

Hardfacing cored wire

Classification

DIN 8555 : MF1-GF-350-GPS
EN 14700 : T Fe 1

General description

Lincore 33 is a self shielded, open arc, flux cored tubular electrode designed primarily for the build-up of steel parts or as a buttering layer prior to hardfacing. Arc characteristics are excellent producing a soft low penetration arc (ideal for build-up) that exhibits low spatter levels and excellent slag removal. Although, Lincore 33 is primarily designed for the open arc operation, it may be used under a neutral flux for conditions requiring spatter elimination and removal of arc glare

Application

Lincore 33 produces a crack-free wear resistant deposit with a hardness range of 25-35 HRc depending on material dilution and number of layers. Designed primarily as a final overlay on steel parts which need to be machined or as a build-up layer of other hardfacing materials. It is particularly suitable of conditions of moderate abrasion and friction, coupled with resistance to impact such as APLs involving rolling, sliding and metal to metal wear.

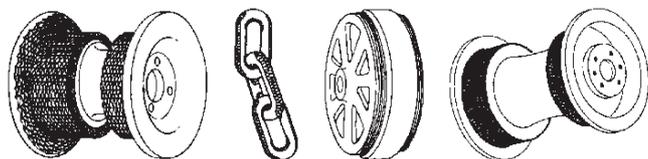
Typical applications include:

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
Shafts
Roller guides



Mechanical properties, typical, all weld metal

	Typical hardness values
Layer 1	21-30 HRc (230-290HB)
Layer 2	26-32 HRc (260-300HB)
Layer 3	28-34 HRc (250-330HB)
Welded on Mild Steel Plate (12mm)	

Packaging and available sizes

Unit type	Diameter (mm)			
	1.1	1.6	2.0	2.8
6.35 kg coil 14C			X	
10 kg coil 22RR	X	X	X	
22.68 kg coil 50C			X	X

Lincore® 33: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Additional information

All work-hardened base material should be removed prior to applying Lincore 33 to prevent embrittlement and cracking.

Preheat and postweld heat treatment is not generally necessary on C/Mn steels, however, preheat up to 260°C may be necessary on high carbon steels or large complex or restrained components.

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.

Welding positions



ISO/ASME PA/1G

Current type

DC +

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

C	Mn	Si	Cr	Al
0.15	2.0	0.7	2.0	1.6

Structure

In the as welded condition the microstructure consists mainly of a mixture of ferrite and bainite

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)	Efficiency (%)
1.1	5.1 to 12.7	80-150	25-31	1.5-3.9	80-85
1.6	3.8 to 8.9	125-225	26-32	2.1-5.0	79-84
2.0	3.2 to 6.4	200-325	23-29	3.1-6.1	87-86

Complementary products

Complementary products include Wearshield[®] BU30

Hardfacing cored wire

Classification

DIN 8555 : MF1-GF-400-GPS

General description

Lincore 40-O is a self shielded, open arc, flux cored tubular electrode that produces a martensitic deposit. The arc characteristics are excellent producing minimal spatter and good slag removal. Although, Lincore 40-O is primarily designed for the open arc operation, it may be used with a neutral flux for conditions requiring spatter elimination and removal of arc glare.

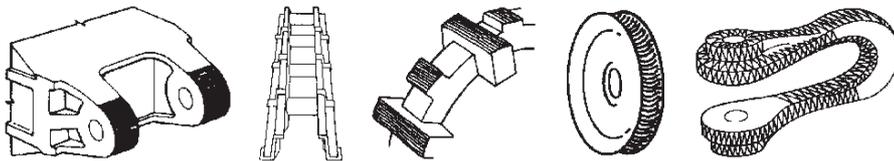
Application

This electrode provides an overlay hardfacing deposit on carbon and low alloy steels that resists rolling, sliding and metal-to-metal wear under heavy impact conditions. The deposit has a hardness of about 40 HRc which fills in the rather large hardness gap between the ferritic bainite buildup deposit of Lincore 33 and the martensitic deposit from Lincore 55 designed for metal-to-metal wear. Although the electrode is designed to provide a hardfacing deposit by itself, it could be used as a build-up electrode to provide a base on which harder deposits could be overlaid.

Typical applications include:

Bucket links
Bucket bases
Guide rolls
Tractor rollers

Actuating cams
Steel shafts
Crane wheels
Mine car wheels



Mechanical properties, typical, all weld metal

	Typical hardness values
Layer 1	ca. 36 HRc (340HB)
Layer 2	ca. 41 HRc (380HB)

Packaging and available sizes

Unit type	Diameter (mm)	
	2.0	2.8
10 kg coil 22RR	X	
22.68 kg coil 50C		X

Lincore® 40-O: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Additional information

The area to be hardfaced should be clean and free of rust, scale, oil, grease or dirt of any kind. Any previous hardfacing deposit that has been embrittled by severe work hardening should also be removed. Irregularities such as cracks, low spots etc. should be properly repaired before hardfacing. Cold parts should be preheated to at least 40°C. Larger parts, and those made of higher alloy or higher carbon steel, should be preheated to the 100-150°C range.

Lincore 40-O deposits normally have good resistance to cross-checking. Special precautions, however, should be taken with any buildup or hardfacing product on applications that are inherently crack sensitive. These applications include the facing of high carbon or alloy steels, previously faced parts and highly stressed parts. The facing of heavy cylinders, massive parts and parts having complex shapes are all examples of applications producing high internal stresses that may result in delayed cracking.

These applications may require one or more of the following:

1. Higher preheat temperature (150-260°C).
2. Higher interpass temperatures.
3. Controlled slow cooling between passes and/or layers

Interpass temperatures in the range of 150-200°C will not significantly affect the hardness of weld deposits produced by Lincore 40-O.

The weld deposited, can be machined with carbide tools or can be finished by grinding.

Welding positions



ISO/ASME PA/1G

Current type

DC +

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

C	Mn	Si	Cr	Mo	Al
0.2	1.5	0.7	3.5	0.4	1.8

Structure

Martensitic

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)	Efficiency (%)
2.0	3.2 to 6.4	200-325	23-29	3.1-6.1	87-86

Complementary products

Complementary products include Wearshield® MM40

Hardfacing cored wire

Classification

DIN 8555 : MF6-GF-50-GP

General description

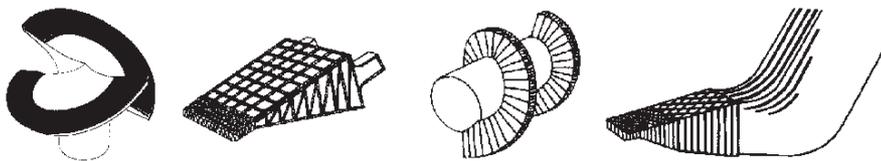
Lincore 50-O is a self shielded, open arc, flux cored tubular electrode that produces a primary austenite and austenite-carbide eutectic weld deposit. The arc characteristics are excellent producing minimal spatter and good slag removal. Although, Lincore 50 is primarily designed for the open arc operation, it may be used with a neutral flux for conditions requiring spatter elimination and removal of arc glare. The as welded deposit usually check cracks.

Application

Lincore 50 produces an abrasion and impact resistant deposit with a hardness range of 34-56HRc depending on base metal chemistry, material dilution and number of layers. The combination of abrasion and impact resistance coupled with hot forging properties makes Lincore 50 particularly suitable for APLs involving transportation of abrasive media under heavy variable loading.

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
- Dragline buckets, links and chains



Mechanical properties, typical, all weld metal

	Typical hardness values
Layer 1	34-41 HRc (320-380HB)
Layer 2	44-53 HRc (415-530HB)
Layer 3	48-56 HRc (460-584HB)

Welded on Mild Steel Plate (12mm)

Packaging and available sizes

Unit type	Diameter (mm)			
	1.1	1.6	2.0	2.8
10 kg coil 22RR			X	
11,34 kg coil 22RR	X	X		
22.68 kg coil 50C	X	X	X	X

Lincore® 50: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

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 irregularities such as cracks and deep gouges can be repaired locally using Wearshield BU30 or Wearshield 15CrMn prior to hardfacing with Lincore 50.

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 carbon steels a preheat of 200°C is usually sufficient, but is dependent on material thickness and chemistry.

The weld metal is not machinable by conventional methods although the deposit can be shaped by grinding. Lincore 50 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. Preheat temperatures similar to those for welding may be necessary to prevent cracking along the cut edge.

Lincore 50 may also be used in corrosive, cavitation and erosion situations such as the chemical, paper mill, food processing industry, glass manufacturing, power generation and tool manufacturing.

Welding positions



ISO/ASME PA/1G

Current type

DC +

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

C	Mn	Si	Cr	Mo	Al
2.2	1.2	1.0	11.0	0.5	0.6

Structure

In the as welded condition the microstructure consists mainly of primary austenite with an austenite-carbide eutectic

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
1.1	5.1 to 15.2	120 - 250	20 - 28	1.9 - 5.8
1.6	3.8 to 8.9	175 - 365	23 - 33	2.7 - 7.9
2.0	3.2 to 6.4	210 - 380	27 - 23	3.4 - 6.8
2.8	2.0 to 3.3	315 - 450	26 - 29	3.9 - 6.4

Complementary products

There is no direct equivalent to Lincore 50 although Wearshield[®] ABR and Wearshield[®] 44 are the nearest.

Hardfacing cored wire

Classification

DIN 8555 : MF2-GF-55-GP

General description

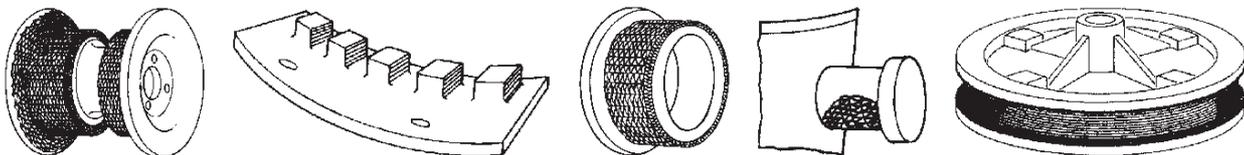
Lincore 55 is a self shielded, open arc, flux cored tubular electrode designed to provide a hardfacing overlay on new or old steel components. Although, Lincore 55 is primarily designed for the open arc operation, it may be used under a neutral flux for conditions requiring spatter elimination and removal of arc glare. A long stickout for maximum efficiency and minimum penetration.

Application

Lincore 55 produces a martensitic and some retained austenite deposit with a hardness range of 50-59HRC. This microstructure makes Lincore 55 particularly suitable for APLs involving sliding, rolling and metal to metal wear, coupled with resistance to mild abrasion. Typical APLs include:

Typical applications include:

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



Mechanical properties, typical, all weld metal

	Typical hardness values
Layer 1	50 - 59 HRC
Layer 2	50 - 59 HRC
Welded on Mild Steel Plate (12mm)	

Packaging and available sizes

Unit type	Diameter (mm)		
	1.1	1.6	2.0
6.35 kg coil 14C			X
10 kg coil 22RR			X
11,34 kg coil 22RR	X		
22.68 kg coil 50C			X

Lincore® 55: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Additional information

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.

A preheat of up to 250°C is necessary to prevent cracking in situations of high restraint and/or heavy thicknesses. Interpass temperatures between 150 - 300°C do not adversely effect deposit hardness.

The deposit thickness is usually limited to 2 layers on high carbon or alloy steels and/or situations of high restraint and heavy sections due to the risk of cracking. Higher preheat and interpass temperatures coupled with slow cooling will minimise the risk of cracking.

The deposited weld metal is not machinable by conventional methods although the deposit can be shaped by grinding.

The deposit can be softened by annealing at 875°C for one hour and slow cooling (air cool 22- 43HRc, furnace cool 15-17HRc). The hardness can be restored by heating at 875°C followed by water quenching (50-59HRc). The component should then be tempered at 150-200°C for one hour (54-59HRc) to retain some toughness.

Welding positions



ISO/ASME PA/1G

Current type

DC +

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

C	Mn	Si	Cr	Mo	Al
0.45	1.4	0.55	5.3	0.8	1.4

Structure

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

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)	Efficiency (%)
1.1	5.1 to 12.7	85 - 165	25 - 31	1.6 - 4.3	80 - 85
1.6	3.8 to 8.9	125 - 245	26 - 32	2.2 - 5.5	79 - 84
2.0	3.2 to 6.4	190 - 330	24 - 30	3.2 - 6.2	87 - 86

Complementary products

Complementary products include Wearshield[®] MM and Wearshield[®] MI(e).

Hardfacing cored wire

Classification

DIN 8555 : MF10-GF-60-CG

General description

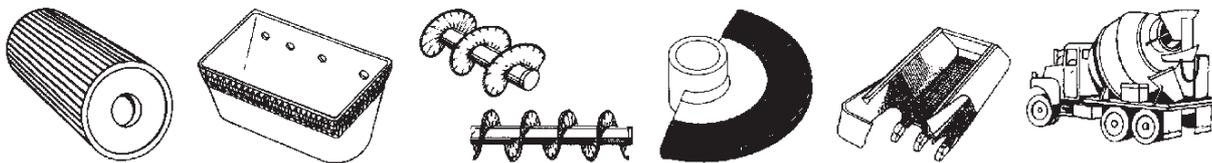
Lincore 60-O is a self shielded, open arc, flux cored tubular electrode that produces a primary carbide weld deposit. Although, designed primarily for the open arc process it can be used with a neutral flux to improve the weld shape, minimise fume and remove arc glare.

Application

Lincore 60-O produces an primary carbide weld deposit with a hardness range of 55-60HRc. The primary carbide microstructure makes Lincore 60-O ideally suitable for APLs of severe abrasion. Typical APLs include:

Typical applications include:

- Crusher rolls, plates and jaws
- Conveyor screws and sleeves
- Bucket and shovel lips
- Brick & coke machinery
- Cement mill parts



Mechanical properties, typical, all weld metal

	Typical hardness values
Layer 1	55 - 60 HRc
Layer 2	58 - 60 HRc
Welded on Mild Steel Plate (12mm)	

Packaging and available sizes

Unit type	Diameter (mm)		
	1.1	1.6	2.0
10 kg coil 22RR			X
11,34 kg coil 22RR	X	X	
22.68 kg coil 50C			X

Lincore® 60-O: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Additional information

When welding with Lincore 60-0 stringer beads should be employed. Weaving is not advised since wide weaves generally increase the check crack spacing which can result in deposit spalling. 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 high carbon steels a preheat of 200°C is necessary to prevent heat affected zone cracking.

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 high carbon steels a preheat of 200°C is necessary to prevent heat affected zone cracking.

The weld metal is not machinable or forgeable and it readily check cracks. The deposit thickness is usually limited to 2 layers, as excessive build-up will result in chipping and fragmentation.

For applications requiring build-ups in excess of 2 layers, buttering layers of Lincore 33, Wearshield BU30 or RepTec 126 Alternatively, a preheat of 650°C can be used to eliminate the formation of check cracks.

Welding positions



ISO/ASME PA/1G

Current type

DC +

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

C	Mn	Si	Cr	Al
4.2	1.6	1.3	25.4	0.6

Structure

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

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
1.1	5.1 to 12.7	125 - 210	21 - 27	1.9 - 4.7
1.6	5.1 to 11.4	240 - 350	28 - 33	3.4 - 7.5
2.0	6.4 to 3.2	250 - 400	25 - 32	3.4 - 6.9

Complementary products

Complementary products include Wearshield[®] 60

Hardfacing cored wire

Classification

DIN 8555 : MF4-GF-60-S

General description

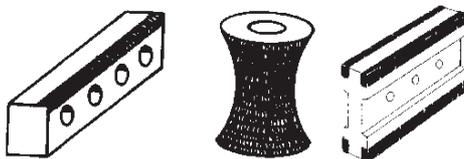
Lincore T&D is a self shielded, open arc, flux cored tubular electrode that produces a H12 type airhardening tool steel deposit. The arc characteristics are excellent producing minimal spatter and good slag removal. Although, Lincore T&D is primarily designed for the open arc operation, it may be used with a neutral flux for conditions requiring spatter elimination and removal of arc glare.

Application

Lincore T&D produces a crack-free wear resistant tool steel deposit with a hardness range of 48- 55HRc. The hardness can be further increased to between 55-65HRc after tempering. It is particularly suitable for APLs involving severe metal to metal wear coupled with elevated temperatures (up to 540°C). Ideally suited to the build up 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	48 - 55 HRc	
Tempered at 540°C	55 - 65 HRc	
Welded on Mild Steel Plate (12mm)		

Packaging and available sizes

Unit type	Diameter (mm)	
	1.6	2.8
10 kg coil 22RR	X	
22.68 kg coil 50C		X

Lincore® T&D: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Additional information

A preheat and interpass temperature of 325°C, or higher (up to 540°C), are 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 weldment should be post weld heat treated to temper the martensite and toughen the deposit. Tempering at 540°C normally produces the optimum 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 30HRc. 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.

Lincore T&D 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. Preheat temperatures similar to those for welding may be necessary to prevent cracking along the cut edge.

Welding positions



ISO/ASME

PA/1G

Current type

DC +

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

C	Mn	Si	Cr	Mo	W	Al
0.65	1.5	0.8	7.0	1.4	1.6	1.8

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

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
1.6	3.8 to 8.9	170 - 300	22 - 26	2.4 - 5.4
2.8	2.5 to 5.1	340 - 500	26 - 30	4.7 - 9.1

Complementary products

Complementary products include Wearshield® T&D

Hardfacing cored wire

Classification

DIN 8555 : MF7-GF-250-KP

General description

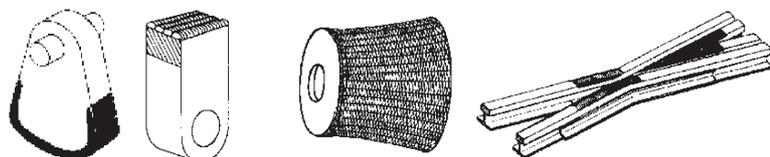
Lincore 15CrMn is a self shielded, open arc, flux cored tubular electrode that exhibits excellent arc characteristics, clean slag detachability, and low spatter levels. Although, Lincore 15CrMn is primarily designed for the open arc operation, it may be used under neutral flux for conditions requiring spatter elimination and removal of arc glare.

Application

Lincore 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 Lincore 15CrMn an ideal electrode for joining manganese steel to itself or carbon steels with minimal the risk of centerline cracking. Joining by the SAW process, however, is not recommended.

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 - 22 HRC (210-235 HB)
Work Hardened	40 - 50 HRC (375-490HB)

Packaging and available sizes

Unit type	Diameter (mm)	
	2.0	2.8
6.35 kg coil 14C	X	
10 kg coil 22RR	X	
22.68 kg coil 50C	X	X

Lincore® 15CrMn: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Lincore[®] 15CrMn

Additional information

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.

Narrow stringer beads are preferred to avoid excessive heat build up in the base material. High heat input welds and interpass temperatures above 260°C causes manganese carbide precipitation resulting in 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.

Lincore 15CrMn deposits work harden 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 build-up of Lincore 15CrMn coupled with a single pass of Wearshield 60 or Lincore 60-O should be employed.

The Lincore 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

Current type

DC +

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

C	Mn	Si	Cr
0.4	15.0	0.25	16.0

Structure

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

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
2.0	3.2 to 8.9	210 - 380	26 - 32	3.3 - 9.7
2.8	1.9 to 4.4	250 - 380	26 - 30	2.5 - 7.5

Complementary products

Complementary products include Wearshield[®] 15CrMn

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Hardfacing cored wire

Classification

DIN 8555 : MF6-GF-55-CGR

General description

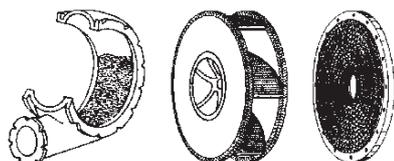
Lincore 420 is a self shielded, open arc, flux cored tubular electrode that produces a martensitic deposit similar to AISI 420 stainless steel. The arc characteristics are excellent producing minimal spatter and good slag removal.

Application

Lincore 420 is martensitic stainless hardfacing electrode designed to provide overlay deposits that resists metal wear under corrosion.

Typical applications include:

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



Mechanical properties, typical, all weld metal

	Typical hardness values
Layer 1	52 HRc
Layer 2	51 HRc
Layer 3	53 HRc
Welded on Mild Steel Plate (12mm)	

Packaging and available sizes

Unit type	Diameter (mm)			
	1.6	2.4	3.2	4.0
14 kg spool S300	X			
22.68 kg coil 50C		X	X	
272.2 kg speed-feed® drum			X	X

Lincore® 420: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Additional information

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.

Areas that contain irregularities such as cracks and deep gouges can be repaired locally using Wearshield® BU30 or Wearshield® 15CrMn prior to hardfacing with Lincore 420.

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 its martensitic stainless structure. But the reduced chromium level might adversely affect the corrosion resistance of the deposit.

Welding positions



ISO/ASME PA/1G

Current type

DC +

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

Ø1.6 mm	C	Mn	Si	Cr	Ø2.0 mm	C	Mn	Si	Cr
	0.5	1.7	0.9	11		0.5	1.4	0.7	11

Structure

Martensitic + ferritic

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
1.1	5.1 to 15.2	120 - 250	20 - 28	1.9 - 5.8
1.6	3.8 to 8.9	175 - 365	23 - 33	2.7 - 7.9
2.0	3.2 to 6.4	210 - 380	27 - 23	3.4 - 6.8

Complementary products

Complementary products include Wearshield® 420

Hardfacing cored wire

Classification

DIN 8555 : MF6-GF-45-KP

General description

**Lincore M is a selfshielded, open arc, flux cored tubular electrode
Deposition of austenitic manganese steel with 14% manganese**

Application

Lincore M is designed for rebuilding and hardfacing of manganese steel, carbon steel and low alloy steel parts. Typical APLs include: Rail crossovers, frogs and switchpoints

Typical applications include:

Rail crossovers, frogs and switches
Dipper teeth and lips
Crusher hammers
Crushers screens and grizzlies
Chain hooks
Dredge parts, pump shells
Parts for safes and vaults

Manganese bucket fronts
Crusher rolls
Dragline pins and links
Rolling mill parts
Drive sprockets
Shovel tracks

Mechanical properties, typical, all weld metal

	Typical hardness values
As deposited	18-28 Rc
Work Hardened	30-48 Rc

Packaging and available sizes

Unit type	Diameter (mm)
	2.0
10 kg coil 22RR	X

Lincore® M: rev. EN 21

Liability: All information in this data sheet is based on the best available knowledge, is subject to change without notice and can only be considered as suitable for general guidance **Fumes:** Consult information on Welding Safety Sheet, available upon request

Additional information

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.

Narrow stringer beads are preferred to avoid excessive heat build up in the base material. High heat input welds and interpass temperatures above 260°C causes manganese carbide precipitation resulting in 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.

Lincore M deposits work harden 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.

First layers on mild and low alloy steel can be welded with RepTec 126, Lincore M can be used to complete the build up.

Welding positions



ISO/ASME PA/1G

Current type

DC +

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

C	Mn	Si	Cr	Ni
0.6	13.0	0.4	4.9	0.5

Structure

Martensitic + ferretic

Calculation Data

Diameter (mm)	Wire Feed Speed (m/min)	Current (A)	Arc Voltage (volts)	Deposition Rate (kg/h)
2.0	3.2 to 6.4	240 - 360	24 - 29	2.9 - 6.2

Complementary products

Complementary products include Wearshield[®] Mangjet (e)