible hydrogen to DIN 8572 (ISO 3690)	
Deposited metal (H DM) ≤ 5 mL/100g	Fused metal (H FM) ≤ 3 ppm

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
65-95	90-140	140-185	180-250

Welding Positions Horizontal, vertical-up, overhead.

Low hydrogen electrode for all positions welding	Tenacito 60	Basic type
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International Standards

DIN 8529	AWS: SFA – 5.5	ISO
E Y 50 76 Mn 1 Ni B	E 8018-G	-

Applications & Characteristics

Basic type electrode for high-tensile fine-grained structural steels. Good weldability in all positions. Low spatter loss. Easy slag removal. Regular seams, high crack resistance. Thanks to their double coating electrodes especially stable up to Ø 3.25 mm produce root passes and all position welding.

Materials of application

Fine grained structural St E 380 (St E 39), St E 420 (St E 43), St E 460 (St E 47), W St E 380 fW St E 39), W St E 420 (W St E 43), W St E 460 (W St E 47), T St E 380 (TT St E 39), T St E 420 (TT St E 43), T St E 460 (TT St E 47).

**Weld metal analysis (%)
(typical values)**

C	Mn	Si	Ni	S	P
0.06	1.80	0.30	0.60	<0.02	<0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	560-660	>500	>24	>140
Stress relieved (580°C/15h/oven)	520-620	>470	>24	>140

Temperature (°C)	+20	0	-20	-40	-60
Charpy - V (Joule)	>140	>120	>100	>90	>60

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
65-95	90-135	140-180	190-240

Welding Positions

Horizontal, vertical-up, overhead.

Low hydrogen electrode for all positions welding	Tenacito 65	Basic type
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International Standards

DIN 8529	AWS: SFA – 5.5	EN 757
ESY 5576 Mn1NiMo BH5	E 9018-G-H4	E 55 5 Mn1NiMo BT42H5

Applications & Characteristics

Basic type electrode for high-tensile fine-grained structural steels. Good weldability in all positions. Low spatter loss. Easy slag removal. Regular seams, high crack resistance. Thanks to their double coating electrodes especially stable up to Ø 3.25 mm produce root passes and all position welding. Radiographic weld quality.

Materials of application

Fine grained structural steels St E 355 to St E 500, T St E 550 V, 17MnMoV 6 4.

Weld metal analysis (%) (typical values)

C	Mn	Si	Ni	Mo	S,P
0.05	1.50	0.30	1.20	< 0.35	< 0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	630-720	>560	>20	>160
Stress relieved (580°C/15h)	620-720	>550	>20	>150

Temperature (°C)	+20	0	-20	-40	-60
Charpy - V (Joule)	>160	>130	>110	>100	>70

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
65-95	90-140	140-185	185-240

Welding Positions

Horizontal, vertical-up, overhead.

Low hydrogen high tensile electrode	Tenacito 70	Basic type
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International Standards

DIN 8529	AWS: SFA – 5.5	ISO
EY 50 75 Mn 1 Ni B	E 9018-G	-

Applications & characteristics

Basic type electrode for high-tensile fine-grained structural steels. Good weldability in all positions. Low spatter loss. Easy slag removal. Regular seams, high crack resistance. Specific characteristics of double coating make diameters up to 3.25 mm suitable for root passes and all-position welding.

Materials of application

Fine grained structural St E 420 (St E 43), St E 460 (St E 47), St E 500 (St E 51), W St 420 (W St E 43), W St E 460 (W St E 47) W St E 500 (W St E 51), T St E 420 (TT St E 43), T St E 460 (TT St E 47), T St E 500 (TT St E 51)

Weld metal analysis (%) (typical values)

C	Mn	Si	Ni	S	P
0.06	1.40	0.60	0.65	<0.02	<0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	580-680	>510	>24	>140
Stress relieved (580°C/15h/oven)	560-660	>510	>24	>120

Temperature (°C)	+20	0	-20	-40	-60
Charpy - V (Joule)	>140	>110	>80	>50	>30
D.V.M. (Joule)	>140	>120	>100	>80	>50

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
65-95	90-135	140-180	190-240

Welding Positions Horizontal, vertical-up, overhead.

Low hydrogen high tensile electrode	Tenacito 75	Basic type
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International Standards

DIN 8529	AWS: SFA – 5.5	ISO
E Y69 75 Mn2NiCrMo B	E 10018-G	-

Applications & characteristics

Basic type electrode for high-tensile fine-grained structural steels. Good weldability in all positions. Low spatter loss. Easy slag removal. Regular seams, high crack resistance. Specific characteristics of double coating make diameters up to 3.25 mm suitable for root passes and all-position welding.

Materials of application

Heat-treated fine grained structural steels e.g. N-A-XTRA 65, N-A-XTRA 70, T 1, T 1 A, T 1 B, HSB 77 V etc.
If heat input is high or in the case of stress-relieving it may be preferable to use the Tenacito 80.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Mo	S	P
0.06	1.50	0.50	0.40	2.10	0.40	<0.02	< 0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	740-840	>690	>18	>120
Stress relieved (580°C/15h/oven)	720-820	>660	>18	>120

Temperature (°C)	+20	0	-20	-40	-60
Charpy - V (Joule)	>120	>100	>80	>60	>40
D.V.M. (Joule)	>110	>100	>80	>60	>50

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
65-95	90-140	140-185	180-240

Welding Positions Horizontal, vertical-up, overhead.

Low hydrogen high tensile electrode	Tenacito 80	Basic type
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International Standards

DIN 8529	AWS: SFA – 5.5	ISO
E Y69 75 Mn2NiCrMo B	E 11018-G	-

Applications & characteristics

Basic type electrode for high-tensile fine-grained structural steels. Good weldability in all positions. Low spatter loss. Easy slag removal. Regular seams, high crack resistance. Thanks to their double coating electrodes especially stable up to Ø 3.25 mm produce root passes and all position welding.

Materials of application

Heat-treated fine grained structural steels e.g. N-A-XTRA 70, T 1, T 1 A, T 1 B, HSB 77 V etc.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Mo	S	P
0.06	1.80	0.50	0.35	2.20	0.40	<0.02	< 0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	760-860	>720	>16	>120
Stress relieved (580°C/15h/oven)	730-830	>700	>16	>120

Temperature (°C)	+20	0	-20	-40	-60
Charpy - V (Joule)	>120	>100	>80	>50	>30
D.V.M. (Joule)	>110	>100	>80	>60	>50

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
65-95	90-135	140-185	180-240

Welding Positions

Horizontal, vertical-up, overhead.

Low hydrogen high tensile electrode	Tenacito 100	Basic type
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International Standards

DIN 8529	AWS: SFA – 5.5	ISO
E Y89 53 Mn2NiCrMo B	E 12018-G	-

Applications & characteristics

Basic type electrode for high-tensile fine-grained structural steels. Good weldability in all positions. Low spatter loss. Easy slag removal. Regular seams, high crack resistance. Thanks to their double coating electrodes especially stable up to Ø 3.25 mm produce root passes and all position welding.

Materials of application

Heat-treated fine grained structural steels, up to a yield strength of 900 N/mm² e.g. XABO 90.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Mo	S	P
0.06	1.60	0.50	0.70	2.40	0.50	<0.02	< 0.02

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
As welded	880-980	>870	>14	>80
Stress relieved (580°C/15h/oven)	860-960	>820	>14	>80

Temperature (°C)	+20	0	-20
Charpy - V (Joule)	>80	>60	>40
D.V.M. (Joule)	>80	>60	>50

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
65-95	90-135	140-185	180-240

Welding Positions

Horizontal, vertical-up, overhead.

Resistant to atmospheric corrosion	Tencord Ti	Rutile type heavy coated
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International Standards

DIN	AWS: SFA – 5.5	ISO
-	E 7013-G	-

Applications & characteristics

Low alloy rutile type electrode for medium to thick structural steels, resistant to atmospheric corrosion. Good weldability in all positions. Automatic striking and re-striking.

Materials of application

Structural steels resistant to atmospheric corrosion WT St 37, Wt St 52, e.g. Patinax 37, RHB 35, COR-TEN A, B, C, Acro 50 Super, Hoesch Regista.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cu	Ni	S	P
0.08	0.50	0.10	0.45	0.80	<0.02	< 0.02

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
500-600	>380	>24	>70

Welding current (type & amperage)

A.C. and D.C. pole (+) or (-)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
65-95	100-140	130-190	190-250

Welding Positions

Horizontal, vertical-up, overhead.

CATEGORY 4

MOLYCORD Ti

MOLYCORD Kb

CROMOCORD Ti

CROMOCORD Kb

CROMOCORD 2

CROMOCORD 2 STC

NICROMOLYCORD

Material Service temperatures up to 525°C	Molycord Ti	Rutile type heavy coated
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**International
Standards**

DIN 8575	AWS: SFA – 5.5	ISO 3580
E Mo R 22	E 8013-G	E Mo R 22

**Applications &
Characteristics**

Heavy-coated rutile type electrode for boiler, storage vessel and pipeline construction; for service temperatures up to 525° C. Good all-position weldability. Low spatter loss. Smooth bead appearance. Good slag detachment.

**Materials of
application**

Creep resisting boiler and tube steels St 35.8, St 45.8, 17Mn4, 19Mn5, 15Mo3
Tube Steels St E 360.7 (St 53.7), St E 385.7 (St 56.7), St E 415.7 (St 60.7).
Steels to API-standards X 52, X 56, X 60.
Observe specifications on preheating and post-weld heat treatment of base materials.

**Weld metal
analysis (%)
(typical values)**

C	Mn	Si	Mo	S	P
0.08	0.60	0.30	0.50	<0.02	< 0.02

**Mechanical
properties of
all-weld metal**

Heat Treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L=5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
As welded	550-650	>470	>20	>60
Stress relieve 580°C/15 h/oven	520-620	>440	>22	>60
Normalized	380-480	>260	>26	>100

Yield strength at elevated temperatures (0.2%)			
Heat Treatment	As welded	Stress relieved 580°C/15 h/oven	Normalized
+ 500°C	>350	>300	>180

**Welding current
(type &
amperage)**

A.C. and D.C. pole (-)			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/450	Ø 5.0/450
60-85	90-130	140-180	190-230

Welding Positions

Horizontal, vertical-up, overhead.

Material Service temperatures up to 525°C	Molycord Kb	Basic type
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International Standards

DIN 8575	AWS: SFA – 5.5	ISO 3580
E Mo B 20	E 7018-A1	E Mo B26

Applications & characteristics

Basic type electrode for boiler, storage vessel and pipeline construction; for service temperatures up to 525°C. Excellent all-position weldability thanks to the double-coating in diameters up to 3.25 mm, providing very stable arc characteristics. Electrode manipulation in root and overhead positions unproblematic. Low spatter loss, ready slag detachment and regular bead appearance.

Materials of application

Creep resisting boiler and tube steels St 35.8, St 45.8, 17Mn4, 19Mn5, 15Mo3
Cast steels GS 22 Mo 4 and others.
Tube steels St E 360.7 (St 53.7), St E 385.7 (St 56.7), St E 415.7 (St 60.7).
Steels to API-standards X 52, X 56, X 60.
Observe specifications on preheating and post-weld heat treatment of base materials.

**Weld metal analysis (%)
(typical values)**

C	Mn	Si	Mo	S	P
0.06	0.80	0.50	0.50	<0.02	< 0.02

Mechanical properties of all-weld metal

Heat Treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L=5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
As welded	550-650	>470	>22	>140
Stress relieve 580°C/15 h/oven	520-620	>450	>22	>140
Normalized	450-550	>320	>30	>100

Yield strength at elevated temperatures (0.2%)			
Heat Treatment	As welded	Stress relieve 580°C/15 h/oven	Normalized
+ 500°C	>350	>300	>200

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/450	Ø 5.0/450
65-90	90-130	140-180	190-230

Welding Positions

Horizontal, vertical-up, overhead.

Material Service temperatures up to 550°C	Cromocord Ti	Rutile type
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International Standards

DIN 8575	AWS: SFA – 5.5	ISO 3580
E Cr Mo 1 R 22	E 8013-G	E 1 Cr Mo R 22

Applications & characteristics

Rutile type electrode suitable for boiler, storage vessel and pipeline construction, for service temperatures up to 550° C. For more demanding works on thick plates etc, use the electrode CROMOCORD Kb. Good weldability in all positions. Observe specifications on preheating and post-weld heat treatment of base materials.

Materials of applications

Creep resisting boiler and tube steels .
13CrMo44, 15CrMo5.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Mo
0.08	0.60	0.30	1.0	0.50

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L=5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
annealed (30 min / 720°C)			
590-690	>490	>22	>60
Tempered (30 min / 930°C / air + 30 min /720°C)			
420-520	>300	>26	>80

Yield strength at elevated temperature (0,2%) (N/mm²)

Heat treatment	Annealed	Tempered
Testing temperature +500°C	>350	>200

Weld current (type & amperage)

A.C. and D.C. pole (+)			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/450	Ø 5.0/450
65-90	90-130	140-180	190-230

Welding Positions

Horizontal, vertical-up, overhead.

Material Service temperatures up to 550°C	Cromocord Kb	Basic type
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International Standards

DIN 8575	AWS: SFA – 5.5	ISO 3580
E Cr Mo 1 B 26	E 8018-B2	E 1 Cr Mo B 26

Applications & characteristics

Basic electrode suitable for boiler, storage vessel and pipeline construction, for service temperatures up to 550°C. Double coating in diameters up to 3.25 mm provides extremely stable arc, suitable for root passes and all-position welding. Observe specifications on preheating and post-weld heat treatment of base materials.

Materials of applications

Creep resisting boiler and tube steels 13 Cr Mo 44, 15 Cr Mo 5 Cast steels GS 22 Cr Mo 5, GS 22 Cr Mo 54, GS 25 Cr Mo 4 etc. Case hardening steels 15Cr3 (EC 60), 16MnCr (EC 80), 20 MnCr5 (EC 100). Alloyed steels 25CrMo4 etc.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Mo
0.06	0.80	0.40	1.0	0.50

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L=5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
annealed (30 min / 720°C)			
560-660	>480	>22	>120
Tempered (30 min / 930°C / air + 30 min / 720°C)			
420-520	>300	>28	>160

Yield strength at elevated temperature (0,2%) (N/mm²)

Heat treatment	Annealed	Tempered
Testing temperature +500°C	>350	>200

Weld current (type & amperage)

D.C. pole (+) and A.C.			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/450	Ø 5.0/450
60-85	100-130	140-180	190-230

Welding Positions

Horizontal, vertical-up, overhead.

Material Service temperatures up to 600°C	Cromocord 2	Basic type
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International Standards

DIN 8575	AWS: SFA – 5.5	ISO 3580
E Cr Mo 2 B 26	E 9016 B3	E 2 Cr Mo B 26

Applications & characteristics

Basic type electrode suitable for boiler, storage vessel and pipeline construction, for service temperatures up to 600°C. Suitable for all-positions welding. Thanks to their double coating, electrodes especially stable up to Ø 3.25 mm produce root passes. Observe specifications on preheating and post-weld heat treatment of base materials.

Materials of application

Creep resisting steels as well as Cr Mo or Cr Mo V steels resisting to hydrogen pressure e.g. 10 Cr Mo 9 10, 10 Cr Si Mo V 7 etc. Welding of similar cast steels as well as alloyed steels with Cr content up to 2%.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Mo
0.06	0.80	0.50	2.4	1.0

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L=5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
annealed (30 min / 760°C)			
600-700	>500	>20	>120
Tempered (30 min / 930°C / air + 30 min / 720°C)			
520-620	>380	>24	>140

Yield strength at elevated temperature (0,2%) (N/mm²)

Heat treatment	Annealed	Tempered
Testing temperature +500°C	>350	>200

Weld current (type & amperage)

D.C. pole (+) and A.C.			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/450	Ø 5.0/450
60-90	85-130	140-185	190-240

Welding Positions

Horizontal, vertical-up, overhead.

Largely insensitive to inservice embrittlement	Cromocord 2 STC	Basic type
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International Standards

DIN 8575	AWS: SFA – 5.5	ISO 3580
E Cr Mo 2 B 20	E 9018 B3	E 2 Cr Mo B 20

Applications & characteristics

Developed specifically for the welding of 2 1/4 Cr/1Mo type steels. Weld metal exhibits exceptional notch toughness. Low levels of trace and tramp elements render the weld metal largely insensitive to inservice embrittlement. Extensive simulated step-cooling heat treatments under quality assured conditions have confirmed this highly desirable property. The weld metal is compatible with the OERLIKON flux-cored wire FLUXOFIL 37STC as well as with the wire/flux combination FLUXOCORD 37 STOOP 37 STC. Typical applications: chemical plant such as hydrocrackers, ammonia synthesis, coal gasification and liquefaction etc.

Materials of application

10 Cr Mo 9 10, 12 Cr Mo 9 10, A 387 Gr 22, Cl 1 and 2, A 182 Gr F 22, A 336 Gr F 22 and F 22a.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Mo	S	P	As	Sn	Sb
0.09	0.50	0.30	2.40	1.00	<0.020	<0.010	<0.040	<0.010	<0.003

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L=5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
550-650	>400	>20	>140
Tempered (650°C / 5h/air + 690°C/17h/air)			

Heat treatment	Temperature °C		
	+20	0	-20
Tempered 650°C / 5h/ air + 690°C 17h/air	>140	>120	>10
Tempered and step cooling 650°C/5 h/air + 690°C / 17h/air and step cooling	>140	>100	>60

Yield strength at elevated temperature (0,2%) (N/mm²)

Heat treatment	Annealed	Tempered
Testing temperature +500°C	>300 (N/mm ²)	>230 (N/mm ²)

Weld current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/450	Ø 5.0/450
60-90	85-130	140-180	180-230

Welding Positions

Horizontal, vertical-up, overhead.

For machine and apparatus constructions	Nicromolycord	Basic type
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International Standards

DIN 8575	AWS: SFA – 5.5	ISO 3580
-	E 12015-G	-

Applications & characteristics

Basic electrode for facing and welding on machine and apparatus constructions. Good welding characteristics. Observe specifications on preheating and post-weld heat treatment of base materials.

Identical and similar steels and cast steels of the types 24 Cr Mo V 52, 24 Cr Mo V 55, 21 Cr Mo V 5 1 1 , 36 Cr Ni Mo 4, 28 Ni Cr Mo 55, 28 Ni Cr Mo 4, GS 24 Cr Ni Mo 3 25.

Materials of Application

Identical and similar steels and cast steels of the types 24 Cr Mo V 52, 24 Cr Mo V 55, 21 Cr Mo V 5 1 1 , 36 Cr Ni Mo 4, 28 Ni Cr Mo 55, 28 Ni Cr Mo 4, GS 24 Cr Ni Mo 3 25.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Mo
0.06	0.80	0.20	1.0	2.4	1.0

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L=5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
As welded			
950-1050	>900	>12	>25
Air tempering (30 min / 920°C/ quenching by air + 6h annealing/600°C/oven cooling up to 300°C)			
900-1,000	>720	>14	>25
Oil tempering (30 min / 920°C/ quenching by oil + 6h annealing/600°C/oven cooling up to 300°C)			
900-1,000	>800	>14	>25

Weld current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/450	Ø 5.0/450
60-80	85-120	110-160	150-190

Welding Positions

Horizontal, vertical-up, overhead.

CATEGORY 5

CITOMANGAN

C1TORAIL

CITODUR 350

CITODUR 38

CITODUR 400 B

CITODUR 600 A

CITODUR 600 B

CITODUR 65 W

CITODUR V 1,000

TOOLCORD

For manganese-alloyed steels	Citomangan	Basic type
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International Standards

DIN 8555	AWS: SFA – 5.5	ISO
E 7-250 K coated	E Fe Mn	-

DIN-standard: 1.3402

Applications & characteristics

Basic manganese-alloyed electrode for wear resistant hard facing on building machines and gravel mixers as well as for parts subject to impact and friction abrasion.

Materials of application

Hard facing and repair welding on wearing parts made of austenitic steels, such as e.g. excavator teeth, crusher jaws, crushing heads, beaters, beating arms, etc.

Weld metal analysis (%) (typical values)

C	Cr	Ni	Mn
0.7	0.3	3	13

Mechanical properties of all-weld metal

Vickers hardness (HV 30) (as-welded condition)	Vickers hardness (HV 30) (after work hardening)
180-200	550-700

Work hardening: normally results in service, but can also be enhanced by peening.

Welding current (type & amperage)

D.C. Pole (+)		
Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
110-135	140-175	180-230

Welding Positions

Horizontal.

For rolling friction	Citorail	Basic type
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International Standards

DIN 8555	AWS: SFA	ISO
E 1-UM-300	-	-

Applications & characteristics

Basic type electrode for medium-hard surfacing which is still machinable. Particularly suitable for repairs of worn parts subject to rolling friction. Good weldability in all positions. Pore and crack resistant weld deposit.

Materials of application

Hard facing of rails, rail crossings, switch points, sprockets, wheel flanges, cable railroads, crane rollers, caterpillar track rollers, chain links, machinery component parts, etc.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr
0.08	0.60	0.70	3.2

Mechanical properties of all-weld metal

Vickers hardness HV 30 (as welded condition)
270-300

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
60-80	110-130	140-180	190-240

Welding Positions

Horizontal, vertical-up, overhead.

For medium hardness surfacing	Citodur 350	Rutile type
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International Standards

DIN 8555	AWS: SFA	ISO
E 1-UM-350	-	-

Applications & characteristics

Rutile electrode for machinable medium-hard surfacing. Stable, arc, smooth surface, easy slag removal. The high tensile strength and the good elongation secures resistant to cracking on possible violent cooling after welding.

Materials of application

Rails, crane rollers, axle's repairs, sprockets etc. For the machinable surfacing of worn parts of machines with a medium hardness.

Weld metal analysis (%) (typical values)

C	Si	Mn	Cr
0.24	0.12	0.20	2.90

Mechanical properties of all-weld metal

Hardness (as welded condition)	
(HB)	(HRC)
350	36

Welding current (type & amperage)

A.C. and D.C. pole (-)			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
80-95	95-120	130-170	160-210

Welding Positions

Horizontal, vertical-up, overhead.

Resistant to frictional abrasion	Citodur 38	Heavy coating type
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International Standards

DIN 8555	AWS: SFA	ISO
E 10-UM-60 R	-	-

Applications & characteristics

Heavy-coated rutile type electrode for highly wear resistant overlaying on parts subject to frictional abrasion. Not suitable for impact conditions. Clean and smooth bead appearance with minimal under-cutting. Approximately 190% recovery. Machinable by grinding only.

Materials of application

Surfacing applications on parts subject to abrasion such as conveyor screws, mixer blades, concrete pump parts, stirring and agitator components, slurry pumps, excavator bucket edges etc.

Weld metal analysis (%) (typical values)

C	Cr
4.3	35

Mechanical properties of all-weld metal

Vickers hardness (HV 30)
57-62 HRC (as welded)

Welding current (type & amperage)

A.C. and D.C. pole (-)		
Ø 3.25/350	Ø 4.0/350	Ø 5.0/450
120-140	170-190	220-250

Welding Positions

Horizontal.

For wear and impact resistance	Citodur 400	Basic type
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International Standards

DIN 8555	AWS: SFA	ISO
E 1-UM-400	-	-

Applications & characteristics

Basic electrode for hard surfacing with wear resistance. Can be machined by grinding. The weld metal has a remarkable impact and peening resistant. For special cases and sensitive base materials a buffer layer of UNIVERS or CITOCHROMAX-N can be used Also for several layers with interpose of CITODUR 400 B without cracking.

Materials of application

Rails, rails crossing, switch points, on rolling friction materials e.g. bucket spare parts, conveyor surfaces, beaters, moulds, cranes and welding repairs on stamping and press dies.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr
0.20	0.40	0.50	2.80

Mechanical properties of all-weld metal

Hardness (HRC)
37-42

Welding current (type & amperage)

A.C. and D.C. pole (+)		
Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
105-135	120-180	170-240

Welding Positions

Horizontal, vertical-up, overhead.

For severe wear conditions	Citodur 600 A	Rutile type
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International Standards

DIN 8555	AWS: SFA	ISO
E 6-60 coated	-	-

Applications & characteristics

Ruffle electrode for hard surfacing of component parts subject to severe wear conditions. Crack and pore free deposit which will stand shock and impact abrasion. Can only be machined by grinding. Multirun hard surfacing without buffer layer is possible without detachment from the base material. When hard facing difficult to weld steels, a buffer layer deposited with UNIVERS or CITOCHROMAX-W is required.

Materials of application

Hard facing of excavator park, bucket teeth, drilling bits, conveyor screws, crusher jaws etc.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Mo	V
0.4	0.2	0.5	6.8	0.5	0.5

Mechanical properties of all-weld metal

Hardness (HB)	
1st layer 550	2nd layer 590-680 (57-62 HRC)

Welding current (type & amperage)

A.C. and D.C. pole (-)		
Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
100-120	140-160	180-210

Welding Positions

Horizontal, vertical-up, overhead.

Tough extremely hard surfacing	Citodur 600 B	Basic type
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International Standards

DIN 8555	AWS: SFA	ISO
E 6-60 coated	-	-

Applications & characteristics

Basic electrode for tough, extremely hard surfacing of component parts subject to severe wear conditions. Crock and pore free deposit, which will stand shock and impact abrasion. Can only be machined by grinding. When hard facing difficult to weld steels, a buffer layer deposited with UNIVERS or CITOCHROMAX-N is required. Multirun hard surfacing without buffer layer is possible without detachment from the base material.

Materials of application

Hard facing of excavator parts, bucket teeth, drilling bits, conveyor screws, crusher jaws etc.

Weld metal analysis (%) (Typical values)

C	Mn	Si	Cr	Mo	V
0.5	0.3	0.4	7.0	0.5	0.5

Mechanical properties of all-weld metal

Vickers Hardness HV 30
670-770 (57-62 HRC) (as-welded condition)

Welding current (type & amperage)

D.C. pole (+) and A.C.			
Ø 2.5/350	Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
70-90	100-135	140-180	190-240

Welding Positions

Horizontal, vertical-up, overhead.

High wear resistance without detachment	Citodur 65 W	Rutile type thick coated
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International Standards

DIN 8555	AWS: SFA	ISO
E 3-UM-60 (65 W) t	-	-

Applications & characteristics

Thick rutile electrode for hard facing with high wear resistance without detachment. The weld metal stays tough even on high temperatures (600°C). Can only be machined by grinding. When hard facing difficult to weld steels a buffer layer deposited with UNIVERS or CITOCHROMAX-N is required every three layers. Electrode can weld on A.C. or D.C. successfully.

Materials of application

Hard surfacing subject to high service temperature e.g. hot working tools, cutting tools, stamping and press dies, crushers etc.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Mo
0.4	0.6	0.5	5.0	5.0

Mechanical properties of all-weld metal

Hardness (as welded condition) (HRC)	Hardness (after annealing) (HRC)
57-62	60-65

Welding current (type & amperage)

A.C. and D.C. pole (-)		
Ø 2.5/350	Ø 3.25/350	Ø 4.0/350
60-80	100-120	140-160

Welding Positions

Horizontal, vertical-up, overhead.

Resistant to frictional abrasion	Citodur V 1,000	Heavy rutile coating type
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International Standards

DIN 8555	AWS: SFA	ISO
E 10-UM-60 r	-	-

Applications & characteristics

Heavy-coated rutile type electrode for highly wear resistant overlaying on parts subject to frictional abrasion. Not suitable for impact conditions. Clean and smooth bead appearance with minimal under-cutting. Approximately 160% recovery. Machinable by grinding only.

Materials of application

Surfacing applications on parts subject to mineral abrasion such as conveyor screws, mixer blades, concrete pump parts, stirring and agitator components, slurry pumps, excavator bucket edges etc.

Weld metal analysis (%) (typical values)

C	Cr
4.3	35

Mechanical properties of all-weld metal

Vickers hardness (HV 30)
680-770 (57-62 HRC) (as welded)

Welding current (type & amperage)

A.C. and D.C. pole (-)		
Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
120-140	170-190	220-250

Welding Positions

Horizontal.

For high-speed cutting tools	Toolcord	Special coating type
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International Standards

DIN 8555	AWS: SFA 5.13	ISO
E 4 UM 60-65-5	E Fe 5-B	-

DIN-standards: 1.3346

Applications & characteristics

Basic type electrode with coating for manufacturing and repairing high-speed cutting tools.

Materials of application

Manufacturing and repairing of cutting tools, e.g for turning planning, milling, reaming, drills, etc.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Mo	V	W
0.9	0.5	0.5	4.2	8.5	0.9	1.1

Mechanical properties of all-weld metal

HRC hardness as Welded (HRC)	HRC hardness after prescribed heat treatment: Hardening: Quenching at temperature 1180-1240°C Quenching agent: oil, dry air, hot bath (450-500°C). Preheating: Twice on hour up to 510-540°C (air cooling)	HRC hardness after annealing for 2-4 hours at 820-850°C (oven cooling)
50-64	62-66	25-30

Welding current (type & amperage)

A.C. and D.C. pole (+)		
Ø 2.5/350	Ø 3.25/350	Ø 4.0/350
70-100	100-150	130-180

Welding Positions

Horizontal only.

CATEGORY 6

CITOCHROMAX - N

CITOCHROMAX - MIL

INOX A

INOX AW

BELINOX

INOX 25/14

INOX Mo

INOX C

INOX 25/20

INOX 29/9

INOX B

INOX BW

BELINOX 316

FERINOX

INOX BL/Nb

INOX BWL/Nb

INOX AL/Nb

INOX AWL/Nb

For difficult to weld steels	Citochromax-N	Basic type
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International Standards

DIN 8556	AWS: SFA – 5.4	ISO - 3581
E 18 8 Mn B 20+	E 307-15	E 18 8 Mn 6 B 20

Applications & characteristics

Basic type high-alloy, crack resistant electrode particularly suitable for difficult to weld steels, as well as for joining dissimilar steels and manganese-alloyed steels. Also suitable as buffer layer when hard facing.

Materials of application

Difficult to weld steels, e.g. non alloy and alloyed high-strength steels as well as high-carbon steels. Joining of dissimilar steels and manganese-alloyed steels. Hard facing and as a buffer layer on steels that are difficult to weld.

Weld metal analysis (%) (typical values)

C	Cr	Ni	Mn
<0.12	19.0	9.0	6.0

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2 Proof stress (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
590-690	>350	>40	>100

Vickers (HV 30) : 200

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/300	Ø 3.25/300	Ø 4.0/340	Ø 5.0/350
65-70	95-120	110-160	150-190

Welding Positions

Horizontal, vertical-up, overhead.

Military purpose Electrode	Citochromax- Mil	Basic type
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International Standards

DIN 8556	AWS: SFA – 5.4	ISO - 3581
E 18 8 Mn 6 nC B20+	E 307 L-15	E 18 8 Mn L B 20

Applications & characteristics

Basic type electrode, crack resistant suitable for difficult to weld steels, as well as for joining dissimilar steels and manganese - alloyed steels. Also suitable as a buffer layer when hard facing.

Materials of application

Difficult to weld steels e.g. non alloy and alloyed high-strength steels as well as high carbon steels. Repairs of worn armour parts of military vehicles. As a buffer layer for hard surfacing of difficult to weld steels.

Weld metal analysis (%) (typical values)

C	Si	Mn	Cr	Ni	Mo
0.08	0.35	4.0	19	9.5	0.6

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2 Proof stress (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
590-690	>350	>40	>100

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/300	Ø 3.25/300	Ø 4.0/340	Ø 5.0/350
65-70	95-120	110-160	150-190

Welding Positions

Horizontal, vertical-up, overhead.

For Cr - Ni steels	Inox A	Basic type
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International Standards

DIN 8556	AWS: SFA – 5.4	ISO - 3581
E 19 9 nC B20	E 308 L-15	E 19 9 L B 20

DIN-standard: 1.4316

Applications & characteristics

Basic type high-alloy extra-low carbon electrode (ELC) for welding non-stabilized and stabilized chromium-nickel steels of the 18 Cr/8 Ni type and resistant to atmospheric corrosion. Resistant to grain disintegration of operating temperatures up to 350° C. Low spatter loss. Good weldability even in positional welding. Stable arc. Smooth beads. Easy slag removal.

Materials of application

All chromium - nickel steels with low or normal C content, as well as titanium and niobium stabilized chromium-nickel steels of the 18 Cr/8 Ni type, e.g. material No, 1.4301, 1.4304, 1.4541, 1.4543, 1,4550 AISI 302, 304, 304 L, 321, 347, 1.4300.

Weld metal analysis (%) (typical values)

C	Si	Cr	Ni	Mn
<0.04	0.3	19.0	10.0	1.0

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2 Proof stress (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
530-630	>340	>35	>75

Welding current (type & amperage)

D.C. pole (+)				
Ø 2.0/275	Ø 2.5/300	Ø 3.25/300	Ø 4.0/340	Ø 5.0/350
30-50	50-70	75-100	110-150	140-190

Welding Positions

Horizontal, vertical-up, overhead.

For Cr - Ni steels	Inox AW	Austenitic-rutile type
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International Standards

DIN 8556	AWS: SFA – 5.4	ISO - 3581
E 19 9 nC R 26	E 308 L-16	E 19 9 L R 26

DIN-standard: 1.4316

Applications & characteristics

Austenitic rutile type electrode joining and hard facing non stabilized and stabilized stainless chromium nickel steels of 18/8 Cr Ni type. Resistant to grain disintegration of operating temperatures up to 400° C. Resistance to oxidizing and combustion gasses up to 800°C. Good weldability using AC or D.C. Easy deslagging, thin beads.

Materials of application

All Cr Ni steels with low or medium C content, as well as titanium and niobium stabilized chromium-nickel steels of 18 Cr/8 Ni type e.g. material No. 1.4300, 1.4301, 1.4306, 1.4541, 1.4543, 1.4550 AISI 302, 304, 304 L, 321, 347.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni
<0.06	0.80	0.70	19.0	10.0

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2 Proof stress (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
550-650	>340	>35	>55

Welding current (type & amperage)

D.C. pole (+) and A.C.				
Ø 2.0/275	Ø 2.5/300	Ø 3.25/300	Ø 4.0/340	Ø 5.0/350
30-50	45-70	70-120	110-150	160-230

Welding Positions

Horizontal, vertical-up, overhead.

Easy welding even with small A.C. machines	Belinox	Austenitic-rutile type
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International Standards

DIN 8556	AWS: SFA 5.4	ISO 3581
E 19 9 n CR 26	E 308 L-16	E 19 9 L R 26

DIN standard: 1.4316

Applications & characteristics

Rutile high-alloy extra-low carbon electrode (ELC) for non-stabilized and stabilized chromium - nickel steels resistant to atmospheric corrosion of the 18 Cr/8 Ni type. Resistant to grain disintegration of operating temperatures up to 350°C. Smooth running. Good striking and reworking. Regular appearance, finely rippled, smooth junction. Easy slag removal.

Materials of application

All chromium-nickel steels with low or medium C content, as well as titanium and niobium stabilized chromium-nickel steels of the 18 Cr/8 Ni type, e.g. material No 1.4300, 1.4301, 1.4306, 1.4541, 1.4543, 1.4550, AISI 302, 304, 304 L, 321, 347.

Weld metal analysis (%) (typical values)

C	Mn	Si	S	P
<0.03	0.7	0.7	19.0	10.0

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2 Proof stress (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+ 20°C) (Joule)
550-650	>340	>35	>55

Welding current (type & amperage)

A.C. and D.C. pole (+)				
Ø 2.0/275	Ø 2.5/300	Ø 3.253/300	Ø 4.0/340	Ø 5.0/350
30-50	50-75	75-110	110-150	140-190

Welding Positions

Horizontal, vertical-up, overhead.

Joining high-alloy and unalloyed steels	Inox 25/14	Rutile type
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International Standards

DIN 8556	AWS: SFA - 5.4	ISO 3581
E 23 12 3 nc R 23	E 309 L-16	E 23 12 L R 26

DIN standard: 1.4332

Applications & characteristics

Austenitic-ferritic electrode with a ferrite content of approx. 15%. Suitable for joining high-alloy and unalloyed steels. For section thicknesses above 12 mm, the unalloyed steel is given a buffer layer with the Inox 25/14 electrode, and welding is completed using an electrode of the inox A or inox B type. Also suitable as a buffer layer on 18-S CrNi steels. Recommended for hard facing of unalloyed steels, providing an 18/8 CrNi alloy in the first pass already.

Materials of application

Joining high-alloy and unalloyed steels. Heat-resistant steels with approx. 12% Ni, e.g. material No 1.4828.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni
< 0.04	1.20	0.80	25.0	13.0

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2 proof stress (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy - V (+20°C) (Joule)
550-650	>400	>30	>50

Welding current (type & amperage)

A.C. and D.C. pole (+)		
Ø 2.5/300	Ø 3.25/300	Ø 4.0/340
40-70	70-100	110-140

Welding Positions

Horizontal, vertical-up, overhead.

High mechanical Strength	Inox Mo	Austenitic-rutile type
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International Standards

DIN 8556	AWS: SFA- 5.4	ISO 3581
E 23 12 3 nc R23	E 309 Mo-16	E 23 12 3 LR 23

Applications & Characteristics

Rutile coated electrode with very good welding characteristics and high mechanical strength values. Very good slag removal. Austenitic weld deposit with a ferrite content of approx. 15-20% Non-scaling up to a temperature of 1050°C. Suitable for difficult to weld steels, especially for repairs.

Materials of application

For welding buffer layers on dad plates. Suitable for welded joints between austenitic and ferritic steels (black-white joints). Welding of difficult to weld steels and heat-resisting steels.

Weld metal analysis (%) (typical values)

C	Si	Mn	Cr	Ni	Mo
<0.03	<1.2	<2.0	22	13	3

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+20°C) (Joule)
>550	>350	>35	>70

Welding current (type & amperage)

A.C. and D.C. pole (+)				
Ø 2.0/275	Ø 2.5/300	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
55-70	70-90	90-110	120-130	140-160

Welding Positions

Horizontal, vertical-up, overhead.

For heat-resistant steels	Inox C	Basic type
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International Standards

DIN 8556	AWS: SFA- 5.4	ISO 3581
E 25 20 B 20 +	E310-15	E 25 20 B 20

DIN standard: 1.4842

Applications & characteristics

Basic fully austenitic electrode for joint welding and hard surfacing of 25% Cr / 20% Ni heat – resistant steels.

Also suitable for heat and scale resistant ferritic Cr steels, provided corrosion resistance in reducing sulphurous combustion gases is not specified. Scale-resistant up to 1050°C. Low spatter loss. Good weldability even in position. Regular bead appearance, easy slag removal.

Materials of application

Austenitic heat-resistant chromium-nickel steels e.g. material No 1.4826, 1.4828, 1.4837, 1.4841, 1.4845, 1.4846, 1.4848, 1.4849, AISI 309, 310, 314.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni
0.15	2.0	0.2	25.0	20.0

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2 proof stress (N/mm ²)	Elongation (L = 5 d) (%)	Impact strength Charpy – V (+20°C) (Joule)
540-640	>400	>30	>70

Welding current (type & amperage)

D.C. pole (+)				
Ø 2.0/300	Ø 2.5/300	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
35-45	50-75	75-110	110-150	140-190

Welding positions

Horizontal, vertical-up, overhead.

For heat-resisting steels	Inox 25/20	Austenitic-rutile type
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International Standards

DIN 8556	AWS: SFA- 5.4	ISO 3581
E 25 20 R 26	E 310 -16	E 25 20 R 26

DIN standard: 1.4842

Applications & Characteristics

Austenitic-rutile type electrode joining and hard facing heat resisting steels of 25/20 Cr Ni type. Also suitable for ferritic heat resisting chromium-nickel steels. Scale resistant of operating temperatures up to 1050°C and -196°C. Good weldability, smooth arc, low spatter loss, easy deslagging. Resistance at high temperatures (up to 1200° C) and oxidizing.

Materials of application

Steels with material No 1.4826, 1.4828, 1.4837, 1.4841, 1.4845, 1.4846, 1.4849, AISI 309, 310, 314.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni
0.10	1.9	1.0	25.5	20.5

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2. Proof stress (N/mm ²)	Elongation (L= 5 d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
540-640	>300	>30	>70

Welding current (type & amperage)

A.C. and D.C. pole (+)				
Ø 2.0/300	Ø 2.5/300	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
35-45	65-80	90-120	115-150	160-210

Welding Positions

Horizontal, vertical-up, overhead.

For difficult to weld steels and dissimilar materials	Inox 29/9	Rutile type
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International Standards

DIN 8556	AWS: SFA- 5.4	ISO 3581
E 29 9 R 26	E 312- 16	E 29 9 R 26

DIN standard: 1.4337

Applications & Characteristics

Austenitic-ferritic electrode with a 25-30% ferrite content. The weld metal of the Inox 29/9 is highly crack resistant and therefore suitable for difficult to weld steels and joining dissimilar materials, e.g. high alloy and unalloyed steels. Also suitable as a stress compensating buffer layer on parent metals susceptible to cracking. Good all-position weldability.

Materials of application

Difficult to weld steels, e.g. unalloyed and high-strength alloy high-alloy steels, tool steels, heat treating steels, spring steels, rail steels, manganese hardening steels. Unalloyed steels with C > 0.25% to be preheated to 150-300° C depending on carbon content and plate thickness.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni
0.12	1.0	0.90	29.0	9.0

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2. Proof stress (N/mm ²)	Elongation (L= 5 d) (%)
740-840	>500	>22

Welding current (type & amperage)

A.C. and D.C. pole (+)			
Ø 2.5/280	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
50-75	75-110	110-150	140-190

Welding Positions

Horizontal, vertical-up, overhead.

For Cr-Ni-Mo steels	Inox B	Basic type
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International Standards

DIN 8556	AWS: SFA- 5.4	ISO 3581
E 19 12 3 nC B 20 +	E 316 L -15	E 19 12 3 LB 20

DIN standard: 1.4430

Applications & Characteristics

Basic type high-alloy extra low carbon electrode (ELC) for welding non-stabilized and stabilized chromium-nickel steels of the 18 Cr/8 Ni/2 Mo type and resistant to atmospheric corrosion. Resistant to grain disintegration of operating temperatures up to 350° C. Low spatter loss. Good weldability even in position. Stable arc. Regular seams. Easy slag removal.

Materials of application

All chromium-nickel steels with a normal or low C content, as well as titanium and niobium stabilized chromium-nickel steels of the 18 Cr / 8 Ni / 2 Mo type, e.g. material 1.4401, 1.4404, 1.4435, 1.4436, 1.4571, 1.4573, 1.4580, 1.4583: AISI 316, 316L, 318.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Mo
<0.03	0.7	0.7	18.0	12.0	2.5

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2-Proof stress (N/mm ²)	Elongation (L= 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
540-640	>380	>30	>65

Welding current (type & amperage)

D.C. pole (+)				
Ø 2.0/275	Ø 2.5/300	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
30-50	50-70	75-110	110-150	150-190

Welding Positions

Horizontal, vertical-up, overhead.

For Cr-Ni-Mo steels	Inox BW	Rutile type
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International Standards

DIN 8556	AWS: SFA- 5.4	ISO 3581
E 19 12 3 nC R 26	E 316 L -16	E 19 12 3 nC R 26

DIN standard: 1.4430

Applications & Characteristics

Rutile high-alloy extra low carbon electrode (ELC) for non-stabilized and stabilized chromium-nickel steels resistant to atmospheric corrosion of the 18 Cr/8 Ni/2 Mo type. Resistant to grain disintegration of operating temperatures up to 350° C. Smooth running. Good striking and restriking. Regular appearance. Low spatter loss. Easy slag removal.

Materials of application

All chromium-nickel steels with a normal or low C content, as well as titanium and niobium stabilized chromium-nickel steels of the 18 Cr / 8 Ni / 2 Mo type, e.g. material 1.4401, 1.4404, 1.4435, 1.4436, 1.4571, 1.4573, 1.4580, 1.4583: AISI 316, 3161, 318.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Mo
< 0.03	0.7	0.7	18.0	12.0	2.8

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2-Proof stress (N/mm ²)	Elongation (L= 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
560-660	>380	>30	>55

Welding current (type & amperage)

D.C. pole (+) and A.C.				
Ø 2.0/275	Ø 2.5/300	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
30-50	50-75	75-110	110-150	140-190

Welding Positions

Horizontal, vertical-up, overhead.

Easy welding even with small A.C. machines	Belinox 316	Rutile type
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International Standards

DIN 8556	AWS: SFA- 5.4	ISO 3581
E 19 12 3 nC R 26	E 316 L -16	E 19 12 3 LR 26

DIN standard: 1.4430

Applications & Characteristics

Rutile high-alloy extra-low carbon electrode (ELC) for non - stabilized and stabilized chromium-nickel steels resistant to atmospheric corrosion of the 18 Cr/ 8 Ni/2 Mo type. Resistant to grain disintegration of operating temperatures up to 350° C. Smooth running. Good striking and restriking. Regular appearance. Finely rippled, smooth junction. Easy slag removal.

Materials of application

All chromium-nickel steels with low or medium C content, as well as titanium and niobium stabilized chromium-nickel steels of the 18 Cr/8 Ni/2 Mo type, e.g. material No 1.4401, 1.4404, 1.4435, 1.4436, 1.4571, 1.4573, 1.4580, 1.4583: AISI 316, 316 L, 318.

**Weld metal analysis (%)
(typical values)**

C	Mn	Si	Cr	Ni	Mo
< 0.03	0.7	0.7	18.0	12.0	2.5

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2-Proof stress (N/mm ²)	Elongation (L= 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
560-660	>380	>30	>55

Welding current (type & amperage)

A.C. and D.C. pole (+)				
Ø 2.0/275	Ø 2.5/300	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
30-50	50-75	75-110	110-150	140-190

Welding Positions

Horizontal, vertical-up, overhead.

Synthetic electrode	Ferinox	Rutile type contains alloying elements
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International Standards

DIN 8556	AWS: SFA- 5.4	ISO 3581
E 19 12 3 nC R 26	E 316 L -16	E 19 12 3 LR 26

Applications & Characteristics

Synthetic rutile high recovery electrode yielding an austenitic ferritic deposit. Particularly suitable for joining non-alloy to high-alloy steels. Also recommended as a buffer layer for stainless cladding applications on non-alloy steels. Good striking characteristics. Stable arc, clean seam, low spatter loss.

Materials of application

Joining non-alloy and high-alloy steels.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Mo
<0.06	1.0	0.7	18.0	12.0	2.8

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2-Proof stress (N/mm ²)	Elongation (L= 5d) (%)	Impact strength Charpy - V (+20°C) (Joule)
550-650	>400	>30	>40

Welding current * (type & amperage)

A.C. and D.C. pole (+)			
Ø 2.0/300	Ø 2.5/350	Ø 3.25/450	Ø 4.0/450
50-80	70-110	110-150	150-200

* The current carrying capacity of the Ferinox electrode is higher than electrode types alloyed core wires. Its deposition efficiency is 160%. As high-alloy electrodes require higher arc voltages than standard types, the amperages recommended in the table have to be increased by approx. 15%.

Welding Positions Horizontal.

Resistant to grain disintegration	Inox BI/Nb	Austenitic - basic type
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International Standards

DIN 8556	AWS: SFA- 5.4	ISO 3581
E 19 12 3 Nb B 20+	E 318 - 15	E 19 12 3 Nb B 20

Applications & Characteristics

Austenitic type basic electrode joining and hard facing non stabilized and stabilized stainless chromium nickel steels of 18/8/2 Cr Ni Mo type. Resistant to grain disintegration of operating temperatures up to 400° C. Smooth and stable arc, low spatter loss, easy deslagging and good appearance beads.

Materials of application

Steels with material No 1.4571, 1.4573, 1.4580, 1.4581, 1.4583, 1.4401, 1.4404, 1.4408, 1.4410, 1.4435, 1.4436, 1.4437.

Ferritic and ferritic-martensitic steels.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Mo	Nb
< 0.05	1.20	0.40	18.5	11.5	2.7	>8%C

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	0.2-Proof stress (N/mm ²)	Elongation (L= 5d) (%)	Impact strength Charpy - V(+20°C) (Joule)
570-670	>400	>30	>65

Welding current (type & amperage)

D.C. pole (+)				
Ø 2.0/300	Ø 2.5/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
40-50	65-80	85-125	120-165	160-220

Welding Positions

Horizontal, vertical-up, overhead.

Resistant to grain disintegration	Inox BWL/Nb	Austenitic - rutile type
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International Standards

DIN 8556	AWS: SFA-5.4	ISO 3581
E 19 12 3 Nb R 26	E 318 - 16	E 19 12 3 Nb R 26

DIN standard: 1.4576

Applications & Characteristics

Austenitic rutile type electrode joining and hard facing non-stabilized and stabilized stainless steels of 18/8/2 Cr Ni Mo type. Resistant to grain disintegration of operating temperatures up to 400° C. Good weldability using A.C. or D.C. Easy deslagging and thin beads.

Materials of application

Steels with material No 1.4571, 1.4573, 1.4580, 1.4583, 1.4401, 1.4404, 1.4435, 1.4436.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Mo	Nb
< 0.05	0.80	0.70	18.5	11.5	2.7	> 8%C

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L= 5d) (%)	Impact strength Charpy - V(+20°C) (Joule)
590-690	>400	>30	>55

Welding current (type & amperage)

A.C. and D.C. pole (+)				
Ø 2.0/300	Ø 2.5/300	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
30-50	50-85	70-125	110-165	160-230

Welding Positions

Horizontal, vertical-up, overhead.

Resistant to grain disintegration	Inox Al/Nb	Austenitic - basic type
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International Standards

DIN 8556	AWS: SFA-5.4	ISO 3581
E 19 9 Mb B 20 +	E 347 -15	E 19 9 Nb B 20

DIN standard: 1.4551

Applications & Characteristics

Austenitic basic type electrode joining and hard facing non-stabilized and stabilized stainless chromium- nickel steels of the 18/8 Ni type. Resistant to grain disintegration of operating temperatures up to 400° C. Good resistance to oxidizing or combustion gasses up to 800° C. Smooth pore free beads, easy deslagging. Operation with D.C.

Materials of application

Steels with material No 1.4541, 1.4543, 1.4550, 1.4552, 1.4878, 1.4301, 1.4306. Ferritic and ferritic-martensitic chromium-nickel steels.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Nb
< 0.05	1.0	0.40	19.0	10.0	> 8 %C

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L= 5d) (%)	Impact strength Charpy – V (+20°C) (Joule)
570-670	>390	>35	>75

Welding current (type & amperage)

A.C. and D.C. pole (+)				
Ø 2.0/275	Ø 2.5/300	Ø 3.25/300	Ø 4.0/340	Ø 5.0/450
40-50	65-80	80-100	120-165	160-220

Welding Positions

Horizontal, vertical-up, overhead.

Resistant to grain disintegration	Inox AWL/Nb	Austenitic-rutile type
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International Standards

DIN 8556	AWS: SFA-5.4	ISO 3581
E 19 9 Nb R 26	E 347 - 16	E 19 9 Nb R 26

DIN standard: 1.4551

Applications & Characteristics

Austenitic-rutile type electrode joining and hard facing non-stabilized and stabilized stainless chromium-nickel steels of 18/8 Cr Ni type. Resistant to grain disintegration of operating temperatures up to 400°C. Scale resistance of the atmosphere and oxidizing combustion gasses up to 800°C. Stable arc, good bead appearance, low spatter toss, easy deslagging.

Materials of application

Steels with material No 1.4541, 1.4543, 1.4550, 1.4878, 1.4301, 1.4306.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Ni	Nb
< 0.05	0.80	0.70	19.0	10.0	> 8 % C

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 50) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
590-690	>390	>30	>55

Welding current (type & amperage)

A.C. and D.C. pole (+)				
Ø 2.0/275	Ø 2.5/300	Ø 3.25/300	Ø 4.0/340	Ø 5.0/450
30-50	65-85	70-125	110-165	160-230

Welding Positions

Horizontal, vertical-up, overhead.

CATEGORY 7

CITOFONTE MONEL

CITOFONTE Ni

SUPERFONTE Ni

SUPERFONTE NiFe

SUPERFONTE SPEZIAL

Deposit metal similar to cast iron	Citofonte Monel	Nickel-Copper type
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International Standards

DIN 8573	AWS:SFA-5.15	ISO
E Ni Cu B G 2	E Ni Cu - B	-

Applications & Characteristics

Electrode provides Weld metal with 70% Ni and 30% Cu content about, suitable for the repair of broken or worn cast iron parts. Also suitable for filling blowholes of castings. Stable arc providing clean bead appearance. Electrode provides crack resistant bead without pore formation. Weld induced stresses can be reduced by hammer peening. Machinable deposit.

Materials of application

Cast iron. Joining of grey cast iron to steel.

Weld metal analysis (%) (typical values)

Ni	Cu	Fe
68	28	< 2.5

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Hardness (HB)
300	160

Welding current (type & amperage)

A.C. and D.C. pole (+)		
Ø 2.5/275	Ø 3/300	Ø 4.0/350
50-80	80-110	110-150

Welding Positions

Horizontal, vertical-up, overhead.

Crack resistant beads	Citofonte Ni	Special coating type
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International Standards

DIN 8573	AWS: SFA-5.15	ISO
E Ni BG 1	E Ni Cl	-

Applications & Characteristics

Nickel-electrode for joining and surfacing of grey cast iron. Stable arc with clean bead appearance. Electrode provides crack resistant bead without pore formation. Chip forming machining processes can be used weld induced stresses can be reduced by hammer peening. The electrode can be welded on A.C. and D.C. (pole +).

Materials of application

Repair and recovery of broken or worn parts made of grey and malleable cast iron. Riling of voids and blowholes, machining errors. Joining of grey cast iron to steel.

Weld metal analysis (%) (typical values)

Ni
approximately 98

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Hardness (HV30)
approx. 300	approx. 160

Welding current (type & amperage)

A.C. and D.C. pole (+)			
Ø 2.5/275	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
50-80	80-110	110-150	150-190

Welding Positions

Horizontal, vertical-up, overhead.

Crack resistant Beads	Superfonte Ni	Special coating type
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International Standards

DIN 8573	AWS: SFA-5.15	ISO
E Ni BG 1	E Ni CI	-

Applications & Characteristics

Nickel-electrode for joining and surfacing of grey cast iron. Stable arc with dean bead appearance. Electrode provides crack resistant dead without pore formation. Chip forming machining processes can be used. Weld induced stresses can be reduced by hammer peening. The electrode can be welded on A.C. and D.C. (pole -).

Materials of application

Repair and recovery of broken or worn parts made of grey and malleable cast iron. Riling of voids and blowholes, machining errors. Joining of grey cast iron to steel.

Weld metal analysis (%) (typical values)

Ni
Approx. 98

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Hardness (HV30)
approx. 300	approx. 160

Welding current (type & amperage)

A.C. and D.C. pole (+)			
Ø 2.5/275	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
50-80	80-110	110-150	150-190

Welding Positions

Horizontal, vertical-up, overhead.

Joining cast iron to steel	Superfonte NiFe	Special coating type
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International Standards

DIN 8573	AWS: SFA-5.15	ISO
E Ni Fe BG 1	E Ni Fe - Cl	-

Applications & Characteristics

Nickel-iron electrode for welding nodular graphite castings. Joining of grey cast iron and malleable cast iron with steel. Stable arc providing clean bead appearance. Electrode provides crack resistant bead without pore formation. Hardening in the HAZ is avoided to a wide extent. Chip forming machining processes can be used. Weld induced stresses can be reduced by hammer peening.

Materials of application

Nodular graphite castings, grey cast iron and malleable cast iron.

Weld metal analysis (%) (typical values)

Ni	Fe	Cu
approx. 53	approx. 43	approx. 2

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Hardness (HB)
approx. 450	approx. 220

Welding current (type & amperage)

A.C. and D.C. pole (-)		
Ø 3.25/300	Ø 4.0/350	Ø 5.0/450
90-110	130-170	170-200

Welding Positions

Horizontal, vertical-up, overhead.

Welding of all qualities of cast iron	Superfonte Spezial	Basic type
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International Standards

DIN 8573	AWS: SFA-5.15	ISO
E Ni Fe BG 2	E Ni Fe - Cl	-

Applications & Characteristics

Suitable for the welding of all qualities of cast iron it finds use in the deposition of buffer layers on weld preparations (chamfered edges) of large section cast iron pieces prior to mixed welding, where the final weld is to be carried out with an electrode normally used for welding steels. Electrode has remarkable fusion properties especially when using D.C. pole (+) Very stable and concentrated arc, easily removed slag, very good wetting properties, including on cast irons termed «dirty» a very high fusion speed and gives very regular beads.

Materials of application

All qualities of cast iron. Joint cast iron to steel.

Weld metal analysis (%) (typical values)

C	Si	Mn	Ni	Al	Fe
1.4	1.1	0.8	50	0.7	balance

Mechanical properties of all-weld metal

Hardness (3 layers) at 200°C (HB)
180-200

Welding current (type & amperage)

D.C. pole (+) and A.C.		
Ø 2.5/275	Ø 3.25/300	Ø 4.0/350
45-70	85-120	110-140

Welding Positions

Horizontal, vertical-up, overhead.

CATEGORY 8

CITOBRONZE
ALCORD 99,5
ALCORD 5 Si
ALCORD 12 Si

For copper alloys	Citobronze	Special coating type
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International Standards

DIN 1733	AWS: SFA - 5.6	ISO
S – Cu Sn 6	E Cu Sn - C	-

Applications & Characteristics

Basic tin-bronze electrode for assembly and surfacing welds on copper alloys. Also suitable for depositing a bronze layer on steel, cast steel and cast iron. Particularly recommended for surfacing welds on bronze bearings in machine-building. Smooth running, good weldability.

Materials of application

Assembly and surfacing welds on tin-bronze materials, red brass and copper as well as for depositing a bronze layer on steel, cast steel and cast iron.

Weld metal analysis (%) (typical values)

Cu	Sn	Mn	P
91	7.5	0.4	0.3

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Hardness (HV 30)
300-350	70-100

Welding current (type & amperage)

D.C. pole .(+)			
Ø 2.5/300	Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
40-70	70-120	130-180	160-200

Welding Positions

Horizontal, vertical-up, overhead.

For welding aluminium	Alcord 99,5	Special coating type
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International Standards

DIN 1732	AWS: SFA-5.3	ISO
S-AI 99.5	ER 1100	-

DIN-standard: 3.0255

Applications & Characteristics

Aluminium electrode for welding aluminium and its alloys in container and apparatus construction.

Materials of application

Aluminium and its alloys.

Weld metal analysis (%) (typical values)

Al	Si	Fe
approx. 99.5	approx. 0.3	approx. 0.2

Mechanical properties of all-weld metal

Yield strength (N/mm ²)	0.2-proof stress (N/mm ²)	Elongation (L = 5d) (%)
>70	>30	>25

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/400	Ø 4.0/400	Ø 5.0/400
60-90	80-110	110-150	150-180

Welding Positions

Horizontal.

For welding aluminium and aluminium alloys	Alcord 5 Si	Special coating type
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International Standards

DIN 1732	AWS: SFA-5.3	ISO
S-AI Si 5	ER 4043	-

DIN-standard: 3.2245

Applications & Characteristics

Aluminium electrode for welding aluminium and Al-alloys containing < 2% alloying elements; also for Al-alloy castings with < 7% Si content.

Materials of application

Al Si 5, Al Mg Si 0.5, Al Mg Si 0.8, Al Mg Si 1 Al and Al alloys with < 2% alloys elements; Al-alloy castings \leq 7% Si.

Weld metal analysis (%) (typical values)

Al	Si	Fe
approx. 95	approx. 5	approx. 0.4

Mechanical properties of all-weld metal

Yield strength (N/mm ²)	0.2-proof stress (N/mm ²)	Elongation (L = 5d) (%)
>135	>60	>12

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/400	Ø 4.0/400	Ø 5.0/400
60-90	80-110	110-150	150-180

Welding Positions

Horizontal.

For welding aluminium castings	Alcord 12 Si	Special coating Type
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International Standards

DIN 1732	AWS: SFA-5.3	ISO
S-AI Si 12	ER 4047	-

DIN-standard: 3.2585

Applications & Characteristics

Silicon-alloyed aluminium electrode for repair welding of aluminium castings.

Materials of application

G-AI Si 12, G-AI Si 12 (Cu), G-AI Si 10 Mg, G-AI Si 10 Mg (Cu).

Weld metal analysis (%) (typical values)

Al	Si	Fe
88.5	11.0	0.5

Mechanical properties of all-weld metal

Yield strength (N/mm ²)	0.2-proof stress (N/mm ²)	Elongation (l = 5d) (%)
>180	>80	>5

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/400	Ø 4.0/400	Ø 5.0/400
60-90	80-110	110-150	150-180

Welding Positions

Horizontal.

CATEGORY 9

CITOMONEL

CRONIDUR 16/56

CRONIDUR 16/67

For monel welding	Citomonel	Special coating type
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International Standards

DIN 1736	AWS: SFA-5.11	ISO
S-Ni Cu 30 Mn	E Ni Cu - 7	-

Applications & Characteristics

The weld metal is free of porosity and resistant to many chemicals. Suitable for applications with working temperatures from -196 to + 450°C. It is advisable to provide protection for the seam underside when welding thin sheets, in order to avoid porosity.

Materials of application

Welding of monel and monel-clad steels. Joining monel to steel. Weld-surfacing of steel with a corrosion-resistant monel coating. Material No. 2.4360, 2.4374, 2.4400. Welded joints in dissimilar steels.

Weld metal analysis (%) (typical values)

C	Ni	Fe	Mn	Si	Cu
0.04	64	1.50	0.80	< 1	balance

Mechanical properties of all-weld metal

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5d) (%)	Impact strength Charpy – V (+ 20°C) (Joule)
450-550	300-350	30	> 110

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/275	Ø 3/300	Ø 4.0/400	Ø 5.0/400
60-80	90-120	110-150	140-180

Welding Positions

Horizontal, vertical-up, overhead.

High resistance to oxidation and corrosion	Cronidur 16/56	Basic type recovery 160%
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International Standards

DIN 1736	AWS:SFA-5.11	ISO
S-Ni Mo 16Cr	E Ni Cr Mo -5	-

Applications & Characteristics

Electrode with special basic low hydrogen coating depositing metal according to Hastelloy C specifications. Surfacing C steel parts and components requiring high resistance to oxidation, corrosion and mechanical stresses at temperatures up to 100° C. Stable and smooth arc. Slag doesn't interfere with weld pool. Covering well. Easy slag removal. Very good bead appearance.

Materials of application

Surfacing C steel parts and components.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Mo	W	Fe	Ni
0.04	0.9	0.5	16	17	4	5	balance

Mechanical properties of all weld metal

Hardness (HB)	Hardness after cold working (HB)
160-200	300-400

Welding current (type & amperage)

A.C. and D.C. pole (+)			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/450
80-100	95-160	140-200	200-250

Welding Positions

Horizontal, (vertical-up).

For cryogenic applications	Cronidur 16/67	Basic type recovery 140%
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International Standards

DIN 1736	AWS:SFA-5.11	ISO
S-Ni Cr 15 Fe Mn-140	E Ni Cr Fe -3	-

Applications & Characteristics

Electrode with special low hydrogen coating depositing a Ni Cr Fe alloy. Joining Ni-alloyed steels used in the field of cryogen applications, such as the 9% Ni steel. Very smooth burning off of the coating. Supports well welding currents. Fast solidification of the molten pool, flat beads. Easy slag removal.

Materials of application

Joining alloys which resist corrosion and high temperatures: Ni and Ni-Cr alloys (Inconel, Nimonic), together, or to stainless or mild steels for the chemical petrochemical and nuclear industries.

Weld metal analysis (%) (typical values)

C	Mn	Si	Cr	Nb	Fe	Ni
0.04	7.8	0.4	16	1.9	8	balance

Mechanical properties of all-weld metal

Heat treatment	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (L = 5d) (%)	Impact strength Charpy - V (-196°C) (Joule)
Annealing	620	390	30	80
Hardening/ annealing 50 h/550°C 25h/620°C	680	410	40	-

Welding current (type & amperage)

D.C. pole (+)			
Ø 2.5/350	Ø 3.25/350	Ø 4.0/350	Ø 5.0/450
75-100	100-140	140-180	170-210

Welding Positions

Horizontal, (vertical-up).

CATEGORY 10

CITOCUT

CHAMFER ROD

For cutting of all qualities of steels	Citocut	Special coating type
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International Standards

D1N	AWS: SFA-	ISO
-	-	-

Applications & Characteristics

Electrode with special coating for cutting steel and grey cast iron. Very useful in repair and demolition work.

Materials of application

All steels (particularly for stainless and manganese steels which cannot be cut by the oxyacetylene process), also for cast iron, copper and its alloys etc.

Welding current (types amperage)

A.C. and D.C. pole (+)		
Ø 3.25/450	Ø 4.0/450	Ø 5.0/450
160-200	200-280	280-350

For grouping of all qualities of steels	Chamfer Rod	Special coating type
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International Standards

D1N	AWS: SFA-	ISO
-	-	-

Applications & Characteristics

Electrode with special coating for cutting, gouging and piercing steel and grey cast iron. Very useful in repair and demolition work.

Materials of application

All steels (particularly for stainless and manganese steels which cannot be cut by the oxyacetylene process), also for cast iron, copper and its alloys etc.

Welding current (types amperage)

A.C. and D.C. pole (+)		
Ø 3.25/350	Ø 4.0/350	Ø 5.0/350
160-200	200-280	280-350

CATEGORY 11

WIRES FOR MAG WELDING

CARBOFIL 1

CARBOFIL 1A

MAG Welding	Carbofil 1
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International Standards

DIN 8559	AWS: SFA - 5.18
SG2	E 70 S - 6

DIN -Standard 1.5125

Applications & Characteristics

Copper-plated non alloy cored wire for welding in CO₂ atmosphere suitable for joints on Non-alloyed steels, for storage tank construction and for pipes welding with a tensile strength up to 510 N/mm²

Materials of application

Non-alloyed structural steels St 33, St 37, St 44, St 52-3, St 50-2* St 60-2*.
Boiler plates H I, H II, H III, 17Mn4, 19Mn5*.
Pipe Steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 55*, St 55.4*, St 52, St 52.4, St E 210.7 (St 34.7) St E 240.7 (St 38.7), St E 290.7 (St 43.7), St 320.7 (St 47.7), St E 360.7 (St 53.7).
Shipbuilding steels A, B, C, D, E.
Cast steels GS-38, GS-45, GS-52.
Preheat to 150-300°C depending on plat thickness.

Chemical analysis of wire(%)

C	Mn	Si	P	S
< 0.14	1.3-1.6	0.7-1.0	< 0.025	< 0.025

Mechanical properties of all-weld metal

Gas	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation L = 5d (%)	Impact strength Charpy - V (+20-C) (Joule)
CO ₂	490-590	>370	>25	> 90
Mixed gas	510-610	>390	>25	> 90

Welding current (amperage, gas consumption & wire speed)

Ø 0.8	Ø 1.0	Ø 1.2	Ø 1.6	Ø 2.4	CO ₂ gas
50-180	80-230	120-280	200-240	400-600	12-20 l/min
2.5-12	2.5-10	3-10	3-8	3-5	m/min

Packing

According to DIN 8559 in coils of 15 kg each.

MAG Welding	Carbofil 1A
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International Standards

DIN 8559	AWS: SFA - 5.18
SG 3	E 70 S - 6

DIN -Standard 1.5125

Applications & Characteristics

Copper-plated non alloy cored wire for welding in CO₂ atmosphere suitable for joints on Non-alloyed steels, for storage tank construction and for pipes welding with a high tensile strength.

Materials of application

Non-alloyed structural steels St 33, St 37, St 44, St 52-3, St 50-2* St 60-2*.
 Boiler plates H I, H II, H III, 17Mn4, 19Mn5*.
 Pipe Steels St 35, St 35.4, St 35.8, St 45, St 45.4, St 45.8, St 55*, St 55.4*, St 52, St 52.4, St E 210.7 (St 34.7) St E 240.7 (St 38.7), St E 290.7 (St 43.7), St 320.7 (St 47.7), St E 360.7 (St 53.7).
 Shipbuilding steels A, B, C, D, E.
 Cast steels GS-38, GS-45, GS-52.
 Preheat to 150-300°C depending on plat thickness.

Chemical analysis of wire(%)

C	Mn	Si	P	S
< 0,14	1.6-1.9	0.8-1.2	< 0.025	< 0.025

Mechanical properties of all-weld metal

Gas	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation L = 5d (%)	Impact strength Charpy - V (+20-C) (Joule)
CO ₂	530-680	>460	>22	> 90

Welding current (amperage, gas consumption & wire speed)

Ø 0.8	Ø 1.0	Ø 1.2	Ø 1.6	Ø 2.4	CO ₂ gas
50-180	80-230	120-280	200-240	400-600	12-20 l/min
2.5-12	2.5-10	3-10	3-8	3-5	m/min

Packing

According to DIN 8559 in coils of 15 kg each.

CATEGORY 12

WIRES FOR SUBMERGED ARC WELDING

OE – S1

OE – S2

Wires for Submerged arc welding	OE - S1
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**International
Standards**

DIN 8557	AWS: SFA- A5.17
S1	EL8

**Applications &
Characteristics**

Copper plated non alloy wire electrodes for welding and surfacing with conjunction with the fluxes listed below.

Fluxes
OS 150, OP 155, OP 143, OP 163, OP 185, OP 100, OP 123, OP 180 S, OP 42 TT, OP 52 HL, OP 120 TT, OP 250 A, OP 350 A, etc.

They are supplied in accordance with DIN 8557 in rings of 20 kg weight and dimensions: inner dia 300 mm, width 70 mm for wire diam. 2.0 mm 2.5 mm, 3.25 mm and 4.0 mm.

**Chemical
analysis
of wire
(typical values)**

Weight %				
C	Si	Mn	S	P
0.10	< 0.10	0.5	< 0.03	< 0.03

Wires for submerged arc welding	OE - S2
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International Standards

DIN 8557	AWS: SFA- A5.17
S2	EM 12

Applications & Characteristics

Copper plated non alloy wire electrodes for welding and surfacing with conjunction with the fluxes listed below.

Fluxes
OS 150, OP 155, OS 160, OP 163, OP 185, OP 100, OP 123, OP 180 S OP 40 TT, OP 52 HL, OP 120 TT etc.

They are supplied in accordance with DIN 8557 in rings of 20 kg weight and dimensions: inner dia 300 mm, width 70 mm for wire diam. 2.0 mm 2.5 mm, 3.25 mm and 4.0 mm.

Chemical analysis of wire (typical values)

Weight %				
C	Si	Mn	S	P
0.10	< 0.15	1.0	< 0.03	< 0.03

CATEGORY 13

FLUX-CORED WIRES

NAME	TYPE	DIN 8555	DIN 8559	AWS/ASME
Fluxofil 11	R	-	SG R1 C 5221	E 70 T-2
Fluxofil 18	R	-	-	E 70 T1-Cr
Fluxofil 30	B	-	SG B1 C 5254	E 70 T-5
Fluxofil 31	B	-	SG B1 C 5254	E 70 T-5
Fluxofil 35	B	-	-	E 80 T 5-G
Fluxofil 36	B	-	-	E 80 T 5-B2
Fluxofil 37	B	-	-	E 80 T 5-G
Fluxofil 37 STC	B	-	-	E 80 T 5-G
Fluxofil 37-3 STC	B	-	-	E 80 T 5-G
Fluxofil 38	B	-	-	E 90 T 5-G
Fluxofil 38 C	B	-	-	E 90 T 5-G
Fluxofil 40	B	-	-	E 80 T 5-G
Fluxofil 41	B	-	-	E 90 T 5-G
Fluxofil 41 R	B	-	-	E 80 T 5-G
Fluxofil 42	B	-	-	E 110T5-K4
Fluxofil 43.1	B	-	-	E 90 T 5-G
Fluxofil 44	B	-	-	E 70 T 5-G
Fluxofil 45	B	-	-	E 120 T 5-G
Fluxofil 48	B	-	-	E 80 T 5-G
Fluxofil 70	B	-	-	E 110 T 5-G
Fluxofil 50	B	SG 1-250	-	-
Fluxofil 51	B	SG 1-300	-	-
Fluxofil 52	B	SG 1-350	-	-
Fluxofil 54	B	SG 1-40	-	-
Fluxofil 56	B	SG 1-50	-	-
Fluxofil 58	B	SG 1-60	-	-
Fluxodur 62	B	SG 10-6°C	-	-
Fluxocord 31	B	-	-	F 7A4-EC-G
Fluxocord 35	B	-	-	F 7A4-EC-A4
Fluxocord 35.21	B	-	-	F 7 A6-EC-G
Fluxocord 35.22	B	-	-	F 7A6-EC-G
Fluxocord 35.23	B	-	-	F 7A6-EC-G
Fluxocord 36	B	-	-	F 7 PO-EC-B2
Fluxocord 37	B	-	-	F 7 PO-EO-B3
Fluxocord 37 STC	B	-	-	-
Fluxocord 37-3 STC	B	-	-	-
Fluxocord 38 C	B	-	-	-
Fluxocord 39	B	-	-	F 7 PO-EC-B6
Fluxocord 40	B	-	-	F 7 A8-EC-G
Fluxocord 41	B	-	-	F 9 A8-EC-G
Fluxocord 41.1	B	-	-	-
Fluxocord 42	B	-	-	F 11 A8-EC-F5
Fluxocord 43.1	B	-	-	-
Fluxocord 44	B	-	-	F 7A15-EC-NI2
Fluxocord 45	B	-	-	F 12A4-EC-G
Fluxocord 48	B	-	-	F 7A4-EC-G
Fluxocord 50	B	UP 1-GF-BFB1 65-250	-	-
Fluxocord 51	B	UP 1-GF-BFB1 65-350	-	-
Fluxocord 52	B	UP 1-GF-BFB1 65-400	-	-
Fluxocord 54	B	UP 5-SF-BFB4 652-35	-	-
Fluxocord 54-6	B	UP 5-GF-BFB4 652-40	-	-

CATEGORY 14

OXY-ACETYLENE WELDING ROD

OXY-ACETYLENE WELDING ROD 1

OXY-ACETYLENE WELDING ROD 2

Oxy-acetylene welding Rod 1

International Standards

DIN 8554	AWS/ASTM
G I	A5.2-69T: RG 45

Applications & characteristics

Copper-coated filler rod with good fluidity, suitable for the welding with oxy-acetylene flame in car body building, plumbing, gas pipes, welding repairs etc.

Chemical analysis of weld deposit (typical values %)

C	Mn	Si	S+P	Cu
0.08	0.4	≤ 0.20	≤ 0.05	0.1-0.2

Source of heat

Oxy-acetylene torch (neutral flame).

Ø (mm)	2.0	2.5	3.0	4.0	5.0
L (mm)	1,000	1,000	1,000	1,000	1,000

Oxy-acetylene welding Rod 2

International Standards

DIN 8554	AWS/ASTM
G II	A5.2-69T: RG 60

Applications & characteristics

Copper-coated filler rod with good fluidity, suitable for the welding with oxy-acetylene flame in car body building, plumbing, gas pipes, welding repairs etc.

Chemical analysis of weld deposit (typical values %)

C	Mn	Si	S+P	Cu
0.05-0.15	0.8-1.2	≤ 0.25	≤ 0.05	0.1-0.2

Mechanical properties of all-weld metal (typical values)

Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (l = 5d) (%)	Impact energy (Joule)	Hardness (Brinell)
440	240	20	75	150

Source of heat

Oxy-acetylene torch (neutral flame).

Ø (mm)	2.0	2.5	3.0	4.0
L (mm)	1,000	1,000	1,000	1,000

CATEGORY 15

FLUXES FOR SUBMERGED ARC WELDING

TYPE	GROUP	DIN 8557 (09/1961)	DIN 32522 (04/1981)
OS 150	1	10 ax 497	FMS 178 AC 10
OP 155	1	-	BMS 189 AC 8 SKM
Uniflux C3S2	1	12 ax 499	BMS 199 AC 12 M
OP 143	2	-	BCS 1 98 AC 10 SKM
OP 144FB	2	-	BCS 1 96 AC 12 B
OS 160	3	8 ax 546	FAR 164 AC 8SK
OP 163	3	10 ax 597	BAR 178 AC 10 M
OP 185	3	10 ax 499	BAR 1 88 AC 10 SKM
Uniflux D1	3	10 ax 497	BAR 1 97 AC 10 SKM
OP 100	4	10 ax 487	BAB 1 76 AC 10
OP 123	4	12 ax 497	BAB 1 67 AC 10 M
OP 180S	4	10 ax 497	BAB 1 67 AC 10 M
OP 37 STC	5	-	BFB 1 55 AC 8 MHP 5
OP 40TT	5	8 b 536	BFB 1 65 DC 8 HP 10
OP 41TT	5	8 b 435	BFB 1 53 DC 8 HP 5
OP 42 TT	5	10 ax 565	BFB 1 66 AC 10 MHP 7
OP 52 HL	5	-	BFB 2 77 Mo AC BM
OP 120 TT	5	10 ax 565	BFB 1 66 AC 10 MHP 7
OP 121 TT	5	10 ax 555	BFB 1 55 AC 10 MHP 5
OP 122	5	12 ax 557	BFB 1 65 AC 12 MHP 5
OP 125 W	5	-	BFB 4554 AC B MHP 5
OP 70 Cr	5	-	BFB 5 7484 DC 8K
OP 70 Cr ELC	5	-	BFB 5 65745 DC 8K
OP 71 Cr	5	-	BFB 5 63745 DC 8K
OP 74 Cr	5	-	BFB 5 55755 AC 8 MHP 5
OP 76	5	-	BFB 6 55455 AC 8 MHP 5
OP 79	5	-	BFB 6 57559 AC 8 MHP 5
OP 87	-	-	BFB 5 99545 AC 10 KMB
OP 250 A	-	-	BCS 3 97 CCr Mo AC 8
OP 350 A	-	-	BCS 3 97 CCr Mo AC 8