Wearshield® BU-30

Hardfacing electrode

Classification

DIN 8555 : E1-UM-350-GP
EN 14700 : E Fe1

General description

Can be used both downhand and out of position, although the flat position is preferred
Arc characteristics are excellent with very low spatter levels
The electrode coating permits the use of the drag or contact welding technique
Good arc restriking

Application

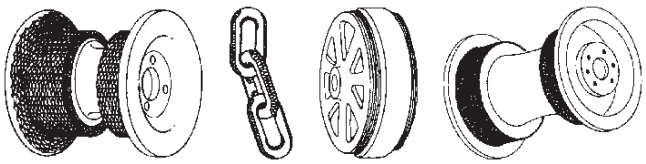
Wearshield BU 30 produces a crack-free wear resistant deposit with a hardness of 31-38 HRc (295-350 HB) depending on dilution and number of layers. It is particularly suitable under conditions of moderate abrasion and friction, combined with resistance to impact. Ideally suitable for APLs involving rolling, sliding and metal to metal wear. It may also be used as a final overlay on parts which need to be machined or as a build-up layer for other hardfacing materials.

Typical applications include:

Buildup:
Shovel and bucket lips
Pump impellers and housings
Dredge and shovel bucket teeth
Mill and crushing hammers

Hardfacing:

Crane and mine car wheels
Tractor rolls, idlers, links and sprockets
Cable drums
Roller guides



Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	31 HRc (295 HB)
2 Layers	35 HRc (330 HB)
3 Layers	38 HRc (350 HB)

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0	6.0
	Length (mm)	350	350	450	450
Unit: Box	Pieces / unit	65	44	23	-
	Net weight/unit (kg)	2.5	2.5	2.5	2.5

Identification Imprint: WEARSHIELD BU-30 Tip Color: black

Wearshield® BU-30: rev. EN 22

Wearshield® BU-30

Additional information

When welding with Wearshield BU30, DC+ is preferred for most applications, although AC also provides satisfactory results. The bead width should be limited to between 12 - 20mm for all electrode diameters when applying a weaving technique. Narrow stringer beads are preferred for edge and corner buildup.
All work-hardened base material should be removed prior to applying Wearshield BU30 in order to prevent embrittlement and cracking.
A preheat and interpass temperature of 150-250°C is necessary to prevent cracking, especially on large complex or high restrained components.The component should be completed without interruptions, however, if interruptions are unavoidable the component should be preheated again prior to welding.
The deposited weld metal can be machined to exact dimensions using high speed or carbide cutting tools.
There is no limit to the deposit build-up with this electrode.
Wearshield BU30 exhibits good resistance to spalling and peeling and moderate resistance to gouging and galling. If gouging is severe then Wearshield Mangjet or Wearshield 15CrMn would be more appropriate because of the higher work hardening effect. If galling is more severe then Wearshield MM or Wearshield MM40 would be preferred.

Welding positions

ISO/ASME	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PF/5Gup

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo
0.2	0.8	1.0	1.5	0.5

Structure

In the as welded condition the microstructure consists mainly of martensite with some bainite

Calculation data

Sizes Diam. x length (mm)	Current range
3.2 x 350	90 - 130A
4.0 x 350	140 - 180A
5.0 x 450	180 - 220A
6.0 x 450	220 - 260A

Complementary products

Complementary products include Lincore® 33

Wearshield® Mangjet (e)

Hardfacing electrode

Classification

AWS A5.13	: EFeMn-A
DIN 8555	: E7-UM-200-KP
EN 14700	: E Fe9

General description

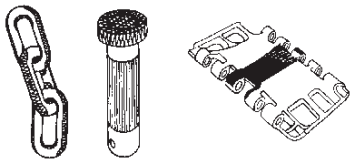
A low hydrogen hardfacing electrode designed for operator appeal
Exhibits excellent arc striking characteristics, clean slag detachability and low spatter
The electrode coating permits out of position welding
140% recovery

Application

Wearshield Mangjet produces a 14% Mn deposit that rapidly work hardens under heavy impact and battering. Ideally suited to APLs to high impact and gouging coupled with moderate abrasion.

Typical applications include:

Jaw and cone crushers
Heavy rock moving plant
Hammer drills
Crusher screens
Dredge parts
Shovel tracks
Rail crossovers, frogs and switches



Mechanical properties, typical, all weld metal

	Typical hardness values
As deposited	18 HRc (210 HB)
Work hardened	47 HRc (450 HB)

Packaging and available sizes

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Unit: Box	Pieces / unit	53	24
	Net weight/unit (kg)	2.5	2.5

Identification Imprint: WEARSHIELD MANGJET(e) Tip Color: Violet

Wearshield® Mangjet (e): rev. EN 22

Wearshield® Mangjet (e)

Additional information

When welding with Wearshield Mangjet DC+ is preferred for most applications especially positional work, although AC and DC - are also satisfactory. The weld width should be limited to 12-20mm for all electrode diameters when employing a weaving technique. Narrow stringer beads are preferred for edge and corner buildup.
All work-hardened base material and previously deposited material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking.
No preheat is required on austenitic manganese steels although a preheat of between 150-200°C maybe necessary on carbon and low alloy steels to prevent pullout.
It is important to avoid excessive heat build up in the base material. Temperatures above 260°C should be avoided as this can cause embrittlement.
For joint welding of manganese steel Wearshield 15CrMn or Arosta 307 are preferred.
There is no definite limitation to the number of passes that may be deposited, however, it is good practise to peen each pass immediately after welding to minimise internal stresses and possible distortion and cracking.

Welding positions

ISO/ASME	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Cr
0.7	15	3.7

Structure

In the as deposited condition, the microstructure consists of a soft manganese alloy austenite which rapidly work hardens under impact loading.

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate - per electrode at max. current - H(kg/h)
3.2 x 350	95 - 105	DC+	-	-	1.1
4.0 x 350	130 - 140	DC+	-	-	1.6

Complementary products

Complementary products include Lincore® M
Wire/flux combination : Lincore M / 801 or 802

Wearshield® 15CrMn

Hardfacing electrode

Classification

DIN 8555 : E7-UM-250-KP
EN 14700 : E Fe9

General description

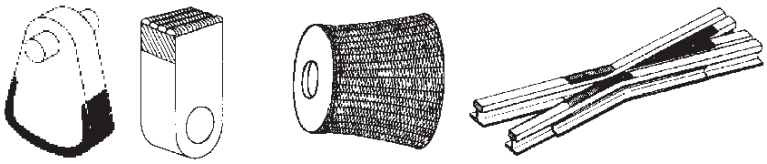
A rutile hardfacing electrode that exhibits excellent arc characteristics
Easy slag detachability, good arc restriking and low spatter
The electrode coating permits out of position welding

Application

APL Wearshield 15CrMn produces a premium austenitic chromium-manganese deposit. The term premium is used because the weld metal has sufficient alloy content to produce a single pass austenitic deposit on ordinary carbon steel. The deposit rapidly work hardens under impact making it particularly suitable for APLs of high impact and gouging, coupled with moderate abrasion. In addition to surfacing, the high crack resistance of this alloy design makes Wearshield 15CrMn an ideal electrode for joining manganese steel to itself or carbon steels with minimal risk of centreline cracking.

Typical applications include:

Railroad frogs
Track ends
Crusher hammers and screens
Earth moving equipment
Rebuilding of austenitic manganese plates and components
Construction equipment



Mechanical properties, typical, all weld metal

	Typical hardness values
As deposited	18 - 24 HRc (210-250 HB)
Work hardened	40 - 50 HRc (375-490 HB)

Packaging and available sizes

	Diameter (mm)	3.2	4.0	4.8
	Length (mm)	355	355	455
Unit: Box	Pieces / unit	49	33	24
	Net weight/unit (kg)	2.5	2.5	2.5

Identification	Imprint: WEARSHIELD 15CrMn	Tip Color: none	**Wearshield® 15CrMn: rev. EN 22**

Wearshield® 15CrMn

Additional information

When welding with Wearshield 15CrMn a short arc or contact drag technique is preferred. The weld width should be limited to 12-20mm for all electrode diameters. Narrow stringer beads are preferred for edge and corner build up.
All work-hardened base material and previously deposited material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking.
No preheat is required on austenitic manganese steels although a preheat of between 150-200°C may be necessary on carbon and low steels to prevent heat affected zone cracking.
It is important to avoid excessive heat build up in the base material. High heat input welds and interpass temperatures above 260°C should be avoided as this can cause embrittlement.
There is no definite limitation to the number of passes that may be deposited, however, it is good practise to peen each pass immediately after welding to minimise internal stresses and possible distortion and cracking.
Wearshield 15CrMn deposits workharden rapidly making them difficult to machine. For best results carbide or ceramic cutting tools and rigid tooling should be used. Grinding can also be successfully employed.
For applications involving severe impact and abrasion, a buildup of Wearshield 15CrMn coupled with a single pass of Wearshield 60 or Lincore 60-O should be employed.
The Wearshield 15CrMn deposit can not be cut using the Oxy-fuel process due to the high chromium content, however, plasma arc and air carbon arc processes are appropriate.

Welding positions

ISO/ASME	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr
0.35	14.0	0.6	15.0

Structure

In the as deposited condition, the microstructure consists of a soft manganese alloy austenite which rapidly work hardens under impact loading.

Calculation data

Sizes Diam. x length (mm)	Current range (A)
3.2 x 355	140 - 160
4.0 x 355	190 - 210
4.8 x 355	220 - 250

Complementary products

Complementary products include Lincore® 15CrMn

Wearshield® MM 40

Hardfacing electrode

Classification

DIN 8555 : E1-UM-400-G*
EN 14700 : E Fe1

* Nearest classification

General description

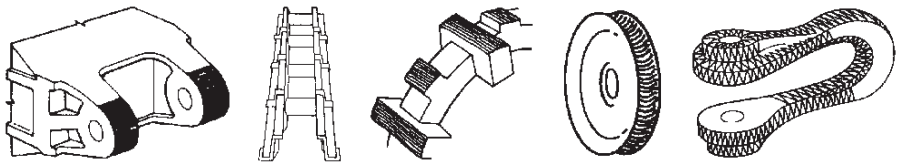
An all position rutile/basic coated electrode that produces a machinable martensitic deposit
Designed for operator appeal and weld quality having excellent arc characteristics
Good restriking and low spatter
The electrode can be used with the drag or contact welding technique as well as out of position

Application

Wearshield MM 40 produces a crack-free wear resistant deposit with a hardness of 42-45 HRc depending on upon material dilution and number of layers. It is particularly suitable for APLs involving sliding, rolling and metal to metal wear, combined with resistance to mild abrasion.

Typical applications include:

Buckets links, bucket bases
Guide rolls
Tractor rolls
Crane wheels



Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	39-42 HRc (360-400 HB)
2 Layers	40-45 HRc (375-425 HB)
3 Layers	42-45 HRc (400-425 HB)

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	450
Unit: Box	Pieces / unit	66	43	22
	Net weight/unit (kg)	2.5	2.5	2.5

Identification	Imprint: WEARSHIELD MM40	Tip Color: red	**Wearshield® MM 40: rev. EN 22**

Wearshield® MM 40

Additional information

When welding with Wearshield MM40 the bead width should be limited to 12 - 20mm for all electrode diameters when using a weaving technique. For edge and corner build-up narrow stringer beads are preferred.
A preheat between 150-250°C is necessary to prevent cracking in situations of high restraint and/or heavy thicknesses.
The deposited weld metal is machinable, therefore, tempering and annealing are not generally necessary but may be carried out to decrease hardness and increase toughness. Annealing at 760°C for several hours and slow cooling followed by tempering at 520°C will reduce the hardness. This deposit can subsequently be flame hardened or furnace hardened.
The build up is usually limited to 4 layers.

Welding positions

ISO/ASME PA/1G PC/2G PF/5Gup

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo
0.2	0.5	1.3	3.4	0.5

Structure

In the as welded condition the microstructure consists mainly of martensite

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
3.2 x 350	90 - 130	DC+	71	175	1.3	38.6	41	1.57
4.0 x 350	140 - 180	DC+	83	312	1.5	56.6	28	1.61
5.0 x 450	170 - 220	DC+	108	640	2.5	114.1	13	1.50

Complementary products

Complementary products include Lincore® 40-0

Hardfacing electrode

Classification

DIN 8555 : E2-UM-55-G*
EN 14700 : E Fe2

* Nearest classification

General description

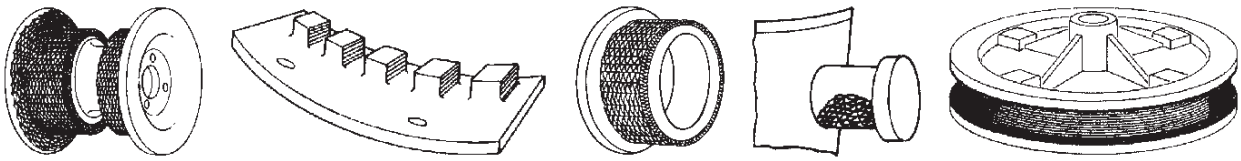
An all position rutile/basic coated electrode that produces a high carbon heat treatable martensitic deposit
Designed for operator appeal and weld quality
Excellent arc characteristics, good restriking and low spatter
The electrode can be used with the drag or contact welding technique as well as out of position

Application

Wearshield MM produces a crack-free wear resistant deposit with a hardness of 55-57 Rc depending on dilution and number of layers. It is particularly suitable for APLs involving sliding, rolling and metal to metal wear, combined with resistance to mild abrasion.

Typical applications include:

Crane and mine car wheels
Sprockets and gear teeth
Skip guides
Dredger buckets
Scrapper blades
Transfer tables
Cable sheaves



Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	45-55 HRc
2 Layers	52-57 HRc

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0	6.0
	Length (mm)	350	350	450	450
Unit: Box	Pieces / unit	66	45	22	-
	Net weight/unit (kg)	2.5	2.5	2.5	2.5
Unit: Linc Pack	Pieces / unit	26	18		
	Net weight/unit (kg)	1.0	1.0		

Identification Imprint: WEARSHIELD MM Tip Color: purple

Wearshield® MM: rev. EN 22

Wearshield® MM

Additional information

When welding with Wearshield MM the bead width should be limited to 12 - 20mm for all electrode diameters when using a weaving technique. For edge and corner buildup narrow stringer beads are preferred.
A preheat between 200-350°C is necessary to prevent cracking with interpass temperatures of up to 400°C in situations of high restraint and/or heavy thicknesses. After welding the component should be covered and slowly cooled.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
The deposit can be tempered at about 425°C to toughen the weld metal resulting in a hardness of approximately 50 HRc. Annealing at 760°C for several hours and slow cooling will reduce the hardness to approximately 30 HRc. This deposit can be readily machined.
Rehardening is archieved by heating to about 950°C for several hours to dissolve all carbides and homogenise the structure, followed by either water or oil quench (thin sections may be air cooled). After quenching the component should be tempered.
Flame hardening is also possible after annealing, although full hardness may not be archieved due to the inability to homogenize the steel in the short heating cycle.
The build up is usually limited to 4 layers.

Welding positions

ISO/ASME	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PF/5Gup

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	W
0.55	0.5	1.5	4.5	0.5	0.5

Structure

In the as welded condition the microstructure consists mainly of martensite with carbides.

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
3.2 x 350	90 - 130	DC+	75	186	1.2	39.0	42	1.62
4.0 x 350	140 - 180	DC+	87	343	1.4	55.8	30	1.65
5.0 x 450	170 - 220	DC+	112	516	2.3	115.2	14	1.62
6.0 x 450	230 - 270	DC+						

Complementary products

Complementary products include Lincore® 55

Hardfacing electrode

Classification

AWS A5.13	: E Fe6*
DIN 8555	: E4-UM-60-SZ
EN 14700	: E Fe4

* Nearest classification

General description

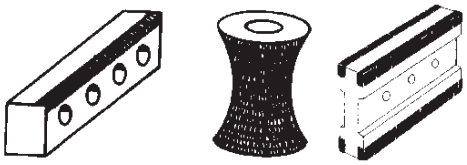
A basic coated electrode that produces a high speed steel deposit similar to M-1 tool steel
The deposited weld metal is air hardening
Designed for operator appeal and weld quality
Excellent arc characteristics, good restriking and low spatter
The electrode coating permits the use of the drag or contact welding technique

Application

Wearshield T & D produces a crack-free wear resistant tool steel deposit with a hardness of 58-62 HRc. This hardness can be further increased to between 63-65HRc after tempering (540-600°C). It is particularly suitable for APLs involving severe metal to metal wear coupled with elevated temperatures (up to 540°C). Ideally suited to the buildup of worn steel dies, cutting tools or the APL of wear resistant surfaces to carbon and low alloy steels.

Typical applications include:

Punch and forging dies
Shear blades
Trimmers
Cutting tools



Mechanical properties, typical, all weld metal

	Typical hardness values
As Welded	58-62 HRc
Tempered at 540-600°C	63-65 HRc

Welded on Mild Steel Plate (12mm)

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	350	350	350
Unit: Box	Pieces / unit	85	56	35
	Net weight/unit (kg)	2.5	2.5	2.5

Identification	Imprint: WEARSHIELD T&D	Tip Color: none	**Wearshield® T&D: rev. EN 22**

Additional information

When welding with Wearshield T & D the weld width should be limited to between 12 - 25mm for all electrode diameters when employing a weaving technique. For edge and corner buildup narrow stringer beads are preferred.
A preheat and interpass temperature of 325°C, or higher (up to 540°C), is necessary to avoid cracking. It is important to ensure that an adequate “soak” is achieved prior to the welding operation. After welding, the component should be covered and slow cooled down to room temperature. Once cooled, the deposited weldment should be post weld heat treated to temper the martensite and toughen the deposit. Tempering at 540-600°C normally produces the optium combination of hardness and toughness.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
Annealing at 850°C for several hours and slow cooling will reduce the hardness to approximately 30 HRc. This deposit can be readily machined. Rehardening is achieved by heating to about 1200°C for several hours to dissolve all carbides and homogenise the steel, followed by air cooling and tempering (540-600°C).
The deposit thickness is usually limited to 4 layers.
Wearshield T & D cannot be cut by the oxy-fuel processes. Plasma arc and air-carbon arc processes can be used to both cut an gouge the weld deposit. Preheat temperature similar to those for welding may be necessary to prevent cracking along the cut edge.

Welding positions

ISO/ASME PA/1G

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	W	V
0.65	0.4	0.7	4	6.0	1.8	1.1

Structure

In the as welded condition the microstructure consists mainly of martensite with some carbides.

After tempering the microstructure consists of tempered martensite with secondary carbides

Calculation data

Sizes Diam. x length (mm)	Current range (A)
3.2 x 350	80 - 100
4.0 x 350	110 - 130
5.0 x 350	130 - 160

Complementary products

Complementary products include Lincore® T&D

Wearshield® MI (e)

Hardfacing electrode

Classification

AWS A5.13 : E Fe6
DIN 8555 : E6-UM-60-GPS
EN 14700 : E Fe6

General description

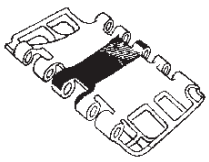
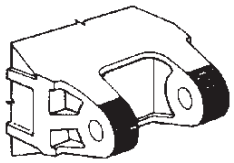
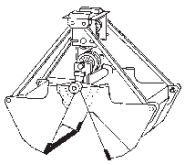
A basic coated electrode that produces a martensitic deposit with a considerable amount of retained austenite
Designed for operator appeal and weld quality
Excellent arc characteristics, good restriking and low spatter

Application

Wearshield MI produces a wear resistant martensite/austenite deposit with a hardness of 45-58 HRc. It can be used to surface a variety of carbon, carbon manganese and alloy steels. The martensite/austenite deposit makes Wearshield MI particularly suitable for APLs involving impact, metal to metal wear and mild abrasion such as by limestone. This deposit tends to cross check.

Typical applications include:

Dipper lips
Construction equipment
Earth moving equipment
Rock crushers
Hammer mills
Conveyor screws
Ditcher teeth
Agricultural equipment

Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	45-55 HRc
2 Layers	50-58 HRc

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0	5.0
	Length (mm)	350	350	350	450
Unit: Box	Pieces / unit	117	69	38	25
	Net weight/unit (kg)	2.5	2.5	2.5	2.5

Identification Imprint: WEARSHIELD MI (E) Tip Color: violet

Wearshield® MI (e): rev. EN 22

Wearshield® MI (e)

Additional information

A preheat and interpass temperature of over 200°C is preferred to help reduce check cracking and avoid chipping and fragmentation.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
The Wearshield MI deposit tends to cross check and is therefore usually limited to 2 layers to avoid chipping and fragmentation.
Wearshield MI cannot be cut by the oxy-fuel processes. Plasma arc and air-carbon arc processes can be used to both cut and gouge the weld deposit.

SMAW

Welding positions

ISO/ASME	PA/1G	PB/2F	PC/2G	PF/3Gup	PE/4G	PF/5Gup

Current type

AC / DC -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr
0.5	0.4	1.8	9

Structure

In the as welded condition the microstructure consists of a mixed structure of martensite and austenite.

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate - per electrode at max. current - H(kg/h)
2.5 x 350	60 _ 70	AC/DC E-	-	-	7.6
3.2 x 350	70 _ 120	AC/DC E-	-	-	1.10
4.0 x 450	110 _ 150	AC/DC E-	-	-	1.45
5.0 x 450	150 - 200	AC/DC E-	-	-	2.00

Complementary products

Solid wire LNM 420 FM.

Wearshield® ABR

Hardfacing electrode

Classification

DIN 8555 : E10-UM-50-GPZ
EN 14700 : E Fe6

General description

A graphite coated electrode that produces a primary austenite and austenite-eutectic weld deposit.
Wearshield ABR is the most versatile product within the Wearshield range
Good resistance to both abrasion and impact, as well as hot-forging properties

Application

Wearshield ABR produces an abrasion and impact resistant deposit with a hardness of 28-55HRc depending on base metal chemistry, dilution and number of layers. The combination of abrasion and impact resistance coupled with hot forging properties makes Wearshield ABR particularly suitable for APLs involving transportation of abrasive media under heavy variable loading. Wearshield ABR is also suitable for metal to metal wear APLs.

Typical applications include:

Dipper and dredge cutter teeth
Rock crusher hammers and mill hammers
Rock crushers and crusher mantles
Screw flights
Coal mining cutters
Conveyor buckets and rolls
Plough shares, scrapper blades and cultivator sweeps
Truck chain and gears

Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	24-53 HRc
2 Layers	28-53 HRc
3 Layers	28-55 HRc

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	54	4.0	4.8
	Length (mm)	355	355	355
Unit: Box	Pieces / unit	85	54	38
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD ABR Tip Color: none

Wearshield® ABR: rev. EN 22

Wearshield® ABR

Additional information

When welding with Wearshield ABR a short arc should be employed. The weld width should be limited to between 12-20mm for all electrode diameters when employing a weaving technique. For edge and corner build up narrow stringer beads are preferred.
Preheat is not necessary when surfacing austenitic substrates such as stainless and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels. For low alloy and carbon steels a preheat of 200°C is usually sufficient, but is dependent on material thickness and chemistry. For optimum abrasion resistance the interpass temperature should be limited to 320°C.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
To obtain a deposit that can be machined by carbide cutting tools, the component should be heated to 750°C for one hour followed by air cooling to room temperature. For maximum machinability the component should be heated to 875-900°C for one hour, furnace cooled to 650°C at a rate not exceeding 10°C per hour, followed by furnace or air cooling to room temperature. The abrasion resistance can be restored by heating to 800°C, quenching and tempering at 200°C.
The deposit thickness is usually limited to 2 layers.
For applications requiring thicker deposits, an intermediate layer of an austenitic material such as Wearshield 15CrMn should be used and each layer peened to relieve residual stresses.
For maximum resistance to spalling one or more layers of Wearshield 15CrMn should be used as buildup.
There is no flux cored equivalent to Wearshield ABR.

Welding positions

ISO/ASME	PA/1G	PC/2G	PF/3Gup	PE/4G

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo
2.1	1.1	0.75	6.5	0.40

Structure

In the as welded condition the microstructure consists of primary austenite and a eutectic of austenite plus carbides.

Calculation data

Sizes Diam. x length (mm)	Current range (A)
3.2 x 355	40 - 150
4.0 x 355	75 - 200
5.0 x 355	110 - 250

Complementary products

The closest product is Lincore® 50, however, the deposit varies significantly to Wearshield ABR.

Wearshield® 44

Hardfacing electrode

Classification

DIN 8555 : E10-UM-45-GPZ
EN 14700 : E Fe14

General description

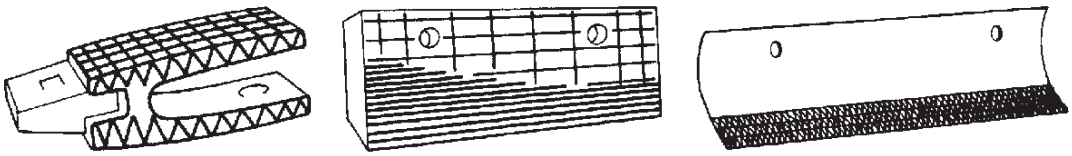
A heavy coated rutile electrode that produces a primary austenite-chrome carbide eutectic weld deposit
Designed for operator appeal and weld quality
Excellent arc characteristics, good restriking, complete slag coverage and low spatter
The electrode coating permits the use of the drag or contact welding technique

Application

Wearshield 44 produces an abrasion and impact resistant deposit with a hardness of 42-48HRc.
The intended use of Wearshield 44 is to provide a combination of abrasion and impact resistance at service temperatures up to 600°C.

Typical applications include:

Ingot tongs
Scrapper blades
Rolling mill guides
Screw flights
Coal mining chutes
Plough shares, scrapper blades and cultivator sweeps
Pulleys and chain links



Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	42 HRc
2 Layers	49 HRc
3 Layers	48 HRc

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	3.2	4.0	4.8
	Length (mm)	355	355	355
Unit: Box	Pieces / unit	59	-	2.7
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD 44 Tip Color: none

Wearshield® 44: rev. EN 22

Wearshield® 44

Additional information

When welding with Wearshield 44 the bead width should be limited to 12-20mm for all electrode diameters when employing a weaving technique. For edge and corner build up narrow stringer beads are preferred.
Preheating is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels. For low alloy and carbon steels a preheat of 200°C is usually sufficient, but is dependent on base material thickness and chemistry.
The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.
The build up is usually limited to 2-3 layers.
Wearshield 44 can be deposited on small components without check cracking, however, check cracking may not be preventable on larger sections.
Wearshield 44 may also be used to overlay cast irons, however, this is not possible without check cracking. To minimise the risk of spalling, closely spaced check cracks are preferred. These are obtained by employing stringer bead welding procedures.

Welding positions

ISO/ASME	PA/1G	PC/2G

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo
2.0	0.16	0.9	24.2	2.5

Structure

In the as welded condition the microstructure consists of primary austenite with an interdendritic eutectic of austenite and chromium carbides

Calculation data

Sizes Diam. x length (mm)	Current range (A)
3.2 x 355	120-160
4.0 x 355	150 - 220
4.8 x 355	190 - 270

Complementary products

There is no flux cored equivalent to Wearshield 44. The closest product is Lincore® 50, however, the deposit varies significantly to Wearshield 44.

Wearshield® ME (e)

Hardfacing electrode

Classification

DIN 8555 : E10-UM-60-GRZ
EN 14700 : E Fe14

General description

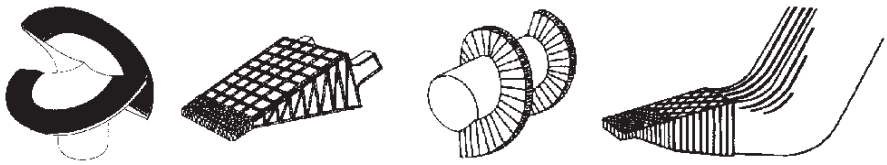
A heavily coated rutile electrode that produces a near eutectic mix of chromium carbides and austenite, with limited primary carbides weld deposit 170% recovery. Designed for operator appeal and weld quality having excellent arc characteristics, good restriking, complete slag coverage and low spatter levels. The electrode coating permits the use of a light drag or contact welding technique

Application

Wearshield ME produces an abrasion resistant deposit with a hardness range of 55-60HRc.
The intended use of Wearshield ME is to provide a combination of abrasion and impact resistance at service temperatures up to 600°C.

Typical applications include:

Ingot tongs
Scrapper blades
Rolling mill guides
Screw flights
Coal mining chutes
Plough shares, scrapper blades and cultivator sweeps
Pulleys and chain links



Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	55 HRc
2 Layers	60 HRc

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	450	450	450
Unit: Box	Pieces / unit	37	23	15
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD ME (E) Tip Color: violet

Wearshield® ME (e): rev. EN 22

Wearshield® ME (e)

Additional information

When welding with Wearshield ME the weld width should be limited to 20mm. Since wide weaves generally increase the check crack spacing which can result in deposit spalling on multiple layers. For edge, corner and general buildup, narrow stringer beads are preferred. Wearshield ME generally check cracks except for single layers on thin base material. Stringer beads tend to produce a consistent crack spacing of between 12-25mm.

Preheat is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels, For low alloy and carbon steels a preheat of 200°C is usually sufficient, but is dependent on base material thickness and chemistry. The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.

The deposit thickness is usually limited to 2-3 layers to avoid spalling.

To minimise the risk of spalling, stringer beads should be employed to produce closely spaced check cracks.

The resultant weld metal microstructure is determined by the level of dilution and base material chemistry. Low dilution welds on carbon and low alloy steels results in a microstructure that is a near eutectic mix of chromium carbides and austenite, with limited primary carbides. High dilution weld deposit produce a microstructure of primary austenite and eutectic resulting in higher toughness and lower abrasion resistance.

For maximum spalling resistance on carbon and low alloy steels, a buffer layer of Wearshield MM 40 or Arosta 307-160 should be applied prior to the Wearshield ME.

Welding positions

ISO/ASME PA/1G PB/2F

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Cr	Si
3	33	1.0

Structure

In the as welded condition the microstructure consists of a near eutectic mix of chromium carbides and austenite, with limited primary carbides

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate - per electrode at max. current - H(kg/h)
3.2 x 450	100 - 140	DC+	-	-	1.15
4.0 x 450	130 - 190	DC+	-	-	1.70
5.0 x 450	160 - 260	DC+	-	-	2.25

Complementary products

There is no flux cored equivalent to Wearshield ME. The closest product is Lincore® 60-O, however, the deposit varies significantly to Wearshield ME.

Wearshield® 50MC

Hardfacing electrode

Classification

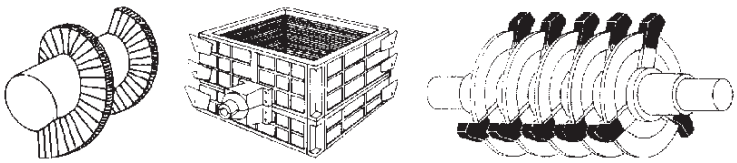
DIN 8555 : E10-UM-65-GRZ
EN 14700 : E Fe16

General description

Basic coated electrode for hardfacing with an efficiency of about 200%
Extreme resistance against abrasion up to temperatures of 700°C

Application

Typical APLs include:
Ore-crushers, ore chutes, hot slag crushers, dragline teeth, diggers, etc.



Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer Welded on Mild Steel Plate	62-67 HRc

Packaging and available sizes

	Diameter (mm)	3.2	4.0
	Length (mm)	350	350
Unit: Box	Pieces / unit	41	27
	Net weight/unit (kg)	2.5	2.5

Identification Imprint: WEARSHIELD 50 MC Tip Color: white

Wearshield® 50MC

Additional information

By preference, weld under inclined angle of 20 degrees.
Weave during welding in a width of approx. 50 mm.
During solidification small cracks will occur.
These cracks, however, will have no detrimental effect on the weld metal properties regarding its abrasive wear resistance.
A maximum of two layers should be applied to prevent the weld from braking out.

Welding positions

ISO/ASME PA/1G PF/3Gup

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Cr	Nb	W	V	Si	B
5	2	21	6.4	3.1	0.7	2.1	0.8

Structure

Supereutectic + primary carbides.

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
3.2 x 350	120 - 160	DC+	156	699	1.28	67	18	1.21
4.0 x 350	160 - 200	DC+	172	1011	1.50	100	14	1.40

Complementary products

Complementary products include Lincore® 65-O.
There is no flux cored equivalent to Wearshield 50MC. The closest product is Lincore® 65-O, however, the deposit varies significantly to Wearshield 50MC.

Wearshield® 60 (e)

Hardfacing electrode

Classification

DIN 8555 : E10-UM-60-GR
EN 14700 : E Fe15

General description

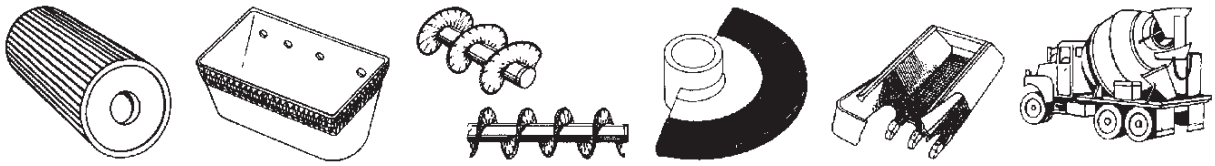
A basic coated downhand 200% recovery electrode that produces a primary carbide weld deposit. The electrode coating facilitates easy arc control and arc visibility whilst maintaining a short arc

Application

Wearshield 60 produces an primary carbide deposit with a hardness range of 60-62 HRc.
The primary carbide microstructure makes Wearshield 60 ideally suitable for APLs of severe abrasion

Typical applications include:

Crusher rolls, plates and jaws
Conveyor screws and sleaves
Shovel lips
Brick & coke machinery
Cement mill parts



Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	57-60 HRc
2 Layers	60-62 HRc

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	3.2	4.0
	Length (mm)	450	450
Unit: Box	Pieces / unit	37	23
	Net weight/unit (kg)	2.5	2.5

Identification	Imprint: WEARSHIELD 60 (E)	Tip Color: Violet	**Wearshield® 60 (e): rev. EN 22**

Wearshield® 60 (e)

Additional information

When welding with Wearshield 60 stringer beads should be employed. Weaving is not advised since wide weaves generally increase the check crack spacing which can result in deposit spalling.
The as-welded deposit readily check cracks.
Preheat is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels.
The deposited weld metal is not machinable.
The deposit thickness is usually limited to 2 layers.
For applications requiring build-ups in excess of 2 layers, buttering layers of Arosta 307-160, Wearshield BU30 or Wearshield Mangjet (manganese steels) should be used prior to Wearshield 60. Alternatively, a preheat of 650°C can be used to eliminate the formation of check cracks.
Alternatively, a preheat of 650°C can be used to eliminate the formation of check cracks.

Welding positions

ISO/ASME PA/1G PB/2F

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Cr	Si
5	35	4

Structure

In the as welded condition the microstructure consists of primary chromium carbides in an austenite - carbide eutectic matrix

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate - per electrode at max. current - H(kg/h)
3.2 x 450	110 - 150	DC+	-	-	1.75
4.0 x 450	140 - 180	DC+	-	-	2.20

Complementary products

Complementary products include Lincore® 60-O and Lincore® 60-S with flux 801 or 802

Hardfacing electrode

Classification

DIN 8555 : E10-UM-65-GRZ
EN 14700 : E Fe16

General description

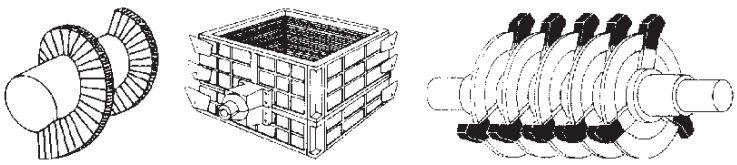
A highly alloyed basic-graphite coated downhand hardfacing electrode that produces a "premium" carbide weld deposit. The electrode facilitates easy arc control whilst maintaining a long arc. Recovery 240%.

Application

Wearshield 70 produces a "premium" carbide weld deposit with a hardness range of 68-70HRc.
The premium carbide microstructure makes Wearshield 70 ideally suitable for APLs of high stress abrasion (crushing of abrasive particles), severe abrasion and abrasion at elevated temperatures (>760°C)

Typical applications include:

Blast furnace bells (burden area)
Hoppers and screens
Sinter plants
Cement mill parts



Mechanical properties, typical, all weld metal

	Typical hardness values
1 Layer	68-70 HRc

Welded on Mild Steel Plate

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	350
Unit: Box	Pieces / unit	28	18	12
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD 70 Tip Color: violet

Wearshield® 70: rev. EN 22

Wearshield® 70

Additional information

When welding with Wearshield 70 stringer beads are preferred, although weld widths up to 50mm by weaving are acceptable. A short welding arc is preferred and the drag technique is not recommended.
In the as welded condition readily check cracks and the spacings between the cracks are small even at slow travel speeds
Preheat is not necessary when surfacing austenitic substrates such as stainless steels and manganese steels, although the interpass temperature should be limited to about 260°C for manganese steels.
The deposited weld metal is not machinable or forgeable.
The deposit thickness is usually limited to 2 layers.
Optimum spalling resistance is achieved using austenitic substrates. For service conditions below 260°C an austenitic manganese substrate is preferred.
For high temperature applications >260°C, an austenitic stainless steel substrate should be used. (i.e. Arosta 307-160)
Wearshield 70 will perform standard primary carbide electrodes (such as Wearshield 60) under either low stress or high temperature abrasion conditions.

Welding positions

ISO/ASME PA/1G PB/2F

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Cr	Nb	Mo	W	Si
4.2	18	9	8.5	7	2.7

Structure

The microstructure consists mainly of primary chromium carbides with premium carbides of molybdenum, niobium, tungsten and vanadium in an austenite - carbide eutectic matrix

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
3.2 x 350	120 - 160	AC	156	699	1.28	67	18	1.21
4.0 x 350	180 - 220	AC	172	1011	1.50	100	14	1.40
5.0 x 350	230 - 300	AC	194	1630	2.06	155	9	1.39

Complementary products

Complementary products include Lincore® 65-O.
There is no flux cored equivalent to Wearshield 70. The closest product is Lincore® 65-O, however, the deposit varies significantly to Wearshield 70.

Wearshield® 420

Hardfacing electrode

Classification

DIN 8555 : E6-UM-55-RZ
EN 14700 : E Fe8

General description

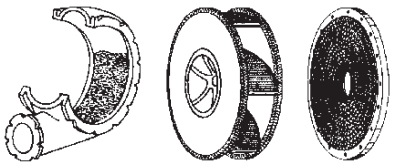
Heavily coated electrode that produces a martensitic deposit similar to AISI 420 stainless steel. Designed for operator appeal and weld quality having excellent arc characteristics, good restriking and low spatter levels. The electrode coating permits the use of the drag or contact welding technique as well as positional welding if required.

Application

Wearshield 420 electrodes are intended to provide abrasion resistance under conditions of high corrosion, abrasion and impact.
The electrode can be used on carbon steels, low alloy steel and martensitic steel.

Typical applications include:

Sand pumps
Dredging equipment
Fans
Valve seats in steam and liquid pipes



Mechanical properties, typical, all weld metal

Typical hardness values: 55 HRc (560HB)

Packaging and available sizes

	Diameter (mm)	3.2	4.0	5.0
	Length (mm)	350	350	450
Unit: Box	Pieces / unit	51	36	22
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: WEARSHIELD 420 Tip Color: brown

Wearshield® 420: rev. EN 22

Wearshield® 420

Additional information

All work-hardened base material and previously deposited hardfacing material should be removed prior to applying a new deposit, since such areas are prone to embrittlement and possible cracking. Areas that contain irregularaties such as cracks and deep gouges can be repaired locally using Wearshield BU30 or Wearshield 15CrMn prior to hardfacing with Wearshield 420.
Preheat would be needed if the welding is done over either highly restrained material or martensitic stainless base metal.
Preheat would be needed if the welding is done over either highly restrained material or martensitic stainless base metal.
A preheat and interpass temperature in the range of 200-300°C can be used depending on the nature of the material to be welded.
Under conditions of low dilution, the microstructure is similar to that of AISI 420 martensitic stainless steel. This structure provides good abrasion resistance under conditions of severe corrosion and high impact. At higher dilutions, when overlaid on mild steel or low alloy steel, the weld metal microstructure will retain it's martensitic stainless structure. But the reduced chromium level might adversely affect the corrosion resistance of the deposit.

Welding positions

ISO/ASME PA/1G PC/2G PF/3Gup PE/4G

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Mn	Si	Cr	Mo	Ti
0.5	0.3	0.4	12.4	0.4	1.3

Structure

Ferrite and martensite

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy - per electrode at max. current - E(kJ)	Dep.rate - per electrode at max. current - H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
3.2 x 350	90 - 130	AC	83	324	1.08	45	40	1.80
4.0 x 350	120 - 170	AC	102	522	1.36	67	26	1.74
5.0 x 450	170 - 220	AC						

Complementary products

Complementary products include Lincore® 420

Wearshield® 34

Repair electrode

Classification

AWS A5.11M : ENiCrMo-5*
DIN 8555-83 : E23-UM-200-CKPTZ

* Nearest classification

General description

Rutile coated stick electrode - weld deposit rate 170% - for hardfacings on machine components and tools subjected to corrosion and heat.
Weld metal comprises low iron nickel-chromium-molybdenum-tungsten-alloy.
Smooth stable arc.
Low dilution with the parent material.
Slag easily removable.

Welding positions

ISO/ASME PA/1G PB/2F

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Si	Mn	Cr	Mo	W	Fe	Ni
0.02	0.9	0.9	16	17	4.0	6.5	balance

Mechanical properties, typical, all weld metal

	Typical hardness values
As deposited	225 HB
Work hardened	400 HB

Packaging and available sizes

	Diameter (mm)	3.2
	Length (mm)	350
Unit: PE tube	Pieces / unit	40
	Net weight/unit (kg)	2.5

Identification Imprint: WEARSHIELD 34 Tip Color: violet

Wearshield® 34: rev. EN 01

Materials to be welded

Hardfacings on new or damaged hot working tools, such as: forging dies, forging saddles, hot-shearing blades, hot-trimming

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
3.2 x 350	110-140	-	-	-	-	59	-	-

* stub end 35mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G
3.2	120

Remarks/ Application advice

In the case of great hardfacing thicknesses, fill beforehand, e.g. with Limarosta 312. Heat up to 300°C with components made from parent materials susceptible to cracking

Untreated weld metal machinable

RepTec Cast 1

Repair electrode

Classification

AWS A5.15 : ENi-CI
ISO 1071 : E C Ni-CI 1

General description

Ni-electrode for repair welding of lamellar cast iron, malleable cast iron and cast iron to steel
Produces a soft malleable weld deposit
Hardness weld deposit ~ 175 HB
Preferable welding on DC-, gives pulsed arc welding, deep penetration, smooth surface, no lack of fusion
Welding on AC, lowest heat input, important at filling
Best choice for multilayer welding

Welding positions

ISO/ASME	PA/1G	PB/2F	PC/2G	PF/3Gup	PG/3Gdown	PE/4G	PF/5Gup	PG/5Gdown

Current type

AC / DC + / -

Chemical composition (w%), typical, all weld metal

C	Fe	Ni
0.7	2.0	97

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm^2)	Tensile strength (N/mm^2)	Elongation (%)	Hardness HB10
Required: AWS A5.15		262-414	276-448	03-6	135-218
ISO 1071		200	250	3	
Typical values	AW	270	445	8	175

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	350	400
Unit: PE tube	Pieces / unit	146	76	44
	Net weight/unit (kg)	2.5	2.5	2.5
Unit: Linc Pack	Pieces / unit	58	30	18
	Net weight/unit (kg)	1.0	1.0	1.0

Identification Imprint: REPTEC CAST 1 Tip Color: black

RepTec Cast 1: rev. EN 21

Materials to be welded

Steel grades	DIN1691	DIN 1692	DIN 1693
For welding and repair			
	GG 10	GTS-35-10	G GG-40
	GG 15	GTS-45-06	G GG-50
	GG 20	GTS-55-4	G GG-60
	GG 25	GTW-35-04	
	GG 30	GTW-40-05	
	GG 35	GTW-45-07	
		GTW-S-38-12	

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
2.5 x 300	50 - 100	DC-	176	268	0.24	19.1	84	1.61
3.2 x 350	70 - 130	DC-	145	303	0.48	32.6	52	1.52
4.0 x 400	90 - 150	DC-	262	647	0.55	56.7	25	1.41

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
2.5	70A	70A	70A	70A	70A
3.2	100A	100A	100A	80A	80A
4.0	120A	120A	120A	110A	110A

Remarks/ Application advice

Residual stresses are decreased by peening after each layer
Cold welding, interpass temperature (Ti<100°C)
Heavy parts preheat (to max. 300°C)

RepTec Cast 3

Repair electrode

Classification

AWS A5.5 : ENiFe-CI
ISO 1071 : E C NiFe-CI 1

General description

Basic graphite coated stick electrode with nickel iron core for cold welding of cast iron, malleable cast iron and joint welding to steel
Specially developed for good peen- and machinable seams e.g. for thick joints
In order to introduce as little heat into the work piece as possible, it is advisable to weld with DC positive

Welding positions

ISO/ASME	PA/1G	PB/2F	PC/2G	PF/3Gup	PG/3Gdown	PE/4G

Current type

AC / DC +

Chemical composition (w%), typical, all weld metal

C	Fe	Ni
0.6	40	balance

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB10
Required: AWS A5.15		296-434	400-579	6-18	165-218
ISO 1071		250	350	6	
Typical values	AW	300	460	10	175

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	300	350
Unit: PE tube	Pieces / unit	155	95	54
	Net weight/unit (kg)	2.5	2.5	2.5

Identification Imprint: REPTEC CAST 3 Tip Color: black

RepTec Cast 3: rev. EN 21

RepTec Cast 3

Materials to be welded

Steel grades	DIN 1691	DIN 1692	DIN 1693
For welding and repair			
	GG-10	GTS-35	G GG-40
	GG-15	GTS-45	G GG-50
	GG-20	GTS-55	G GG-60
	GG-25	GTW-35	G GG-70
	GG-30	GTW-40	G GG-80
	GG-35	GTW-45	
	GG-40	GTW-S-38	

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
2.5 x 300	50 - 70	AC	58	106	0.76	15.9	82	1.3
3.2 x 300	70 - 90	AC	69	161	1.24	30.8	42	1.3
3.2 x 350	70 - 90							
4.0 x 350	100 - 120	AC	75	234	1.78	46.2	27	1.2
4.0 x 400	100 - 120							

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
2.5	60A	60A	60A	60A	70A
3.2	80A	80A	80A	75A	80A
4.0	110A	110A	110A	105A	110A

Remarks/ Application advice

Welding of short beads is recommendable.
Peening (with a ball hammer) immediately after welding eliminates shrinkage stresses.
Perlitic cast iron often needs 200°C preheating.

RepTec Cast 31

Repair electrode

Classification

AWS A5.15 : ENiFe-CI
ISO 1071 : E C NiFe-CI 1

General description

Electrode for repair welding of cast iron, malleable cast iron and cast iron to steel
The nickel-iron weld deposit is easily machineable
Particularly applicable for nodular cast iron
Hardness weld deposit ~ 180 HB
Excellent current carrying capacity due to bi-metal core wire
Welding on AC and DC- polarity
Best choice welding DC -

Welding positions

ISO/ASME	PA/1G	PB/2F	PC/2G	PF/3Gup	PG/3Gdown	PE/4G	PF/5Gup	PG/5Gdown

Current type

AC / DC -

Chemical composition (w%), typical, all weld metal

C	Fe	Ni
0.7	45	balance

Mechanical properties, typical, all weld metal

	Condition	0.2% Proof strength (N/mm²)	Tensile strength (N/mm²)	Elongation (%)	Hardness HB10
Required: AWS A5.15		296-434	400-579	6-18	165-218
ISO 1071		250	350	6	
Typical values	AW	300	460	12	180

Packaging and available sizes

	Diameter (mm)	2.5	3.2	4.0
	Length (mm)	300	350	400
Unit: PE tube	Pieces / unit	154	82	47
	Net weight/unit (kg)	2.5	2.5	2.5
Unit: Linc Pack	Pieces / unit	62	33	19
	Net weight/unit (kg)	1.0	1.0	1.0

Identification Imprint: REPTEC CAST 31 Tip Color: black

RepTec Cast 31: rev. EN 21

RepTec Cast 31

Materials to be welded

Steel grades	DIN 1691	DIN 1692	DIN 1693
For welding and repair			
	GG10	GTS-35-10	G GG-40
	GG15	GTS-45-06	G GG-50
	GG20	GTS-55-4	G GG-60
	GG25	GTW-35-04	
	GG30	GTW-40-05	
	GG35	GTW-45-07	
		GTW-S-38-12	

Calculation data

Sizes Diam. x length (mm)	Current range (A)	Current type	Arc time - per electrode at max. current - (s)*	Energy E(kJ)	Dep.rate H(kg/h)	Weight/ 1000 pcs. (kg)	Electrodes/ kg weldmetal B	kg Electrodes/ kg weldmetal 1/N
2.5 x 300	70 - 100	DC-	124	211	0.32	19.1	91	1.72
3.2 x 350	90 - 150	DC-	123	328	0.62	29.4	47	1.37
4.0 x 400	100 - 180	DC-	168	714	0.74	55.7	30	1.45

* stub end 35 mm

Welding parameters, optimum fill passes

Welding positions Diameter (mm)	PA/1G	PB/2F	PC/2G	PF/3G up	PE/4G
2.5	80A	80A	80A	80A	80A
3.2	110A	110A	110A	110A	110A
4.0	150A	160A	160A	150A	150A

Remarks/ Application advice

Residual stresses are decreased by peening after each layer
Cold welding, interpass temperature (Ti<100°C)
Heavy parts preheat (to max. 300°C)