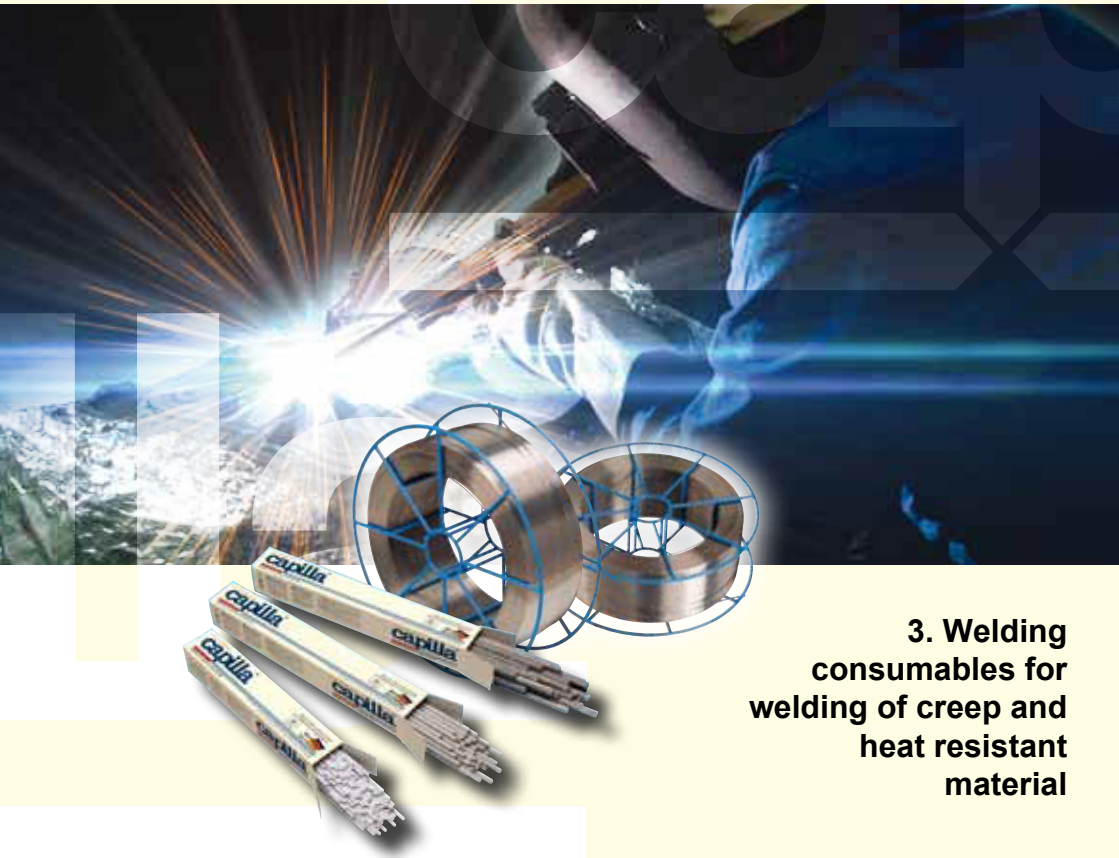
capilla®

Part catalogue



3. Welding consumables for welding of creep and heat resistant material

3 Welding consumables for welding of creep and heat resistant materials

3.1 Coated stick electrodes for welding of creep and heat resistant materials

capilla®	EN ISI 3580-A EN ISO 14172* EN ISI 3581-A**	Mat.-No.:	AWS	Page
P 91	E CrMo 9 1 B 42**	-	E 9015-B9	**62**
P 911	E CrMoWV 9 1 1 B 42**	-	~E 9015-B9	**63**
P 92	E CrMoWV 9 0,5 2 B 42**	-	~E 9015-B9	**64**
P 121	E CrMoWV 12 B 42**	1.4937	-	**65**
4009	E 13 B 42	1.4009	E 410-25	**66**
4015	E 17 B 42	1.4015	E 430-25	**67**
4018	EZ 13 B 42	1.4018	E 410-25	**68**
410 NiMo	E 13 4 B 42	1.4351	E 410NiMo-25	**69**
4405	EZ 17 6 B 42	1.4405	-	**70**
4115	EZ 17 1 R 42	1.4115	-	**71**
4122	EZ 17 1 1 B 42	1.4122	-	**72**
4034	EZ 13 B 42	1.4034	E 420-25	**73**
308 H	E 19 9 R 12	1.4948	E 308 H	**74**
316 H	E 19 12 3 R 12	-	E 316 H	**75**
309	E 23 12 R 22	~1.4829	~E 309-16	**76**
310 H	E 25 20 H R 12	-	E 310 H	**77**
4820	E 25 5 R 32	1.4820	-	**78**
4830	EZ 25 24 Nb B 32	1.4830	-	**79**
4850	EZ 21 32 Nb B 32	~1.4850	-	**80**
4853	EZ 25 35 Nb B 32	~1.4853	-	**81**
4863	EZ 18 36 Nb B 32	~ 1.4863	~ E 330-15	**82**
4879	~E Ni 6702 (NiCr28Fe6W)*	~ 2.4879	-	**83**
625 K	E Ni6625 (NiCr22Mo9Nb)*	2.4621	E NiCrMo-3	**84**
Alloy C	~ E Ni 6059 (NiCr23Mo16)*	2.4608	E NiCrMo-13	**85**
6000 DL	~E Ni 6082 (NiCr20Mn3Nb)*	2.4648	~ E NiCr-3	**86**
6000 B	~E Ni 6082 (NiCr20Mn3Nb)*	2.4648	~ E NiCr-3	**87**
4778	-	~2.4778	-	**88**
50/50 Nb	-	2.4813	-	**89**

3.2 Wire electrodes for welding of creep and heat resistant materials

3.2.1 Solid wires for gas shielded arc welding of creep and heat resistant material

capilla®	EN ISO 14343-A EN ISO 18274 * EN ISO 21952-A**	Mat.-No.:	AWS	Page
P 91 MAG	G CrMo 9 1**	1.4903	ER 90S-B9	**90**
4009 MAG	G 13	1.4009	ER 410	**90**
4015 MAG	G 17	1.4015	ER 430	**90**
4018 MAG	G 13	1.4018	ER 410	**90**
410 NiMo MAG	G 13 4	1.4351	ER 410 NiMo	**90**
4115 MAG	GZ 17 1	1.4115	-	**90**
4122 MAG	GZ 17 1 1	1.4122	-	**90**
4034 MAG	GZ 13	1.4034	ER 420	**90**
308 H MAG	G 19 9 H	1.4948	ER 308 H	**91**
309 MAG	G 23 12	1.4829	ER 309	**91**
310 H MAG	G 25 20 H	1.4848	ER 310 H	**91**
4820 MAG	G 25 5	1.4820	-	**91**
4830 MAG	G(Z) 25 24	1.4830	-	**91**
4850 MAG	G(Z) 21 32 Nb	1.4850	-	**91**
4853 MAG	G(Z) 25 35 Nb	1.4551	-	**91**
Alloy C MAG	S Ni 6059 (NiCr23Mo16)*	2.4607	ER NiCrMo-13	**91**
625 MAG	S Ni 6625 (NiCr22Mo9Nb)*	2.4831	ER NiCrMo-3	**91**
6000 MAG	S Ni 6082 (NiCr20Mn3Nb)*	2.4806	ER NiCr-3	**91**

3.2.2 Welding rods for tungsten inert gas welding of creep and heat resistant materials

capilla®	EN ISO 14343-A EN ISO 18274 * EN ISO 21952-A**	Mat.-No.:	AWS	Page
P 91 WIG	G CrMo 9 1**	1.4903	ER 90S-B9	**92**
4009 WIG	W 13	1.4009	ER 410	**92**
4015 WIG	W 17	1.4015	ER 430	**92**
4018 WIG	W 13	1.4018	ER 410	**92**
410 NiMo WIG	W 13 4	1.4351	ER 410 NiMo	**92**
4115 WIG	WZ 17 1	1.4115	-	**92**
4122 WIG	WZ 17 1 1	1.4122	-	**92**
4034 WIG	WZ 13	1.4034	ER 420	**92**
308 H WIG	W 19 9 H	1.4948	ER 308 H	**93**
309 WIG	W 23 12	1.4829	ER 309	**93**
310 H WIG	W25 20 H	1.4848	ER 310 H	**93**
4820 WIG	W 25 5	1.4820	-	**93**
4830 WIG	W(Z) 25 24	1.4830	-	**93**
4850 WIG	W(Z) 21 32 Nb	1.4850	-	**93**
4853 WIG	W(Z) 25 35 Nb	1.4551	-	**93**
Alloy C WIG	S Ni 6059 (NiCr23Mo16)*	2.4607	ER NiCrMo-13	**93**
625 WIG	S Ni 6625 (NiCr22Mo9Nb)*	2.4831	ER NiCrMo-3	**93**
6000 WIG	S Ni 6082 (NiCr20Mn3Nb)*	2.4806	ER NiCr-3	**93**

3.2.3 Tubular wires for gas shielded arc welding of creep and heat resistant material

capilla®	EN ISO 17633-A EN ISO 17634-A*	Mat.-No.:	AWS	Page
G P91 MM	T CrMo 91 BM*	-	-	**94**
G 4009 MM	T 13 MM 2	1.4009	E 410 T0-4	**94**
G 4015 MM	T 17 MM 2	1.4015	-	**94**
G 410 NiMo MM	T 13 4 MM 2	1.4351	E 410 NiMo T0-4	**94**
G 4034 MM	TZ 13 MM 2	1.4034	E 420 T0-4	**94**
G 4405 MM	TZ 17 6 1 MM 2	1.4405	-	**94**

Standards:

EN ISO 3580-A:	E CrMo 91 B 42
EN 1599:	E CrMo 91 B 42
AWS SFA-5.5:	E 9018-B9
Mat.-No.:	1.4903
Recovery:	**130%**

capilla® P 91

Product description:

CrMoVNb-alloyed basic coated stick electrode, good welding characteristics producing a creep and ruptur resistant high temperature weld metal

Applications:

Designed for welding of quenched and tempered 9%-Cr-steels.

Base materials:

1.4903 (X10CrMoVNb 9 1),
ASTM A213-T91;ASTM A335-P91,
ASTM A387 Gr. 91, ASTM A182 F91.

Typical weld metal composition:

[wt. - %]

	C	Mn	Si	Cr	Mo	Ni	V	Nb	Fe
Min.		**0,6**		**8,5**	**1**	**0,6**	**0,18**		
Max.	**0,1**	**0,7**	**0,3**	**9,5**	**1,2**	**0,8**	**0,24**	**0,07**	**Bal.**

Mechanical properties:

(Heat treatment: 760°C/2h; Minimum values at ambient temperature)

Tensile strength R_m:	680	[MPa]
Yield strength $R_{p0,2}$:	550	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	17	[%]
Impact strength (ISO-V):	47	[J]

Positions: all except PD, PE and PG

Redrying: min. 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]	Polarity
2,5	350	60 – 90	=(+)
3,25	350	80 – 120	
4,0	350	110 – 170	

also available:
find in table of content

Capilla P 91 MAG
Capilla P 91 WIG
Capilla G P91 BM (tubular wire)

Standards:

EN ISO 3580-A:	E CrMoWV 9 1 1 B 42
EN 1599:	E CrMoWV 9 1 1 B 42
AWS SFA-5.5:	~E 9015-B9
Recovery:	**130%**

capilla® P 911

Product description:

CrMoNiVWNb-alloyed basic coated stick electrode, good welding characteristics producing a creep and rupture resistant high temperature weld metal matching similar alloyed base metals

Applications:

For welding of high temperature resistant martensitic Cr-steels

Base materials:

1.4905 (X11CrNiWVNb 9-1-1), E 911,
ASTM A355 Gr. 911 (T911),
ASTM A213 Gr. T911.

Typical weld metal composition:

[wt. - %]

	C	Mn	Si	Cr	Mo	Ni	Nb	W	Fe
Min.		**0,6**		**8,5**	**0,9**	**0,6**		**0,9**	
Max.	**0,11**	**0,7**	**0,25**	**9,5**	**1,1**	**0,8**	**0,05**	**1,1**	**Bal.**

Mechanical properties:

(Heat treatment: 760°C/2h; Minimum values at ambient temperature)

Tensile strength R_m:	720	[MPa]
Yield strength $R_{p0,2}$:	550	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	15	[%]
Impact strength (ISO-V):	41	[J]

Positions: all except PD, PE and PG

Redrying: min. 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 120
4,0	350	110 – 170

Polarity =(+)

Standards:

EN ISO 3580-A:	E CrMoWV 9 0,5 2 B 42
EN 1599:	E CrMoWV 9 0,5 2 B 42
AWS SFA-5.5:	~E 9015-B9
Recovery:	**130%**

capilla® P 92

Product description:

CrMoNiVWNb-alloyed basic coated stick electrode, good welding characteristics producing a creep and rupture resistant high temperature weld metal matching similar alloyed base metals

Applications:

For welding of high temperature resistant martensitic Cr-steels

Base materials:

ASTM A355 Gr. 92 (T92),
NF 616

Typical weld metal composition:

[wt. - %]

	C	Mn	Si	Cr	Mo	Ni	V	W	N	Nb	Fe
Min.	**0,9**	**0,6**		**8,5**	**0,5**	**0,6**	**0,18**	**1,3**	**0,04**	**0,05**	
Max.	**0,12**	**0,7**	**0,4**	**9,5**	**0,7**	**0,8**	**0,24**	**1,6**	**0,07**	**0,07**	**Bal.**

Mechanical properties:

(Heat treatment: 760°C/2h; Minimum values at ambient temperature)

Tensile strength R_m:	720	[MPa]
Yield strength $R_{p0,2}$:	560	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	15	[%]
Impact strength (ISO-V):	41	[J]

Positions: all except PD, PE and PG

Redrying: min. 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)

Standards:

EN ISO 3580-A: E CrMoWV 12 B 42
EN 1599: E CrMoWV 12 B 42
Mat.-No.: 1.4937

Recovery: **130%**

capilla® P 121

Product description:

CrMoNiVW-alloyed basic coated stick electrode, good welding characteristics producing a creep and rupture resistant high temperature weld metal matching similar alloyed base metals

Applications:

Welding of similar high temperature 12%-Cr-steels and steel casts (quenched and tempered)

Base materials:

1.4913 (X19CrMoVNb 11-1),
1.4922 (X20CrMoV 12-1),
1.4923 (X22CrMoV 12-1),
1.4935 (X20CrNoWV 12-1),
1.4931 (GX22CrMoV 12-1).

Typical weld metal composition:

[wt. - %]

	C	Mn	Si	Cr	Mo	Ni	V	W	Fe
Min.		**0,5**		**10,5**	**0,9**	**0,5**	**0,18**	**0,5**	
Max.	**0,03**	**0,6**	**0,4**	**11,5**	**1,1**	**0,6**	**0,24**	**0,6**	**Bal.**

Mechanical properties:

(Heat treatment: 760°C/2h; Minimum values at ambient temperature)

Tensile strength R_m:	700	[MPa]
Yield strength $R_{p0,2}$:	590	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	15	[%]
Impact strength (ISO-V):	35	[J]

Positions: all except PD, PE and PG

Redrying: min. 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)

Standards:

EN ISO 3581-A:	E 13 B 42
EN 1600:	E 13 B 42
AWS SFA-5.4:	E 410 - 25
Mat.-No.:	1.4009
Recovery:	**150%**

capilla® 4009

Product description:

Basic coated stick electrode for overlay and fusion welding of ferritic-martensitic chromium steels.
This stick electrode is suitable for overlays of sealing surfaces of gas-, water- and steam-fittings up to service temperatures of 450°C.
The weld metal is corrosion resistant as similar alloyed chromium steels.
If the base metal does not require a higher preheating temperature, T_{PH} = 200°C is recommended.

Applications:

The electrode shows an excellent suitability for overlay and fusion welding of 13 % Cr-steels.

Suitable for materials like:

1.4000, 1.4001, 1.4002, 1.4006, 1.4021, 1,4024.

Typical weld metal composition:

[wt. - %]

	C	Cr	Mn	Fe
Min.		**11,5**		
Max.	**0,1**	**14,5**	**0,7**	**Bal.**

Mechanical properties:

(Heat treatment: 680°C/8h; Minimum values at ambient temperature)

Tensile strength R_m:	650	[MPa]
Yield strength $R_{p0,2}$:	450	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	15	[%]
Hardness:	180	[HB 30]
	35	[HRC] without heat reatment

Positions: all except PD, PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)

also available:
find in table of content

Capilla 4009 MAG
Capilla 4009 WIG

Standards:

EN ISO 3581-A:	E 17 B 42
EN 1600:	E 17 B 42
AWS SFA-5.4:	E 430 - 25
Mat.-Nr.:	1.4015
Recovery:	**150%**

capilla® 4015

Product description:

Basic coated stick electrode suitable for overlays of sealing surfaces at gas-, water- and steam-fittings up to service temperatures of 450°C.
The weld metal has a comparable corrosion resistance as similar alloyed chromium steels.
Scaling resistant up to 950°C.
It is recommended to preheat the work piece to approx. 250°C before welding.
A stress-relief-heat treatment up to temperatures of T_{PWHT} = 800°C is recommended if T_{PWHT} is not limited by the properties of the base metal.

Applications:

The electrode is suitable for overlay and fusion welding of heat treatable steels alloyed with 17 % chromium.
Often used as cover pass on tough austenitic filler passes (e.g in sulphurous media at elevated temperatures).

Suitable for materials like:

1.4057, 1.4740, 1.4742, 1.4059, 1.4741.

Typical weld metal composition:

[wt. - %]

	C	Cr	Mn	Fe
Min.		**16**	**0,5**	
Max.	**0,1**	**18**	**1**	**Bal.**

Mechanical properties:

(Heat treatment: 800°C/1h; Minimum values at ambient temperature)

Tensile strength R_m:	540	[MPa]
Yield strength $R_{p0,2}$:	340	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	20	[%]
Hardness:	150	[HB 30]
	240	[HB 30] without heat reatment

Positions: all except PD, PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)

also available:
find in table of content

Capilla 4015 MAG
Capilla 4015 WIG
Capidur 4015

Standards:

EN ISO 3581-A:	EZ 13 1 B 42
EN 1600:	EZ 13 1 B 42
AWS SFA-5.4:	~E 410 - 25
Mat.-No.:	1.4018
Recovery:	**150%**

capilla® 4018

Product description:

Basic coated stick electrode suitable for overlays of sealing surfaces at gas, water and steam fittings up to service temperatures of 450°C.
The weld metal is corrosion resistant as similar alloyed chromium steels.
It is recommended to preheat the work piece to approx. 250°C.
A stress-relief heat treatment at T_{PWHT} up to 680°C is recommended.

Applications:

The electrode is suitable for overlay and fusion welding of heat treatable steels with 13 % Cr.
Often used as filler material for cover passes on austenitic fusion weldings (e.g. in sulphurous media at higher temperatures).

Suitable for materials like:

1.4008.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Fe
Min.		**11,5**	**1,5**	
Max.	**0,1**	**13,5**	**2**	**Bal.**

Mechanical properties:

(Heat treatment: 640°C/8h; Minimum values at ambient temperature)

Tensile strength R_m:	650	[MPa]
Yield strength $R_{p0,2}$:	450	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	25	[%]
Hardness:	180 35	[HB 30] [HRC] without heat reatment

Positions: all except PD, PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)

also available:
find in table of content

Capilla 4018 MAG
Capilla 4018 WIG
Capilla G 4018 BM (tubular wire)

Standards:	
EN ISO 3581-A:	E 13 4 B 42
EN 1600:	E 13 4 B 42
AWS A 5.4:	E 410 NiMo-25
Mat.-No.:	1.4351
Recovery:	**150%**

capilla® 410 NiMo

Product description:

Basic coated stick electrode for overlay and joint welding of ferritic-martensitic chromium steels. The weld metal is corrosion resistant as similar alloyed chromium (nickel) steels and exhibits a very good resistant against wear and cavitation, especially when used as material of hydraulic turbines. If thick-walled components have to be preheated at 200°C, a post weld heat treatment should be performed to improve the toughness of weld and base metal.

Applications:

The electrode is suitable for overlay and fusion welding of 13 % chromium (nickel) steels.

Suitable for materials such as:
1.4313, 1.4001, 1.4002.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Mo	Mn	Fe
Min.		**11,5**	**3**	**0,5**		
Max.	**0,1**	**14,5**	**5**	**1**	**0,7**	**Bal.**

Mechanical properties:

(Heat treatment: 600°C/8h; Minimum values at ambient temperature)

Tensile strength R_m:	800	[MPa]
Yield strength $R_{p0,2}$:	600	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	25	[%]
Hardness:	310	[HB 30]
	38	[HRC] without heat reatment

Positions: all except PD, PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)

also available:
find in table of content

Capilla 410 NiMo MAG
Capilla 410 NiMo WIG
Capilla G 135 MM (tubular wire)

Capidur 410 NiMo

Standards:

EN ISO 3581-A: EZ 17 6 1 B 42
EN 1600: EZ 17 6 1 B 42
Mat.-No.: ~1.4405

Recovery: **150%**

capilla® 4405

Product description:

Basic coated high-recovery stick electrode suitable for welding of similar alloyed stainless ferritic-martensitic chromium steels. Overlay welding of steam and gas fitting for service temperatures up to 450°C.
The corrosion resistance of the weld metal is comparable with similar CrNi(Mo) steel grades and casts.
Preheating of thick walled base materials (s ≥ 10mm): 150 – 350°C

A PWHT is recommended.

Applications:

The electrode is perfectly suitable for overlay and fusion welding of 13 - 17 % Cr(Ni)- steels.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Mo	Mn	Fe
Min.		**16**	**5**	**0,8**		
Max.	**0,06**	**17**	**6**	**1,3**	**0,7**	**Bal.**

Mechanical properties:

(Heat treatment: 600°C/8h; Minimum values at ambient temperature)

Tensile strength R_m:	800	[MPa]
Yield strength $R_{p0,2}$:	570	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	15	[%]
Impact strength (ISO-V):	35	[J]

Positions: all except PD; PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)

also available:
find in table of content

Capilla G 4405 BM (tubular wire)

Standards:

EN ISO 3581-A: EZ 17 1 B 42
EN 1600: EZ 17 1 B 42
Mat.-No.: 1.4115

Recovery: **150%**

capilla® 4115

Product description:

Basic coated high-recovery stick electrode suitable for welding of similar alloyed stainless chromium steels. Overlay welding of steam and gas fitting for service temperatures up to 450°C.

Preheating: similar base metals: 300 – 400°C,
dissimilar base metals: 150 – 350°C.

Applications:

The electrode is perfectly suitable for overlay and fusion welding of 17 % chromium (nickel) steels.

Suitable for materials like:

1.4313, 1.400, 1.4001, 1.4002.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Mo	Mn	Fe
Min.	**0,15**	**16**		**0,8**		
Max.	**0,2**	**17**	**0,5**	**1,2**	**0,7**	**Bal.**

Mechanical properties:

(Heat treatment: 720°C/8h; Minimum values at ambient temperature)

Tensile strength R_m:	700	[MPa]
Yield strength $R_{p0,2}$:	650	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	15	[%]
Hardness:	200 43	[HB 30] [HRC] without heat reatment

Positions: all except PD; PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)

also available:
find in table of content

Capilla 4115 MAG
Capilla 4115 WIG
Capidur 4115

Standards:

EN ISO 3581-A: EZ 17 1 1 B 42
EN 1600: EZ 17 1 1 B 42
Mat.-No.: 1.4122

Recovery: **150%**

capilla® 4122

Product description:

Basic electrode for weld metal which is corrosion resistant as chromium steels of the same or similar kind.
In case of welding unalloyed or low alloyed base metals, preheating of the work piece is recommended (150 - 350°C; depending on wall thickness).
Base metals of the same or similar kind should be preheated between 300 and 400°C.

Applications:

The electrode is suitable for overlay and fusion welding of curable 17%-chromium steels.

Overlay welding of gas, water and steam valves and fittings. Service temperatures up to 450°C.
Furthermore suitable for heat and wear resistant overlays of rolls, drums and gripper tongs.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Mo	Mn	Fe
Min.		**16**		**0,9**		
Max.	**0,4**	**18**	**0,5**	**1,1**	**0,6**	**Bal.**

Mechanical properties:

(Heat treatment: 760°C/2h; Minimum values at ambient temperature)

Tensile strength R_m:	800	[MPa]
Yield strength $R_{p0,2}$:	600	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	12	[%]
Hardness:	230	[HB 30]
	48	[HRC] without heat reatment

Positions: all except PD, PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)

also available:
find in table of content

Capilla 4122 MAG
Capilla 4122 WIG

Standards:

EN ISO 3581-A:	EZ 13
EN 14700:	E Fe 7
Mat.-No.:	1.4034
Recovery:	**150%**

capilla® 4034

Product description:

Basic coated stick electrode for weld metal which is corrosion resistant as chromium steels of the same or similar kind.
In case of welding unalloyed or low alloyed base metals preheating of the work piece is recommended (150°C - 350°C; depending on wall thickness).
Base metals of the same or similar kind should be preheated in the range between 300 and 400°C.

Applications:

The electrode is suitable for overlay and fusion welding of curable 13%-chromium steels.

Overlay welding of gas, water and steam valves and fittings. Service temperatures up to 450°C. Furthermore suitable for heat and wear resistant overlays of rolls, drums and gripper tongs.

Typical weld metal composition:

[wt. - %]

	C	Cr	Mn	Ni	Fe
Min.		**12,5**			
Max.	**0,4**	**13,5**	**0,5**	**0,6**	**Bal.**

Mechanical properties:

(Heat treatment: 550 - 760°C/ 2h; Minimum values at ambient temperature)

Hardness:	240 – 360	[HB 30
	51 – 55	[HRC] without heat reatment

Positions: all except PD, PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)~

Standards:

EN ISO 3581-A:	E 19 9 H R 12
EN 1600:	E 19 9 R 12
AWS A 5.4:	E 308 H-16
Mat.-No.:	1.4948

capilla® 308 H

Product description:

Rutile-basic coated stick electrode suitable for fusion welding of heat resistant stainless austenitic steel grades without Nb or Ti.

Service temperatures: up to 700°C

Applications:

Suitable for welding steel grades like:

1.4948, 1.4878, 1.4550.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Fe
Min.		**18**	**9**	
Max.	**0,03**	**20**	**11**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	550	[MPa]
Yield strength $R_{p0,2}$:	320	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	35	[%]
Impact strength (ISO-V):	70	[J]

Positions: all except PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,0	300	40 – 60
2,5	300	50 – 90
3,25	350	80 – 110
4,0	350	100 – 150
5,0	450	150 – 200

Polarity =(+)~

also available:
find in table of content

Capilla 308 KB
Capilla 308 L
Capilla 308 LR

Capilla 308 MAG
Capilla 308 WIG
Capilla G 308 L RM (tubular wire)

Standards:

EN ISO 3581-A: E 19 12 3 R 12
EN 1600: E 19 12 3 R 12
AWS A 5.4: E 316 H-16

capilla® 316 H

Product description:

Rutile-basic coated stick electrode suitable for fusion welding of heat resistant stainless Cr-Ni-Mo-steel grades.
Due to elevated Si- and Cr-contents the weld metal has better scaling resistance in comparison to Capilla 316 L.

Applications:

Suitable for welding steel grades like:

1.4401, 1.4404, 1.4406, 1.4408,
1.4420, 1.4435, 1.4436, 1.4571,
1.4573, 1.4580, 1.4581, 1.4583.

Typical weld metal composition:

[wt. - %]

	C	Si	Cr	Ni	Mo	Fe
Min.			**18**	**11**	**2,5**	
Max.	**0,03**	**1,0**	**20**	**13**	**3**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	550	[MPa]
Yield strength $R_{p0,2}$:	320	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	35	[%]
Impact strength (ISO-V):	70	[J]

Positions: all except PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]	**Polarity**
2,0	300	40 – 60	=(+)~
2,5	300	60 – 90	
3,25	350	80 – 110	
4,0	350	100 – 150	
5,0	450	150 – 200	

also available:
find in table of content

Capilla 316 KB
Capilla 316 L
Capilla 316 LF
Capilla 316 LR
Capilla 316 MAG
Capilla 316 WIG
Capilla G 316 L RM (tubular wire)
Capicoat 316 H

Standards:

EN ISO 3581-A:	E 23 12 R 32
EN 1600:	E 23 12 R 32
AWS A 5.4:	E 309 -26
Mat.-No.:	~1.4829
Recovery:	**120%**

capilla® 309

Product description:

Rutile-basic coated stick electrode for fusion welding of heat resistant Cr-Ni steels.
Also suitable for fusion welding of dissimilar steels (high alloyed to low alloyed steels).
The weld metal is heat resistant up to 1050°C.
Also appropriate for overlay weldings of non-alloyed steels, if an 18/8 Cr-Ni alloy shall be realised in the first layer.

Applications:

Claddings, buffer layers and joints

Base materials:

1.4710, 1.4729, 1.4740, 1.4825, 1.4828, 1.4878, 1.4780, 1.4541, 1.4550, 1.4712, 1.4724, 1.4742, 1.4826

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Fe
Min.		**21**	**11**	
Max.	**0,08**	**23**	**13**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	550	[MPa]
Yield strength $R_{p0,2}$:	400	[MPa]
Yield strength $R_{p1,0}$:	430	[MPa]
Elongation (L=5d):	30	[%]
Impact strength (ISO-V):	55	[J]

Positions: all except PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,0	300	40 – 60
2,5	300	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150
5,0	450	150 – 200

Polarity =(+)~

also available:
find in table of content

Capilla 309 MAG
Capilla 309 WIG

Capilla G 309 RM (tubular wire)

Standards:

EN ISO 3581-A:	E 25 20 H R 12
EN 1600:	E 25 20 H R 12
AWS A 5.4:	E 310H -16
Mat.-No.:	~1.4846

capilla® 310 H

Product description:

Basic coated stick electrode for welding of heat resistant CrNi-steels. The weld metal is fully austenitic. It is resistant to low-sulphur, nitrogenous gases at service temperatures up to 1200°C.

Not resistant to high sulphuric gases.

Applications:

Suitable for welding steel grades like:

1.4826, 1.4837, 1.4848.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Mn	Fe
Min.		**23**	**19**	**2,5**	
Max.	**0,4**	**26**	**21**	**3**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	600	[MPa]
Yield strength $R_{p0,2}$:	400	[MPa]
Yield strength $R_{p1,0}$:	450	[MPa]
Elongation (L=5d):	10	[%]

Positions: all except PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,0	250/300	60 – 90
2,5	300	80 – 110
3,25	350	100 – 150
4,0	350	150 – 190
5,0	350	160 – 210

Polarity =(+)~

also available:
find in table of content

Capilla 310
Capilla 310 KB
Capilla 310 H MAG
Capilla 310 H WIG

Standards:

EN ISO 3581-A: E 25 4 R 32
EN 1600: E 25 4 R 32
Mat.-No.: 1.4820

Recovery: **120%**

capilla® 4820

Product description:

Rutile-basic coated stick electrode suitable for cladding and fusion welding of similar alloyed 25%-Cr-steels.

Scaling resistant in oxidising fume gases up to 1150°C.

Very resistant to sulphuric gases at elevated temperatures

Applications:

Suitable for cladding and fusion welding of corrosion and scaling resistant 25%-Cr-steels without Mo.

The weld deposit is corrosion resistant like similar alloyed duplex stainless steels.

Base materials:

1.4340, 1.4347, 1.4821.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Fe
Min.	**0,05**	**25**	**4,5**	
Max.	**0,08**	**26**	**5,5**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	700	[MPa]
Yield strength $R_{p0,2}$:	500	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	20	[%]
Hardness:	180	[HB 30]

Positions: all except PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,0	300	40 – 60
2,5	300	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150
5,0	450	150 – 200

Polarity =(+)

also available:
find in table of content

Capilla 4820 MAG
Capilla 4820 WIG

Standards:

EN ISO 3581-A: EZ 25 24 Nb B 32
EN 1600: EZ 25 24 Nb B 32
Mat.-No.: 1.4830

Recovery: **120%**

capilla® 4830

Product description:

Basic coated high recovery stick electrode;
The deposited weld metal has a fully austenitic structure with carbide precipitations.

Scaling resistant up to 1000°C

Applications:

Fusion welding and cladding of heat resistant fully austenitic steels and similar alloyed steel casts, e.g.

Material No.: 1.4855, 1.4845.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Nb	Fe
Min.		**24**	**23**	**0,9**	
Max.	**0,25**	**26**	**25**	**1,2**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	600	[MPa]
Yield strength $R_{p0,2}$:	400	[MPa]
Yield strength $R_{p1,0}$:	450	[MPa]
Elongation (L=5d):	10	[%]

Positions: all except PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]	Polarity
2,5	300	60 – 90	=(+)~
3,25	350	80 – 110	
4,0	350	100 – 150	

Standards:

EN ISO 3581-A: EZ 21 32 Nb B 32
EN 1600: EZ 21 32 Nb B 32
Mat.-No.: ~1.4850

Recovery: **130%**

capilla® 4850

Product description:

Basic coated high recovery stick electrode;
The deposited weld metal has a fully austenitic structure with carbide precipitations.

Scaling resistant up to 1050°C

Applications:

Joint and overlay weldings at heat resistant steels and sorts of steel cast which have similar alloying composition e.g.

Material No.: 1.4876, 1.4861, 1.4859.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Nb	Fe
Min.	**0,12**	**21**	**32**	**0,9**	
Max.	**0,18**	**23**	**35**	**1,2**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	600	[MPa]
Yield strength $R_{p0,2}$:	380	[MPa]
Yield strength $R_{p1,0}$:	400	[MPa]
Elongation (L=5d):	25	[%]
Impact strength (ISO-V):	50	[J]

Positions: all except PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]	Polarity
2,0	300	60 – 90	=(+)~
3,25	350	80 – 110	
4,0	350	100 – 150	

also available:
find in table of content

Capilla 4850 MAG
Capilla 4850 WIG

Standards:

EN ISO 3581-A:	EZ 25 35 Nb B 32
EN 1600:	EZ 25 35 Nb B 32
EN 14700:	~E Ni 1
Mat.-No.:	~1.4853
Recovery:	**130%**

capilla® 4853

Product description:

Basic coated high-recovery stick electrode suitable for welding of high heat resistant steel casts.

The weld metal is scaling resistant at service temperatures up to 1050°C.

Applications:

Fusion welding and cladding of similar alloyed heat resistant steels and steel casts e.g.

Material No.: 1.4852

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Nb	Mn	Fe
Min.	**0,3**	**25**	**34**	**1,2**	**0,9**	
Max.	**0,5**	**27**	**36**	**1,5**	**1,1**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	600	[MPa]
Yield strength $R_{p0,2}$:	400	[MPa]
Yield strength $R_{p1,0}$:	450	[MPa]
Elongation (L=5d):	8	[%]

Positions: all except PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]	Polarity
2,5	300	60 – 90	=(+)~
3,25	350	80 – 110	
4,0	350	100 – 150	

also available:
find in table of content

Capilla 4853 MAG
Capilla 4853 WIG

Standards:

EN ISO 3581-A:	EZ 18 36 Nb B 32
EN 1600:	EZ 18 36 Nb B 32
EN 14700:	~E Ni 1
AWS A 5.4:	~ E330-15
Mat.-No.:	~ 1.4863
Recovery:	**130%**

capilla® 4863

Product description:

Basic coated high-recovery electrode suitable for welding of high heat resistant steels and steel casts. Scaling resistant at service temperatures up to 950°C.
High resistance to carburizing atmosphere.

Applications:

Fusion welding and cladding of similar alloyed heat resistant steels and steel casts e.g.

Material No.: 1.4849, 1.4864, 1.4865.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	Nb	Fe
Min.	**0,19**	**17**	**34**	**1,2**	
Max.	**0,25**	**19**	**36**	**1,5**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	550	[MPa]
Yield strength $R_{p0,2}$:	320	[MPa]
Yield strength $R_{p1,0}$:	340	[MPa]
Elongation (L=5d):	15	[%]
Impact strength (ISO-V):	40	[J]

Positions: all except PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	300	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)~

Standards:

EN ISO 14172: ~E Ni 6702 (NiCr28Fe6W)
Mat.-No.: ~2.4879

Recovery: **130%**

capilla® 4879

Product description:

Basic coated high recovery stick electrode suitable for welding of heat resistant Ni-base alloys and very high alloyed NiCr(W)-steel casts.
Scaling resistant at service temperatures up to 1150°C.

Applications:

Fusion welding and cladding of similar alloyed heat resistant alloys e.g.

Material No.: 2.4879.

Typical weld metal composition:

[wt. - %]

	C	Cr	Ni	W	Fe
Min.	**0,4**	**27**	**48**	**4**	
Max.	**0,6**	**30**	**52**	**5**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	650	[MPa]
Yield strength $R_{p0,2}$:	450	[MPa]
Yield strength $R_{p1,0}$:	500	[MPa]
Elongation (L=5d):	5	[%]
Impact strength (ISO-V):	-	[J]

Positions: all except PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	300	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150

Polarity =(+)~

Standards:

EN ISO 14172	E Ni 6625 (NiCr22Mo9Nb)
EN 14700:	E Ni 2
AWS A 5.11:	E NiCrMo 3
Mat.-No.:	2.4621

capilla® 625 K

Product description:

High corrosion resistance in several media, also against stress corrosion cracking.
Scale resistant at service temperatures up to 1100°C, good mechanical properties up to 1000°C and down to -196°C.

Max. service temperature in sulphurous media: 500°C.

Applications:

Joints and claddings of similar materials and steels.

Fusion welding of CrNi(N) steels for cryogenic applications and heat treatable nickel steels.

Appropriate base metals:

Alloy 800, 1.4876, 2.4856, 1.4539.

Typical weld metal composition:

[wt. - %]

	C	Cr	Mo	Nb	Ni
Min.		**19**	**8**	**2**	
Max.	**0,6**	**30**	**11**	**4**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	760	[MPa]
Yield strength $R_{p0,2}$:	450	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	30	[%]
Impact strength (ISO-V):	75 60	[J] [J] -196°C

Positions: all except PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	300	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150
5,0	350	150 – 200

Polarity =(+)

also available:
find in table of content

Capilla 625
Capilla 625 MIG
Capilla 625 WIG

Standards:

DIN EN ISO 14172:	E Ni 6059 (NiCr23Mo16)
(DIN 1736):	EL-NiCr 23 Mo 16
(DIN 8555):	E: 23-UM-200 CPRTZ
AWS A5.14:	E NiCrMo-13
Mat.-No.:	2.4609
Recovery:	**150%**

capilla® Alloy C

Product description:

The weld metal of this rutile-basic coated stick electrode is corrosion resistant in reducing and especially oxidising media. Due to the high Cr-content this alloy is heat and scaling resistant.

The weld deposit is work hardening.

Applications:

Claddings and fusion welds of similar alloyed materials used in the chemocal plan engineering. Also suitable for corrosion resistant claddings on mild steels.
Also used for wear resistant weldings on hot forming tools

base materials:

NiCr21Mo14W (2.4602),
NiCr23 Mo16Al (2.4605),
NiMo16Cr16Ti (2.4610),
NiMo16Cr15W (2.4819).

Typical weld metal composition:

[wt. - %]

	C	Si	Cr	Mo	Fe	Mn	Ni
Min.			**22**	**15**			
Max.	**0,01**	**0,1**	**24**	**16**	**1,5**	**0,5**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	700	[MPa]
Yield strength $R_{p0,2}$:	420	[MPa]
Yield strength $R_{p1,0}$:	-	[MPa]
Elongation (L=5d):	30	[%]
Impact strength (ISO-V):	60	[J]

Positions: -

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	300	60 – 90
3,25	350	80 – 110
4,0	350	100 – 150
5,0	350	150 – 200

Polarity =(+)

also available:
find in table of content

Capilla Alloy C MAG
Capilla Alloy C WIG

Standards:

EN ISO 14172: ~ E Ni 6082 (NiCr20Mn3Nb)
EN 14700: E Ni 2
AWS A 5.11: ~ E NiCrFe-3
Mat.-No.: ~ 2.4648

capilla® 6000 DL

Product description:

Basic coated stick electrode for fusion welding and cladding of nickel alloys and cryogenic nickel steels.
In case of dissimilar welding of nickel base materials to carbon steels even at high temperatures no carbon diffusion from the ferritic base material into the fully austenitic weld metal occurs.

Good resistance to thermal shocks.

Applications:

Especially suitable for dissimilar joints at working temperatures from –196°C to + 650°C.

Temperature limitations:
Scale resistant up to 1000°C;
in sulphurous atmosphere max. 500 °C;
fully loaded welds max. 800 °C.

Material Nos.:

1.4876, 2.4870, 2.4867, 2.4816,
1.5662, 1.4429, 1.4539, 1.4922
and joints of these materials with low alloyed steels.

Typical weld metal composition:

[wt. - %]

	C	Cr	Mn	Nb	Fe	Ni
Min.	**0,03**	**18**	**4**	**2**	**3**	
Max.	**0,06**	**21**	**6**	**2,8**	**5**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	620	[MPa]
Yield strength $R_{p0,2}$:	380	[MPa]
Yield strength $R_{p1,0}$:	420	[MPa]
Elongation (L=5d):	35	[%]
Impact strength (ISO-V):	90	[J]
	70	[J] -196°C

Positions: all except PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,0	300	40 – 60
2,5	300	60 – 90
3,25	350	80 – 120
4,0	350	110 – 160
5,0	350	150 – 190

Polarity =(+)

also available:
find in table of content

Capilla 6000
Capilla 6000B

Capilla 6000 MAG
Capilla 6000 WIG

Standards:

EN ISO 14172: ~E Ni 6082 (NiCr20Mn3Nb)
EN 14700: E Ni 2
AWS A 5.11: ~E NiCrFe-3
Mat.-No.: ~2.4648

Recovery: **150%**

capilla® 6000 B

Product description:

Basic coated stick electrode for fusion welding and cladding of nickel alloys and cryogenic nickel steels.
In case of dissimilar welding of nickel base materials to carbon steels even at high temperatures no carbon diffusion from the ferritic base material into the fully austenitic weld metal occurs.

Good resistance to thermal shocks.

Applications:

Especially suitable for dissimilar joints at service temperatures in the range of –196°C to + 650°C.

Service temperature limitations:
Scaling resistant up to 1000 °C;
in sulphurous atmosphere max. 500 °C;
fully loaded welds max. 800 °C.

Material Nos.:

1.4876, 2.4870, 2.4867, 2.4816,
1.5662, 1.4429, 1.4539, 1.4922
and joints of these materials with low alloyed steels.

Typical weld metal composition:

[wt. - %]

	C	Cr	Mn	Nb	Fe	Ni
Min.	**0,03**	**18**	**4**	**2**	**3**	
Max.	**0,06**	**21**	**6**	**2,8**	**5**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	620	[MPa]
Yield strength $R_{p0,2}$:	380	[MPa]
Yield strength $R_{p1,0}$:	420	[MPa]
Elongation (L=5d):	35	[%]
Impact strength (ISO-V):	90 70	[J] [J] -196°C

Positions: all except PD, PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,0	300	40 – 60
2,5	350	60 – 90
3,25	350	80 – 120
4,0	350	110 – 160
5,0	350	150 – 190

Polarity =(+)~

also available:
find in table of content

Capilla 6000
Capilla 6000 DL

Capilla 6000 MAG
Capilla 6000 WIG

Standards:

Special electrode (no standard)
Mat.-No.: ~2.4778

Recovery: **150%**

capilla® 4778

Product description:

Basic coated high-recovery stick electrode. The Co-base weld metal has an austenitic structure.

Scaling resistant up to 1250°C.

Applications:

Fusion welding and cladding of similar alloyed heat resistant materials and Ni-base alloys.

e.g. Material Nos.: 2.4778, 2.4779.

Typical weld metal composition:

[wt. - %]

	C	Cr	Co	Fe
Min.	**0,12**	**29**	**48**	
Max.	**0,18**	**30**	**50**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	490	[MPa]
Yield strength $R_{p1,0}$:	390	[MPa]
Yield strength $R_{p1,0/1000}$:	25 (900°C)	[MPa]
Elongation (L=5d):	6	[%]

Positions: all except PD, PE and PG

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]
2,5	350	60 – 90
3,25	350	80 – 110
4,0	450	100 – 150

Polarity =(+)~

Standards:

Special electrode (no standard)
Mat.-No.: 2.4813

Recovery: **200%**

capilla® 50/50 Nb

Product description:

Rutile-basic coated special electrode suitable for construction welding of furnaces, burners and chimneys, especially if high mechanical stresses in combination with hot gas corrosion caused by sulphurous and vanadium containing media have to be expected.

High preheating (600 °C) before the welding is recommended.

Applications:

Scaling resistant in atmospheric gases and flue gases up to 1150°C .

Base metals:

IN 560, IN 657, IN 671.

Typical weld metal composition:

[wt. - %]

	C	Cr	Nb	Fe	Ni
Min.		**48**	**1,5**		
Max.	**0,1**	**49**	**1,8**	**0,8**	**Bal.**

Mechanical properties:

(without heat treatment; minimum values at ambient temperature)

Tensile strength R_m:	900	[MPa]
Yield strength $R_{p0,2}$:	690	[MPa]
Yield strength $R_{p1,0}$:	450	[MPa]
Elongation (L=5d):	3	[%]

Positions: PA, PB, PC

Redrying: 320°C/2h

Dimension:

Ø [mm]	Length [mm]	Welding current [A]	Polarity
2,5	350	60 – 90	=(+)~
3,25	350	80 – 110	
4,0	450	100 – 150	

3.2 Wire electrodes for welding of creep and heat resistant material

3.2.1 Solid wires for gas shielded arc welding of creep and heat resistant material

Designation	Standard	Weld Metal Analysis [Wt.%]									Properties					
capilla®	**EN ISO 14343-A EN ISO 21953-A***	**C**	**Mn**	**Si**	**Cr**	**Ni**	**Mo**	**Nb**	**others**	**Fe**	**$R_{o0,2}$ [MPa]**	**R_m [MPa]**	**L=5d [%]**	**Hardness [HB/*HRC*]**	**Hardness (PWHT) [HB/*HRC*)**	**SG**
P 91 MAG	G CrMo 91* 1.4903	0,1	0,5	0,3	9	0,7	1	0,06	-	Bal.	520	620	17	-	ISO-V 50 J (760°C/4h)	M13
4009 MAG	G 13 1.4009	0,08	0,6	0,9	14	0,4	-	-	-	Bal.	450	650	15	*35*	180 (680°C/8h)	M13
4015 MAG	G 17 1.4015	0,07	0,7	0,8	17	-	-	-	-	Bal.	340	540	20	240	150 (800°C/1h)	M13
4018 MAG	G 13 1.4018	0,06	0,6	0,3	12	1,3	-	-	-	Bal.	450	650	15	*35*	180 (680°C/8h)	M13
410 NiMo MAG	G 13 4 1.4351	0,03	0,7	0,8	13	4,7	0,5	-	-	Bal.	600	800	15	*38*	250 (600°C/8h)	M13
4115 MAG	GZ 17 1 1.4115	0,2	0,4	0,6	17	0,4	1,1	-	-	Bal.	500	70	15	*43*	200 (760°C/2h)	I1 M13
4122 MAG	GZ 17 1 1 1.4122	0,4	0,5	0,5	16	0,5	1	-	-	Bal.	600	800	12	*48*	230 (760°C/2h)	M13
4034 MAG	GZ 13 1.4034	0,4	0,5	0,5	13	0,6	-	-	-	Bal.	-	-	-	*53*	240-360	M13

Min. values at AT; shielding gas (SG) acc. EN ISO 14175; (PWHT = post weld heat treatment);
Dimensions: Ø 1,0; 1,2; 1,6 [mm]; Spools: K 300; other dimensions and packing units on demand

3.2.1 Solid wires for gas shielded arc welding of creep and heat resistant material (continued)

Designation	Standard	Weld Metal Analysis [Wt.%]									Properties				
capilla®	**EN ISO 14343-A EN ISO 18274 ***	**C**	**Mn**	**Si**	**Cr**	**Ni**	**Mo**	**Nb**	**Others**	**Fe**	**$R_{o0,2}$ [MPa]**	**R_m [MPa]**	**L=5d [%]**	**KV (ISO-V) [J]**	**SG**
308 H MAG	G 19 9 H 1.4948	0,08	1,2	1,2	19	9	-	-	-	Bal.	320	550	30	70	M13
309 MAG	G 23 12 1.4829	0,11	1,2	1,2	22	11	-	-	-	Bal.	320	550	30	70	M13
310 H MAG	G 25 20 H 1.4848	0,4	1,5	1	26	21	-	-	-	Bal.	400	600	10	-	M13
4820 MAG	G 25 5 1.4820	0,06	1	0,7	25	5	-	-	-	Bal.	500	700	20	-	M13
4830 MAG	G(Z) 25 24 1.4830	0,3	1,4	0,6	25	24	-	1,3	-	Bal.	400	600	10	-	M13
4850 MAG	G(Z) 21 32 Nb 1.4850	0,2	2,3	0,2	22	33	-	1,7	-	Bal.	380	600	25	50	M13
4853 MAG	G(Z) 25 35 Nb 1.4551	0,42	1,8	1,2	25	35	-	1,3	-	Bal.	400	600	8	-	M13
Alloy C MAG	S Ni 6059 (NiCr23Mo16)* 2.4607	0,01	0,5	0,1	23	Bal.	16	-	-	1,5	420	700	40	60	I1
625 MAG	S Ni 6625 (NiCr22Mo9Nb)* 2.4831	0,03	0,2	0,25	22	Bal.	9	3,6	-	1,5	420	760	30	60	I1
6000 MAG	S Ni 6082 (NiCr20Mn3Nb)* 2.4806	0,02	2,8	0,2	19,5	Bal.	-	2,5	-	>2	380	620	35	90	I1

Min. values at AT; shielding gas (SG) acc. EN ISO 14175; (PWHT = post weld heat treatment);
Dimensions: Ø 1,0; 1,2; 1,6 [mm]; Spools: K 300; other dimensions and packing units on demand

3.2.2 Welding rods for tungsten inert gas welding of creep and heat resistant material

Designation	Standard	Weld Metal Analysis [Wt.%]									Properties					
capilla®	**EN ISO 14343-A EN ISO 21953-A***	**C**	**Mn**	**Si**	**Cr**	**Ni**	**Mo**	**Nb**	**others**	**Fe**	**$R_{o0,2}$ [MPa]**	**R_m [MPa]**	**L=5d [%]**	**Hardness [HB/*HRC*]**	**Hardness (PWHT) [HB/*HRC*)**	**SG**
P 91 WIG	G CrMo 91* 1.4903	0,1	0,5	0,3	9	0,7	1	0,06	-	Bal.	520	620	17	-	**ISO-V** 50 J (760°C/4h)	I1
4009 WIG	W 13 1.4009	0,08	0,6	0,9	14	0,4	-	-	-	Bal.	450	650	15	*35*	180 (680°C/8h)	I1
4015 WIG	W 17 1.4015	0,07	0,7	0,8	17	-	-	-	-	Bal.	340	540	20	240	150 (800°C/1h)	I1
4018 WIG	W 13 1.4018	0,06	0,6	0,3	12	1,3	-	-	-	Bal.	450	650	15	*35*	180 (680°C/8h)	I1
410 NiMo WIG	W 13 4 1.4351	0,03	0,7	0,8	13	4,7	0,5	-	-	Bal.	600	800	15	*38*	250 (600°C/8h)	I1
4115 WIG	WZ 17 1 1.4115	0,2	0,4	0,6	17	0,4	1,1	-	-	Bal.	500	70	15	*43*	200 (760°C/2h)	I1
4122 WIG	WZ 17 1 1 1.4122	0,4	0,5	0,5	16	0,5	1	-	-	Bal.	600	800	12	*48*	230 (760°C/2h)	I1
4034 WIG	WZ 13 1.4034	0,4	0,5	0,5	13	0,6	-	-	-	Bal.	-	-	-	*53*	240-360	I1

Min. values at AT; shielding gas (SG) acc. EN ISO 14175; (PWHT = post weld heat treatment);
Dimensions: Ø 1,0; 1,6; 2,0; 2,4 [mm]; Length: 1000 [mm]; other dimensions on demand

3.2.2 Welding rods for tungsten inert gas welding of creep and heat resistant material (continued)

Designation	Standard	Weld Metal Analysis [Wt.%]									Properties				
capilla®	**EN ISO 14343-A EN ISO 18274 ***	**C**	**Mn**	**Si**	**Cr**	**Ni**	**Mo**	**Nb**	**Others**	**Fe**	**$R_{o0,2}$ [MPa]**	**R_m [MPa]**	**L=5d [%]**	**KV (ISO-V) [J]**	**SG**
308 H WIG	W 19 9 H 1.4948	0,08	1,2	1,2	19	9	-	-	-	Bal.	320	550	30	70	M13
309 WIG	W 23 12 1.4829	0,11	1,2	1,2	22	11	-	-	-	Bal.	320	550	30	70	I1
310 H WIG	W 25 20 1.4848	0,4	1,5	1	26	21	-	-	-	Bal.	400	600	10	-	I1
4820 WIG	W 25 5 1.4820	0,06	1	0,7	25	5	-	-	-	Bal.	500	700	20	-	I1
4830 WIG	W(Z) 25 24 1.4830	0,3	1,4	0,6	25	24	-	1,3	-	Bal.	400	600	10	-	I1
4850 WIG	W(Z) 21 32 Nb 1.4850	0,2	2,3	0,2	22	33	-	1,7	-	Bal.	380	600	25	50	I1
4853 WIG	W(Z) 25 35 Nb 1.4551	0,42	1,8	1,2	25	35	-	1,3	-	Bal.	400	600	8	-	I1
Alloy C WIG	S Ni 6059 (NiCr23Mo16) 2.4607	0,01	0,5	0,1	23	Bal.	16	-	-	1,5	420	700	40	60	I1
625 WIG	S Ni 6625 (NiCr22Mo9Nb)* 2.4831	0,03	0,2	0,25	22	Bal.	9	3,6	-	1,5	420	760	30	60	I1
6000 WIG	S Ni 6082 (NiCr20Mn3Nb)* 2.4806	0,02	2,8	0,2	19,5	Bal.	-	2,5	-	>2	380	620	35	90	I1

Min. values at AT; shielding gas (SG) acc. EN ISO 14175;
Dimensions: Ø 1,0; 1,6; 2,0; 2,4 [mm]; Length: 1000 [mm]; other dimensions on demand

3.2.3 Tubular wires for gas shielded arc welding of creep and heat resistant material

Designation	Standard	Weld Metal Analysis [Wt.%]									Properties					
capilla®	EN ISO 17633-A EN ISO 17634-A*	C	Mn	Si	Cr	Ni	Mo	Nb	Others	Fe	$R_{o0,2}$ [MPa]	R_m [MPa]	L=5d [%]	Hardness [HB/*HRC*]	Hardness (PWHT) [HB/*HRC*]	SG
G P91 MM	T CrMo 91 BM	0,1	0,6	0,3	9	0,7	1	0,07	V= 0,2	Bal.	550	680	17	-	220 (760°C/2h)	M13
G 4009 MM	T 13 MM 2 1.4009	0,08	0,6	0,9	12	-	-	-	-	Bal.	450	650	15	*38*	220 (680°C/8h)	M13 M21
G 4015 MM	T 17 MM 2 1.4015	0,08	1,2	0,8	17	-	-	-	-	Bal.	340	540	20	220	150 (800°C/1h)	M13 M21
G 410 NiMo MM	T 13 4 MM 2 1.4351	0,03	0,7	0,8	13	4,7	0,5	-	-	Bal.	600	800	15	*38*	250 (600°C/8h)	M13 M21
G 4034 MM	TZ 13 MM 2 1.4034	0,4	0,5	0,5	13	0,6	-	-	-	Bal.	-	-	-	*50*	240-360	M13 M21
G 4405 MM	TZ 17 6 1 MM 2 1.4405	0,06	0,7	0,4	17	6	1	-	-	Bal.	570	800	15	-	250 (620°C/4h)	M13 M21

Min. values at AT; shielding gas (SG) acc. EN ISO 14175. (PWHT = post weld heat treatment).
Dimensions: Ø 1,0; 1,2; 1,6 [mm]; Spools: K 300; other dimensions and packing units on demand.

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