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## Standard

EN 14700	E Co3
DIN 8555	E20-UM-55-CSTZ
AWS A5.13	E CrCo-C

## Application

AX-ES1 is a high recovery electrode suitable for alternating current with approx. 160 % metal recovery.

The weld metal forms the hardest, most abrasion resistant of the common cobalt base alloys. The alloy is of the highest corrosion resistance, is creep and heat resistant, and is scale resistant to approx. 1000°C and corrosion resistant especially to reducing acids.

Particularly suitable for wearing parts in the chemical industry, cutting and crushing tools, heavily stressed hot working tools without thermal shock, grinding, stirring and boring tools as well as for running and contact surfaces on fittings and valve seats or cones in combustion engines.

Excellent sliding properties and good polishing properties.

Because of its great hardness the alloy is only machinable by grinding.

## Rebaking temperature

350°C / 1h

## Composition of the weld metal (typical data in %)

C	Si	Mn	Cr	W	Fe	Co
2.2	1.2	1.0	30.0	12.5	3.0	Residue

## Processing hint

The working temperature is dependent on the base material.

Preheating and interpass temperature of 400° C to 600° C and very slow cool down, if necessary furnace cooling. Short arc and steep electrode guide.

Subsequent heat treatment according to requirements of the base material.

## Material properties

Welding process	Manual metal arc	Mechanical properties of the weld metal as per DIN 32525-4 approx. 55
Hardness at 20°C	[HRC]	approx. 44
Hardness at 600°C	[HRC]	approx. 34
Hardness at 800°C	[HRC]	

## Approvals

(Request current scope if required)

## Product forms (others available on request)

3.2 x 350	90 – 130 A	5.0 x 350	150 - 200
4.0 x 350	120 – 170 A		

## Welding position/ polarity

PA; PB; PC  (open circuit voltage >42V)

# AX-ES6

## Standard

EN 14700	E Co2
DIN 8555	E20-UM-40-CTZ
AWS A5.13	ECrCo-A

## Application

AX-ES6 is a high recovery electrode suitable for alternating current with approx. 140 % metal recovery. For armouring on components exposed to multiple stresses from abrasion and cavitation, corrosion and also pressure, shock and high temperatures up to approx. 900°C.

Particularly suitable for contact surfaces on fittings and valve seats or cones in combustion engines, sliding surfaces metal on metal, heavily stressed hot working tools without thermal shock, grinding, stirring and boring tools.

Excellent sliding properties and good polishing properties, good toughness. The weld metal is still easily machinable by cutting with tungsten carbide tools.

## Rebaking temperature

350°C / 1h

## Composition of the weld metal (typical data in %)

C	Si	Mn	Cr	W	Fe	Co
1.0	0.9	1.0	28.0	4.5	3.0	Residue

## Processing hint

Preheating and interpass temperature to be used in accordance with the steelmaker's instructions, a preheating and interpass temperature of 400° C to 600° C is recommended and slow cool down, if necessary furnace cooling is to be observed.

Subsequent heat treatment according to requirements of the base material.

## Material properties

Welding process	Manual metal arc	Mechanical properties of the weld metal as per DIN 32525-4
Hardness at 20°C	[HRC]	approx. 42
Hardness at 300°C	[HRC]	approx. 35
Hardness at 600°C	[HRC]	approx. 29

## Approvals

(Request current scope if required)

## Product forms (others available on request)

2.5 x 350	60 - 80 A	4.0 x 350	120 – 170 A
3.2 x 350	90 – 130 A	5.0 x 350	150 – 200 A

## Welding position/ polarity

PA; PB; PC  (open circuit voltage >42V)



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## Standard

EN 14700  
DIN 8555

E Co3  
E20-UM-50-CTZ

AWS A5.13

ECrCo-B

## Application

AX-ES12 is a high recovery electrode suitable for alternating current with approx. 160 % metal recovery. For armouring on components exposed to multiple stresses from abrasion and cavitation, corrosion and also pressure, shock and high temperatures up to approx. 900°C. The hardness and toughness of this alloy lies between AX-ES1 and AX-ES6. It is more wear resistant than AX-ES6 and tougher than AX-ES1. For armouring on running, seal and slip surfaces of fittings and pumps, machining tools in the hardwood, paper and plastics industries, as well as for crushing hammers, valve spindles and earth augers and also for heavily stressed hot working tools without thermal shock.

The weld metal is still machinable by cutting with tungsten carbide tools, otherwise by grinding.

## Rebaking temperature

350°C / 1h

## Composition of the weld metal (typical data in %)

C	Si	Mn	Cr	W	Fe	Co
1.4	1.0	1.0	28.0	8.5	3.0	Residue

## Processing hint

Preheating and interpass temperature to be used in accordance with the steelmaker's instructions; a preheating and interpass temperature of 400° C to 600° C is recommended with following slow cool down, if necessary furnace cooling. Subsequent heat treatment according to requirements of the base material.

## Material properties

Welding process	Manual metal arc	Mechanical properties of the weld metal as per DIN 32525-4
Hardness at 20°C	[HRC]	approx. 48
Hardness at 300°C	[HRC]	approx. 37
Hardness at 600°C	[HRC]	approx. 29

## Approvals

(Request current scope if required)

## Product forms (others available on request)

2.5 x 350	60 - 80 A	4.0 x 350	120 – 170 A
3.2 x 350	90 – 130 A	5.0 x 350	150 – 200 A

## Welding position/ polarity

PA; PB; PC

(open circuit voltage >42V)

# AX-ES21

## Standard

EN 14700	E Co1
DIN 8555	E20-UM-300-CKTZ
AWS A5.13	E CrCo-E

## Application

AX-ES21 is a high recovery electrode suitable for alternating current with approx. 140 % metal recovery.

It has the toughest, most corrosion resistant and creep resistant weld metal of the common cobalt hard alloys. It is suitable for tough and crack-proof armourings exposed to a combined load of pressure, shock, abrasion, corrosion and high temperatures up to around 900°C.

For contact surfaces on gas, water, steam and acid fittings and pumps, valve seats and cones of combustion engines as well as for hot working tools with thermocycling.

The alloy has excellent sliding properties and is work hardening up to approx. 45 HRC.

Gas weld metal is very easily machinable by cutting.

## Rebaking temperature

350°C /1h

## Composition of the weld metal (typical data in %)

C	Si	Mn	Cr	Mo	Ni	Fe	Co
0.3	1.0	1.0	28.0	5.5	3.0	3.0	Residue

## Processing hint

Preheating and interpass temperature to be used in accordance with the steelmaker's instructions, a preheating and interpass temperature of 150° C to 400° C is recommended. After welding slow cool down is to be observed, if necessary furnace cooling. Subsequent heat treatment to be guided by the requirements of the base material.

## Material properties

Welding process	Manual metal arc welding	Mechanical properties of the weld metal as per DIN 32525-4
Hardness at 20°C	[HRC]	approx. 30
Hardness at 300°C	[HB]	approx. 280
Work-hardened	[HRC]	approx. 45

## Approvals


(Request current scope if required)

## Product forms (others available on request)

2.5 x 350	60 - 80 A	4.0 x 350	120 – 170 A
3.2 x 350	90 – 130 A	5.0 x 350	150 – 200 A

## Welding position/ polarity

PA; PB; PC

 (open circuit voltage >42V)

# AX-Co1 rod Stellite®1

## Standard

EN 14700  
DIN 8555  
AWS A 5.21

R ZCo3  
G/WSG 20-GO-55-CSTZ  
ERCoCr-C mod.

## Area of application

Filler rod of a cobalt-chromium-tungsten alloy for corrosion resistant, heat and wear resistant hardfacings. Stellite alloy with high resistance to abrasion, oxidation and erosion. Eminently suitable to counter sliding stress of metal on metal. AX-Co 1 is suitable for TIG and gas welding. Depending on base material, a buffer layer with AX-307 is recommended.

## Special hints

Hardest of the generally used cobalt base alloys. The weld metal is very abrasion, creep and heat resistant. The high hardness only allows machining by grinding. The alloy is corrosion resistant, especially against reducing acids and scale resistant to approx. 1000°C. Excellent sliding properties and good polishing characteristics.

## Composition of the filler rod/filler wire (typical data in %)

C	Si	Mn	Cr	W	Fe	Co
2.5	2.0	1.0	30.0	15.0	3.0	Residue

## Important base materials

For grinding and chaser mills, wear rings, wear elements in the chemical industry as well as salt and lye pumps. Rust and acid-resistant stainless steel: fitting parts, shafts, spindles, valves and for running and contact surfaces on fittings and valve seats and cones in combustion engines as well as for heavily stressed hot working tools without thermal shock load.

## Material properties

Hardness at 20°C	[HRC]	52-58
Hardness at 600°C	[HRC]	approx. 40

## Applicable shielding gases (EN ISO 14175)

TIG: argon I1

GAS: set acetylene excess (reducing flame)

## Approval

(Request current scope if required)

## Product forms (other lengths on request)

Rod	Ø mm	3.2	4.0	5.0			
	x1000mm						

# AX-Co6 rod Stellite® 6

## Standard

EN 14700	R Co2
DIN 8555	G/WSG 20-GO-40-CSTZ
AWS A 5.21	ERCoCr-A

## Area of application

Tough, high strength and heat resistant Stellite alloy for overlays where wear stress is accompanied by light impact stress and corrosion. AX-Co6 is the Stellite type predominantly used. Very well suited to workpieces that have to withstand pressure and abrasion under high temperatures. Scale resistant up to approx. 900°C. AX-Co6 is suitable for TIG and gas welding. Depending on base material, a buffer layer with AX-307 is recommended.

## Special hints

Because of the Cr and W carbides embedded in the cobalt-base alloys, alongside high abrasion these alloys also resist heavy corrosion attacks. The weld metal is still easily machinable by cutting with tungsten carbide tools.

Excellent sliding properties and good polishing characteristics, good toughness.

## Composition of the filler rod (typical data in %)

C	Si	Mn	Cr	W	Fe	Co		
1.2	2.0	1.0	30.0	5.0	3.0	Residue		

## Important base materials

Particularly suitable for contact surfaces on fittings, valve seats and cones in combustion engines, heavily stressed hot working tools without thermal shock load, salt and lye pumps, rust and acid resistant fitting parts, shafts and spindles, grinding, stirring and boring tools as well as for metal on metal sliding surfaces.

## Material properties

Hardness at 20°C	[HRC]	40-42
Hardness at 600°C	[HRC]	approx. 33

## Applicable shielding gases (EN ISO 14175)

TIG: argon I1

GAS: set acetylene excess (reducing flame)

## Approval

(Request current scope if required)

## Product forms (other lengths on request)

Rod	Ø mm x 1000 mm	2.4	3.2	4.0	5.0	6.4	
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# AX-Co12 rod Stellite®12

## Standard

EN 14700  
DIN 8555  
AWS A 5.21

R Co3  
G/WSG 20-GO-50-CSTZ  
ERCoCr-B

## Area of application

The cobalt-based alloy Co 12 is somewhat more wear resistant compared with the Co 6. The toughness and the hardness can be placed between the Co1 and Co6. Particularly suitable for wear stress in combination with corrosion, scale resistant up to approx. 900°C. AX-Co12 is suitable for TIG and gas welding. Depending on base material, a buffer layer with AX-307 is recommended.

## Special hints

Alongside high abrasion, this alloy also resists heavy corrosion stress. The weld metal is still machinable by cutting with tungsten carbide tools.

## Composition of the filler rod (typical data in %)

C	Si	Mn	Cr	W	Fe	Co		
1.4	2.0	1.0	28.0	8.2	3.0	Residue		

## Important base materials

The alloy is particularly suitable for machining tools in the hardwood, paper and plastics industries, for extruder worms, valve spindles, earth augers. For running and contact surfaces of fittings, hot pressing dies, high temperature liquid pumps, valve seats and plugs of combustion engines and billet shears, as well as for highly stressed hot working tools.

## Material properties

Hardness at 20°C	[HRC]	47-51
Hardness at 600°C	[HRC]	approx. 40

## Applicable shielding gases (EN ISO 14175)

TIG: argon I1

GAS: set acetylene excess (reducing flame)

## Approval

(Request current scope if required)

## Product forms (other lengths on request)

Rod	Ø mm x 1000 mm	2.4	3.2	4.0	5.0	6.4	

# AX-Co21 rod Stellite® 21



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## Standard

EN 14700	R Co1
DIN 8555	G/WSG 20-GO-300-CKTZ
AWS A 5.21	ERCoCr-E

## Area of application

The weld metal of these cast rods for TIG welding or gas welding is highly creep resistant and resistant to high temperatures, corrosion and oxidation. Good wear resistance, very good toughness and good thermal shock resistance is achieved with these filler rods. This alloy has excellent sliding properties and is strain hardenable to approx. 45 HRC.

## Special hints

Alongside high abrasion and heavy corrosion, this alloy also resists impact load as well as extreme thermal shocks. The weld metal is very easily machinable by cutting with tungsten carbide tools.

## Composition of the filler rod (typical data in %)

C	Si	Mn	Cr	Mo	Ni	Fe	Co		
0.35	1.5	1.2	28.0	6.0	3.0	3.0	Residue		

## Important base materials

The alloy is particularly suitable for hot working tools with thermocycling, for contact surfaces on steam, water, gas and acid fittings, for extruder worms, valve spindles, earth augers. For high temperature liquid pumps, valve seats of combustion engines and billet shears.

## Material properties

Hardness at 20°C	[HRC]	30-35
Hardness at 300°C	[HRC]	28-30
work-hardened	[HRC]	approx. 45

## Applicable shielding gases (EN ISO 14175)

TIG: argon I1  
GAS: acetylene excess (reducing flame)

## Approval

(Request current scope if required)

## Product forms (other lengths on request)

Rod	Ø mm x	2.4	3.2	4.0	5.0	6.4
	1000m					

Other lengths on request





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## Standard

EN 14700 DIN 8555 AWS A 5.21	T Co3 MF 20-GF-55-CGTZ ERCCoCr-C	
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## Properties

Hardest of the generally used cobalt base alloys. The weld metal is very abrasion, creep and heat resistant. The high hardness only allows machining by grinding. The alloy is corrosion resistant, especially against reducing acids and scale resistant to approx. 1000°C. Very well suited to metal on metal sliding stress. Depending on base material, a buffer layer with AX-FD-DW307 is recommended.

## Application areas

The AX-FD-Co1 is used in grinding and chaser mills, wear rings, wear elements in the chemical industry as well as salt and lye pumps, bearing surfaces, hot shears, valves for running and sealing surfaces on fittings, valve seats and plugs as well as for heavily stressed hot working tools without thermal shock load.

## Composition of the weld metal (typical data in %)

C	Si	Mn	Cr	W	Fe	Co	Rest
2.3	1.0	1.0	29.0	12.0	4.0		

## Mechanical properties

Hardness of weld metal: 53 HRC

## Applicable shielding gases (EN ISO 14175)

TIG: Argon I1, MAG: mixed gas M13

## Welding conditions and versions

Dimensions	Amperage [A]	Voltage [V]
1.2	100-250	15-30
1.6	140-350	15-30

## Approvals

(Request current scope if required)

## Product forms (others available on request)

Spools / drum	Ø mm	1.2	1.6	2.0	2.4		

## Welding position/ polarity

TIG/MAG	PA; PB			
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# AX-FD-Co6

## Standard

EN 14700  
DIN 8555  
AWS A 5.21

T Co2  
MF 20-GF-45-CTZ  
ERCCoCr-A

## Properties

The Co-base alloy Co6 is the mainly used stellite alloy. It is used where wear stress is accompanied by corrosion and light impact stress. Very well suited to workpieces that have to withstand pressure and abrasion under high temperatures. Scale resistant up to approx. 900°C. Excellent sliding properties and good toughness and polishing properties. Still easily machinable with tungsten carbide tools. Depending on base material, a buffer layer with AX-FD-DW307 is recommended.

## Application areas

Sealing surfaces on fittings, valve seats and plugs in combustion engines, highly stressed hot working tools without thermal shock load, hot press dies, shafts and spindles, high temperature liquid pumps as well as for metal on metal sliding surfaces.

## Composition of the weld metal (typical data in %)

C	Si	Mn	Cr	W	Fe	Co	
1.05	1.0	1.0	29.0	4.5	4.0	Rest	

## Mechanical properties

Hardness of weld metal: 42 HRC

## Applicable shielding gases (EN ISO 14175)

TIG: Argon I1, MAG: mixed gas M13

## Welding conditions and versions

Dimensions	Amperage [A]	Voltage [V]
1.2	100-250	16-29
1.6	140-350	16-30

## Approvals

(Request current scope if required)

## Product forms (others available on request)

Spools / drum	Ø mm	1.2	1.6	2.0	2.4	2.4	

## Welding position/ polarity

TIG/MAG PA; PB





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## Standard

EN 14700  
DIN 8555  
AWS A 5.21

T Co2  
MF 20-GF-50-CTZ  
ERCCoCr-B

## Properties

The Co-base alloy Co12 is somewhat more wear resistant compared with Co6. The toughness and the hardness can be placed between AX-FD-Co1 and AX-FD- Co6. Particularly suitable for wear stress in combination with corrosion and heat, scale resistant up to approx. 900°C. Depending on base material, a buffer layer with AX-FD-DW307 is recommended.

## Application areas

The alloy is particularly suitable for machining tools for the hardwood, paper and plastics industry, extruder worms, valve spindles, earth borers. For running and sealing surfaces of fittings, hot press dies, high temperature liquid pumps, valve seats and plugs of combustion engines and billet shears, as well as for highly stressed hot working tools.

## Composition of the weld metal (typical data in %)

C	Si	Mn	Cr	W	Fe	Co
1.6	1.0	1.5	29.0	8.0	3.0	Rest

## Mechanical properties

Hardness of weld metal: 46 HRC

## Applicable shielding gases (EN ISO 14175)

TIG: Argon I1, MAG: mixed gas M13

## Welding conditions and versions

Dimensions	Amperage [A]	Voltage [V]
1.2	100-250	16-29
1.6	140-350	16-30


## Approvals

(Request current scope if required)

## Product forms (others available on request)

Spools / drum	Ø mm	1.2	1.6	2.0	2.4

## Welding position/ polarity

TIG/MAG | PA; PB | 

# AX-FD-Co21

## Standard

EN 14700  
DIN 8555  
AWS A 5.21

T Co1  
MF 20-GF-350-CKTZ  
ERCCoCr-E

## Properties

The Co-base alloy Co21 is high-temperature resistant and resistant to corrosion and cavitation. This alloy is considered as the most creep and corrosion resistant Co-base alloy and can be work-hardened by cold forming up to 45HRC. Excellent sliding and polishing properties. Very good toughness and thermal shock resistance. Very suitable also against impact load.

## Application areas

Particularly suitable for hot working tools with thermocycling, for contact surfaces on steam, water, gas and acid fittings, for high temperature liquid pumps, valve seats of combustion engines, hot stamping dies.

## Composition of the weld metal (typical data in %)

C	Si	Mn	Cr	Mo	Ni	Fe	Co Rest
0.25	1.0	1.0	28.5	5.5	3.0	4.0	

## Mechanical properties

Hardness of weld metal: 33 HRC  
Work hardened: approx. 45 HRC

## Applicable shielding gases (EN ISO 14175)

TIG: Argon I1, MAG: mixed gas M13

## Welding conditions and versions

Dimensions	Amperage [A]	Voltage [V]
1.2	100-250	16-29
1.6	140-350	16-30

## Approvals

(Request current scope if required)

## Product forms (others available on request)

Spools / drum	Ø mm	1.2	1.6	2.0	2.4		

## Welding position/ polarity

TIG/MAG PA; PB

