Estd. 1966

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Complete Welding Support

LOTHERME

A unique range for Repair & Maintenance Welding.

RECLAMATION WELDING HANDBOOK

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RECLAMATION WELDING HANDBOOK

57 YEARS Since 1966

Estd. 1966
D&H sécheron
Complete Welding Support

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LoTherme

OUR PROFILE

D&H Sécheron has been a successful player in the field of Welding Consumables for more than five decades now and today, the name is held synonymous with high quality welding consumables, as well as dedicated customer service. Our comprehensive product range is well complimented by our interactive customer education programs, which have two-pronged benefits - enabling proper selection of consumables & the correct usage of them thus sharpening our own insight of our customer's requirements. This is in turn helps to fuel our research activities to improve further.....

D&H Sécheron has played a vital role in the field of Maintenance Welding: Repair & Reclamation of components to enhance their service life. In fact our LoTherme range of products, are dedicated to maintenance needs of a broad spectrum of industries that regularly need consumables like SMAW Electrodes, OA FCW and GS FCW Wires for repair welding and to prolong service life of plant and machinery.

LoTherme consumables are now used by a number of industries like Cement, Power, Mining, Steel, Sugar, Railways, Transportation and General Engineering Industries. Several consumables have formed an ideal solution for the reclamation of the Components. This booklet highlights the various aspects of maintenance welding, the characteristics and applications of consumables from our LoTherme range.

We hope that this booklet will be of use to all the Maintenance Welding Personnel of various industries in enabling them to select the right consumables. Any queries regarding selection of consumables, its application etc for the LoTherme Range of products can be sought from us.

RECLAMATION WELDING

Effective maintenance and repair are essential for efficient running of industries. Welding, as a tool of maintenance and repair, plays a vitally important role in the functioning of all major industries. In general it may be said that practically any metal part which has broken or worn- out in service can be reclaimed by welding. In fact, one of the first uses of welding was to repair broken machinery and parts. What started out, as a process for making an emergency repair until a replacement could be obtained, has today become an economic necessity to conserve expensive materials and to reduce inventories.

The need for maintenance welding arises mainly because of :

a) Wear
b) Failure

Wear is caused by mechanical means like friction, abrasion and impact in case of, relative movement between the parts in contact with each other. Wear is also caused by corrosive action of the medium being handled by the particular equipment. It is observed that the magnitude of wear, may it be due to mechanical or chemical reasons, is greater at higher temperatures. Complete failure of the equipment is the next stage if wear exceeds permissible levels. Failure can also take place due to defective material or accidental overloads.

In addition to the application of welding process to salvage broken parts, resurfacing by welding has become an economical solution to various problems. A majority of maintenance welding is carried out by the shielded manual metal arc process.
To obtain longer service life in many cases, it is even economical to surface new parts before putting them to use.

This handbook is designed to guide you in the selection of suitable electrodes for shielded manual arc welding for various maintenance applications.

SPECIAL FEATURES OF RECLAMATION WELDING

In reclamation welding, the weld metal is deposited on the worn-out components or is used to join fractured component. Therefore, it is essential that the weld metal possesses the properties, which will meet the service requirements of the components and enhance its service life. Most of the times the component calls for welding only in certain area and therefore in reclamation welding it is essential to see that the component does not lose its original properties in the areas where welding has not been done. These special features associated with reclamation welding impose restrictions on selection of welding consumables and also call for reduction of heat input during welding.

LOTHERME LOW HEAT INPUT WELDING

LoTherme electrodes are specially designed for low heat input welding. These electrodes are the result of extensive development, testing and analysis in our well-equipped modern laboratories.

The advantages of welding, particularly for maintenance and repair applications, with low heat input LoTherme electrodes needs no emphasis. It is well known that the composition and metallurgical state of the base material affects the properties of the deposited weld metal since the first layer will always be diluted with base material.

The carbon content and other alloying elements can have a pronounced effect on the first layer of weld deposit. There is also a risk of damage of the desirable structure in the heat-affected zone of the base material. It is in this context that the introduction of LoTherme low heat input electrodes can be fully appreciated.
You derive the following benefits when you use LoTherme electrodes:

LoTherme

You derive the following benefits when you use LoTherme electrodes:

- Reduced pick-up of carbon and other detrimental elements from the base material,
- Minimal effect on the surface of the base material adjacent to the fusion zone, known as heat-affected zone,
- Reduced propensity for grain coarsening in weld metal and HAZ, thereby resulting in better toughness of weld and HAZ,
- Reduced width of the HAZ,
- Reduction in the cracking tendency of the highly brittle materials due to reduced 'thermal shock,
- Less distortion of the weldment,
- Lower consumption of electrodes, especially in hardfacing applications due to lower dilution with the parent material.

Through developments in the design of flux coating, it has been ensured that each LoTherme electrode performs at low welding currents, low arc voltage and short arc length. These factors are strictly controlled to ensure that you get the maximum advantage of low heat input welding with LoTherme electrode.

SELECTION OF ELECTRODE FOR RECLAMATION WELDING

Selection of electrode in maintenance welding is a very important step for achieving the desired results. The two major factors, which basically control the selection of electrodes are:

1) Types of base material.
2) Service condition.

Though there are other factors, which can influence the choice on welding electrodes, the above two factors primarily decide the welding electrodes.

TYPES OF MATERIAL

The different types of base materials that are normally encountered in any industry are:

1) Carbon and low alloy steels
2) Stainless Steels
3) Ni & Ni base alloys
4) Austenitic Mn steels and
5) Cast iron.

The salient features of welding these materials are listed in appropriate sections in this handbook together with the electrodes that are suitable for these materials. These guidelines should help the maintenance welding personnel to select the electrode for their applications.

WELDING TECHNIQUE

The welding technique for each type of LoTherme electrode is highlighted in the individual product literature. It is, however, necessary to observe certain general procedures and precautions in order to obtain best results.

Electrodes should be kept dry. Moisture pick-up affects the performance of the electrodes as also the soundness of the weld deposits. It is advisable to dry the electrodes before use as suggested in the individual product literature.

- Clean the weld groove and the adjacent area thoroughly free from rust, scale, paint, oil, grease or any other surface contamination. For removal of paint, oil or grease from the surface, it is advisable to use acetone or any other solvent.

- Use lowest possible current and short arc. As far as do not weave the electrode. Use stringer bead technique. If weaving becomes necessary due to position of welding, the width of weaving should not exceed two to three times the core wire diameter of the electrode.

- While welding on austenitic manganese steel, cast irons and thin sheets especially stainless steel, the length of each weld bead should be limited and the welds staggered over the surface to be welded. In case of austenitic manganese steel and cast irons, short and staggered weld beads help avoid cracks whereas in case of thin sheets, this technique helps control distortion. Please refer to individual LoTherme product literature for further details on control of heat input.

- While welding hard and brittle materials, especially cast irons, it is necessary to peen the weld beads. Peening helps in reduction of residual stresses by 'stretching' the weld metal. Peening should be done immediately after the weld metal has solidified and before slag is removed.

- Appropriate pre-heat and pre-weld heat treatment may have to be adopted depending upon the physical as well as the metallurgical conditions from which the parts may have to be reclaimed. Please consult our Engineer for further details.

Packing and storage of electrodes

All LoTherme electrodes are supplied is moisture-proof and shock- proof high density polythene containers. For further protection, the electrodes are first packed in moisture-proof, low-density polythene bags.

LoTherme electrodes are supplied in 1 kg. and 2 kg. packing. Small quantities in each packet will help you control your inventory costs as well as avoid wastage of electrodes.

Rectangular containers facilitate storing. No special storage conditions are necessary for LoTherme electrodes. The storage area, however, should not be exposed to moisture conditions.

Each LoTherme electrode is printed along the length near the holder-end with the brand name for easy and positive identification.

Save Time and Money with LoTherme

Due to its economic advantages, welding naturally plays a very important role in maintenance work, particularly for emergency repairs or building-up worn out parts. There is no need to treat such work as a temporary job to keep the plant going till a replacement part is procured. LoTherme-low heat input electrodes are specially designed to ensure that the parts reclaimed by welding, in many cases, perform better than the original.

Each LoTherme electrode is developed after a thorough study of the application requirements.

Save time and money by adopting LoTherme electrodes and techniques.

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ELECTRODES FOR CARBON & LOW ALLOY STEELS

CARBON AND LOW ALLOY STEELS

The carbon steels are the most common materials used for various applications. The percentage of carbon is a major criterion in deciding its properties and also its weldability. Increasing amounts of carbon results in loss of ductility of the material and renders the material difficult to weld. Therefore, the percentage of carbon will have to be determined before deciding on the welding techniques and consumables. The susceptibility of the material to form hard structures like martensite increases with the higher percentage of carbon, additional precautions like pre-heat, post-heat may be required to achieve the desired properties.

The alloy steels in addition to carbon have additions of alloying elements like Mn, Ni, Cr, Mo, V, etc., which increase the susceptibility of the material to form hard structures like martensite. These low alloy steels also, therefore, require special consideration while designing the welding procedures. In general, these low alloy steels are welded with a suitable pre-heat depending on the composition of the base material and the section thickness involved.

Our LoTherme electrodes in the 200 and 300 series are suitable for this group of materials; the 200 series suitable for sheet metal welding and the 300 series suitable for carbon and low alloy steels. Apart from joining applications LoTherme-352 is also suitable for buffer layers on a variety of carbon and low alloy steels and cast iron. These buffer layers are:

a) Useful for providing a ductile layer over the hard material before hardfacing.
b) For sealing off the impurity elements particularly in cast steel.

Depending on the composition of the material, suitable pre-heat for the base material will have to be selected.

LoTherme - 200

A special low heat input electrode for welding mild steel.

Characteristics :

LoTherme-200 is a specially formulated low heat input electrode for welding mild steel sheets, structural, etc. It can be used on AC/DC (±) and can be operated with ease in all welding positions including vertical down. The beads are finely rippled and arc is smooth.

Applications :

LoTherme-200 is ideally suited for sheet metal welding, structural welding using low heat input welding technique. Ideal for welding mild steels in maintenance work.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	461	28

Welding Instructions :

Clean the weld area free from all contaminants. Use low current, short arc technique.

Electrical Characteristics : AC/DC (±)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-190	120-160	80-120	50-75

LoTherme - 210

Exclusive electrode for low heat input welding of mild steel with minimal distortion.

Characteristics :

LoTherme-210 flux formation is so chosen that the electrode produces excellent weld finish at extremely low current. It can be used on AC/DC (±) in all positions.
Finely rippled weld beads, soft and steady arc which is easy to strike and re-strike and self-detachable slag are a few among many pleasant features associated with LoTherme-210.

Applications :

LoTherme-210 has been specially designed for welding sheet metal with low heat input technique in order to prevent distortion. However, it can also be used for welding mild steel of higher thickness.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	470	28

Welding Techniques :

Keep the electrode dry. Clean the weld area free from any surface contamination. Use low current and short arc technique. While welding sheet metal, it will be of greater advantage if the job can be placed in an inclined position and welded downhill. This will also help in increasing welding output

Electrical Characteristics : AC/DC (±)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-200	110-160	80-120	50-80

LoTherme - 210R

A medium coated electrode for low heat input welding of mild steel with minimal distortion.

Characteristics :

LoTherme-210R produces excellent weld finish. It operates equally well in all positions. Finely rippled weld beads, soft and steady arc radiographic quality weld and self-detachable slags are a few among many pleasant features associated with LoTherme- 210R.

Applications :

LoTherme-210R used for fabrication and repairing of Buckles, Gear cases, Protector tubs, Door patches, Side panels, End wall patches etc. of rolling stocks and locomotives.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	YS (MPa)	%El (L=5d)	%RA	CVN Impact at 0^{0}C (J)
Typical	480	400	27	60	54
Range	410 (min)	330 (min)	26 (min)	50 (min)	47 (min)

Coating Factor :

Medium (1.36 to 1.50)

Welding Techniques :

Keep the electrode dry. Clean the weld area free from any surface contamination. Use low current and short arc technique.

Electrical Characteristics : AC/DC (±)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-200	120-150	90-120	60-90

LoTherme - 351

Low heat input basic coated type high-yield hydrogen controlled electrode.

Characteristics :

- Steady, smooth arc, which is easy to strike and re-strike.
- Extremely low spatter, excellent slag detachability and finely rippled weld beads.
- Radiographic quality welds having excellent cracking resistance.
- Weld metal of excellent toughness to withstand heavy dynamic loading and impact.

Applications :

LoTherme 351 is ideally suited for welding carbon steels used in the construction of machinery and equipment subjected to heavy dynamic load, impact and severe service conditions. Some of the typical applications include: Heavy structures subjected to dynamic loading and impact, Highly restrained joints, Rail coaches, Wagons, Ships, Girders for columns, bridges, Blast furnace shells, Rotary kiln shells, building machinery, Earth moving machinery, Boilers, Pressure vessels.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	520	28

Welding Techniques :

Re-dry the electrodes at 250°C for 01 hour before use. Clean the weld area completely free from oil, grease, paint, rust or any other foreign matter. For welding heavy sections in cast steel, preheating of the part may prove beneficial. Use short arc.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	170-220	130-160	90-120	60-90

LoTherme - 352

Hydrogen controlled electrode for mild, medium carbon, high strength steels, cast steels, "problem steels", and for cushion layer under hard deposits.

Characteristics :

LoTherme-352 is a hydrogen controlled electrode, operates equally well in all positions. High quality, high strength, crack-free radiographic welds are the special features of LoTherme-352. Welds display good ductility and impact resistance at ambient and sub-zero temperatures.

Applications :

LoTherme-352 is ideally suited for welding mild, medium carbon, high tensile steels, difficult steels, steels high in sulphur and phosphorus, heavy structures, plant and equipment subjected to dynamic loading and impact. It is equally good for depositing buffer layer before hard surfacing.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	550	28

Welding Techniques :

For best results, re-dry the electrode at 250°C for 02 hours before use. Clean the weld area completely free from oil, grease, paint, rust or any other foreign matter. For welding heavy sections in cast steel, pre-heating of the part may prove beneficial. Use short arc.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	170-210	140-170	110-140	60-90

LoTherme - 352R

A low heat input electrodes for mild, medium carbon steels, cast steels and for buffer layers.

Characteristics :

LoTherme-352R is a low heat input AC/DC electrode, operates equally well in all positions. High quality, high strength, crack free radiographic welds are the special features of LoTherme-352R. Welds display excellent ductility and toughness.

Applications :

LoTherme-352R is suitable for repair of bogies, both cast and fabricated. Also suitable for welding mild, medium carbon steels, difficult steels, steels heavy structures, repair of Co-Co bogies, plant and equipment subject to dynamic loading and impact. It is also suitable for depositing buffer layers before hard surfacing.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	560	28

Welding Techniques :

Re-dry the electrodes at 250°C for 01 hour before use. Clean the weld area completely free from oil, grease, paint, rust or any other foreign matter. For welding heavy sections in cast steel, preheating of the part may prove beneficial. Use short arc.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	170-210	140-170	100-130	60-90

LoTherme - 354

Hydrogen controlled, low heat input electrode depositing a low alloy steel weld metal.

Characteristics :

LoTherme-354, a hydrogen controlled, low heat input electrode depositing low alloy steel weld metal. It operates equally well in all positions. The electrode also gives smooth arc, very low spatter loss and easy slag removal. The weld is ductile and meets x-ray quality requirements.

Applications :

LoTherme-354 is ideally suited for welding, low alloy steel, carbon steel to low alloy steel, medium carbon high tensile steels etc. The electrode can be used for welding of low alloy '**Mo**' bearing steels in thermal power plants, especially for welding tube to tube sheets in the heat exchangers and unknown carbon steels.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	540	28

Welding Techniques :

Re-dry the electrodes at 250-300°C for 01 hour before use. Clean the weld area completely free from oil, grease, paints, rust or any other foreign matter. Depending on the base material a suitable welding procedure should be evolved for reclamation.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	185-230	135-180	90-130	60-90

LoTherme - 355

An extra low hydrogen low heat input electrode depositing a low alloy steel weld metal. Extra high strength facilitates welding of critical jobs.

Characteristics :

LoTherme-355 is an extra low hydrogen low heat input electrode depositing a low alloy steel, high strength weld metal ideal for maintenance and repair welding of Cr - Ni - Mo high strength low alloy steels, case hardened steels, heat-treated steels, etc. The extra low hydrogen helps in preventing cold cracks.

Applications :

Ideal for maintenance and repair welding of high strength steels, case hardened steels, heat-treated steels, etc. Typical applications include welding of rolls, shafts, gear wheels, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	765	20

Welding Techniques :

Re-dry the electrodes at 350°C for 2 hours. Clean the weld area free from all contaminants. In case of the case hardened materials, the case depth should be removed before welding. Depending on the base material, a suitable procedure should be evolved for reclamation.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-170	110-140	80-120	50-70

LoTherme - 356

An extra low hydrogen low heat input electrode depositing a low alloy steel weld metal.

Characteristics :

LoTherme-356 is an extra low hydrogen low heat input electrode depositing a low alloy steel, high strength weld metal ideal for maintenance and repair welding of Cr-Mo high strength low alloy steels, case hardened steels, heat-treated steels, etc. The extra low hydrogen helps in preventing cold cracks.

Applications :

LoTherme-356 is ideal for maintenance and repair welding of high strength steels, case hardened steels, heat-treated steels, etc. Typical applications include welding of rolls, shafts, gear wheels, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL (PWHT: 690°C for 1 Hr) :

Properties	UTS(MPa)	%El (L=4d)
Typical	600	25

Welding Techniques :

Re-dry the electrodes at 250°C for 1 hour. Clean the weld area free from all contaminants. In case of the case hardened materials, the case depth should be removed before welding. Depending on the base material, a suitable procedure should be evolved for reclamation.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	110-150	80-120	50-70

LoTherme - 357

Low heat input electrode for withstanding moderate thermal shocks, on carbon steel applications only.

Characteristics :

LoTherme-357, is a special type electrode, operates equally well in all positions. Smooth and soft arc, which is easy to strike and restrike. Finely rippled smooth weld beads. Crack free radiographic welds are the special features of LoTherme-357.

Applications :

LoTherme-357 is a versatile low heat input electrode. Ideally suited for welding 0.5%Cr-0.5%Mo, 1%Cr-0.5%Mo and 1.25%Cr-0.5%Mo steels. The weld deposit gives good tensile strength.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	590	25

Welding Techniques :

For best results re-dry the electrodes at 250°C for 2 hours before use. Clean the weld area completely free from oil, grease, paints, rust or any other foreign matter. For welding heavy sections in cast steel and low alloy steel, preheating of the part may prove beneficial. Use short arc and stringer beads.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	170-200	140-170	90-120	60-80

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ELECTRODES FOR STAINLESS STEEL ALLOYS

STAINLESS STEEL

Stainless steels are normally alloyed with considerable amounts of alloying elements like Cr, Ni. The most commonly used austenitic stainless steels contain 18%Cr-8%Ni, 25%Cr-12%Ni, 25%Cr-20%Ni and several modified versions are also available to suit the service conditions.

The 400 series of LoTherme electrodes represent the electrodes depositing stainless steels weld metal. This range consists of electrodes, which are suited not only for welding similar steels but also for dissimilar steels.

Electrodes like LoTherme-452, LoTherme-453 and LoTherme-455 are suited for welding stainless steels of similar composition, Electrodes like LoTherme-456, LoTherme-457, LoTherme-458, LoTherme-464, LoTherme-467 and LoTherme-468 are suited not only for welding stainless steels but also are suited for welding a number of dissimilar steels combinations. The various steels that can be welded with these electrodes are indicated in the individual technical data of each electrode.

LoTherme - 408

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A low heat input electrode for SS308L deposits.

Characteristics :

- Quiet and stable arc, which is easy to strike and re-strike.
- Low carbon deposits increase the resistance to intergranular corrosion.
- On horizontal fillet welds, produce more of spray arc and a finer rippled weld bead.
- The weld metal is of radiographic quality.
- Electrode can be used in horizontal, vertical up and overhead positions.
- Detachability of slag is very easy.

Applications :

LoTherme-408 is ideally suited for repair & joining of stabilized as well as un-stabilized 18%Cr - 8%Ni stainless steels of normal as well as extra low carbon versions. It can also used for welding cast steels of matching composition.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	580	38

Welding Techniques :

Re-dry the electrodes at 300-350°C for 01 hour. Clean the weld area free from rust, oil, grease, paint, or any other surface contamination. To ensure minimal heat input, use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	100-130	70-100	50-70

LoTherme - 409

Low heat input stainless steel electrode for similar and dissimilar applications.

Characteristics :

- A highly crack resistant weld deposit which displays good corrosion and scaling resistance.
- On horizontal fillet welds, produce more of spray arc and a finer rippled weld bead.
- The weld metal is of radiographic quality.
- Electrode can be used in horizontal, vertical up, and overhead positions.
- Detachability of slag is very easy.

Applications :

LoTherme-409 is ideally suited for repair welding SS 309L class in wrought or cast form. It can also used for welding dissimilar metals, such as joining SS304L to carbon steel, welding the clad side of SS304L clad steels, and applying stainless steel sheet lining to carbon steel shells.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	570	40

Welding Techniques :

Re-dry the electrodes at 300-350°C for 01 hour. Clean the weld area free from rust, oil, grease, paint, or any other surface contamination. To ensure minimal heat input, use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	100-130	70-100	50-70

LoTherme - 409M

Low heat input stainless steel electrode for similar and dissimilar applications.

Characteristics :

- Quiet and stable arc, which is easy to strike and re-strike.
- A highly crack resistant weld deposit which displays good corrosion and scaling resistance.
- Weld metal withstand high temperatures up to 1200°C
- On horizontal fillet welds, produce more of spray arc and a finer rippled weld bead.
- The weld metal is of radiographic quality.
- Electrode can be used in horizontal, vertical up, and overhead positions.
- Detachability of slag is very easy.

Applications :

For repairing stainless steel of similar composition in wrought or cast form and for overlay application to resist heat and corrosion. Suitable for repair & joining dissimilar steels, such 18-11-Mo steel to mild steel, clad side welding of 18-11-Mo steel, and for buffer layer applications.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	570	35

Welding Techniques :

Ensure the electrodes are dry and in case of moisture pick-up, re-dry the electrodes at 300-350°C for 01 hour. Ensure cleanliness of the weld area and use short arc, lowest current possible and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	100-130	70-100	50-70

LoTherme - 410

Low heat input electrode for depositing 12.5% Chromium steel.

Characteristics :

LoTherme-410 is a low heat input, high deposition electrode, depositing air-hardening type chromium steel having 12.5% Cr. The weld deposit displays good resistance to corrosion, erosion, pitting and abrasion.

Applications :

LoTherme-410 is specially designed for joining of similar alloys and for surfacing and overlay applications on unalloyed steels and chromium steel having 12.5%Cr. Ideally suited for surfacing of valves and other components of turbine, steam valves made of 13%Cr steel, etc.

WELD METAL HARDNESS : 370-400 VPN

Welding Techniques :

Ensure that the electrodes are perfectly dry before use. In case of moisture pick-up, re-dry the electrodes at 250-300°C for 01 hour before use. Clean the weld area free from any surface contamination. Hold a short arc length and weld with stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	170-200	120-160	90-120	70-90

LoTherme - 430

Low heat input electrode for welding of AISI 430 and equivalent17% chromium steels. Martensitic Stainless Steel Deposits withstand Cavitation Erosion.

Characteristics :

LoTherme-430 is a low heat input electrode depositing a weld metal containing 17% chromium. The weld deposit displays good resistance to Cavitation Erosion.

Applications :

LoTherme-430 is ideally suited for welding of stainless steel AISI 430 and equivalent 17% chromium steels. For overlay on carbon steel, low alloy steels, and chromium steels. It is an appropriate electrode, where the service conditions require good resistance to corrosion, cavitation and heat up to 550°C. Typical applications include surfacing of valves, impellers, hydro-turbine Pelton wheel, and valve seats.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL

Properties	UTS(MPa)	%El (L=4d)	Weld Metal Hardness
Typical	530	22	250-300 BHN

Welding Techniques :

Keeping the electrodes dry. For best results, re-dry the electrodes at 250-300°C for 01 hour before use. Clean the weld are thoroughly free from any foreign matter.Use low current, short arc and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	100-130	80-110	70-90

LoTherme - 444H

Complete Welding Support

A unique electrode for surfacing of valves & valve seats, steel plant hot metal rolls.

Characteristics :

- Unique deposit high temperature metal to metal wear on steel plant rolls.
- A special purpose electrode for hard-facing of valves & rollers.
- Excellent operating characteristics.
- Weld metal having excellent crack resistance.
- Weld metal possesses excellent resistance to corrosion, erosion, pitting, & abrasion.

Applications :

LoTherme-444H is ideally suited for surfacing components subjected to high temperature metal to metal wear, corrosion, erosion combined with abrasion. Typical applications include rebuilding of runners, hardfacing of valves & valve seats, pulp & paper machinery, continuous casting rolls & rolls subjected to high temp in steel Rolling mills.

WELD METAL HARDNESS : 400-500 BHN

Welding Techniques :

Keep the electrodes dry. In case of moisture pick up, re-dry at 200- 250°C for 01 hour. Clean the weld area throughly free from any foreign matter. Use low current, short arc and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	120-150	80-110	60-80

LoTherme - 444L

Martensitic Stainless Steel Electrode with High Strength for increased resistance to cavitation erosion.

Characteristics :

LoTherme-444L especially designed for the fabrication and repair welding of hydro turbine components made of soft martensitic SS 13%Cr - 4%Ni alloyed steels and cast steel. Suitable for reclamations of ASTM CA6NM casting, Continuous Casting Rolls, etc.

Applications :

LoTherme-444L is well suited welding electrode for joining and building up on corrosion resistant martensitic Cr - Ni steels and the corresponding cast steels. The welding deposit has an increased resistance against cavitations and erosion also at working temperatures up to 350°C.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)	Weld Metal Hardness	CVN Impact Strength at RT
Typical	775	17	330-400 BHN	60 Joules

Welding Techniques :

Weld the electrode slightly inclined with a short arc. Re-dry 2-3 hours at 250-300°C. For wall thickness more than 10mm, preheating base metal to 150°C is recommended.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	110-150	80-110	60-90

LoTherme - 451

Stabilized low carbon electrode for Cr-Ni-Mo Steel.

Characteristics :

LoTherme-451 produces deposits of extra low carbon with balanced Cr-Ni ratio and controlled ferrite. Furthermore, stabilisation with Niobium ensures excellent resistance to corrosion. The presence of molybdenum improves the corrosion resistance in reducing media. Easy arc striking and re-striking, excellent weld finish and good slag detachability are some of the many pleasant features associated.

Applications :

LoTherme-451 is well suited for welding AISI 316, 316L, 316Ti, 317, 318, 318Ti, and other molybdenum bearing stainless steels, which find extensive applications in paper, fertilizer, oil refining and chemical industries. The extra low carbon coupled with columbium in the weld deposit ensures excellent resistance to carbide precipitation and the resultant intergranular corrosion.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	600	35

Welding Techniques :

For best results, re-dry the electrodes at about 250°C for 01 hour before use. Clean Weld surface thoroughly free from any surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	110-150	80-110	60-90

LoTherme - 452

Low heat input AC/DC, all position, extra low carbon electrode for Food & Pharma Grade Stainless Steel.

Characteristics :

LoTherme-452 produces weld deposits of extra low carbon with balanced Cr-Ni ratio and controlled ferrite of outstanding resistance to hazards of cracking, weld decay, corrosion and pitting. Excellent weld finish, easy striking and re-striking, stable arc and good slag detachability are a few among many pleasant features associated with LoTherme-452.

Applications :

LoTherme-452 is ideally suited for welding AISI stainless steels types 201, 301, 302, 304, 304L, 308, 308L and their equivalents. The extra low carbon in the weld deposit ensures freedom from carbide precipitation and resultant intergranular corrosion.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	520	35

Welding Techniques :

For best results, re-dry the electrodes at about 250°C for 01 hour before use. Clean Weld surface thoroughly free from any surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	90-130	70-90	50-70

LoTherme - 453

Low heat input, all position, Cr-Ni-Nb stabilized electrode.

Characteristics :

LoTherme-453 produces Nb stabilized weld deposits with balance Cr-Ni ratio and controlled ferrite for excellent resistance to corrosion. The electrode is characterized by soft and stable arc, which is easy to strike and re-strike, finely rippled weld beads of radiographic quality and easily detachable slag.

Applications :

LoTherme-453 is ideally suited for low heat input welding on AISI 301, 302, 304, 304L, 308, 308L, 321 and 347 stainless steel which are used in oil refining, chemical, paper pigments and paints, brewery, dairy and food processing industries. The welds have excellent resistance to carbide precipitation and the resultant inter- granular corrosion.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	530	30

Welding Techniques :

For best results, re-dry the electrodes at about 250°C for 01 hour before use. Clean Weld surface thoroughly free from any surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	90-130	70-90	50-70

LoTherme - 454

Low heat input electrode for increases the resistance to intergranular corrosion.

Characteristics :

LoTherme-454 is a stainless steel electrode depositing an extra low carbon weld metal. Weld metal deposited by these electrodes reduces the possibility of intergranular carbide precipitation and thereby increases the resistance to intergranular corrosion without the use of stabilizers such as niobium or titanium.

Applications :

LoTherme-454 is specially designed for joining of similar alloys and for surfacing and overlay applications on unalloyed steels. It is ideally suited for welding stainless steels of AISI316L varieties and their equivalents. The extra low carbon content ensure excellent corrosion resistance against sulphuric acids, phosphoric acids, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	600	36

Welding Techniques :

Ensure that the electrodes are perfectly dry. Re-dry the electrodes at 250-300°C for 01 hour before use. Clean the weld area free from any surface contamination. Hold a short arc length and weld with stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-180	100-140	80-110	60-80

LoTherme - 455

Low heat input AC/DC, all position extra low carbon Cr-Ni electrode with Molybdenum.

Characteristics :

LoTherme-455 produces deposits of extra low carbon with balanced Cr-Ni ratio and controlled ferrite. Further more, stabilization with columbium ensures excellent resistance to corrosion. The presence of molybdenum improves the corrosion resistance in reducing media. Easy arc striking and re-striking, excellent weld finish and good slag detachability are some of the many pleasant features associated with LoTherme-455.

Applications :

LoTherme-455 is well suited for welding AISI 316, 316L, 316Ti, 317, 318, 318Ti, and other molybdenum bearing stainless steels, which find extensive applications in paper, fertilizer, oil refining and chemical industries.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	530	30

Welding Techniques :

For best results, re-dry the electrodes at about 250°C for 01 hour before use. Clean Weld surface thoroughly free from any surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	90-130	70-90	50-70

LoTherme - 456

Low heat input AC/DC, all position versatile stainless steel electrode for high corrosion resistant applications.

Characteristics :

LoTherme-456 is characterized by excellent operational features on DC as well as AC power sources, a quiet, soft and stable arc, which is easy to strike and restrike, good slag detachability and evenly rippled beads. The weld metal is strong, tough and ductile.

Applications :

LoTherme-456 is ideally suited for joining stainless steels to carbon steels, low alloy steels, cast steels and austenitic manganese steels for overlay welds. Typical applications include valve seats, pump impeller, shafts, etc. for chemical dairy, brewery and food industries. Deposits withstand acid corrosion & suitable for welding AISI 316L type stainless steel.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	560	30

Welding Techniques :

For best results, re-dry the electrodes at about 250°C for 01 hour before use. Clean Weld surface thoroughly free from any surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	100-130	80-100	60-90

LoTherme - 457

Special electrode for low heat input welding and surfacing of austenitic manganese steels and steels of widely varying composition for progressive work hardening.

Characteristics :

LoTherme-457 produces weld deposits, which display excellent resistance to impact in combination with corrosion. The special features include, soft and stable arc, which is easy to strike and re- strike, well rippled smooth weld beads and good slag detachability.

Applications :

The balanced chemistry of LoTherme-457 results in high quality welds on a wide range of similar and dissimilar steels, such as joining of austenitic manganese steels to themselves, and to Carbon Steels. Other applications include welding of heat treatable alloy steels for fabrication welding, maintenance and reclamation of worn-out parts, both for buffer layer and hardfacing in mining, cement, steel, power plant, earth moving machinery, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)	Weld Metal Hardness (as welded)	Work Hardens (under Impact)
Typical	608	35	200 BHN	450-550BHN

Welding Techniques :

Keeping the electrodes dry. In case of moisture pick up, re-dry at 250°C for minimum 01 hour. Clean the weld area thoroughly free from any foreign matter. Use low current, short arc and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	120-160	80-100	55-80

LoTherme - 457IVR

Specially developed low heat electrode for resurfacing rail points and crossings.

Characteristics :

LoTherme-457 IVR has been formulated to produce extra tough and crack resistant weld metal. The weld metal exhibits excellent resistance to rolling and sliding friction, and impact. The weld metal work hardens under impact. The electrode possesses pleasing operating characteristics and produces smooth, well- rippled weld beads.

Applications :

LoTherme-457 IVR has been specially developed for resisting rolling and sliding friction, and impact service conditions as encountered by rail points and crossings. It is ideally suited for resurfacing rail points and crossings, worn-out rails, etc. in order to enhance the service life. LoTherme -457 IVR is recommended for both buffer and surface layers.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	Weld Metal Hardness (as welded)	Work Hardens (under Impact)
Typical	220 BHN	450-550 BHN

Welding Techniques :

Keep the electrodes dry. In case of moisture pick-up, they should be redry at 250°C for minimum 01 hour. Clean the area thoroughly of all contaminants. Use low current, short arc and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	130-170	90-120	60-90

LoTherme - 458

A versatile electrode for low heat input welding of Stainless steels to carbon Steels and for overlays.

Characteristics :

LoTherme-458 produces welds of radiographic quality and for joining SS to Steels, resistance to corrosion. Evenly rippled, extremely smooth weld beads. Soft and stable arc, which is easy to strike and re-strike. Good slag detachability.

Applications :

LoTherme-458 is ideally suited for :

(1) Welding stainless steel AISI 309 and similar compositions in wrought or cast form ;

(2) Joining 18/8 stainless steel to mild steel ;

(3) Welding the clad side of 18/8 stainless steel ;

(4) Applying sheet linings of 12% Cr or 17% Cr steel to mild steel Shells ;

(5) Overlays on carbon steels and low alloy steels for superior corrosion resistance.

Typical applications include chemicals pumps and a number of other machinery and equipment.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	560	30

Welding Techniques :

Keep the electrode dry. Re-dry electrodes at 250°C for 01 hour. Use low current, short arc length and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	90-130	70-100	50-70

LoTherme - 464

Low heat input, special purpose stainless steel electrode for welding stainless steels and steels to resist scaling up to 1200°C.

Characteristics :

LoTherme-464 is characterized by a stable arc, which is easy to strike and re-strike. Easily removable slag, smooth finely rippled welds of radiographic quality. The weld metal is fully austenitic in structure and possesses high strength, high ductility, good toughness and creep strength. Resistance to scaling is retained up to 1200°C.

Applications :

LoTherme-464 is ideally suited for welding of stainless steel AISI 310 to itself and to other steels, straight chromium stainless steels, dissimilar steels, including steels of relatively high hardenability, clad steels, carbon-molybdenum and chromium-molybdenum piping. Some of the typical applications include welding of kiln anchors, heat exchangers, heat-treating pots and boxes, furnace parts, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	550	30

Welding Techniques :

Re-dry the electrode at 250°C for 01 hour before use. Keep the interpass temperature as low as possible by using current and low heat input. Use short arc and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	90-130	70-100	50-70

LoTherme - 467

A heat resistant stainless steel electrode with molybdenum for low heat input welding and overlays, on most types of stainless carbon steel. Deposit resists high temperature & corrosion.

Characteristics :

LoTherme-467 is characterized by quiet and stable arc, which is easy to strike and re-strike, finely rippled, smooth weld beads and good slag detachability.

Applications :

LoTherme-467 is a 'universal' electrode suited for welding all grades of steels where high strength and corrosion resistance in combination with heat resistance are important factors. For welding of straight chromium stainless steel such as AISI 410, and 430 LoTherme-467 is an appropriate electrode. Typical applications of LoTherme-467 include salvaging pumps, valves and shafts operating at high temperature. Also suitable for hot dies and overlays on cast iron.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	570	30

Welding Techniques :

For best results, re-dry the electrodes at about 250°C for 01 hour before use. Clean weld surface thoroughly free from any surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	110-130	80-100	60-80

LoTherme - 468

A universal low heat input high strength, high alloy electrode for crack-free welds and overlays on steels of widely varying compositions. Unique Dissimilar Steel joining alloy.

Characteristics :

LoTherme-468 core wire and flux material are so chosen that it is highly favourable for producing welds which have complete freedom from hazards of cracking on a wide variety of similar and dissimilar steels. It operates equally well on AC as well as on DC(+) in all welding positions. Extremely low spatter. Easily detachable slag. Very smooth weld finish, which takes high polish, hence suitable for frictional wear resistance.

Applications :

LoTherme-468 is ideally suited for high strength, crack-free welds and overlays subject to services under wear, friction, impact, heat & corrosion on carbon, low alloy, molybdenum-vanadium spring, tool and die, stainless and dissimilar steels. Typical applications include dies, tools, leaf and coil springs and similar parts and surfacing hot dies, gear teeth, forged shafts, earth moving equipment and machine parts.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	830	23

Welding Techniques :

Re-dry the electrode at about 125°C for 01 hour before use. Clean the weld area free from oil, grease, dirt or any other surface contamination. Hold a short arc. Do not weave the electrode. Weld with stringer beads. Intermittent welds may be necessary for welding high alloy and hardenable steels. Peening will relieve internal stresses. For certain high alloy tool steels preheating is recommended.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	100-130	75-95	60-80

LoTherme - 469

A low heat input electrode for crack free, high strength welds on all steels.

Characteristics :

LoTherme-469 is an ideal low heat input electrode for high strength welds on steels. Pleasing operating characteristics, smooth weld beads, high strength crack resistant weld metal are features associated with this electrode.

Applications :

Ideally recommended for high strength joints in steels, dissimilar joints in carbon, low alloy steels, dissimilar joints in carbon steels to stainless steels, etc. Typical applications include gears, dies, shafts, earth moving machinery, general machine parts, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)
Typical	785

Welding Techniques :

The electrodes should be dry. Re-dry the electrodes at 250°C for 01 hour. Use short arc and stringer beads. Use Pre- heating wherever necessary.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	90-110	70-90	50-70

LoTherme - 470

A versatile low heat input electrode for crack free welds on a variety of steels especially for joining SS to CS.

Characteristics :

LoTherme-470 is a low heat input electrode ideally suited for producing crack free welds on a variety of steels. It operates equally well on AC as well as DC (+) in all positions. Smooth weld beads, extremely low spatter are some of the features associated with this electrode.

Applications :

Ideal for repair and maintenance welding on a variety of steels; dissimilar joints between carbon, low alloy steels to other steels, stainless steels, etc. surfacing applications; ideal for buffer layers before hardfacing. Ideal for joining and building up of a number of components in earthmoving and mining, thermal power, cement, sugar, general engineering industries.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)
Typical	620

Welding Techniques :

The electrodes should be dry. Re-dry if necessary at 250°C for 01 hour. Clean the weld area free from all contaminants. Use short arc stringer beads. Use preheat wherever necessary.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	125-145	95-115	75-95	55-75

LoTherme - 470M

Low heat input multipurpose electrode for dissimilar and steel, Mn. steel mining applications.

Characteristics :

- Excellent operating characteristics.
- The weld metal has excellent crack resistance and good toughness.
- The weld metal is of radiographic quality.
- Detachability of slag is very easy.

Applications :

Ideal for welding of similar and dissimilar combinations of carbon steels, low alloy steels, stainless steels, manganese steels, etc. It is specially designed for rebuilding and joining in cement, power and mining industries. It is best suitable for typical application bucket boom, frame of earth moving equipment.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	620	35

Welding Techniques :

Re-dry the electrode at 250-300°C for 01 hour before use. Clean weld area free from all surface contamination. Use as low a current as possible, short arc and minimize weaving.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	120-150	80-120	60-80

LoTherme - 483

Low heat input electrode depositing low carbon high Cr - high Ni - Mo -Cu weld metal.

Characteristics :

LoTherme-483 is a special DC (+) electrode producing a low carbon Cr-Ni-Mo-Cu weld metal which resists Sulfuric acid, Phosphoric acid corrosion environment. It is characterized by quite and stable arc, which is easy to strike and restrike, finely rippled smooth weld beads and good slag detachability.

Applications :

LoTherme-483 is ideally suited for welding similar composition materials to itself and to other grades of stainless steels.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	530	34

Welding Techniques :

Welding zone must be clean and free from residues, such as grease, paint or metal dust. Use stringer beads, short arc and smallest possible size, which helps in reducing the heat input. The electrodes should be kept dry. Re-dry the electrodes at 200-250°C for 01 hour before use.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	100-140	80-100	50-70

LoTherme - 485

Low-carbon, fully austenitic electrode, High Cr-Ni-Mo-C alloy having high corrosion resistance.

Characteristics :

LoTherme-485 distinguishes itself particularly by resistance to tension cracks and pitting in media containing chloride. This alloy has remarkably high corrosion resistance against phosphoric acid and exhibits very low excavation rates in sulphuric media. The electrode can be welded in all positions, except vertical down. The seam has a finely rippled, smooth and regular structure.

Applications :

LoTherme-485 electrode for joining and the surfacing of base materials of the same and of similar nature.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	530	31

Welding Techniques :

Welding zone must be clean and free from residues, such as grease, paint or metal dust. Use stringer beads, short arc and similar possible electrode size, which helps in reducing the heat input. The electrodes should be kept dry. In case of moisture pick-up re-dry the electrodes at 250°C for 01 hour.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	80-120	60-90

Electrodes for Nickel & Nickel Alloys

Nickel & Nickel Alloys

Because of their high strength and good corrosion resistance at high temperature, Ni-base alloys have become the most extensively pure high temperature alloys. Typical applications for commercially pure Ni are food processing equipment, caustic handling equipment, chemical shipping drums, and electrical and electronic parts. Nickel and nickel based alloys are used in industrial applications for:

1. Corrosion resistance.
2. Heat resistance and high temperature properties.
3. Cryogenic properties.

Preheating is not normally required unless there is a risk of porosity from moisture con condensation. PWHT is not usually needed to restore corrosion resistance.

Inconel type of deposit is used for obtaining high temperature, high strength joints designed to perform at over 200°C such as on creep resistant chrome-molybdenum steels to stainless steels. These types are suitable when welding sections over 25 mm. For welding tool steels requiring toughness under repeated cyclic stress and oxidation resistance upto 1000°C, Hastalloy C type of deposit is regularly used. The drop in strength and hardness as the temperature goes up is very gradual.

The welding of Ni-alloys is similar to the welding or austenitic stainless steels. Nickel and Ni-alloys can be joined by all of the are welding processes commonly used for steel and other metals. However, not all of the processes are applicable to every alloy because of metallurgical characteristics or non-availability of suitable welding materials. Is general, the precipitation hardening alloys require closer control of the welding process variables because of the possibility of ageing and the formation of refractory oxides during welding.

LoTherme - 510N

A high Nickel-Cr-Mn-Nb Alloy for extreme thermal shocks resistance, high temperature and cryogenic applications exhibiting sustained creep properties for multiple number of years.

Characteristics :

LoTherme-510 N producing high quality Nickel alloy deposits. It operates in all positions. Excellent weld finish, steady arc, and good slag remove-ability.

Applications :

LoTherme-510 N is a universal, all positional electrode, designed for joining and surfacing of Nickel & Nickel Alloys, Inconel alloys, Nickel-Cr-Fe based materials, 9% Ni Steels for cryogenic applications for very high-temperature applications and applications of extreme thermal cycles, possessing much higher UTS and Elongation compared to many other products. It is recommended for welding different steels, such as austenitic to ferrite steels, as well as for cladding on unalloyed and low-alloyed steels. Typical applications include cement kiln rings, blast furnace components, reformer tubes, chemical containers & liquid gas installations.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)	CVN Impact Strength at RT	CVN Impact Strength at -196°C	Weld Metal Hardness
Typical	640	38	90 Joules	60 Joules	180 BHN

Welding Techniques :

Ensure that the electrodes are redry at 250°C for 02 hours before use. Clean the weld area free from rust, oil, grease, paint, or any other surface contamination. To ensure minimal heat input, use short arc and stringer bead technique.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	110-140	80-100	50-70

LoTherme - 511N

Low heat input electrode for welding Ni-Cr-Fe alloys and dissimilar steels experiencing high temperature.

Characteristics :

LoTherme-511 N operates in all positions. The weld deposit is hot cracking resistant and does not tend to embrittlement. The weld metal working significantly after more than 10,000 hours at temperature up to 850°C. Has exceptional impact properties, with excellent lateral expansion.

Applications :

LoTherme-511 N is used for joining or cladding heat resistant Ni- Cr-Fe alloys, Inconel Alloys heat, resistant austenitic steels, heat resistant austenitic ferrite materials, Ni-Cr-Fe materials, joining of dissimilar steels, nickel based alloys.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)	CVN Impact Strength at RT	CVN Impact Strength at -196°C	Weld Metal Hardness
Typical	600	36	90 Joules	60 Joules	190 BHN

Welding Techniques :

Re-dry the electrodes 250°C for 2 hours before use. Clean the weld area free from rust, oil, grease, paint, or any other surface contamination. To ensure minimal heat input, use short arc and stringer bead technique.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	110-140	70-100	50-70

LoTherme - 512

Low heat input electrode for high strength and corrosion resistant welds on Monel and other Ni-Cu alloys.

Characteristics :

LoTherme-512 is a hydrogen controlled, low heat input welding electrode. Good weld finish with good slag detachability. Versatile in applications for maintenance welding.

Applications :

LoTherme-512 electrode core wire and flux formulation are so balanced as to make it a versatile electrode for welding of monel to monel, to other Ni-Cu alloys, Ni-Cu alloys to themselves, Ni-Cu Alloys to steels, the clad side of Ni-Cu clad steel and for surfacing steel parts for service against corrosion by sea water, chlorinated solvents, sulphuric acid and alkalis. Ideal for power plants, chemical, food, dairy and oil refining industries.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	560	30

Welding Techniques :

The electrode should be stored dry. In case of moisture pick-up, redry the electrodes to 250°C for 01 hour before use. Clean the weld area free from surface contamination of any form. Use short arc and weld with stringer beads. Wherever possible weld in flat position.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	105-135	70-100	50-70

LoTherme - 513

Low heat input electrode depositing practically pure nickel for wrought and cast Nickel and Ni Alloys.

Characteristics :

LoTherme-513 is a special purpose electrode, versatile in applications in the field of fabrication and maintenance welding of machinery and equipment. It is meant for use with DC reverse polarity in all positions. Finely rippled even weld beads. Stable arc, which is also easy to strike and restrike. Good slag detachability.

Applications :

LoTherme-513 is so designed as to deposit practically pure nickel. It is highly useful for welding nickel in wrought and cast forms, pure nickel to themselves and for joining nickel to steels, for surfacing carbon and low-alloy steels. It is an ideal electrode for building up worn out or missing sections, repairing defects and cladding mild steel for chemical, food, dairy and oil refining industries. It is also ideal for overlays on parts used for caustic soda service.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	420	22

Welding Techniques :

Dry the electrode at 250°C for 01 hour before use. Clean the weld area free from any surface contamination. Use DC reverse polarity, short arc, stringer beads. Control the heat input to as low a level as possible by allowing the weld to cool before depositing subsequent passes. Wherever possible, weld in flat position.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	110-140	80-110	55-75

LoTherme - 514

Outstanding electrode for welding Ni-Cr-Mo-W-Co alloys and for surfacing application with strength and heat & oxidation resistance up to 1000°C.

Characteristics :

LoTherme-514, a non-synthetic electrode is specially developed to produce high nickel deposit containing carefully controlled quantities of Chromium, Molybdenum, Tungsten and Cobalt. Progressively work hardens.

The welds are Characterised By :

1. Suitable for welding / cladding on Nickel alloys like Hast Alloy, Inconel to themselves & with any other steels.
2. Excellent heat resistance, strength and toughness up to about 1000°C.
3. High resistance to corrosion by most types of acids or their combinations.
4. Good thermal shock resistance.
5. Good machinability. Progressively work hardens to 400 BHN to retain hardness even at elevated temperatures.

Applications :

LoTherme-514 is ideally suited for welding Ni-Cr-Mo alloys to themselves, to other metals and for surfacing steel with Ni-Cr-Mo deposit. Applications in this category include valves, pumps, etc. It is thus highly suited for hot working tools, e.g. shear blades, forging dies, punches, hot trimming dies, heating elements, etc. Ideally suited to extreme chloride environment.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)	Work Hardens (under Impact) Upto
Typical	686	28	400 BHN

Welding Techniques :

Redry the electrode at 250°C for 01 hour before use. Use low current, short arc and stringer beads. Wherever possible weld in flat position.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	110-150	80-100	70-90

LoTherme - 515N

Extreme Corrosion resistance electrode with high Nickel content.

Characteristics :

LoTherme-515 N electrode is weld-able in all positions, except vertical down. Stable arc, good slag remove-ability. The seam is finely rippled and notch-free. It gives a fully austenitic weld metal without hot cracks, not prone to embrittlement either at high or low temperatures.

Applications :

LoTherme-515 N is recommended for cold-tough steels up to 9% Ni and working temperatures down to -196°C, particularly where the welded joint has to undergo hot deformation or stress relieving. Cold tough austenitic Cr - Ni steels can also be welded with LoTherme-515 N. This electrode is also suitable for joining different materials, such as austenitic to ferritic stainless steel, steels to Nickel alloys and steels to Copper alloys.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)	CVN Impact Strength at RT	CVN Impact Strength at -196°C
Typical	620	35	85 Joules	55 Joules

Welding Techniques :

Ensure that the electrodes are dry. In case of moisture pick-up, re-dry the electrodes at 250°C for 02 hours before use. Clean the weld area free from rust, oil, grease, paint, or any other surface contamination. To ensure minimal heat input, use short arc and stringer bead technique.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	80-120	60-90

LoTherme - 516N

Extreme Scale resistant electrode with High Ni-Cr Alloy with High Mo content for high temperature applications.

Characteristics :

LoTherme-516 N has excellent welding properties, a regular and finely rippled bead appearance due to spray arc. Very easy slag removal. The weld deposit is highly corrosion resistant, scale resistant and work hardening. Machinable with cutting tools. Resistance to hot cracking for service temperature up to 1100°C.

Applications :

LoTherme-516 N electrode for cladding & joining and surfacing high-temperature Ni-Cr-Mo alloys. Special applications are in oxidizing media at high temperatures, especially for the construction of gas turbines, combustion chambers and ethylene production plants, journals, trimming dies, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)	CVN Impact Strength at RT
Typical	715	32	90 Joules

Welding Techniques :

Ensure that the electrodes are dry. In case of moisture pick-up, re- dry the electrodes at 250°C for 2 hours before use. Clean the weld area free from rust, oil, grease, paint, or any other surface contamination. To ensure minimal heat input, use short arc and stringer bead technique.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	80-120	60-90

LoTherme - 525N

Inconel type of electrode, for welding & surfacing steels.

Characteristics :

LoTherme-525N is a non-synthetic Inconel type of electrode, depositing weld metal of Ni-Cr-Co-Mo alloy. Its weldability and usability are good and stable welding can be performed. The weld metal has excellent crack resistance.

Applications :

Lotherme-525N electrodes are used for welding and surfacing steels with Ni-Cr-Co-Mo weld metal. The electrodes are also used for applications where optimum strength and oxidation resistance is required above 820°C & up to 1150°C, especially when welding on base metal of Nickel-Iron-Chromium alloys. Specially recommended for welding furnace heating elements, reformer tubes etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

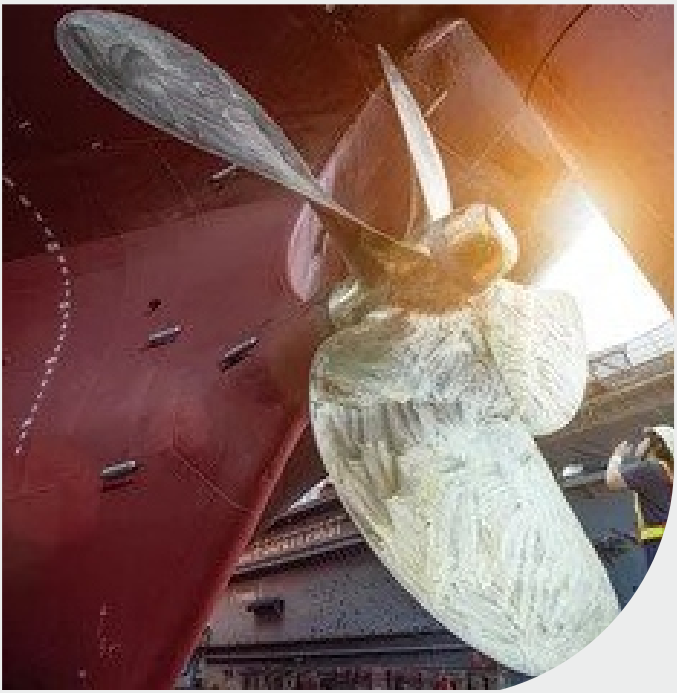
Properties	UTS(MPa)	%El (L=4d)
Typical	665	29

Welding Techniques :

Ensure the electrodes are dry. Re-dry the electrodes at 300-325°C for 01 hour. Use short arc, stringer bead, and smallest possible size of electrode and minimum current to reduce the heat input.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	110-140	70-100	50-70



ELECTRODES FOR COPPER & COPPER ALLOYS

Copper & Copper Alloys

Copper has a FCC (face centred cubic) crystal structure, as do most of its alloys; that is why they have good formability and malleability. The principal alloying elements in Cu-alloys are Al, Ni, Si, Sn, and Zn. Most commercial copper alloys are solid solutions and show no allotropic or crystallographic changes on heating and cooling. The main features of copper and its alloys;

1. Corrosion resistance.
2. Electrical and thermal conductivity.

In terms of weldability, the alloys have quite different welding characteristics. Copper needs substantial preheat to counteract the high thermal conductivity. But alloys like copper-nickel can be fusion welded without any preheat, as the thermal conductivity is similar to low carbon steel. Buttering technique should be used to join copper alloys to carbon/stainless steel. This is to take care of the copper migration to the HAZ and precipitation at the grain boundaries. The buffering, with a pure nickel electrode, can be applied on either the copper or the steel side. The groove has to be filled up a stainless or a bronze type of deposit.

The preheating should be 300-500°C when buttering copper or bronze whereas the preheating temperature has to be chosen according to the base material if the buttering is done on the steel side.

Surface oxides can cause a serious problem during welding and soldering or Cu and its alloys. The oxides on Al-bronze, Be copper, Cr-copper, and Si-bronze are difficult to remove. The surface to be joined must be clean, and special fluxing or shielding methods must be used to prevent the film from reforming during the joining operation.

LoTherme - 532

Basic coated Tin-bronze electrodes with 6% tin.

Characteristics :

LoTherme-532 is distinguished by good welding properties. With steady arc and low spatter losses it gives dense, pore-less seams. The slag is easily removed.

Applications :

LoTherme-532 for joining copper and copper alloys, phosphorus and tin-bronzes as well as copper-clad plates in mechanical and plant engineering and ship building. For surfacing on copper and copper alloys, phosphor and tin-bronzes.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	314	30

Welding Techniques :

Seam preparation with large V angle (80-90°). Electrode guided vertical, arc 3-4 mm. Only work-pieces more than 5 mm need preheating up to 100 - 250°C. Bronze castings must be cooled slowly. Electrodes that have got damp must be dried 2 - 3 hours at 150°C.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	130-160	100-130	80-100	60-90

LoTherme - 533

Tin-bronze electrodes with 6% tin for welding with AC machines.

Characteristics :

LoTherme-533 is distinguished by good welding properties. With steady arc and low spatter losses it gives dense, pore-less seams. The slag is easily removed.

Applications :

LoTherme-533 for joining copper and copper alloys, phosphorus and tin-bronzes as well as copper-clad plates in mechanical and plant engineering and ship building. For surfacing on copper and copper alloys, phosphor and tin-bronzes.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	314	30

Welding Techniques :

Seam preparation with large V angle (80-90°). Electrode guided vertical, arc 3-4 mm. Only work-pieces more than 5 mm need preheating up to 100 - 250°C. Bronze castings must be cooled slowly. Electrodes that have got damp must be dried 2 - 3 hours at 150°C.

Electrical Characteristics : AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	80-120	60-90

LoTherme - 534

Aluminium Bronze electrode for sea water corrosion resistance.

Characteristics :

LoTherme-534 possesses outstanding welding properties and can be used in all positions, except vertical down. The weld metal displays high mechanical properties and is tough, pore-less and not prone to cracking.

Applications :

LoTherme-534 is used for joining and surfacing on aluminium- bronzes (up to 10% Al), copper and copper alloys as well as surfacing on steel, cast steel and cast iron. It is also suitable for welding pipe cavities in new aluminium-bronze castings. Its corrosion resistance allows it to be used on marine propellers, acid pumps and fittings.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	450	20

Welding Techniques :

Clean the weld zone thoroughly. Wall thickness in excess of 5 mm must be grooved out with a 90°V. Bigger work-pieces are preheated to about 150-250°C. To avoid overheating, guide the electrode vertically at high welding speed. Use only dry electrodes. Electrodes that have got damp must be dried 2 - 3 hours at 250°C.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	130-160	80-110	70-90

LoTherme - 535

Complex aluminium-bronze electrode with high mechanical properties and sea water resistant.

Characteristics :

LoTherme-535 possesses outstanding welding properties and can be used in all positions, except vertical down. The weld metal displays high mechanical properties and is tough, pore-less and not prone to cracking. It work hardens to give excellent resilience to wear.

Applications :

LoTherme-535 is used for joining and surfacing on complex aluminium-bronzes, especially those with high Mn, as well as steel and grey cast iron. It is also eminently suited for shipbuilding (marine propellers, pumps and fittings) and in the chemical industry (valves, pumps) where chemical attach is accompanied by erosion. Its favorable coefficient of friction makes it ideal for surfacing on shafts, sliding surfaces, bearings, punches and dies of all kinds.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	650	25

Welding Techniques :

Clean the weld zone thoroughly. Wall thickness in excess of 5 mm must be grooved out with a 90°V. Bigger work-pieces are preheated to about 200-250°C. To avoid overheating, guide the electrode vertically at high welding speed. Use only dry electrodes. Electrodes that have got damp must be dried 2 - 3 hours at 250°C.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-190	120-160	80-120	60-90

LoTherme - 536

A specially formulated low-heat input 70/30 alloy for Copper-Nickel welding.

Characteristics :

LoTherme-536 is a copper - nickel electrode, for joining and surfacing of wrought and cast alloys of similar composition as well as 80/20 and 90/10 alloys. It operates in all positions.

Applications :

LoTherme-536 is used in offshore applications because of its good resistance to the corrosion in sea water. It is also suitable for ship- building, chemical process equipments, oil refineries, food industries, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El (L=4d)
Typical	390	28

Welding Techniques :

Clean the weld zone thoroughly. Wall thickness in excess of 5 mm must be grooved out with a 90°V. Bigger work-pieces are preheated to about 200-250°C. To avoid overheating, guide the electrode vertically at high welding speed. Use only dry electrodes. Electrodes that have got damp must be dried 2 - 3 hours at 250°C.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	130-160	100-130	80-100	60-90

ELECTRODES FOR HARD-FACING, WEAR-FACING OR OVERLAY APPLICATIONS

HARDFACING OF MATERIALS

The components in service are subjected to different types of wear namely friction, abrasion, impact, etc., which cause the material wear and render them unsuitable for service. The components are normally hardfaced by depositing a suitable weld metal, which will resist the type of wear encountered in service. It is needless to emphasize here that depending on the type of wear, the weld metal will have to be selected. Let us consider the hardfacing of various materials to resist different types of wear.

The frictional wear which is encountered in rollers, drives, bearings, gears, etc., is due to the movement of the metallic surface over the other. The resistance to this type of wear can be achieved by hardfacing the components with a weld metal with **LoTherme-601**. This weld metal will be an air hardening type and the hardness will be in the range of 250 to 350 VPN. This weld metal will have considerable toughness also and resist impact forces, which occur in service. The use of **LoTherme-603** can be made for applications, which involve abrasion & heavy impact. To resist heavy abrasion, the chromium carbide type weld metals are preferred. **LoTherme-604, LoTherme-611** are ideal weld metals suited for resisting heavy abrasion. The weld metals of **LoTherme-605** and **LoTherme-613** are suited for resisting heavy abrasion in combination with high temperature. The typical service conditions in which these weld metals are suitable are indicated in the individual literature.

In hardfacing, it is necessary to understand the phenomena that occur during welding known as dilution.

DILUTION

Dilution is defined as the percentage of base material in the weld metal. When a weld metal is deposited on the base material, it mingles with the base material and the resultant weld metal is of an intermediate composition. In all maintenance welding applications the dilution effect should be taken into consideration.

Normally in manual metal arc welding this dilution can be expected to be around 30 % which means, the deposited weld metal will have 70 % of weld metal and 30 % of base material.

FOR EXAMPLE IF WE CONSIDER THE FOLLOWING :

Base material : A1 + B1 + C1 + etc.

Weld metal : A2 + B2 + C2+ etc.

Where A, B, C are different elements

Resultant deposited weld metal :

For A : (0.7A2 + 0.3A1)

B : (0.7B2 + 0.3B1) and so on.

The practical consequence of this dilution effect can be observed as follows :

1) When a hardfacing deposit is made on mild steel, the first layer may get diluted with the base material and therefore may not give the required hardness in the first layer.

2) When depositing a hardfacing deposit (which is normally air hardening and has higher hardenability) on a high carbon material, the weld metal can pick up carbon from the base material, and on solidification the weld metal may crack because of the formation of brittle structures. In such cases, it is preferred to have a ductile weld metal deposition, which can, even with the carbon pickup from the base material, retain sufficient ductility to produce crack free weld metal. These are known as buffer layer or cushioning layers.

Hardfacing of austenitic manganese steel is one of the commonly practiced maintenance welding jobs in industries like, cement plants, thermal power plants, mining and earthmoving industries.

HARDFACING OF AUSTENITIC MANGANESE STEELS

These steels also known as ' Hadfield steels' find wide range of applications in cement units. These steels contain about 11-14 % Mn and because of the presence of this element, these steels are rendered austenitic in structure at room temperature. These steels have the property of work hardening and therefore are used for services where impact loads are involved. Some of the components of austenitic manganese steels are crusher jaws, crusher rolls, crusher hammers, etc.

When these austenitic manganese steels are heated, because of the precipitation of carbides on the grain boundaries, the steel gets embrittled. Therefore, it is essential that during welding, the heat input is restricted to the minimum. In general, it is not recommended to heat this material to above 310°C (and during welding the interpass temperature should never be more then 100°C). It is advisable to keep a portion of the casting immersed in water during welding so that the heat is dissipated fast and precipitation of brittle phases is avoided.

Since these types of steels will not be subjected to any further heat treatment after welding, care should be exercised to see that the properties of the base material are not hampered because of welding.

Reclamation of austenitic manganese steel component calls for detailed welding procedures and use of appropriate welding electrodes so that best service life can be obtained. Normally, the build-up can be done using LoTherme-607. However, on work hardened surfaces it is preferable to have a single layer deposition of LoTherme-610. After sufficient build-up using LoTherme-607 the top 02 layers should be made with LoTherme-603/604/605 depending on the type of wear to which this component will be subjected to in service.

The deposition of the air hardening deposit will help in reducing the initial wear of the components. By the time air hardened layers wear out, the austenitic manganese steel deposit below, would have work hardened and resist wear subsequently.

As detailed earlier, while hardfacing austenitic manganese steels, care should be taken to restrict the heat input to a minimum and overheating of the casting should be avoided by using:

1) The minimum possible current and the lowest possible size of the electrode.

2) Keeping the component immersed in water and maintaining a low interpass temperature in such a way that the comp01nt is warm to touch.

3) Using small stringer beads and adopting intermittent and sequential welding techniques.

Apart from this, a number of hardfacing applications are encountered in various industries. By analyzing the service and the hardness requirements of the actual job, one can select the appropriate electrode.

LoTherme - 600

Co-Cr-W-alloy of Cobalt Grade 1 for surfacing to resist high temperature wear.

Characteristics :

LoTherme-600 welds well in the horizontal position. Soft arc, smooth seam surface. It still retains great hardness at high temperatures, even at red heat, and recovers its original hardness after cooling.

Applications :

LoTherme-600 is the hardest of the cobalt-containing alloys and is used mainly for severe friction wear, erosion and corrosion. It is very resistant to sliding stressing metal-to-metal, and is therefore recommended for pump bushes, screw conveyors, wear rings, guide rails, cutters, rolls, etc.

Welding Metal Hardness :

At Room Temperature: 45-55 RC
At 600°C: 43-48 RC

Welding Techniques :

Re-dry the electrodes at 250°C for 01 hour before use. Clean the weld zone free from rust, scale and grease. Bigger work pieces are preheated to about 300°C. Keep the amperage as low as possible, so as to fuse the parent metal as little as possible. Guide the electrode vertically, keeping the arc short. Weave only slightly. Cool slowly in an oven or under asbestos. Machinable only by grinding.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-190	120-160	80-120	60-90

LoTherme - 601

Low heat input touch-weld electrode for machinable overlays on all ferrous metals deposit in flame hardenable.

Characteristics :

LoTherme-601 is characterized by a soft and stable arc, which is easy to strike and re-strike, smooth, crack free welds, good slag detachability. The deposited weld metal has a high degree of toughness, excellent resistance to rolling and sliding friction and heavy impact loads.

Applications :

LoTherme-601 is a versatile electrode for hardfacing, overlay and inlay applications on all ferrous metals, components, machine parts requiring moderate hardness in combination with good machinability, such as tractor sprockets, gears, shafts, axles, pinion teeth, concrete and pan mixer blades, ropeway and tram car rails, and wheels, points and crossing, crane wheels, ropeway trolley wheels.

Welding Metal Hardness : 240-300 BHN

Welding Techniques :

Clean the weld area. Use low current and a short arc length. Avoid weaving of the electrode. While surfacing on medium and high carbon steels, use LoTherme-352 for buffer layers in order to avoid chances of cracking. For surfacing on heavy sections and materials high in carbon, pre-heating of the part may be necessary.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-250	130-160	95-120	60-90

LoTherme - 602

Low heat input, touch-weld, low manganese electrode for moderately hard deposit to resist impact & frictional wear. It is a flame hardenable alloy.

Characteristics :

LoTherme-602 is characterised by a stable arc, which is easy to strike and re-strike, good slag detachability and weld beads of fine appearance. It operates equally well on AC as well as DC in all positions.

Applications :

LoTherme-602 is ideally suited for a number of applications, which demand good abrasion resistance, combined with fairly high degree of toughness. It can be used on mild steel, carbon steel, low alloy steels, etc. Some of the typical applications include gears, shafts, crane wheels, brake shoes, forging dies, drive sprockets, conveyor parts, cold punching dies, rail ends, log wheels, ploughshares, wobblers, etc.

Welding Metal Hardness : 280-380 BHN

Welding Techniques :

The electrode should be stored dry. In case of moisture pick-up, Re-dry at 150°C for 01 hour before use. Use low current and short arc. Avoid excessive weaving. For base materials with carbon content of 0.3% and above, use buffer layers with LoTherme-352 before surfacing.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-190	130-160	95-120	55-75

LoTherme - 602B

A basic electrode, with high recovery, for moderately hard deposit, especially on high tensile ferrous metals, that are heat treatable, well suited for difficult to weld steels in forging industries.

Characteristics :

LoTherme-602B is characterised by a stable arc, good slag detachability and weld beads of fine appearance. It operates in all positions.

Applications :

LoTherme-602B is highly crack resistant, even in multiple layer deposit, ideally suited for a number of applications, which demand good impact resistance, combined with high degree of toughness. It can be used on mild steel, carbon steel, low alloy steels, etc. Some of the typical application include gears, shafts, crane wheels, brake shoes, forging dies, drive sprockets, conveyor parts, cold punching dies, rails ends, log wheels, ploughshares, wobblers, etc.

Weld Metal Hardness : 320-380 BHN

Welding Techniques :

The electrode should be stored dry. Re-dry at 250°C for 1 hour before use. Use low current and short arc. Avoid excessive weaving. For base materials with carbon content of 0.30% and above, use buffer layers with LoTherme-352 before surfacing. When welding hardenable steels of large thickness, adequate care for preheating, slow cooling after welding & PWHT are recommended for best result.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	170-210	140-170	90-130	60-80

LoTherme - 603

Low heat input, basic coated versatile electrode for hard surfacing of widely varying machine parts and components.

Characteristics :

LoTherme-603 a hard surfacing electrode, operates well in all positions. The deposited weld metal has exceptional abrasion and wear resistance in combination with resistance to heavy impact. Evenly rippled, porosity free weld deposits permit heavy build-up without danger of cracking. In most cases LoTherme-603 can be used directly on the job without the necessity of depositing buffer layers.

Applications :

LoTherme-603 core wire and flux formulation are so chosen as to make the electrode versatile in terms of surfacing applications on a large variety of machine parts, equipment, etc. Typical applications include surfacing chipper knives, conveyor bucket lips, shear blades, shovels dredger and elevator bucket lips rock crushers, rock drills, tractor grousers and paddlers. In crushing applications, LoTherme-603 is recommended as the final layer on 14% manganese weld deposit to reduce the initial wear.

Welding Metal Hardness : 52-62 RC

Welding Techniques :

Ensure that the electrodes are perfectly dry before use. In case of moisture pick-up, re-dry the electrodes at 200°C for 01 hour before use. Clean the weld area free from any surface contamination. Hold a short arc length and weld with stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350
Current Range (Amps)	170-210	140-170	100-130

LoTherme - 603R

Rutile-coated, touch-welding, H/F electrode for wear resistant surfacing on wide range of machine components.

Characteristics :

LoTherme- 603 R has excellent welding properties, a homogeneous, finely rippled bead appearance due to the spray arc and very easy slag removal. This electrode is weldable with very low amperage settings (advantage for edge buildup).

Applications :

LoTherme-603R is used for wear resistant buildups for abrasion and impact applications. Typical applications include surfacing chipper knives, conveyor bucket lips, shovels dredger and elevator bucket lips, rock crushers, rock drills, tractor grousers and paddlers.

Welding Metal Hardness : 55-60 RC

Welding Techniques :

Preheat high-alloy tool steels to 400-450°C and maintain this temperature during the whole welding process. Hold electrode vertically with a short arc and lowest possible amperage setting. Machining only by grinding. Re-dry electrodes that have got damp for 01 hour at 100°C.

Electrical Characteristics : AC/DC (±)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	110-150	80-110	60-90

LoTherme - 604

Unique graphite based low heat electrode for hard facing overlays on machine parts and components subject to high abrasion and moderate impact.

Characteristics :

LoTherme-604 yields hard and tough deposits, which have excellent resistance to abrasion in combination with friction, moderate impact.

Applications :

LoTherme-604 is ideally suited for surfacing machine parts subject to high stress grinding abrasion as also grouping abrasion on carbon steels, manganese steels, malleable iron and air hardenable alloy steels. Typical applications for abrasion resistance include excavator teeth, ploughshares, cultivators, impellers, excavator buckets, bucket teeth, cams, fan blades, exhaust blades, scraper bars, dredger buckets and oil expeller worms. It is also well suited for coal crushing applications such as mill hammers, pulverizers and cement grinder rings.

Welding Metal Hardness : 56-62 RC

Welding Techniques :

Re-dry the electrodes at 200°C for 01 hour before use. Clean the weld area. Use short arc and avoid weaving of the electrode. While surfacing medium and high carbon steels use LoTherme-352 for buffer layers to avoid chances of cracking. Do not use more than 02 layers of LoTherme-604 at a time. For a heavy build-up, deposit a cushion layer of LoTherme-352 or LoTherme 607 followed by 02 layers of LoTherme-604.

Electrical Characteristics : AC/DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	165-190	120-160	90-120	70-90

LoTherme - 605

Low heat input versatile electrode for depositing Chromium Carbide alloy to resist high abrasion and impact along with mild corrosion.

Characteristics :

LoTherme-605 is a hard surfacing electrode, operates well in all positions. The deposited weld metal has exceptional abrasion wear resistance in combination with resistance to impact & mild corrosion. Evenly rippled, porosity free weld deposits permit heavy build-up without danger of cracking. In most cases, it can be used direct on the job without the necessity of depositing buffer layers.

Applications :

LoTherme-605 core wire and flux formulation are so chosen as to make the electrode versatile in terms of surfacing applications on a large variety of machine parts, equipment, etc. Typical applications include surfacing Sugar Mill cane cutting knives, shredder & fibrizer hammers, anvil, chipper knives, conveyor bucket lips, shear blades, shovels dredger and elevator bucket lips rock crushers, rock drills, tractor grousers and paddlers. In crushing applications, it is recommended as the final layer on 14% manganese weld deposit to reduce the initial wear.

Welding Metal Hardness : 55-60 RC

Welding Techniques :

Ensure that the electrodes are perfectly dry before use. In case of moisture pick-up, re-dry the electrodes at 200°C for 01 hour before use. Clean the weld area free from any surface contamination. Hold a short arc length and weld with stringer beads.

Electrical Characteristics : DC (±)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350
Current Range (Amps)	150-180	120-160	95-120

LoTherme - 606

Co-Cr-W-alloy of Cobalt Grade 6 hard-facing to resisting impact and wear.

Characteristics :

LoTherme-606 welds well in the horizontal position. Soft arc, smooth seam surface. High resistance to impact, corrosion and hardness at elevated temperature under alternating temperatures stressing.

Applications :

LoTherme-606 is used primarily on work-pieces exposed to high alternating temperatures and corrosion. Specific applications: valves and valve seats, sealing surfaces, hot shear blades, hot pressing tools, forging de-burrers, wire mill rolls and beaters for coke combustion.

Weld Metal Hardness :

At Room Temperature: 32-40 RC
At 600°C: 30-35 RC

Welding Techniques :

Re-dry the electrodes at 250°C for 01 hour before use. Clean the weld zone free from rust, scale and grease. Bigger work pieces are preheated to about 300°C. Keep the amperage as low as possible, so as to fuse the parent metal as little as possible. Guide the electrode vertically, keeping the arc short. Weave only slightly. Cool slowly in an oven or under asbestos. Machinable with tungsten carbide tools.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	80-120	60-90

LoTherme - 607

Versatile low heat input welding and surfacing electrode producing a weld metal highly resistant to cracking, heavy impact, metal-to metal wear and deformation, with rapid work hardening.

Characteristics :

LoTherme-607 is characterised by excellent performance in all positions, soft and stable arc which is easy to strike and re-strike, good slag detachability and well rippled, uniform weld beads. The electrode produces a unique weld metal chemistry and set of physical and mechanical properties which are highly favorable for obtaining crack free weld deposits having outstanding resistance to heavy impact, metal-to-metal wear and plastic deformation.

Applications :

LoTherme-607 is ideally suited for use on austenitic manganese steels. Typical applications include surfacing and building up of broken or worn out 14% manganese steel parts such as jaw and roll crushers, crusher hammers, excavator bucket teeth and lips, dredger buckets, dipper teeth, rail road trucks, frogs and switches and similar machine parts and components subject to heavy impact and high stresses.

Weld Metal Hardness :

As Welded: 160-200 BHN
Work hardens under impact up to: 43-53 RC

Welding Techniques :

Re-dry electrodes at 250°C for 01 hour. Clean the weld area. Use low current, short arc, short and stringer beads. For joining or resurfacing of austenitic manganese steel, ensure that the inter-pass temperature does not exceed 100°C, by keeping the object submerged partially in a tank full of running water.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-190	110-150	80-120	50-80

LoTherme - 607H

A special purpose electrode for joining and surfacing.

Characteristics :

LoTherme-607H is a basic coated electrode yielding a weld deposit, which possesses excellent ductility and toughness. It is highly suitable for joining austenitic manganese steel to carbon steel, surfacing, filling-up cavities in austenitic Mn steel castings.

Applications :

Typical applications of LoTherme-607H include railroad tracks, frogs and switches, pulverizers, hammers, rock crusher jaws and mining equipment.

Weld Metal Hardness :

As Welded : 200-300 BHN
Work Hardens up to : 550 BHN (Under Impact)

Welding Techniques :

Ensure that the electrodes are perfectly dry before use. In case of moisture pick-up, re-dry the electrodes at 200-250°C for 01 hour before use. Clean the weld area free from any surface contamination. Hold a short arc length and weld with stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	130-160	90-120	60-90

LoTherme - 608

Versatile low heat input electrode for hard-facing and overlay applications on high speed steels and tool steels.

Characteristics :

LoTherme-608 is a versatile electrode for surfacing, inlay, overlay and hardfacing of a variety of machine tools and components for prolonged service life. The weld deposits are highly resistant to wear and retain hardness and toughness up to 600°C. This special feature enables the weld metal to retain its cutting edge and hardness even at elevated temperatures. Use of LoTherme-457 may be necessary as buffer layer on tool steels.

Applications :

LoTherme-608 has been specially designed for surfacing cutting tools, dies, punches, bamboo chipper knives, paper cutting knives, shearing blades, boring tools, and large number of other machine tools requiring high speed steel type deposit of appropriate hardness.

Weld Metal Hardness : 56 - 60 RC

Welding Techniques :

Keep the electrodes dry. In case of moisture pick-up, re-dry at 250°C for 01 hour before use. Clean the weld area free from any surface-contamination. Pre-heating of hardenable steels, complicated parts and heavy sections at 200-300°C may be necessary depending upon the size and type of the job.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	140-170	90-120	60-90

LoTherme - 609

A special formulated low hydrogen electrodes for hot shear blades.

Characteristics :

LoTherme-609 is a low heat input electrode depositing a C-W-Co-Cr- V alloy. The electrode has excellent operating characteristics and operates smoothly without posing any difficulty for the welders. The weld metal possesses good toughness and resistance to shock loads. The weld metal retains hardness even at elevated temperatures of 600°C and possesses good resistance to oxidation.

Applications :

LoTherme-609 is ideally suited for reclaiming hot shear blades and components of similar type where retention of elevated temperature hardness is important.

Weld Metal Hardness : 55 - 60 RC

Welding Techniques :

For best results re-dry the electrodes at 250°C for 01 hour before use. Clean the weld area completely free from oil, grease, paints, rust of any other foreign matter. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	130-160	90-120	60-90

LoTherme - 610

An outstanding, low heat input electrode for hard-facing and applying buffer and cushion layers on a wide variety of austenitic manganese steel components, with progressive work hardening.

Characteristics :

LoTherme-610 yields a weld metal, which has high toughness and abrasion resistance in combination with excellent resistance to deformation and cracking. Ideally suited for depositing buffer layers on hard austenitic manganese steel surface.

Applications :

LoTherme-610 is ideally suited for hardfacing, overlay, buffer, and cushion layer applications on a variety of components on mild steel, carbon steel, low alloy steel and austenitic manganese steel. Typical applications include surfacing mining machinery, dredging equipment, excavator parts, mill hammers, cement mill air rings, crusher hammers, roll crusher, muller tyres, shovel tracks, coal mining cutters, tractor grousers, dipper teeth, sand pump impellers, value seats, etc.

Weld Metal Hardness :

As Welded: 280-380 BHN
Work hardens under impact up to: 480-550 BHN

Welding Techniques :

For best results, re-dry electrodes at 250°C for 01 hour before use. Clean weld surface thoroughly free from any surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-190	110-150	80-100	50-70

LoTherme - 611

Low heat input, versatile, hard-facing electrode having excellent resistance to abrasion accompanied by mild impact.

Characteristics :

LoTherme-611 is a versatile low heat input electrode producing a weld metal having exceptional resistance to heavy abrasion in combination with high compressive load and moderate impact even at temperatures up to 500°C. Soft and stable arc, which is easy to strike and restrike, easily detachable slag and smooth, regular weld bead are some of the pleasant features associated with the electrode.

Applications :

LoTherme-611 is ideally suited for hardfacing parts and components subject to heavy abrasion, erosion, metal-to-metal wear and moderately heavy impact. Typical applications include air rings, conveyor screws, dredger buckets, shovels, impellers, mill hammers, mixer blades, muller ploughs, dipper teeth, I.D. fans, etc. in steel mills, construction and earth moving machinery, power plants and cement industry.

Weld Metal Hardness : 55 - 58 RC

Welding Techniques :

Re-dry electrode at 250°C for 01 hour before use. Clean weld surface free from all surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-190	130-160	90-120	60-80

LoTherme - 612

Co-Cr-W-alloy of Cobalt Grade 12 hard-facing resisting heat, corrosion and wear.

Characteristics :

LoTherme-612 welds well in the horizontal position. Soft arc, smooth seam surface. Very high resistance to combined abrasion and impact stressing under high temperatures. Corrosion-resistant.

Applications :

LoTherme-612 is given preference where corrosion, abrasion and impact stressing are imposed simultaneously. Typical specific applications are cutters and tools for processing plastics, wood and paper, as well as highly stressed sealing and sliding surfaces.

Weld Metal Hardness :

At Room Temperature: 37-45 RC
At 600°C: 35-40 HRC

Welding Techniques :

Re-dry the electrodes at 250°C for 01 hour before use. Clean the weld zone from rust, scale and grease. Bigger work pieces are preheated to about 250°C. Keep the amperage as low as possible, so as to fuse the parent metal as little as possible. Guide the electrode vertically, keeping the arc short. Weave only slightly. Cool slowly in an oven or under asbestos. Machinable by grinding.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	80-120	60-90

LoTherme - 613

An outstanding low heat input, hard-facing electrode having excellent resistance to abrasion, metal-to-metal wear at ambient as well as at high temperatures and good corrosion resistance.

Characteristics :

LoTherme-613 yields weld deposits, which have excellent resistance to abrasion and metal-to-metal wear in combination with good resistance to corrosion. The weld deposits possess hardness of 48-56 HRC. Hardness is retained up to 550°C. A soft and stable arc, which is easy to strike and restrike, good slag detachability and smooth weld profile are some of the many pleasing features associated with LoTherme-613.

Applications :

Where conditions are highly abrasive and also corrosive e.g. flue gases, slurries, etc., LoTherme-613 is the most appropriate electrode. The capacity to retain hardness at high temperatures, and excellent resistance to abrasion make LoTherme-613 ideally suited for surfacing blast furnace bells and hoppers, conveyor screws, coke, chutes, steel mill grinders, pump impellers, valves, etc.

Weld Metal Hardness : 48-55 RC

Welding Techniques :

For best result, re-dry the electrodes at 200°C for 01 hour before use. Clean weld surface thoroughly free from all surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350
Current Range (Amps)	180-220	140-170	100-130

LoTherme - 614

An electrode for surfacing medium Mn steel and cast Mn steel crossings.

Characteristics :

LoTherme-614 is a low heat input hardfacing electrode for resurfacing of fabricated medium Mn steel and cast Mn steel crossings to withstand traffic of 25 GMT minimum. It has been formulated to produce strong, tough, easy work hardening and highly abrasion resistible weld metal. The electrode possesses pleasing operating characteristics and produces smooth, well- rippled weld beads.

Applications :

LoTherme-614 is ideally suited for welding high manganese steel such as rail crossings, Bullet proof steel plates, Crushing blades, Crushing hammers etc.

Weld Metal Hardness :

As Welded: 200-300 BHN
After Work Hardening: 400-470 BHN

Welding Techniques :

For best results, dry the electrodes at about 250°C for 1 hour before use. Remove all the damaged and fatigued metal and clean weld area. Use low current, short arc and stringer bead technique.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	140-180	100-140	70-90

LoTherme - 615

An electrode for resisting extreme abrasion, erosion & metal to metal wear severe impact.

Characteristics :

LoTherme-615 is a specially designed complex Titanium Carbide alloy, in martensitic matrix, designed to resist extreme abrasion, erosion, metal to metal wear and high impact loads while handling minerals. A crack free multilayer deposit is obtained.

Applications :

LoTherme-615 is specially designed for heavy compressive loads and severe impact experienced especially in roller press, scraper blades, coal crusher rolls, pulverize rolls, blow bars, impact arm, shovel buckets, clinker breaker hammers, etc.

Weld Metal Hardness : 51-58 RC

Welding Techniques :

For best result, re-dry the electrodes at about 250°C for 1 hour before use. Remove all the damaged and fatigued metal and clean weld area. Use short arc and stringer bead technique. For high carbon steels use preheat up to 300°C.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-220	120-160	100-140	70-90

LoTherme - 616

Electrode for resisting high abrasion wear with moderate impact at 450°C.

Characteristics :

LoTherme-616 is a high Niobium-Chromium Carbide alloy specially designed to resist high stress grinding abrasion wear with moderate impact, even at elevated temperature of 450°C. The deposit will exhibit surface relief checks.

Applications :

It is suitable for welding of conveyor screws, VRM tyres, Coke chutes, coal mill exhaust fan blades, table liners, screens, oils expeller screws, etc.

Weld Metal Hardness : 56-62 RC

Welding Techniques :

For best result, re-dry the electrodes at about 200-250°C for 1 hour before use. Remove all the damaged and fatigued metal and clean weld area. Use short arc and stringer bead technique. For High Carbon Steels use preheat up to 300°C. For austenitic manganese steels do not allow the temperature of parts to exceed 150°C and use LoTherme-457 as cushioning layers. Slow cool after welding.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	170-220	130-160	110-140	70-90

LoTherme - 617

Low heat input, hardfacing electrode having excellent resistance to high stress abrasion, severe erosion at moderate temperature.

Characteristics :

- A versatile electrode producing a weld metal having exceptional resistance to wear from combined abrasion, erosion and moderate impact.
- Soft and stable arc which is easy to strike and re-strike.
- Electrode deposits high rate of weld metal with little slag.
- Thick single pass deposits give high yield.

Applications :

LoTherme-617 is ideally suited for hardfacing machine parts and components subject to combination of heavy abrasion, erosion, and moderate impact. Typical applications include surfacing carbon steels, austenitic manganese steels like drag line bucket walls, scraper blades, crushing blades, crushing hammers, conveyor chains, etc.

Weld Metal Hardness : 57-62 RC

Welding Techniques :

For best result, re-dry the electrodes at about 200-250°C for 1 hour before use. Remove all damaged and fatigued metal before deposition. Use short arc and stringer bead technique. 01 pass overlay is normally recommended. If more build-up is required, use cushion layer of LoTherme-602 for steels, LoTherme-457 for 14% manganese steels.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	150-180	120-150	80-110	70-90

LoTherme - 618

Low heat input hardfacing electrode having outstanding abrasion, erosion resistance at high temperatures.

Characteristics :

- Specially formulated to retain abrasion, erosion resistance up to 650°C.
- Excellent resistance to wear due to high temperature Abrasion & Erosion.
- Soft and stable arc which is easy to strike and re-strike.
- Easy handling with rapid deposition rate.
- Thick single pass deposits give extra high yield.

Applications :

LoTherme-618 is a specially designed for hard-facing carbon steel and austenitic manganese steels for applications encountering abrasion and erosion at elevated temperatures. The typical applications include clinker conveyor chains, sinter handling equipment, coke pusher shoes, augers, slurry pumps, billet conveyor guide, hot slag conveyors, etc.

Weld Metal Hardness : 57-63 RC

Welding Techniques :

In case of moisture pick-up, re-dry the electrodes at 200°C for 01 hour before use. Remove all damaged and fatigued metal and clean weld area. Use short arc and stringer bead technique. For high carbon steels, hardfacing use preheat up to 275°C. For austenitic manganese steels do not allow temperature of parts to rise more then 150°C and use LoTherme-457 as a cushion layer. Slow cool after welding.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	180-220	140-160	120-140	70-90

LoTherme - 618S

"Spray" electrode for roughening the cast-iron cane crushing rolls in the SUGAR industry. Equally efficient in both Wet & Dry arcing.

Characteristics :

LoTherme-618 S has an aggressive "spray" type arc with excellent penetration to allow application while the mill is in operation. It has been developed to resist the extreme load produced during crushing. The deposit is highly abrasion-resistant and also corrosion-resistant.

Applications :

The application of LoTherme-618 S electrode on sugar mill rollers improves the grip on the cane, increases the quantity of sugar care crushed and, consequently, results in a higher sugar recovery.

Weld Metal Hardness :

On Carbon Steel : 55 - 60 RC
On cast Iron : 58 - 62 HRC

Welding Techniques :

In case of moisture pick-up, re-dry the electrodes at 200°C for 01 hour before use. Hold electrode vertical to work piece. Keep stable arc on moving roll for full spraying effect.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	170-200	140-170	100-140	70-100

LoTherme - 619

Low heat input hard-facing electrode for reconditioning of worn- out MM steel and Gr. 90A points and crossings for use in high traffic density routes.

Characteristics :

LoTherme-619 has been formulated to produce strong, tough, easy work hardening and highly abrasion resistible austenitic 15%Cr-15%Mn-2%Ni weld metal. The electrode possesses pleasing operating characteristics and produces smooth, well-rippled weld beads, with easy slag detachability.

Applications :

LoTherme-619 is ideally suited for welding high manganese steel such as rail crossings, Bulletproof steel plates, Crushing blades, Crushing hammers etc.

Weld Metal Hardness :

As Welded: 230-260 BHN
Work hardens under impact up to: 400-470 BHN

Welding Techniques :

Keep the electrode dry. In case of moisture pick up, re-dry the electrode at 250°C for 01 hour. Clean the weld area thoroughly free from any foreign matter, Use low current, short arc and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	140-180	100-140	70-90

LoTherme - 621

Specially designed Electrodes produces cobalt base grade 21 weld metal with Mo for Impact, Pressure & Abrasion at elevated temperature.

Characteristics :

LoTherme-621 has excellent welding properties and a homogeneous, finely rippled bead due to spray arc. Very easy slag removal.

Applications :

LoTherme-621 is used for crack resistant hardfacing on parts subject to a combination of impact, pressure, abrasion, corrosion and high temperatures up to 900°C, such as running and sealing faces on gas, water, steam and acid fittings and pumps, valve seats and cones for combustion engines, working parts in gas and power plants, hot working tools with changing thermal load. Excellent gliding characteristics, good polishability and toughness, highly work hardening nonmagnetic, machinable with cutting tools.

Weld Metal Hardness :

At Room Temperature: 250-300 BHN
At 600°C: 220-280 BHN
Work hardens under impact up to: 45 RC

Welding Techniques :

Ensure that the electrodes are dry. In case of moisture pick-up, re-dry the electrodes at 300°C for 02 hours before use. Clean weld area and preheat the base material. Hold electrode vertically and with a short arc and lowest possible amperage. Ensure slow cooling.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	80-120	60-90

LoTherme - 622

Unique alloy for intense hot media like on Clinker/Sinter Breaker Hammer, Grate-Bars to withstand the extreme Abrasion/Erosion coupled with hi-temperatures up to 800°C.

Characteristics :

LoTherme-622 is a specifically formulated SMAW electrode to combat & extend the life of components subjected to severe high-temperature Abrasion up to 800°C of the mineral heat. Highly alloyed deposit retains the hardness at elevated temperature. The rich micro-carbides resists extensively the severe abrasion/erosion & moderate impact.

Applications :

Major applications, that are subjected to intense high temperature abrasion/erosion, includes Cement Industry Clinker breaker hammers, hard facing areas of Pre-heater fans, Coke oven & Sinter handling areas in Steel plants, such as Sinter-deck, Sinter-breaker hammers and Grizzly / Grate-bars.

Weld Metal Hardness :

Two Layers on carbon steel : 61 - 67 RC
Single layer on carbon steel : 58 - 63 RC

Welding Techniques :

The fatigued metal is to be removed before commencement of welding. Short arc with stringer bead is recommended. When higher thickness of deposit is required, use LoTherme-352 on Carbon steel and LoTherme-457 on Hadfield steel, as barrier layers. While pre- heat is required for higher carbon steel base metal, pre-heat should not be done on Hadfield steels. Re-dry electrodes to min. 200°C for 01 hour before use for optimum results.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350
Current Range (Amps)	180–200	140–170	110–140

LoTherme - 623F

Non-Machinable weld for applications involving severe abrasion.

Characteristics :

LoTherme-623F is a basic coated electrode producing an air hardening weld metal which has excellent resistance to abrasion. The welds are non-machinable and are ideally suited for applications involving severe abrasion.

Applications :

Typical applications include cane cutting knives, crusher hammers, jaws, rollers, rock drills, tractor grousers, etc

Weld Metal Hardness : 53 – 56 RC

Welding Techniques :

Ensure that the electrodes are perfectly dry before use. In case of moisture pick-up, re-dry the electrodes at 250-300°C for 01 hour before use. Clean the weld area free from any surface contamination. Hold a short arc length and weld with stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350
Current Range (Amps)	180-220	140-170	100-130

LoTherme - 624BE

Low heat input, low hydrogen electrode having excellent resistance to abrasion at elevated temperature.

Characteristics :

- Low heat input, low hydrogen, Ni-Mo alloy based electrodes.
- Electrode producing a weld metal having exceptional resistance to wear to combat abrasion, impact, and retain hardness at elevated temperatures.
- Soft and stable arc, which is easy to strike and re-strike.

Applications :

LoTherme-624 BE is ideally suited for hardfacing machine parts and components subject to combination of heavy abrasion, metal- to-metal wear, moderate impact and hardness at elevated temperatures. Typical applications include surfacing such as hot shears, blast furnace bells, tong teeth, hoppers, valve seats, guide plates, etc.

Weld Metal Hardness :

As Deposited : 50 - 53 RC
At 550°C : 40 - 43 RC

Welding Techniques :

Remove all damaged and fatigued metal before deposition. Use short arc and stringer bead technique. Keep the electrodes dry. In case of moisture pick-up, re-dry at 250°C for 01 hour before use.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	190-220	160-185	120-150	80-100

LoTherme - 625

Low heat input hard-facing electrode for reconditioning of worn-out MM steel and Gr. 90A points and crossings for use in high traffic density 35 GMT.

Characteristics :

LoTherme-625 is characterized by producing easy work hardening and highly wear resistible austenitic 17%Cr - 15%Mn - 3%Ni weld metal. The electrode possesses pleasing operating characteristics and produces smooth, well-rippled weld beads.

Applications :

LoTherme-625 is ideally suited for welding high manganese steel such as rail crossings and points, jaw and roll crushers, crusher hammers, crushing blades, etc.

Weld Metal Hardness :

As Welded: 200-300 BHN
Work hardens under impact up to: 400-470 BHN

Welding Techniques :

Keep the electrode dry. In case of moisture pick up, re-dry at 250°C for 01 hour. Clean the weld area thoroughly free from any foreign matter, Use low current, short arc and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	200-250	160-190	130-160	100-130

LoTherme - 627

A special low heat input hardfacing electrode.

Characteristics :

LoTherme-627 is a specially formulated low heat input hard-facing electrode for the reclamation of rolls, crane wheels, etc. The electrode has pleasing operating characteristics. The weld metal has excellent resistance to heat and rolling friction and resistance to wear at elevated temperatures. The weld deposit is machinable for smooth finish.

Applications :

The weld metal is ideally suited for the reclamation of steel mill rolls and other similar applications involving roll friction and elevated temperature wear.

Weld Metal Hardness : 280 - 380 BHN

Welding Techniques :

Keep the electrode dry. In case of moisture pick-up, re-dry at 150°C for 01 hour before use. Clean the weld area free from any surface contamination. Use short arc and stringer bead technique.

Electrical Characteristics : AC/DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	130-160	90-120	60-90

LoTherme - 628

Low heat input electrodes depositing air hardening weld metal for hardfacing.

Characteristics :

LoTherme-628 is a low heat input electrode specially designed for hardfacing and build-up of worn out machine parts and components. Welds are highly resistance to abrasive wear and possesses moderate toughness. It can be used in all positions. Soft and stable arc, which is easy to strike and re-strike, well rippled smooth weld beads and good slag detachability are the special operating characteristics.

Applications :

LoTherme-628 has versatility of applications in areas of building- up worn out parts and hard-facing. It can be use directly on the job without the necessity of putting a buffer layer. Some of the typical applications including surfing / rebuilding of shafts, chain sheaves, dies, shares, sprockets, rail ends & crossings, pulleys, idler wheels.

Weld Metal Hardness : 290-390 BHN

Welding Techniques :

Keep the electrodes dry. For best results, re-dry the electrodes at 250°C for 01 hour before use. Clean the weld area thoroughly free from any foreign matter. Use low current, short arc and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	180-220	130-160	80-110	70-90

LoTherme - 629

Low heat input electrodes for versatile hard-facing applications.

Characteristics :

LoTherme-629 is a low heat input electrode specially designed for hardfacing and build-up of worn out machine parts and components. Welds are abrasive wear resistance and possesses moderate toughness. It can be used in all positions. Soft and stable arc, which is easy to strike and re-strike, well rippled smooth weld beads and good slag detachability are the special operating characteristics.

Applications :

LoTherme-629 is versatility of applications in areas of building-up worn out parts and hardfacing. It can be use directly on the job without the necessity of putting a buffer layer. Some of the typical applications include surfacing / rebuilding of shafts, chain sheaves, dies, shares, sprockets, rail ends & crossings, pulleys, idler wheels.

Weld Metal Hardness : 290-390 BHN

Welding Techniques :

Keep the electrodes dry. For best results, re-dry the electrodes at 250°C for 01 hour before use. Clean the weld area thoroughly free from any foreign matter. Use low current, short arc and stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	180-220	130-160	80-110	70-90

LoTherme - 630

Electrode is especially meant for cavitation wear, corrosion & high temperature impact.

Characteristics :

- It gives soft and smooth arc, which is easy to strike and re-strike.
- Detachability of slag is very easy.
- Smooth, regular and finely rippled beads.
- Weld metal has good erosion and corrosion resistance.

Applications :

LoTherme-630 is a highly corrosion resistant, especially against cavitation, erosion, compression and impact, experienced on water- turbines & pump constructions. It is ideal for surfacing on 13%Cr - 4%Ni stainless steel for service life improvement. As a result of work - hardening under impact to around 50 HRC, it exhibits extreme wear resistance in its application areas like high temperature impact resistance on steel plant rolls. Especially applicable for the surface of Turn Over Cooling Bed Rakes. Weld-metal is resistant to scaling up to 900°C Machinable with tungsten carbide tip tool.

Weld Metal Hardness :

As welded: 240 BHN
Work hardens under impact up to: 50 RC

Welding Techniques :

- The electrode should be dry. In case of moisture pick up, re-dry the electrode at 250°C for 02 hours.
- Use short arc.
- Preheating or PWHT not warranted in case of normal carbon steels or stainless steel base material.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350
Current Range (Amps)	180-220	130-160	80-110

LoTherme - 635

Low heat input electrode for hot working tools.

Characteristics :

LoTherme-635 is a low heat input, all position electrodes depositing low alloy weld metal. The welds are of radiographic quality. The weld metal has got superior deformation resistance at high temperatures.

Applications :

It is ideally suited for surfacing of hot forging dies and repairs of large hot working dies, punches and inserts by filling out of shape for further machining to get desired profiles.

Weld Metal Hardness :

On Three Layers hardness PWHT 560°C for 01 hour : 360-400 BHN

Welding Techniques :

Ensure that the electrodes are perfectly dry before use. In case of moisture pick-up, re-dry the electrodes at 250°C for 01 hour. Clean the weld area free from any surface contamination. When welding on high hardenable materials of large thicknesses, adequate care for preheating, slow cooling & PWHT are necessary. Hold a short arc length and weld with stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	6.3x450	5x450	4x450
Current Range (Amps)	250-280	200-250	150-180

LoTherme - 635E

Low heat input electrode for repairs of large hot working dies.

Characteristics :

LoTherme-635E is a low heat input, heavy coated, hydrogen controlled, all position electrodes depositing low alloy weld metal. The welds are of radiographic quality. The weld metal has got superior deformation resistance at high temperatures.

Applications :

It is ideally suitable for surfacing and repair of hot forging dies, punches and inserts by filling out of shape for further machining to get desired profiles. It is also suitable for repairs of earth moving equipments made of high tensile steel, repair of case hardening steel parts after removing the hard zones, for repairing cracks in Ni- Cr hot working dies.

Weld Metal Hardness :

On Three Layers Hardness PWHT 560°C for 01 Hour : 360-400 BHN

Welding Techniques :

Ensure that the electrodes are perfectly dry before use. In case of moisture pick-up, re-dry the electrodes at 250°C for 01 hour. Clean the weld area free from any surface contamination. When welding on high hardenable materials of large thicknesses, adequate care for preheating, slow cooling & PWHT are necessary. Hold a short arc length and weld with stringer beads.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350
Current Range (Amps)	250-280	200-250	150-180

LoTherme - 650P

High Heat & Tempering Resistant Alloy for Surfacing of Mandrels, Hot Piercieng Plugs.

Characteristics :

LoTherme- 650 P has excellent welding properties, a homogeneous, finely rippled seam and a self-lifting slag.

Applications :

LoTherme-650P is suited for heat resistant buildups on hot working steels particularly exposed to metallic gliding wear and elevated shock stress, such as die cast molds for brass, aluminum and magnesium, hot piercing plugs, hot pressed mandrills, trimming tools, hot shear blades, extruding tools, forging dies and hot flow pressing tools for steel. Due to the excellent metal to- metal gliding properties, also suitable for buildups on guiding and gliding surfaces. Tempering resistant up to 650°C, scale resisting up to 900°C.

Weld Metal Hardness :

As Welded	:	47 - 52 RC
Annealed at 850 - 900°C	:	35 RC
Hardened at 1100 - 1150°C	:	48 - 52 RC
Tempered at 700°C	:	40 RC

Welding Techniques :

Clean welding area to metallic bright. Preheating temperature depends on the welding application (150-240°C). On low-alloy steels at least 3-4 layers should be applied. For best results, re-dry the electrodes at 250°C for 01 hour before use.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	80-120	60-90

LoTherme - 660 G2

Electrode for high temperature resistant surfacing of hot work steels exposed to compression and friction especially in a re- rolling mill.

Characteristics :

LoTherme-660 G2 electrode welds well in the horizontal and slightly rising positions. The weld pool is easy to control and the slag is easily removed.

Applications :

On the strength of its great hardness, toughness and high- temperature resistance, LoTherme-660 G2 is employed for surfacing on machine components and tools exposed to friction and compression with moderate impact loads and operating temperatures up 500°C. These include dead centers, tons, slide - and guide ways, hot and cold cut-off attachments, valves, slides, hot shear blades, extrusion press pistons, dies, strippers, deburrers, sheet punching tools. It is also used to good advantage for the economic manufacture of cold and hot working tools.

Weld Metal Hardness : 50 - 57 RC

Welding Techniques :

Preheat the work piece to 250-300°C. Guide the electrode as vertically as possible, with medium-long arc. Let the work piece cool slowly under asbestos. Finish by grinding. For best results, re- dry the electrodes at 250°C for 01 hour before use.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	80-120	60-90

LoTherme - 660 G3

Electrode for high temperature resistant surfacing on hot work steels exposed to impact, compression and friction, especially in a re-rolling mill.

Characteristics :

LoTherme-660 G3 electrode welds well in the horizontal and slightly rising positions. The weld pool is easy to control and the slag is easily removed.

Applications :

On account of its high tensile strength, toughness and high- temperature resistance, LoTherme-660 G3 is employed for surfacing on machine components and tools exposed to impact, compression and friction at operating temperatures up to 550°C, such as cutting edges for cold and hot shear blades, guillotine shears, dies, swages, hammers etc. It is also used to good advantage for the economic manufacture of cold and hot working tools.

Weld Metal Hardness : 46 - 52 RC

Welding Techniques :

Preheat the work piece to 250-300°C. Guide the electrode as vertically as possible, with medium-long arc. Let the work piece cool slowly under asbestos. Finish by grinding. For best results, re- dry the electrodes at 250°C for 01 hour before use.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	120-160	90-120	60-90

LoTherme - 660 G4

Electrode for high temperature resistant surfacing exposed to compression and friction, especially in a re-rolling mill.

Characteristics :

LoTherme-660 G4 electrode welds well in the horizontal and slightly rising positions. The weld pool is easy to control and the slag is easily removed.

Applications :

On the strength of its toughness and high-temperature resistance, LoTherme-660 G4 is employed for surfacing on machine components exposed to impact, compression and friction at operating temperatures up to 550°C. Accordingly LoTherme-660 G4 is particularly suited for building-up dies. It can also be used to good effect for surfacing rollers, drive cloverleaves, hot shear blades, etc. It is also employed for the economic manufacture of these work pieces.

Weld Metal Hardness : 37 - 45 RC

Welding Techniques :

Preheat the work piece to 250-300°C. Guide the electrode as vertically as possible, with medium-long arc. Let the work piece cool slowly under asbestos. Subsequent machining with tungsten carbide or grinding. For best results, re-dry the electrodes at 250°C for 01 hour before use.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	130-170	90-120	60-90

LoTherme - 684

Low heat input electrodes for high stress grinding abrasion and hard deposit on ferrous metals.

Characteristics :

LoTherme-684 is a low heat input complex carbide electrode, which is easy to strike and re-strike having very high abrasion resistance & good slag detachability. Weld beads are of fine appearance. It operates in all positions. The weld metal is designed to give excellent resistance to high stress grinding abrasion, galling and scratching abrasion.

Applications :

It can be used on variety of steels and cast iron. Ideally suited for parts subject to abrasion, impact and compressive load, for sand pump, mining & cement industry, bucket lips, pug mill screw, power-station coal nozzles and coal burners.

Weld Metal Hardness : 57 - 62 RC

Welding Techniques :

- Keep the electrode dry. In case of moisture pick, re-dry at 150°C for 01 hour before use.
- Use low current and short arc.
- For base materials with carbon content of 0.3% and above, use buffer layers with LoTherme-352 / 607 before surfacing.

Electrical Characteristics : DC (+)/AC

Size (mm) Dia x Length	5x350	4x350	3.15x350
Current Range (Amps)	150-180	120-150	95-120

LoTherme - 9580

Superior Alloy designed for Die Rebuilding & Surfacing for extra tough Hot & Cold Working Tools.

Characteristics :

A superior alloy designed for surfacing / cladding of a new die and re-building of worn-out hot forging dies. The consumables has very good welder appeal and easy slag detachability. The deposited weld metal is tough for hot or cold work tooling. It is free from cracks, porosities and any other surface defects.

Applications :

LoTherme-9580 is suitable for hot & cold work trimmers, shear, blanking & forming dies, punches, coining dies, header dies, forging dies, hot working tools & guides, H-11 dies, etc. It has exceptional wear characteristics at high temperature, ideal for press dies and impactor dies. Machinability is limited to grinding.

Weld Metal Hardness (on 3 layers) :

As Welded : 52-57 RC
SR 560°C for 01 hour : 51-56 RC

Welding Techniques :

Re-dry the electrodes at 250-300°C for 1 hour. When welding hardenable steels of large thickness, adequate care for preheating, slow cooling & post weld heat treatment are recommended for best results. Pre-heat heavy thickness jobs up to 400°C and maintain this while welding, with short arc, along with peening after every pass is necessary. After welding, cool in still air up to 200°C. Then charge these large dies into a furnace to hold at 560°C and temper for 01 hour per inch thickness of job and then slow cool to room temperature for machining.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	6.3 x 350	5 x 350	4 x 350	3.15 x 350
Current Range (Amps)	250-280	200-250	150-180	100-140

LoTherme - 9580 (Mod)

Electrode designed for die rebuilding & surfacing for extra tough hot & cold working tools.

Characteristics :

LoTherme-9580(Mod) have balanced chemical composition contain with Cr - Ni - Mo and V. It is designed for surfacing / cladding of a new die and re-building of worn-out hot forging dies. The consumables has very good welder appeal and easy slag detachability. It is free from cracks, porosities and any other surface defects.

Applications :

LoTherme-9580(Mod) is suitable for hot & cold work trimmers, shear, blanking & forming dies, punches, coining dies, header dies, forging dies, hot working tools & guides, H-11 dies, etc. It has exceptional wear characteristics at high temperature, ideal for press dies and impactor dies. It is also suitable for cold forming application like automotive trim section. Machinability is limited to grinding.

Weld Metal Hardness (on 3 layers) :

As Welded : 50-55 RC
SR 580°C for 01 hour : 54-56 RC
SR 600°C for 01 hour : 51-53 RC
SR 610°C for 01 hour : 48-50 RC

Welding Techniques :

Re-dry the electrodes at 250-300°C for One hour. When welding hardenable steels of large thickness, adequate care for preheating, slow cooling & post weld heat treatment are recommended for best results. Pre-heat heavy thickness jobs up to 400°C and maintain this while welding, with short arc, along with peening after every pass is necessary. After welding, cool in still air up to 200°C.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	6.3 x 350	5 x 350	4 x 350	3.15 x 350
Current Range (Amps)	250-280	200-250	150-180	100-140

LoTherme - 9650

High Cr forging die rebuilding alloy with High Deposition Rate.
Shock Resistant Weld Metal even at elevated temperature.

Characteristics :

A specially designed alloy for surfacing /cladding of a new die and re-building of worn-out hot forging dies for better service life. The consumable has very good welder appeal and easy slag detachability. The deposited weld metal is martensitic stainless steel and highly resistant to heat, corrosion, wear & galling. It is free from cracks, porosities and any other surface defects. Its broad tempering range permits for conventional machining with carbide tools.

Applications :

LoTherme-9650 is suitable for weld-surfacing & reclamation of forging dies, hot working tools & guides, shallow hammer dies, screw press dies, impactor dies, etc.

Weld Metal Hardness :

As Welded : 40-45 RC
SR 560°C for 01 hour : 38-43 RC

Welding Techniques :

Re-dry the electrodes at 250°C for 01 hour. When welding hardenable steels of large thickness, adequate care for preheating, slow cooling post weld heat treatment are recommended for best results. Pre-heat heavy thickness jobs up to 400°C and maintain this while welding, with short arc, along with peening after every pass is necessary. After welding, cool in still air up to 200°C. Then charge these large dies into a furnace to hold at 560°C and temper for 01 hour per inch thickness of job and then slow cool to room temperature for machining.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	6.3 x 350	5 x 350	4 x 350	3.15 x 350
Current Range (Amps)	250-280	200-250	150-180	100-140

LoTherme - 60-RE

Touch Welding type of hardfacing consumable with self-lifting slag on AC & DC± welding for wide range of components.

Characteristics :

LoTherme-60-RE is an alloyed air-hardening type of electrode depositing non-machinable weld metal. It has a finely ripped bead due to spray transfer arc. The electrode is weldable at very low amperage to assist edge build up.

Applications :

It is ideally suited for rock drill, bulldozer blade, drill bits, coal- cutter blades, excavator teeth, bucket lip, etc.

Weld Metal Hardness : 55-60 RC

Welding Techniques :

Preheat high alloy tool steels to 400-450°C and maintain this temperature during the whole welding process. Hold electrode vertically with a short arc and lowest possible amperage setting. Machining is only by grinding. Re-dry electrodes that have got damp for 01 hour at 100°C.

Electrical Characteristics : AC/DC (±)

Size (mm) Dia x Length	5 x 450	4 x 450
Current Range (Amps)	160-200	120-160

LoTherme - D-HD

Excellent toughness while exhibiting good machinability for repair of cracked and fractured steels.

Characteristics :

A unique alloy designed to deposit low alloy steel weld metal for surfacing of hammer dies. The weld metal is tough, free from cracks, porosities and any other surface defects.

Applications :

LoTherme-D-HD is suitable for deposition of surface or buffer layers on forging dies, hot working tools, hammer bases, sow blocks, rams, bolster plates, columns, etc. used as a barrier layer prior to surfacing with higher alloys.

Weld Metal Hardness (on 3 layers) :

As Welded : 35-39 RC
SR 560°C for 01 hour : 35-38 RC

Welding Techniques :

Re-dry the electrodes at 250°C for 1 hour. When welding hardenable steels of large thickness, adequate care for preheating, slow cooling & post weld heat treatment are recommended for best results. Pre-heat heavy thickness jobs up to 400°C and maintain this while welding, with short arc, along with peening after every pass is necessary. After welding, cool in still air up to 200°C. Then charge these large dies into a furnace to hold at 560°C and temper for 01 hour per inch thickness of job and then slow cool to room temperature for machining.

Electrical Characteristics : DC (+)

Size (mm) Dia x Length	6.3 x 350	5 x 350	4 x 350	3.15 x 350
Current Range (Amps)	250-280	200-250	150-180	110-140

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ELECTRODES FOR CAST IRON ALLOYS

CAST IRONS

Next to carbon steels the cast irons form an important group of materials. Cast irons are iron carbon alloys, which have carbon more then 1.7%. The effect of higher carbon was detailed earlier. The cast irons are highly brittle and their ductility is very less. However, because of their shock resistance, heat resistance and corrosion resistance in certain media, they are used for many applications.
Cast irons have poor weldability . This is due to :

1) The formation of high carbon martensite in the HAZ during welding which embrittles the material and causes cracking.

2) Ductility of the material is so less that it is not able to withstand the shrinkage stresses that occur during welding because of which cracks appear.
However, many of the cast irons can be welded taking due precautions like pre-heating, post heating, slow cooling, etc.
For welding of cast irons, LoTherme range offers :

LoTherme-701	: Non- machinable deposit.
LoTherme-702	: Monel type, machinable weld metal.
LoTherme-703	: Fe-Ni type, machinable type.
LoTherme-704 & LoTherme-705	: Ni type, machinable weld metal

Apart from the selection of electrode the most important aspect in producing sound welds in cast irons is the welding procedure that is to be adopted. The various steps in welding cast irons are given below :

1. Grind the area to be welded so that the casting skin is removed.
2. Clean the area free from all contaminants.
3. If a crack has to be repaired, drill crack arrestor holes at the end of the cracks
4. Deposit welds in small lengths of 25-30 mm at a time.
5. Peen the welds.
6. After welding allow the casting to cool slowly by covering with suitable insulating material.

LoTherme - 701

Unique formulation gives Spray transfer to seal the porosities on Cast Iron. Non-machinable deposits.

Characteristics :

The special flux formulation of LoTherme-701 electrode produces a quick freezing deposit. Spray transfer to seal porosities on Cast Iron, preventing oil coming out during welding. It is ideally suited for buttering layer before joining oil-soaked Cast Iron.

Applications :

LoTherme-701 is highly suited repair & maintenance for welding of cast iron, cast steel machine parts, equipments, etc. For repair of defective castings in steel foundry. Where repair welding of rusty, dirty or greasy castings are involved, LoTherme-701 is the appropriate electrode.

Welding Techniques :

Re-dry the electrode at 150°C for 01 hour before use. Use low current, short weld runs followed by peening.

Electrical Characteristics : AC/DC (-)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	160-200	130-160	80-120	55-85

LoTherme - 702

A low heat input, Ni-Cu alloy (Monel) type electrode for machinable welding of cast iron.

Characteristics :

LoTherme-702 is a nickel-copper alloy electrode for low heat input welding of cast iron without preheating. The welds are sound, strong and easily machinable. The electrode displays a soft and steady arc, which is easy to strike and re-strike and ability to operate on low currents.

Applications :

LoTherme-702 is suited for joining of broken cast iron parts, repairing defects in cast iron foundry and repairs of fractured iron parts in all welding positions. Typical applications include rebuilding of worn out surface, gear teeth, pump impellers, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL

Properties	UTS(MPa)	Weld Metal Hardness
Typical	335	160

Welding Techniques :

Re-dry the electrode at 150°C for 01 hour before use. Clean the base material thoroughly free from any surface contamination. Use short weld runs followed by peening. In case of repair welding on castings, remove entire defective portion to sound metal prior to welding.

Electrical Characteristics : AC/DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	140-170	100-130	80-100	50-70

LoTherme - 703

Low heat input electrode for high-strength machinable deposit.
Highly suitable for crack-free joining of Cast Iron to Steel.

Characteristics :

LoTherme-703 produces high strength, machinable welds and overlays on grey and alloy cast irons. Deposits are even crack-free on joints of Cast Iron to Steels. A stable arc and evenly rippled, smooth beads are some of the many pleasant features of the electrode.

Applications :

LoTherme-703 is used for :

1. Welding grey cast iron, malleable iron and S.G. iron ;
2. Welding cast iron to steel and to nickel alloys and ;
3. Repair welds and rectification of defects in castings.

Typical applications include engine heads, pump castings, impellers, rope drums, ingot moulds and a variety of cast iron machine parts. Due to the high strength and ductility, LoTherme-703 is ideal for welding heavy and highly stressed cast iron sections.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL

Properties	UTS(MPa)	Weld Metal Hardness
Typical	420	190 BHN

Welding Techniques :

For joining bevel the edges to 75-90° in single or double 'Vee' groove according to thickness of the parts. For repair of cracks, drill holes at the two ends of the crack to arrest its further propagation. Remove entire cracked material to sound metal by chipping, gouging or machining. Clean the weld area free from grease, oil, paints, etc. prior to welding. Re- dry the electrode at 150°C for 01 hour before use. Weld short beads not exceeding 50 mm at a time. Each bead should be peened when still hot. For large and heavy sections pre heating of the job may be necessary. After the welding is completed, the castings should be covered completely with a layer of asbestos or dry lime until it attains room temperature.

Electrical Characteristics : AC/DC (-)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	130-170	100-130	85-120	50-70

LoTherme - 704

A low heat input, high nickel electrode for better machinability deposit on cast iron.

Characteristics :

LoTherme-704 is a low heat input electrode, which deposits a very high nickel alloy. The arc is stable even at low current ranges, and this minimises dilution of weld metal with harmful elements present in the parent metal. Slag coverage is complete and slag detachability is excellent. The deposit bonds soundly with the parent metal and the beads are smooth and dense. The welds are machinable.

Applications :

LoTherme-704 is ideally suited for sound, crack-free welds on grey cast iron, S.G. iron, malleable iron and for joining cast irons to steels and to nickel-copper alloys. It is equally good for corrosion resistant overlays, filling and building up of worn out parts and joining broken sections. Typical applications are repair welding on machine bases, motor blocks, heavy castings, valve bodies, sprockets, pumps castings and gears.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	Weld Metal Hardness
Typical	345	140 BHN

Welding Techniques :

Re-dry the electrode at 150°C for 01 hour before use. Clean weld area free from any surface contamination. Bevel broken parts or cracks to 70-80° Vee. Use a short arc and as low a current as possible. Deposit short weld beads not exceeding 25 mm. Peen the weld to relive internal stresses and allow the work-piece to cool slowly to room temperature. Pre-heating of the part is generally not necessary.

Electrical Characteristics : AC/DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	125-165	95-125	65-95	45-65

LoTherme - 705

Low heat input electrode producing outstanding quality machinable welds on cast iron.

Characteristics :

LoTherme-705 flux formulation is so chosen that the electrode produce extremely soft arc which is essential for low heat input and avoiding dilution of weld metal with harmful elements present in the parent metal. The electrode produces crack free machinable welds.

Applications :

LoTherme-705 is ideally suited for sound, crack free welds on grey cast iron, spheroidal iron, malleable cast iron to themselves, to each other, to steel, or to monel or copper alloys. Equally good for cladding, filling, surfacing and building up of worn-out parts or broken sections. Repair welding of valve bodies, sprockets, engine blocks, pump casings, gears, machine base and defective castings are some of the various applications of LoTherme-705.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	Weld Metal Hardness
Typical	345	150 BHN

Welding Techniques :

Re-dry the electrode at 150°C for 01 hour before use. Clean weld area free from all surface contamination. Bevel broken parts or crack areas to about 70° Vee. For cold welding, use as low a current as possible and deposit short weld beads not exceeding 50 mm. Peen the welds. Pre-heating of the part is not necessary.

Electrical Characteristics : AC/DC (+)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	125-165	95-125	65-105	45-65

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ELECTRODES FOR CUTTING AND GOUGING

LoTherme - 801

For cutting and piercing all ferrous and non-ferrous metals and alloys without the need for any auxiliary equipment.

Characteristics :

LoTherme-801 is designed to produce fairly smooth cuts and pierce metals in all positions. The special coating withstands high current without overheating. A forceful arc renders it possible to cut all metals and alloys without the necessity of supplementary gas, compressed air or oxygen or special torches.

Applications :

LoTherme-801 is meant for cutting and piercing carbon steels, low alloy steels, stainless steels, cast irons, nickel and nickel alloys, copper, brass, bronze, aluminium and other metals and alloys. Although the cut will not be as smooth as that produced by gas cutting of carbon steel, the application of LoTherme-801 extends to various ferrous and non-ferrous metals which cannot be cut by conventional gas cutting process. The electrode is also suitable for cutting and piercing out of position jobs, rivets, risers, etc., where gas cutting is not convenient.

Welding Techniques :

Mark the area to be cut or pierced with chalk. Hold the electrode at an angle of 45° to the job and use a sawing motion to cut. Manoeuvre LoTherme-801 continuously in sawing motion, pressing it against the surface of the metal. The high arc-force produced by the electrode and the manual pressure ensures and rapid cutting. For piercing, position the electrode perpendicular to the part. Strike the arc and apply push in and pull out motion till the part is pierced.

Electrical Characteristics : AC/DC (-)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	280-320	200-240	150-180	120-150

LoTherme - 802

AC/DC electrode for chamfering and grooving of various metals with electric arc. without any auxiliary equipment.

Characteristics :

LoTherme-802 is designed to produce smooth grooves in all positions. The special coating of the electrode withstands high current without overheating. The forceful arc renders it possible to chamfer and gouge various metals without the need for supplementary gas, air, oxygen or special torches. The force of the arc blows away undesired materials from its path leaving a clean groove for subsequent operations such as welding, surfacing, re-building, etc. Delayed arcing facilities accurate positioning of electrode.

Applications :

LoTherme-802 is meant for chamfering and gouging carbon steels, low alloy steels, stainless steel, cast irons, nickel alloys, etc., to bevel out cracks, remove defective weld metal and unwanted metal in castings. The special advantage of LoTherme-802 is the accessibility in locations where it is inconvenient to work with metal cutting tools or even gas cutting torch. LoTherme-802 comes in handy wherever repair or maintenance welding is envisaged such as in foundries, steel plants and fabrication industries.

Welding Techniques :

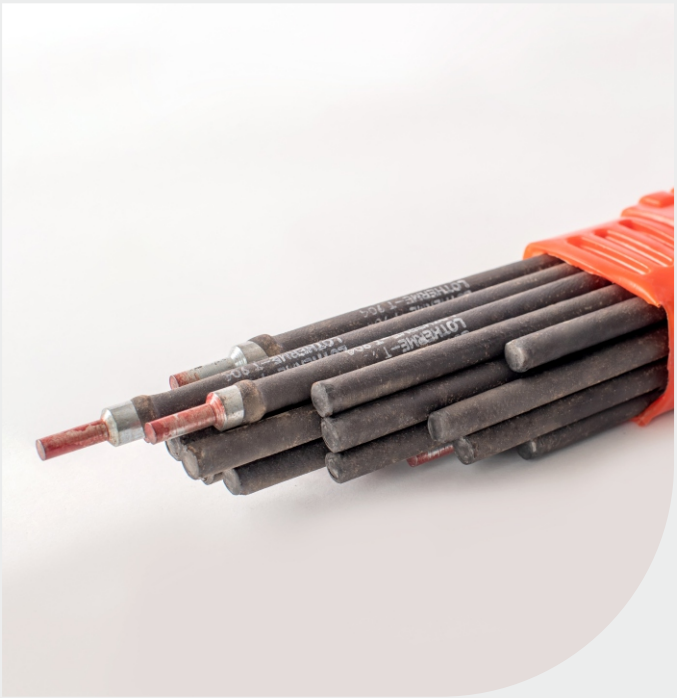
Mark the area to be gouged with Chalk. Hold the electrode pointing towards the path of gouging at an angle not exceeding 25° to the job. Push the electrode along the line, maintaining contact with the base metalallthewhile. The strong arc-force produced by LoTherme-802 and the pushing action will blow the molten metal ahead and away from the groove. Avoid reverse motion.

Electrical Characteristics : AC/DC (-)

Size (mm) Dia x Length	5x350	4x350	3.15x350	2.5x350
Current Range (Amps)	300-360	230-280	150-200	125-175

LOTHERME

Estd. 1986
D&H sécheron
Complete Welding Support



TUBULAR ELECTRODES

LoTherme - T 901

Tubular electrode deposits excellent abrasion resistant weld metal.

Characteristics :

LoTherme-T 901 tubular electrode deposits excellent abrasion resistant weld metal. With steady arc and low spatter losses it gives dense and poreless seams. It works very well with low currents, very less dilution, higher deposition rate and higher hardness can be achieved on single layer also.

Applications :

Weld metal of LoTherme-T 901 is excellent abrasion resistant under moderate impact on carbon steels, low alloy and other steels. It is ideally suited for wear resistance overlays on austenitic manganese steels. Typical applications include bucket lips & teeth, crusher teeth, coal crusher jaws, coal crusher hammers, quarry screen plates, blow bars, clinker-grinder buttons, gyratory c01s, toggle plates, etc.

Weld Metal Hardness : 58 - 61 RC (on Two layer deposit)

Welding Techniques :

Clean the weld area free from any surface contaminations by grinding and wire brushing. Austenitic manganese steels should not be preheated.

Electrical Characteristics : DC (±)/AC

Size (mm) Dia x Length	10.0x450	8.0x450	6.3x450
Current Range (Amps)	140-190	125-175	85-125

LoTherme - T 904

Tubular electrode deposited weld metal for severe abrasion and erosion at elevated temperature.

Characteristics :

LoTherme-T 904 tubular electrode deposits complex carbides of Cr, Mo, Nb, W & V weld metal for severe abrasion resistance and erosion resistance at elevated temperatures up to 800°C. With steady arc and low spatter losses it gives dense and pores -less seams. It works very well with low currents, very less dilution, higher deposition rate and higher hardness can be achieved on single layer also.

Applications :

Weld metal of LoTherme-T 904 provides severe abrasion resistance and erosion resistance at elevated temperatures up to 800°C on carbon steels, low alloy and other steels. Typical applications include sinter breakers, sinter fans, clinker parts, blast furnace bells, hoppers, cement kiln parts, coal burner nozzles, etc.

Weld Metal Hardness : 63 - 65 RC

Welding Techniques :

Clean the weld area free from any surface contaminations by grinding and wire brushing.

Electrical Characteristics : DC (±)/AC

Size (mm) Dia x Length	10.0x450	8.0x450	6.3x450
Current Range (Amps)	140-190	125-175	85-125

LoTherme - T 905

Tubular electrode deposited tungsten carbide alloy with excellent abrasion resistance.

Characteristics :

LoTherme-T 905 tubular electrode deposits tungsten carbide alloy weld metal. It gives maximum resistance to severe wear under low impact. With a steady arc and low spatter losses it gives dense and pores-less seams. It works very well with low currents, very less dilution, higher deposition rate and higher hardness can be achieved on single layer also.

Applications :

Weld metal of LoTherme-T 905 provides maximum abrasion resistance among all hardfacing alloys on carbon steels, low alloy and other steels. Typical applications include pan scrapers, concrete mixers, oil drill collars, induced draft fans, forced draft fans, primary air fans, coal crusher plates, muller blades, conveyor screws, etc.

Weld Metal Hardness : 65 - 70 RC (on Two layer deposit)

Welding Techniques :

Clean the weld area free from any surface contaminations by grinding and wire brushing. Austenitic manganese steels should not be preheated.

Electrical Characteristics : DC (±)/AC

Size (mm) Dia x Length	10.0x450	8.0x450	6.3x450
Current Range (Amps)	140-190	130-180	85-140

LoTherme - T 909

Tubular electrode deposited weld metal of complex carbide alloy with excellent abrasion resistance.

Characteristics :

LoTherme-T 909 tubular electrode deposits weld metal of complex carbide alloy of chromium, molybdenum and vanadium. It gives maximum resistance to course and fine grinding abrasion under moderate to heavy impact. With a steady arc and low spatter losses it gives dense and pores-less seams. It also gives high- temperature wear-resistance up to 500°C. It works very well with low currents, very less dilution, higher deposition rate and higher hardness can be achieved on single layer also.

Applications :

Weld metal of LoTherme-T 909 provides severe abrasion on carbon steels, low alloy and other steels under moderate to heavy impact. Deposits polish on service. Typical applications include hammers, power shovels, conveyor screw fights, drag-chain buckets, rolling mill guides, ripper teeth, crushing equipments, bunker funnel, clinker hammers, hot air fans, mill plow blades, agricultural appliances, etc.

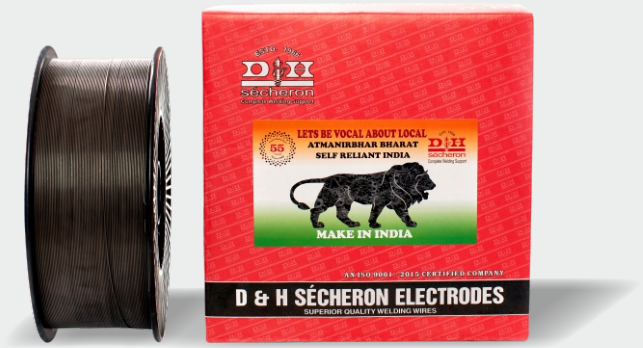
Weld Metal Hardness : 58 to 63 RC

Welding Techniques :

Clean the weld area free from any surface contaminations by grinding and wire brushing. Austenitic manganese steels should not be preheated.

Electrical Characteristics : DC (±)/AC

Size (mm) Dia x Length	10.0x450	8.0x450	6.3x450
Current Range (Amps)	140-190	130-180	90-140



Flux Cored Wires

LoTherme OA Series

LoTherme OA-0026

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LOTHERME OA-0026 is a hard-surfacing wire to deposit chromium carbides having excellent abrasion resistance property even for elevated temperature applications. The weld metal has good corrosion & erosion resistance in mineral-water mixer and some times used as buffer layer for surfacing jobs. Weld reveals stress relief cracks during cooling of the bead. Weld metal is machinable by grinding only.

Applications :

LOTHERME OA-0026 is suitable for welding of dredge pump impellers, ore crushers, screw conveyors, shovel bucket teeth, dredge cutters, ore chutes, surfacing on sinter plant decks & breakers, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
60 HRC	Good	Very Good

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-0196

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LOTHERME OA-0196 is a hard-surfacing wire to deposit complex carbides of chromium, molybdenum, vanadium along with niobium and tungsten. The weld metal has excellent abrasion & impact resistance property at elevated service temperature applications up to 800°C. The deposited weld bead has metallic appearance and does not require any post-weld cleaning. Stress relief cracks appear on surface of the weld during cooling of the bead. Weld bead is machinable by grinding.

Applications :

LOTHERME OA-0196 is suitable for welding of chutes in blast furnace bells & screens, burden area & throat armour plates of blast furnace, sinter plant decks & parts, grizzly bars, sugarcane industries, boiler fan blades, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
60-62 HRC	Good	Excellent

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-352

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-352 wire is designed for single and multiple pass flat & horizontal position welding for low & medium carbon steels. It has high deposition rate and in especially suitable for welding poor joint fit up joints.

Applications :

LoTherme OA-352 is suitable for construction of farm machinery, automobiles, field erection of structures, fabrication of frames, heavy equipment repair, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL

Properties	UTS(MPa)	Yield Stength (MPa)	%El (L=4d)	Weld Metal Hardness	CVN Impact Strength at 20°C
Typical	530	440	22	90 HRB	50 Joules

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	1.6	2.4	2.8
Current Range (Amps)	150-200	250-300	300-350
Voltage (V)	26-28	26-28	26-28
Stick Out (mm)	30-40	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-410S

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-410S is an open arc self shielded flux cored wire to deposit martensitic stainless steel weld metal having 11-13% chromium in it. The deposited weld metal is tough, very good resistant to metal-to-metal wear and heat resistant to approximately 450^{0}C.

Applications :

LoTherme OA-410S hard facing wire is suitable for reclamation of ASTM CA-6NM casting, continuous casting rolls, steam & gas turbine components, valve & valve seats and surfacing layer during re-building of continuous casting rolls, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
As-weld: 43 HRC	Good	Excellent

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-430S

Complete Welding Support

Self Shielded Open Arc Flux Cored Wire

Characteristics :

LoTherme OA-430S deposits 16% to 19% chromium stainless steel deposits. The weld metal is scaling resistant up to 800°C, resistance to solidification cracking and easily machinable.

Applications :

LoTherme OA-430S wire is used as a buffer layer prior to hard surfacing of continuous casting rolls with LoTherme OA-444L wire. This wire is also suitable for automobile body, valves & valve seats, steam & gas turbine components, etc.

Typical All Weld Metal Hardness :

On a 3-layer deposit in as-weld condition : 200-300 BHN

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	240-300	260-320
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-444L

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LOTHERME OA-444L is an open arc self shielded flux cored wire giving a 12%Cr-3. 5%Ni-0.4%Mo deposit. It has excellent resistance to cracking and good resistance to corrosion, erosion and metal-to-metal wear & abrasion. Presence of controlled amount of nitrogen in the weld metal makes the deposit excellent galling resistant. The weld metal also retains its properties at elevated temperature.

Applications :

LoTherme OA-444L hard facing wire is especially designed for the fabrication and repair welding of hydro turbine components made of soft martensitic steels like 13%Cr - 4%Ni alloyed steels and cast steel. This wire is also suitable for surfacing & re-building of worn out rolls in steel plants.

Typical All Weld Metal Hardness:

On a 3-layer deposit in as-weld condition : 42 - 48 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	240-300	260-320
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-457S

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme-457S deposits 18%Cr 8%Ni 6%Mn type work hardening, radiographic quality weld metal, suitable for welding manganese steel to carbon steel and for build up applications involving severe impact and compressive loads. It is used for welding 13% Mn steel, high carbon steels and other steels which are difficult to weld with unalloyed or low alloyed electrodes. This wire is also used as buffer layer before hard surfacing.

Applications :

LoTherme OA-457S is suitable for welding of railway points & crossings, armour plate, dredging equipments, hammers, jaw & cone crushers, roll crushers, various applications in steel mill like; coupling boxes, hook liners, ladle repairs, joining of wear plates, VRM Table Reconditioning, VRM Roller Reconditioning & RPR Reconditioning, etc.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS (MPa)	%El (L=5d)	CVN, J at RT	Hardness	Abrasion Resistance	Impact Resistance
Typical	620	27	105	As-weld : 98 HRB On Cold work : 41 HRC	Moderate	Excellent

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	1.6	2.4	2.8
Current Range (Amps)	150-200	250-300	300-350
Voltage (V)	26-28	26-28	26-28
Stick Out (mm)	30-40	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-468S

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-468S wire deposits 28%Cr-8%Ni type weld metal suitable for both single and multi-layer applications. The wire burns with a stable & smooth arc and results in good slag detachability. The deposited weld metal is of radiographic quality and extremely resistant to cracks & fissures.

Applications :

LoTherme OA-468S is suitable for welding of armour-vehicles, various dissimilar steels like; high carbon steels, manganese steels, cast steels, spring steels, etc. The wire is especially suitable for welding of steels of unknown chemical compositions and is recommended for laying buffer layer before hard surfacing.

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	Yield Stength (MPa)	%El (L=5d)	CVN Impact Strength at +20^{0}C
Typical	815	710	18	50 Joules

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	220-280	220-300
Voltage (V)	26-28	26-28
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-602

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-602 is a wire to deposit low alloy air-hardening type weld metal having moderate resistance to abrasion and very good resistance to impact & compression. The wire is suitable for rebuilding of carbon & low alloy steel components where resistance to compressive loading is of prime importance. It is also used as a buffer layer prior to hard surfacing.

Applications :

LoTherme OA-602 is suitable for re-building and reclamation of tractor rollers, crane wheel, drive sprockets, pins, shafts, carbon steel rollers, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Abrasion Resistance	Impact Resistance
As-weld: 34 HRC	Moderate	High

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-603

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-603 is an open arc self-shielded flux cored wire to deposit high alloy martensitic weld metal having a good combination of abrasion resistance and toughness. The weld deposit is machinable by grinding.

Applications :

LoTherme OA-603 is suitable for re-building and reclamation of cast iron rolls, sugar mill rolls, crusher cylinders, oil expeller screws, worm screws, shovel bucket teeth & lips, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Abrasion Resistance	Impact Resistance
As-weld: 52 HRC	Very Good	Good

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-604

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

Lotherme OA-604 is an open arc self-shielded flux cored wire to deposit high carbon martensitic weld metal possessing a good combination of abrasion resistance and toughness. The weld deposit is machinable by grinding.

Applications :

Lotherme OA-604 wire is suitable for the re-building and reclamation of cast iron rolls, sugar mill rolls, crusher cylinders, oil expeller screws, worm screws, shovel bucket teeth & lips, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
As-weld: 50 HRc	Good	Very Good

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	220-280	260-320
Voltage (V)	26-28	26-28
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-607

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-607 is a hard-surfacing wire to deposit high carbon high manganese austenitic weld metal suitable for heavy impact loading. Weld metal work hardens after cold work. The wire burns with a smooth arc and results in good slag detachability. The deposited weld metal has excellent impact and moderate abrasion resistance.

Applications :

LoTherme OA-607 is suitable for re-building and reclamation of crusher cylinders & rollers, Hadfield manganese steel (~14% Mn) parts, crushing hammers, dredging equipments, shovel bucket teeth and lips, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
As weld : 98 HRB On Cold work : 46 HRC	Excellent	Good

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-608

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-608 is a hard-surfacing wire deposits high carbon, high manganese & chromium containing austenitic weld metal suitable for heavy impact loading. Weld metal undergoes work hardening with cold work. The wire burns with a smooth arc and results in good slag detachability. The deposited weld metal has excellent impact and good abrasion resistance.

Applications :

LoTherme OA-608 is suitable for re-building and reclamation of crushing hammers, crusher cylinders & rollers, Hadfield manganese steel (~14% Mn) components & parts, dredging equipments, shovel bucket teeth & lips, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Abrasion Resistance	Impact Resistance
As-weld: 240 BHN On Cold work : 460 BHN	Good	Excellent

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-610

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-610 is an open arc self shielded flux cored wire giving a 16%Cr-4%Mn deposit. The weld metal has excellent abrasion resistance property combine to good resistance to cracking, corrosion, erosion and metal-to-metal wear. The wire is used to deposit buffer layer on austenitic manganese steel components prior to surfacing.

Applications :

LoTherme OA-610 wire is especially designed for the hard- surfacing, overlay and buffer layer applications of various components & parts made of carbon steel, low alloy steel and austenitic manganese steel. The typical applications include;surfacing of mining & excavation components, cement mill parts, steel plant rolls & roll crushers, etc.

Weld Metal Hardness (on 3 layers) :

As welded : 220-250 BHN
Work hardens under impact : 500-550 BHN

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-611

Self shielded hard-surfacing flux cored wire

Characteristics :

LoTherme OA-611 is a hard-surfacing wire to deposit chromium carbides having excellent abrasion resistance property even for elevated temperature applications. The weld metal has good corrosion & erosion resistance in mineral-water mixer. Weld reveals stress relief cracks during cooling of the bead. Weld metal is machinable by grinding only.

Applications :

LoTherme OA-611 is suitable for welding of dredge pump impellers, ore crushers, screw conveyors, shovel bucket teeth, dredge cutters, ore chutes, VRM Table Reconditioning, VRM Roller Reconditioning & RPR Reconditioning, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
60 HRC	Low	Very Good

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	1.6	2.4	2.8
Current Range (Amps)	150-200	250-300	300-350
Voltage (V)	26-28	26-30	26-30
Stick Out (mm)	30-40	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-611CRC

Self shielded hard-surfacing flux cored wire

Characteristics :

LoTherme OA-611 CRC is a customized open arc hard-surfacing wire to deposit a uniform distribution of chromium carbides in a ferritic matrix. The weld metal has excellent abrasion resistance property and has good corrosion & erosion resistance in mineral-water mixer. Weld deposits reveals stress relief cracks during cooling of the bead and is machinable by grinding. Deposition efficiency of the wire is more than 90%.

Applications :

LoTherme OA-611 CRC is designed in lower diameters (1.6mm) for versatility in welding applications. Suitable for welding of cement plant machineries, dredge pump impellers, ore crushers, screw conveyors, shovel bucket teeth, dredge cutters, ore chutes, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Impact Resistance	Abrasion Resistance	Hardness-1 Layer	Hardness-3 Layer
Moderate	Excellent	54 HRC min	56-62 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	1.6	2.4	2.8
Current Range (Amps)	180-240	220-300	220-350
Voltage (V)	26-28	26-30	26-30
Stick Out (mm)	20-30	30-40	30-40

Standard Wire Diameter (mm): 1.6

Note : Any other diameter wires may be available on request.

Packing Data : Layer wound 12.5 kg plastic spool. Card-board drum packing 180-240kg.

Note : Any other type of packaging may be available on request.

LoTherme OA-611 MOD

Self Shielded hard surfacing flux Cored Wire.

Characteristics :

LoTherme OA-611 MOD is a hard-surfacing wire to deposit a superior distribution of chromium carbides in a martensitic matrix. The weld metal has excellent abrasion resistance property and has good corrosion & erosion resistance in mineral-water mixer. Weld deposits reveals stress relief cracks during cooling of the bead and is machinable by grinding only.

Applications :

LoTherme OA-611 MOD is suitable for welding of cement plant machineries, dredge pump impellers, ore crushers, screw conveyors, shovel bucket teeth, dredge cutters, ore chutes, any equivalent high chromium surfacing applications, etc. The wire is also suitable for making wear & abrasion resistant plates.

ALL-WELD METAL PROPERTIES (TYPICAL):

Impact Resistance	Abrasion Resistance	Hardness-1 Layer	Hardness-3 Layer
Moderate	Very Good	54 HRC min	58-62 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	220-300	220-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Layer wound 12.5 kg plastic spool. Card-board drum packing 180-240kg.

Note : Any other type of packaging may be available on request.

LoTherme OA-611 (SPL)

Self Shielded hard surfacing flux Cored Wire.

Characteristics :

LoTherme OA-611 (SPL) is a hard-surfacing wire to deposit a superior distribution of chromium carbides in a martensitic matrix. The weld metal has excellent abrasion resistance property and has good corrosion & erosion resistance in mineral-water mixer. Suitable for hard surfacing of MS Plate for Wear Plate. Weld deposits reveals stress relief cracks during cooling of the bead and is machinable by grinding only.

Applications :

LoTherme OA-611 (SPL) is suitable for welding of cement plant machineries, dredge pump impellers, ore crushers, screw conveyors, shovel bucket teeth, dredge cutters, ore chutes, any equivalent high chromium surfacing applications, etc. The wire is also suitable for making wear & abrasion resistant plates.

ALL-WELD METAL PROPERTIES (TYPICAL):

Impact Resistance	Abrasion Resistance	Hardness-1 Layer	Hardness-3 Layer
Moderate	Very good	55 HRC min	58-62 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	220-300	220-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Layer wound 12.5 kg plastic spool. Card-board drum packing 180-240kg.

Note : Any other type of packaging may be available on request.

LoTherme OA-612

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-612 is a hard-surfacing wire to deposit complex carbides of chromium & niobium having very good abrasion resistance property even for elevated temperature applications. The weld metal is suitable for low impact severe abrasion resistant applications up to 500°C. Weld metal is machinable by grinding only.

Applications :

LoTherme OA-612 is suitable for welding of coke chutes, coal mill exhaust fan blades, conveyor screws, screen in the coal industry, oil expeller screws, VRM Table Reconditioning, VRM Roller Reconditioning & RPR Reconditioning, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
62 HRC	Moderate	Very Good

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	1.6	2.4	2.8
Current Range (Amps)	150-200	250-300	300-350
Voltage (V)	26-28	26-30	26-30
Stick Out (mm)	30-40	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-615

Self Shielded Open Arc TiC Flux Cored Wire.

Characteristics :

LoTherme OA-615 is an open-arc hard-surfacing wire specially designed to deposit hard finely dispersed Titanium carbide alloy in high chromium martensitic matrix with alloy addition of Silicon, Molybdenum, Vanadium, etc. The weld metal is resistant to extreme abrasion, erosion, metal to metal wear, high pressure and against impact load. Weld bead is machinable by grinding.

Applications :

LoTherme OA-615 is suitable for heavy compressive loads especially in roller press, coal & cement crusher rolls, pulverizer rolls, mixer tyres, clinker rolls, hammers, plough shares & dredging equipments, crusher & chutes, shredders, scrapper blade, vertical shaft impact crusher rotors, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
54-58 HRC	High	Excellent

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	1.6	2.4	2.8
Current Range (Amps)	150-200	250-300	300-350
Voltage (V)	26-28	26-30	26-30
Stick Out (mm)	30-40	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-617

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-617 is a hard-surfacing wire to deposit complex carbides of chromium, molybdenum along with niobium and tungsten. The weld metal has excellent abrasion resistance property for low impact applications at service temperature up to 600^{0}C. The deposited weld bead has metallic appearance and does not require any post-weld cleaning. Stress relief cracks appear on surface of the weld during cooling of the bead. Weld bead is machinable by grinding.

Applications :

LoTherme OA-617 is suitable for welding of chutes in blast furnace bells & screens, burden area & throat armour plates of blast furnace, sinter plant parts, sugarcane industries, boiler fan blades, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
64 HRC	Low	Excellent

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	1.6	2.4	2.8
Current Range (Amps)	150-200	250-300	300-350
Voltage (V)	26-28	26-30	26-30
Stick Out (mm)	30-40	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-617(SPL)

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-617 (Spl) is a hard-surfacing wire to deposit complex carbides of chromium, molybdenum along with niobium and tungsten. The weld metal has excellent abrasion resistance property for low impact applications at service temperature up to 600^{0}C. The deposited weld bead has metallic appearance and does not require any post-weld cleaning. Stress relief cracks appear on surface of the weld during cooling of the bead. Weld bead is machinable by grinding.

Applications :

LoTherme OA-617 (Spl) is suitable for welding of chutes in blast furnace bells & screens, burden area & throat armour plates of blast furnace, sinter plant parts, sugarcane industries, boiler fan blades, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
60-62 HRC	Good	Excellent

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-618

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

Lotherme OA-618 is a specially designed for hardfacing on carbon steel & Stainless Steel for applications encountering severe abrasion and erosion at elevated temperatures up to 850°C. The deposit will exhibit surface relief checks, soft and stable arc.

Applications :

Lotherme OA-618 is suitable for welding of clinker conveyor chains, sinter handling equipment, coke pusher shoes, augers, slurry pumps, billet conveyor guide, hot slag conveyors, coal burner nozzle tips, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):
On a 2nd Layerdeposit : 62-68 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	1.60	2.40
Current Range (Amps)	160-200	250-300
Voltage (V)	26-28	26-28
Stick Out (mm)	30-35	30-40

Standard Wire Diameter (mm): 1.6 and 2.4

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-622

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-622 is a hard-surfacing wire to deposit low alloy air-hardening type weld metal having moderate resistance to abrasion and very good resistance to impact & compression. The weld metal is machinable. The wire is suitable for re- building and overlay applications except 14% manganese steel components.

Applications :

LoTherme OA-622 is suitable for re-building and reclamation of crawler tractor rollers, drive sprockets, links, pins, shovel rollers, crane wheels, idle wheels, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
As-weld: 40-50 HRc	Good	Good

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-625

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-625 is a hard-surfacing wire to deposit high chromium (~14%) high manganese (~13%) austenitic weld metal suitable for heavy impact loading. The wire burns with a smooth arc and results in good slag detachability. The deposited weld metal work hardens after cold work and has excellent impact and good abrasion resistance. Weld metal is machinable by grinding.

Applications :

LoTherme OA-625 is suitable for re-building and reclamation of manganese steel (~14% Mn) components, railway crossings, gyratory & jaw crushers, shaft drive ends, dredge pump cutters, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
As-weld: 24-28 HRC On Cold work : 45-48 HRC	Excellent	Excellent

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-633

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-633 is a hard-surfacing wire to deposit air-hardening, crack-free martensitic weld metal resistant to moderate abrasion, heavy impact and high compressive load applications. Weld metal is machinable by grinding only.

Applications :

LoTherme OA-633 is suitable for re-building and reclamation of rock drills, agricultural equipments, burden area of blast furnace bells & hoppers, shear blades, VRM Table Reconditioning, VRM Roller Reconditioning & RPR Reconditioning, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Abrasion Resistance	Impact Resistance
As-weld: 54 HRc	Moderate	Very Good

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-300	300-350
Voltage (V)	26-30	26-30
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 12.5 kgs plastic spool. Each spool is sealed in a polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme OA-653

Self Shielded Open Arc Flux Cored Wire.

Characteristics :

LoTherme OA-653 is an open-arc hard-surfacing wire specially designed to deposit hard finely dispersed Chromium carbides alloy in high chromium martensitic matrix with micro-alloy additions in the weld metal. The wire deposits weld metal by spray arc transfer. The deposited weld metal has good resistance to abrasion & erosion along with very good bonding properties. Weld beads are machinable by grinding.

Applications :

LoTherme OA-653 is suitable for applications where heavy compressive loads along with abrasion properties are required. The wire is especially suitable for sugar mill crushing rollers. The wire operates in both dry arcing & also in wet arcing condition of sugar mill rolls. The wire also find use in screw conveyors, coal & cement crusher rolls, pulverizer rolls, shovel bucket teeth, dredge cutters, etc.

ALL-WELD METAL PROPERTIES (TYPICAL):

Hardness	Impact Resistance	Abrasion Resistance
54-60 HRC	Moderate	Excellent

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	2.4	2.8
Current Range (Amps)	250-430	280-480
Voltage (V)	28-32	28-32
Stick Out (mm)	30-40	30-40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Wire is supplied in a layer wound 12.5 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box. The wire may also be supplied in 25kg ring and 250kg cardboard drum packing.

Note : Any other type of packaging may be available on request.

LoTherme GS-352

Gas shielded hard surfacing flux cored wire.

Characteristics :

LoTherme GS-352 is a gas shielded flux cored wire designed for welding of medium carbon steel & structural components and joining & repair welding of casting & forgings. The weld deposit contains very low diffusible hydrogen and good resistant to cracks & fissures. The wire produces an easy to remove slag and results smooth & uniform radiographic quality weld bead.

Applications :

LoTherme GS-352 is designed for both single & multi-pass welding of components subjected to fatigue & dynamic loading. The weld metal possesses good combination of strength & impact properties and is an excellent choice for repair welding. The weld area shall be cleaned from rust, paint, etc to get the best results.

RECOMMENDED SHIELDING GAS : CO_2

TYPICAL ALLOY CONTENT OF THE WELD METAL (%) :

Element	C	Mn	Si	S	P
Typical	0.06	1.38	0.45	0.011	0.018

TYPICAL MECHANICAL PROPERTIES OF ALL WELD METAL :

Properties	UTS(MPa)	%El	CVN at RT	CVN at -30°C
In as-weld condition	545	22	130J	65J

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
1.20	160 – 240	26 – 30	25 – 35
1.60	180 – 270	26 – 30	25 – 35

Standard Wire Diameter (mm): 1.2 and 1.6

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in layer wound 15 kg plastic spools. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme GS-535

Forging die building flux cored wire

Characteristics :

A customized gas shielded wire designed for fabrication of a new die and re-building of worn-out hot forging dies. The deposited weld metal is resistant to heat, metal to metal wear & galling. It is free from cracks, porosities and any other surface defects. The wire has very good welder's appeal and easy slag detachability.

Applications :

LoTherme GS-535 wire is suitable for weld-surfacing & reclamation of DIN 2714 forging dies, hot working tools & guides, etc.

RECOMMENDED SHIELDING GAS : Argon-CO_2 mixed gas & CO_2

TYPICAL ALL-WELD COMPOSITION (%) WITH Ar-CO_2 GAS SHIELDING:

Element	C	Mn	Si	S	P	Cr	Ni	Mo	V
Typical	0.08-0.15	1.2-2.0	0.30-0.80	0.030 max	0.030 max	2.0-3.0	1.2-1.8	0.5-1.0	0.20-0.30

ALL-WELD METAL HARDNESS (TYPICAL):

On a 3-layer deposit in as-weld condition : 38-42 HRC
After SR at 560C for 2 hours : 35-38 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
2.4	200 – 300	26 – 30	30 – 40
2.8	250 – 350	26 – 30	30 – 40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : The wire is supplied in a layer wound 12.5 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme GS-535(SPL)

Forging die rebuilding flux cored wire.

Characteristics :

A customized gas shielded wire designed for fabrication of a new die and re-building of worn-out hot forging dies with higher hardness requirements. The deposited weld metal is resistant to heat, metal to metal wear & galling. It is free from cracks, porosities and any other surface defects. The wire has very good welder's appeal and easy slag detachability.

Applications :

LoTherme GS-535 (Spl) wire is suitable for weld-surfacing & reclamation of those forging dies, Trimming dies, hot working tools & guides, etc where hardness requirement is on the higher side (>45 HRC).

RECOMMENDED SHIELDING GAS : Co_2 & Argon-CO_2 mixed gas

TYPICAL ALL-WELD METAL COMPOSITION (%) WITH CO_2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Ni	Mo
Typical	0.12	1.02	0.32	0.018	0.020	2.66	2.52	0.84

TYPICAL ALL WELD METAL HARDNESS :
On a 3-layer deposit in as-weld condition : 42-48 HRC
After SR at 550^{0}C for 2 hours : 40-45 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
1.6	180 – 280	26 – 30	25 – 30
1.2	160 – 260	26 – 30	25 – 30

Standard Wire Diameter (mm): 1.2 and 1.6

Note : Any other diameter wires may be available on request.

Packing Data : The wire is supplied in a layer wound 12.5/15 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme GS-602

Gas shielded hard surfacing flux cored wire.

Characteristics :

A basic type gas shielded wire designed for air hardening type hard surfacing deposit with machinable characteristics. The wire has very good welder's appeal and easy slag detachability. The deposit is low alloy steel martensitic weld metal having good toughness and resistance to impact loading.

Applications :

LoTherme GS-602 wire is suitable for weld-surfacing & reclamation of track rollers, flanges, links, shafts, pulleys, idle rollers, conveyor parts, axles, gear shafts, shear blades, etc.

RECOMMENDED SHIELDING GAS : CO_2

TYPICAL ALL-WELD METAL COMPOSITION (%) WITH CO_2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Mo
Typical	0.23	1.67	0.54	0.016	0.018	1.72	0.23

TYPICAL ALL WELD METAL HARDNESS :

On a 3-layer deposit in as-weld condition : 32-40 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
1.2	160 – 240	26 – 30	25 – 35
1.6	180 – 270	26 – 30	25 – 35

Standard Wire Diameter (mm): 1.2 and 1.6

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in a layer wound 15 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme GS-602H

Gas shielded hard surfacing flux cored wire.

Characteristics :

A gas shielded basic type wire designed to deposit air-hardened hard surfacing weld metal with machinable characteristics. The wire has very good welder's appeal and easy slag detachability. The low alloy steel weld metal consists of tempered martensite having good toughness and resistance to impact loading.

Applications :

LoTherme GS-602H wire is suitable for weld-surfacing & reclamation of track rollers, links, shafts, pulleys, idle rollers, conveyor parts, axles, shear blades, etc where the applications call for a slight higher order of hardness (42-48HRC).

RECOMMENDED SHIELDING GAS : CO_2

TYPICAL ALL-WELD METAL COMPOSITION (%) WITH CO_2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Mo
Typical	0.21	1.55	0.62	0.016	0.018	1.82	0.18

TYPICAL ALL WELD METAL HARDNESS :

On a 3-layer deposit in as-weld condition : 42-48 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
1.2	160 – 240	26 – 30	25 – 35
1.6	180 – 270	26 – 30	25 – 35

Standard Wire Diameter (mm): 1.2 and 1.6

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in a layer wound 15 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme GS-633

Gas shielded hard surfacing flux cored wire.

Characteristics :

A basic type medium alloy gas shielded wire designed for air hardening type hard surfacing deposit. It has good welder's appeal & easy slag detachability. The weld is non-machinable and finished by grinding. The wire deposits a crack-free, martensitic weld metal suitable for heavy impact and moderate abrasion resistant applications.

Applications :

LoTherme GS-633 wire is suitable for weld-surfacing & reclamation of agricultural equipments, excavator components, conveyor buckets & screws, drill bits, scraper blades, conveyor parts, dredge rollers, concrete mixer blades, etc.

RECOMMENDED SHIELDING GAS : CO_2

TYPICAL ALL-WELD METAL COMPOSITION (%) WITH CO_2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Mo
Typical	0.52	1.1	0.53	0.012	0.017	5.45	0.51

TYPICAL ALL WELD METAL HARDNESS :
On a 3-layer deposit in as-weld condition : 52-58 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
1.2	160 – 240	26 – 30	25 – 35
1.6	180 – 270	26 – 30	25 – 35
2.0	200 – 300	26 – 30	25 – 35

Standard Wire Diameter (mm): 1.2 and 1.6

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in a layer wound 15 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme GS-635

Gas shielded hard surfacing flux cored wire.

Characteristics :

A basic type medium alloy gas shielded wire designed for air hardening type hard surfacing deposit. It has good welder's appeal & easy slag detachability. The weld is non-machinable and finished by grinding. The wire deposits a crack-free, martensitic weld metal suitable for heavy impact and moderate abrasion resistant applications.

Applications :

LoTherme GS-635 wire is suitable for weld-surfacing & reclamation of agricultural equipments, excavator components, conveyor buckets & screws, drill bits, scraper blades, conveyor parts, dredge rollers, concrete mixer blades, etc.

RECOMMENDED SHIELDING GAS : CO_2

TYPICAL ALL-WELD METAL COMPOSITION (%) WITH CO_2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Mo
Typical	0.57	1.21	0.54	0.012	0.017	5.5	0.50

TYPICAL ALL WELD METAL HARDNESS :

On a 3-layer deposit in as-weld condition : 55-60 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
1.2	160 – 240	26 – 30	25 – 35
1.6	180 – 270	26 – 30	25 – 35
2.0	200 – 300	26 – 30	25 – 35

Standard Wire Diameter (mm): 1.2 and 1.6

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in a layer wound 15 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme GS-635B

Gas shielded hard surfacing flux cored wire.

Characteristics :

A basic type high alloy gas shielded flux cored wire designed for air hardening type hard surfacing deposit for severe abrasion resistant applications. It has good welder's appeal & easy slag detachability. The weld is non-machinable and finished by grinding. The wire deposits a crack-free, martensitic weld metal that can impart excellent resistance to mineral wearing stresses and abrasion.

Applications :

LoTherme GS-635 B wire is suitable for weld-surfacing & reclamation of the drill bits, agricultural equipments, excavator components, conveyor buckets & screws, scraper blades, conveyor parts, dredge rollers, rig drilling pipes, concrete mixer blades, oil expeller worms, etc.

RECOMMENDED SHIELDING GAS : CO_2

TYPICAL ALL-WELD METAL COMPOSITION (%) WITH CO_2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Mo
Typical	0.78	0.85	0.54	0.012	0.017	5.0	0.55

TYPICAL ALL WELD METAL HARDNESS :

On a 3-layer deposit in as-weld condition : 58-60 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
1.2	160 – 240	26 – 30	25 – 35
1.6	180 – 270	26 – 30	25 – 35

Standard Wire Diameter (mm): 1.2 and 1.6

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in a layer wound 15 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme GS-9580

Die rebuilding & surfacing flux cored wire

Characteristics :

A customized gas shielded flux cored wire designed for fabrication of a new die and re-building of worn-out hot forging dies. The wire has very good welder's appeal and easy slag detachability. The deposited weld metal is tough for hot or cold work tooling. It is free from cracks, porosities and any other surface defects.

Applications :

LoTherme GS-9580 wire is suitable for trimmers, shear, blanking & forming dies, punches, header dies, forging dies, hot working tools & guides, etc.

RECOMMENDED SHIELDING GAS : Argon-CO_2 gas mixture & CO_2

TYPICAL ALL-WELD METAL COMPOSITION (%) WITH CO_2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Ni	Mo	V	W
Typical	0.38	1.47	0.82	0.014	0.019	5.4	0.67	1.84	0.28	1.9

ALL WELD METAL HARDNESS (TYPICAL) :
On a 3-layer deposit in as-weld condition : 55-57 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
2.4	200 – 300	26 – 30	30 – 40
2.8	250 – 350	26 – 30	30 – 40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : The wire is supplied in a layer wound 12.5 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

Die rebuilding & surfacing flux cored wire

Characteristics :

A customized gas shielded flux cored wire designed for fabrication of a new die and re-building of worn-out hot forging dies. The wire has very good welder's appeal and easy slag detachability. The deposited weld metal is tough for hot or cold work tooling. It is free from cracks, porosities and any other surface defects.

Applications :

LoTherme GS-9580 (Mod) wire is suitable for trimmers, shear, blanking & forming dies, punches, header dies, forging dies, hot working tools & guides, etc. The weld metal is suitable to those areas where higher hardness is preferred.

RECOMMENDED SHIELDING GAS : Argon-CO_2 gas mixture & CO_2

ALL-WELD COMPOSITION (%) WITH Ar-CO2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Ni	Mo	V	W
Typical	0.40-0.80	0.8-1.8	0.30-0.90	0.030 max	0.030 max	5.0 7.5	0.40 0.80	1.6 3.0	0.30 0.60	2.0 3.5

ALL WELD METAL HARDNESS (TYPICAL) :

On a 3-layer deposit after 560°C for 2 hrs SR condition : 54-58 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
1.6	180 – 280	26 – 30	25 – 30
2.4	200 – 300	26 – 30	30 – 40
2.8	250 – 350	26 – 30	30 – 40

Standard Wire Diameter (mm): 1.6, 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : The wire is supplied in a layer wound 12.5 kg plastic spool and 2.4/2.8mm wire is also available in 25kg ring packing. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

LoTherme GS-9650

Gas shielded hard surfacing flux cored wire

Characteristics :

A customized gas shielded wire designed for fabrication of a new die and re-building of worn-out hot forging dies. The wire has very good welder's appeal and easy slag detachability. The deposited weld metal is martensitic stainless steel and highly resistant to heat, corrosion, wear & galling. It is free from cracks, porosities and any other surface defects.

Applications :

LoTherme GS-9650 wire is suitable for weld-surfacing & reclamation of forging dies, hot working tools & guides, etc.

RECOMMENDED SHIELDING GAS : Argon-CO_2 gas mixture

TYPICAL ALL-WELD METAL COMPOSITION (%) WITH Ar-CO_2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Ni	Mo	V
Typical	0.21	0.92	0.95	0.018	0.022	10.5	2.0	2.3	0.20

ALL WELD METAL HARDNESS (TYPICAL) :

On a 3-layer deposit in as-weld condition : 40-48 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
2.4	200 – 250	26 – 28	30 – 40
2.8	250 – 300	26 – 28	30 – 40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : Supplied in a layer wound 12.5 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

Forging die rebuilding flux cored wire

Characteristics :

A customized gas shielded flux cored wire designed to deposit low alloy steel weld metal for surfacing of hammer dies. The weld metal is tough, free from cracks, porosities and any other surface defects.

Applications :

LoTherme GS-Ditherme HD wire is suitable for deposition of surface or buffer layers on forging dies, hot working tools, etc.

RECOMMENDED SHIELDING GAS : Argon-CO_2 gas mixture & Co_2

TYPICAL ALL-WELD METAL COMPOSITION (%) WITH Ar-CO_2 SHIELDING:

Element	C	Mn	Si	S	P	Cr	Ni	Mo	V
Typical	0.072	1.51	0.68	0.014	0.021	2.0	1.9	0.94	0.38

TYPICAL ALL WELD METAL HARDNESS :

On a 3-layer deposit in as-weld condition : 36-38 HRC
After SR at 550°C for 2 hours : 34-36 HRC

Electrical Characteristics: DCEP/DC (+)

Diameter (mm)	Current Range (Amps)	Voltage(V)	Stick Out (mm)
2.4	200 – 300	26 – 28	30 – 40
2.8	250 – 350	26 – 28	30 – 40

Standard Wire Diameter (mm): 2.4 and 2.8

Note : Any other diameter wires may be available on request.

Packing Data : The wire is supplied in a layer wound 12.5 kg plastic spool. Each spool is sealed in polythene bag and then packed in a shrink-wrapped corrugated box.

Note : Any other type of packaging may be available on request.

DISSIMILAR METAL WELDING CONSUMABLES CHART

	Cast iron	Nodular iron	Steels Cast steel non-alloyed	Steels Cast steel low and medium alloyed	Steels Cast steel high alloyed
Brown	534 535	535	535	535	515 N 534 535
German silver	702 535	703 535	535 512	535 512	512 535
Brass	534 535	535 534	535 534	535 534	535 534
Copper	705 535	535 703	535 515N	515 N 534 535	515 N 534 535
Nickel Nickel alloys	705 704 N 703	703 704 N	513 515N 512	513 512 515 N	513 512 515N
Steel Cast steel high alloyed	705 704 N 703	703 704 N	457, 468 464	457, 468 464	457, 468 464, 457 S 515N
Steel Cast steel low & medium alloyed	705 704 N 703	704 N 703	457, 468 464	457 S, 457 464	
Steel Cast steel non-alloyed	704 N 703	704 N 703	210, 352 464		
Nodular iron	704 N 703	704 N 703			
Cast iron	704 N 703				

DISSIMILAR METAL WELDING CONSUMABLES CHART

Nickel Nickel alloys	Copper	Brass	German silver	Bronzes
512, 513 535	512, 513 535	512, 513 535	535, 534	535, 534
512, 513 535, 515 N	535	512, 535 534	535	
535, 534	535, 534	535, 534		
512, 513 535, 515 N	534			
512, 513 535, 515 N				

APPLICATION GUIDE

SUGAR PLANTS

Wear & tear due to Abrasion, Impact, Corrosion and Friction has been a constant problem for the Maintenance Engineer in the Sugar Industry. To achieve high performance, high productivity, low operation cost without disturbing the production operation is task at hand. This can only be achieved through Reclamation & Repair to prolong life. It will also minimize inventory and down time considerably.

Sr. No.	Name of Components	Base Material	Wear Factors	Recommended D&H Sécheron Consumables	
				SMAW	FCAW
1	Cane Grabs	C.Steel	Wear	LoTherme-603R	LoTherme-OA-603
2	Cane Lever Arms	C.Steel	Wear	LoTherme-603R	LoTherme-OA-603
3	Cane Loading Spikes	C.Steel	Wear	LoTherme-603R	LoTherme-OA-603
4	Cane Cutting Knives	C.Steel	Wear	LoTherme-611	LoTherme-OA-611
5	Fibrizer	C.Steel	Wear	LoTherme-602/605	-
6	Trash Beam	Cast Iron	Crack	LoTherme-701 /702	-
7	Trash Plate	C.Steel	Teeth Wear	LoTherme-605	-
8	Scraper Plate	C.Steel	Teeth Wear	LoTherme-605	-
9	Crusher Roller	Steel/CI	Wear/Slip	LoTherme-618	LoTherme-OA-618
10	Roller Pinion	C.Steel	Wear	LoTherme-352/602	-
11	Tail Bar	L.A. Steel	Wear	LoTherme-457S	LoTherme-OA-457S

12	Square Coupling	Steel/CI	Wear	LoTherme-602/701+703	LoTherme-OA-602
13	Juice Ring	Steel	Wear	LoTherme-660 G2/ 603R	-
14	Striking Bar of Anvil	Steel	Wear	LoTherme-457S + 660 G2	LoTherme-OA-457S
15	Juice Pump	Cast Iron	Wear	LoTherme-703	-
16	Magma Pump	Bronze	Wear	LoTherme 534/532/ 533	-
17	SS Condenser	SS 316	Wear/Fab	LoTherme-451	-
18	Centrifuge Shaft	Alloy steel	Wear	LoTherme-468	LoTherme-OA-468S
19	Sprocket	Steel	Wear	LoTherme-603	-
20	Pump Shaft Keys	Steel	Wear	LoTherme-468	-
21	Brake Drum	Cast Iron	Wear	LoTherme-703	-
22	Unknown Material	Steel	Wear/Crack	LoTherme-468	LoTherme-OA-468S
23	Turbine Casing	Steel	Crack	LoTherme-468	LoTherme-OA-468S
24	Sugar Mill Roller	Cast Iron/S.G Iron	Wear	LoTherme-618S	LoTherme-OA-653

APPLICATION GUIDE
STEEL INDUSTRY

Today, Steel Plants are working at maximum utilization hence, several parts are constantly subjected to continuous wear and fear at rapidly changing temperatures. Metal to Metal wear & tear, Corrosion, Abrasion etc. has been be a regular problem at every service workshop the Steel Industry. Lotherme's recommendation will enormously bring down the need to replace. Reclamation and repair is the only profitable solution.

Sr. No.	Name of Components	Base Material	Wear Factors	Recommended D&H Sécheron Consumables	
				SMAW	FCAW
1	Gear	Cast Steel	Abrasion/Friction	LoTherme-602	LoTherme GS-602
2	Pinion of Sinter M/c	Forged Steel	Abrasion/Friction	LoTherme-352/602	LoTherme GS-352/602
3	Hammer Mill Rotor	Forged Steel	Abrasion	LoTherme-352/602	LoTherme GS-352/602
4	Cooler Fan Blade	Cast Steel	Abrasion/Friction	LoTherme-352/602	LoTherme GS-352/602
5	Blower Fan Blade & Hub (Impeller)	Special Alloy	Abrasion/Friction	LoTherme-352/602	LoTherme GS-352/602
6	Rail	Mn. Steel	Abrasion/Impact	LoTherme-352/602	LoTherme GS-352/602
7	Support Rolls	Cast Steel	Friction	LoTherme-703	-
8	Friction Wheel	Forged Steel	Abrasion/Friction	LoTherme-352	LoTherme-GS-352
			COKE OVEN		
9	Air Compressor Body	Cast Iron	Accident	LoTherme-701/703	-
10	Motor Base Plate	Cast Iron	Accident	LoTherme-701/703	-
11	Pump Body	Cast Iron	Accident	LoTherme-701/703	-

12	Chute	Stainless Steel	Abrasion	LoTherme-468/457	LoTherme-OA-468S/OA-457S
13	Flange	Stainless Steel	Abrasion	LoTherme-468/457	LoTherme-OA-468S/OA-457S
14	Shaft	Stainless Steel	Abrasion	LoTherme-468/457	LoTherme-OA-468S/OA-457S
15	Gears	Cast Steel	Friction	LoTherme-352/602	LoTherme-GS-352/GS-602
16	Dog Clutch	Cast Steel	Friction	LoTherme-602	LoTherme-GS-602
17	Gear Box	Cast Iron	Accident	LoTherme-701/703	-
18	Conveyor Drums	Cast Steel	Friction	LoTherme-602	LoTherme-GS-602
19	Crusher Jaws Hammer	Mn. Steel	Impact/Abrasion	LoTherme-625	LoTherme-OA-625
20	Pulleys	Cast Iron	Friction	LoTherme-701/705	-
21	Buckets	Mn. Steel	Impact/Abrasion	LoTherme-625	LoTherme-OA-625
22	Gear Wheel	Cast Iron	Friction	LoTherme-352/468	LoTherme-GS-352/OA-468S
23	Motor Casings	Cast Iron	Accident	LoTherme-701/705	-
24	Transmission Gear	Cast Iron	Friction	LoTherme-457	LoTherme-OA-457S
25	Bush Bars	Copper	Friction	LoTherme-533/532	-
26	Lifting Blocks	Cast Iron	Accident	LoTherme-701/705	-
27	Chains	Cast Steel	Friction	LoTherme-468/457	LoTherme-OA-468S/OA-457S
28	Leader Tips	Alloy Steel	Friction	LoTherme-602	LoTherme-GS-602

29	Chassis	Cast Steel	Crack	LoTherme-468	LoTherme-OA-468S
30	Hydraulic Units	Brass/Bronze	Friction	LoTherme-532	-
31	Washery Main Pump	Cast Iron	Accident	LoTherme-701/457	-
32	Coke Crushing Hammer	Steel	Impact	LoTherme-625/603	LoTherme-OA-625/OA-603
33	Pinion For Pusher Rack	Mn. Steel	Abrasion/Impact	LoTherme-457 S	LoTherme-OA-457S
34	Coupling Flanger	Cast Steel	Friction	LoTherme-352	LoTherme-GS-352
35	Ram Beams of Support	Cast Steel	Vibration	LoTherme-352	LoTherme-GS-352
36	Cooling Members	Copper	Joining	LoTherme-533/532	-
37	Sinter Breaker	Cast Steel	Abrasion/ Impact	LoTherme-625/603	LoTherme-OA-625/OA-603
38	Hammers	Cast Steel	Abrasion/ Impact	LoTherme-625/603	LoTherme-OA-625/OA-603
39	Pallets	Cast Steel	Abrasion	LoTherme-352/468	LoTherme-GS-352/OA-468S
40	Pallets	Cast Steel	Abrasion	LoTherme-705/703	-
41	Shafts	Stainless Steel	Joining/Surfacing	LoTherme-468	LoTherme-OA-468S
42	Crusher Jaws	Mn. Steel	Abrasion/Impact	LoTherme-625/603	LoTherme-OA-625/OA-603
43	Valves	Cast Iron	Abrasion/Surfacing	LoTherme-701/703	-
44	Throat Armour Plates	Cast Steel	Abrasion/Erosion	LoTherme-605/617	LoTherme-OA-605 (SPL)/OA-617

			STEEL MELTING SHOP		
45	Furnace Doors	Cast Steel	Joining	LoTherme-510 N	-
46	Pump Shafts	En Steel	Joining/Surfacing	LoTherme-468	LoTherme-OA-468S
47	Pulley	Cast Iron	Broken/Buildup	LoTherme-703/705	-
48	Kiln Shell	Cast Steel	Joining	LoTherme-352	LoTherme-GS-352
49	Ladle Trunion	Cast Steel	Abrasion	LoTherme-352/602	LoTherme-GS-352/GS-602
50	Crane Rails	Cast Steel	Abrasion	LoTherme-352/625	LoTherme-GS-352/OA-625
51	Rollers	Cast Iron	Broken/Joining	LoTherme-701/703	-
52	Valves	Stainless Steel	Steel Erosion	LoTherme-612	LoTherme-OA-612
53	Oxygen Lancer	Copper	Erosion	LoTherme-532	-
			FOUNDRY		
54	Crane Bearing Pedestal	Cast Steel	Friction	LoTherme-352	LoTherme-GS-352
55	Sand Pump	Cast Iron	Abrasion	LoTherme-701/705	-
56	Impeller Casing	Cast Iron	Abrasion	LoTherme-705	-
57	Mix Muller Plough	Mn. Steel	Abrasion	LoTherme-625	LoTherme-OA-625
58	Impeller Backplate	Cast Iron	Friction	LoTherme-705	-
59	Valve Spindle of Max M	Brass	Friction	LoTherme-533/532	-

60	Elevator Shaft	Steel	Friction	LoTherme-468	LoTherme-OA-468S
61	Feed Screw	Cast Steel	Abrasion	LoTherme-611	LoTherme-OA-611
62	Vibartor Table	Cast Iron	Crack	LoTherme-701/703	-
63	Moulding Box	Cast Iron	Crack	LoTherme-701/703	-
64	Feeder Head	Steel	Abrasion	LoTherme-611	LoTherme-OA-611
65	Rollers	Steel	Friction	LoTherme-468	LoTherme-OA-468S
66	Mould Drill	H.S.S	Friction	LoTherme-608	LoTherme-OA-608
67	Mould Knife	H.S.S	Friction	LoTherme-608	LoTherme-OA-608
68	Fan Blade	Steel	Abrasion	LoTherme-611	LoTherme-OA-611
69	Heat Treatment Grill	Stainless Steel	Heat	LoTherme-457 + 464	-
70	Heating Elements	Nichrome	Heat	LoTherme-510N	-
71	Machine Base	Cast Iron	-	LoTherme-701/703	-
72	Machine Housing Engine Blocks	Cast Iron	-	LoTherme-701/703	-
73	Sand Discharge Chute	Mild steel	Abrasion	LoTherme-611	LoTherme-OA-611
74	Pump Shaft	Steel	Friction	LoTherme-468	LoTherme-GS-468S
75	Mns. Liner Mould	Mn.Steel	Impact/Abrasion	LoTherme-607	LoTherme-OA-607
76	Scrap Blades	Mn.Steel	Abrasion	LoTherme-607 + 611	LoTherme-OA-607 + OA-611

77	Scrap Blades	Mn.Steel	Abrasion	LoTherme-611	LoTherme-OA-611
			MILL		
78	Tackle Ingot Mould	Cast Iron	Cavitation/ heat	LoTherme-701/705	-
79	Idlers	Cast Iron	Friction	LoTherme-705	-
80	Idlers	Steel	Friction	LoTherme-468	LoTherme-GS-468S
81	Rollers	Cast Iron	Friction	LoTherme-701/705	-
82	Rollers	Steel	Friction	LoTherme-468	LoTherme-GS-468S
83	Housing	Cast Iron	Crack/Joining	LoTherme-701/703	-
84	Housing	Cast Iron	Crack/Joining	LoTherme-701/703	-
85	Crane Rails	Mn.Steel	Friction/Abrasion	LoTherme-625/602	LoTherme-OA-625/OA-602
86	Crane Wheels	Forged Steel	Friction/Abrasion	LoTherme-602	LoTherme-OA-602
87	Impellers	Cast Iron, Bronze	Abrasion, Abrasion	LoTherme-701,532/533	-
88	Main Stand Bores	Cast Iron	Friction	LoTherme-352	LoTherme-GS-352
89	Flying Shear Housing	Cast Steel	Friction	LoTherme-352	LoTherme-GS-352
90	Hot Shear Blade	HCHC	Impact/Friction	LoTherme-600	-
91	Hot Working	HCHC	Friction	LoTherme-660 G3	-
92	Wire Cutters	HSS	Friction	LoTherme-608	LoTherme-OA-608

			REFACTORIES		
93	Supporting Rolls Of Rotary Kiln	Low Alloy Steel	Abrasion/Friction	LoTherme-352 + 602	LoTherme-GS-352 + OA-602
94	Impact Crusher	Low Alloy Steel	Friction/Impact	LoTherme-608 + 603	LoTherme-OA-608 + OA-603
95	Ratters	Mn.Steel	Abrasion	LoTherme-608 + 603	LoTherme-OA-608 + OA-603
96	Crown Gears	Cast Steel	Friction	LoTherme-602	LoTherme-OA-602
			ELECTRICAL		
97	Fan Cover Of Motors	Cast Iron	Friction/Accident	LoTherme-701 / 703	-
98	Motor Foundation	Cast Iron	Accident	LoTherme-701 / 703	-
99	Armature Shaft	Steel	Friction	LoTherme-468	LoTherme-GS-468S
100	Bearing Seating	Cast Steel	Friction	LoTherme-602	LoTherme-OA-602
101	Housing	Cast Iron	Friction	LoTherme-703	-
102	Copper Bushes	Copper	Friction	LoTherme-532 / 533	-
			CENTRAL REPAIR SHOP		
103	Machine Beds Housing	Cast Iron	Joining	LoTherme-701 / 705	-
104	Crane Wheels	Cast Steel	Abrasion	LoTherme-352	LoTherme-GS-352
105	Hosing	Cast Steel	Abrasion	LoTherme-352	LoTherme-GS-352
106	Wheel Punch	Cast Steel	Abrasion	LoTherme-603	LoTherme-OA-603
107	Shear Blades	Alloy Steel	Impact/Heat	LoTherme-464 + 606	-

109	Hammer Pallets	Mn. Steel	Impact	LoTherme-625	LoTherme-OA-625
110	Weaving Plates	Carbon Steel	Abrasion	LoTherme-352 + 602	LoTherme-GS-352 + OA-602
111	Spindle	Carbon Steel	Friction	LoTherme-352	LoTherme-GS-352

APPLICATION GUIDE
TRANSPORT SECTOR

In a fast changing world, transportation in growing leaps and bounds, continuous and extended houses of running causes wear and tear in several components. These need not to be replaced by expensive spares. Instead repair and rebuild worn out ports to prolong life. Lotherme will help you find solutions to save considerably.

Sr. No.	Name of Components	Base Material	Wear Factors	Recommended D&H Sécheron	
				SMAW	FCAW
1	Clutch Housing	Cast Iron	Crack/Impact /Friction	LoTherme-703	-
2	Clutch Withdrawal Face	Cast Iron	Impact/ Friction	LoTherme-703	-
3	Clutch Release Finger	Cast Iron	Broken/ Impact	LoTherme-602	LoTherme-OA-602
4	Clutch Yoke	Cast Iron	Friction	LoTherme-602	LoTherme-OA-602
5	Rear Flange	Cast Iron	Friction	LoTherme-352	LoTherme-GS-352
6	Interlock Shifter Shaft	Forged Steel	Friction/ Impact	LoTherme-468	LoTherme-OA-468S
ENGINE					
7	Cylinder Block	Cast Iron	Impact/Crack	LoTherme-703	-
8	Cylinder Head	Cast Iron	Impact/Crack	LoTherme-703	-
9	Pulley	Cast Iron	V-Belt Area	LoTherme-602 B	-
10	Flywheel Ring Gear	Alloy Steel	Chipped	LoTherme-468 N	-
11	Patching in Cylinder Block	Cast Iron	Cracked/Heat	LoTherme-703	-
GEAR BOX					
12	Gear Box Housing	Cast Iron	Impact/Crack	LoTherme-703	-
13	Gear Box Housing	Cast Iron	Bearing Area/Friction	LoTherme-705	-
14	Gear Shifting Fork	Steel	Impact	LoTherme-611	LoTherme-OA-611

15	Gear	Steel	Pitting on Teeth/Corrosion	LoTherme-468	LoTherme-OA-468S
16	Gear	Steel	Impact/Chipped or Broken	LoTherme-468	LoTherme-OA-468S
17	Gear Shilling Shaft	Steel	Friction/Chipped /Teeth	LoTherme-468	LoTherme-OA-468S
			PROPELLER SHAFT		
18	Flange	Steel	Friction/Impact Elongated Hole	LoTherme-352	LoTherme-GS-352
19	Propeller Shaft (Rear)	Alloy Steel	Bearing Seal/Friction	LoTherme-468	LoTherme-OA-468S
			DIFFERENTIAL		
20	Thrust Area	Steel	Impact	LoTherme-468	LoTherme-OA-468S
21	Bearing Area	Steel	Heat	LoTherme-468	LoTherme-OA-468S
22	Housing	Cast Iron	Cracked/Heat	LoTherme-701 + 703	-
23	Housing	Cast Iron	Cracked/Heat	LoTherme-468	LoTherme-OA-468S
24	Hypoid Gear	Steel	Impact/ Chipped off	LoTherme-468	LoTherme-OA-468S
25	Crown Wheel	Steel	Impact/Chipped /Teeth	LoTherme-468	LoTherme-OA-468S
26	Crown Wheel	Brass	Chipped/Teeth /Friction	LoTherme-532	-
27	Rear Axle Housing	Alloy Steel	Damaged Threads	LoTherme-468	LoTherme-OA-468S
28	Leaf Serino	Serino Steel	Impact/Broken	LoTherme-468	LoTherme-OA-468S
29	Slack Adjuster	Cast Iron	Heat	LoTherme-703	-

			AXLE & WHEEL		
30	Wheel Rim	Steel	Impact/Heat	LoTherme-352	LoTherme-GS-352
31	Stub Axle	Steel	Friction/Damaged Threads	LoTherme-468	LoTherme-OA-468S
32	Wheel Hub	Steel	Friction/Bearing Area	LoTherme-468	LoTherme-OA-468S
33	Rear Axle Tube	Steel	Corrosion/Pitting on Teeth	LoTherme-468	LoTherme-OA-468S
34	Rear Axle Shaft Holes Get Elongated	Steel	Friction/Impact	LoTherme-468	LoTherme-GS-468S
35	Rear Hub	Cast Iron	Heat/Crack	LoTherme-705	-
36	Front Beam	Cast Iron	Impact/Crack /Vibration	LoTherme-602	LoTherme-OA-602
			BRAKES		
37	Stack Adjuster	Steel	Impact/Crack	LoTherme-468	LoTherme-OA-468S
38	Stack Adjuster	Cast Iron	Heat/Crack	LoTherme-703	-
39	Compressor Housing	Cast Iron	Heat/Impact /Crack	LoTherme-703	-
			CHASSIS		
40	Chassis	Steel	Impact/Crack	LoTherme-468	LoTherme-OA-468S
41	Shovel/Bracket	Mild Steel	Impact	LoTherme-352	LoTherme-OA-352
42	Leaf Spring	Spring Steel	Impact/Broken	LoTherme-468	LoTherme-OA-468S

APPLICATION GUIDE

CEMENT PLANTS

The cement Industry has been one of core industries contributing to industrial growth. Our & decades of association with the Cement Industry has given in depth knowledge of the need to save down time and minimize inventory. This is a key factor in this highly competition market. Our solutions will minimize effect of wear & Tear are Abrasion, Impact & Hand.

Sr. No.	Name of Components	Base Material	Wear Factors	Recommended D&H Sécheron Consumables	
				SMAW	FCAW
1	Hammer (New)	Mn. Steel	Impact/ Abrasion	LoTherme-607/603	LoTherme OA-607/GS-633
2	Hammer (Old)	Mn. Steel	Impact/ Abrasion	Lotherme-457 + 607 + 603	LoTherme OA-457/OA-607/GS-
3	Jaw-Crusher Plate & Eccentric Shaft	Alloy Steel	Friction	LoTherme-352 + 602 + 607	LoTherme GS-352/GS-602/OA-
4	Shovel Bucket & Lip	Mn. Steel	Abrasion/ Impact	LoTherme-468/607	LoTherme OA-468/OA-607
5	Toggle Bearing Plate	Mn. Steel	Abrasion	LoTherme-625	LoTherme OA-625
6	Idler, Guides & Track Rollers	Carbon Steel	Impact/ Friction	LoTherme-352	Lotherme GS-352
7	Sprockets	Alloy Steel	Friction/ Impact	LoTherme-352 + 603	LoTherme GS-352/GS-633
8	Hammer Arms & Shafts	Alloy Steel	Impact	LoTherme-468	LoTherme GS-468
9	Track Link & Shoes	Mn. Steel	Impact/ Abrasion	LoTherme-607	LoTherme OA-607
10	Diaphragm	Mn. Steel	Impact	LoTherme-625	LoTherme OA-625
11	Scooping-Liner Plates	M.S./Mn. Steel	Abrasion	LoTherme-468	LoTherme OA-468
12	Cylinder Mill-Teeth & Crusher Bar	Austenitic/Mn Steel	Impact/Abrasion	LoTherme-468	LoTherme OA-468
13	F.K. Pump Shaft-Bearing	Carbon Steel	Friction	LoTherme-468	LoTherme OA-468
14	F.K. Pump Screw (Flight & Delivery	Carbon Steel or Mild Steel	Abrasion/Heat/Corrosion	LoTherme-468	LoTherme OA-468
15	Mill Gear Drive Pinion	Cast Steel	Friction	LoTherme-352	Lotherme GS-352
16	Mill Head/Journal	Cast Steel	Impact	LoTherme-352	Lotherme GS-352

17	Kiln Tyre	Cast Steel	Friction	LoTherme-352 + 602	LoTherme GS-352/GS-602
18	Girth-Gear Teeth (Broken Tooth)	Cast Steel	Fatigue/Friction	LoTherme-352 + 457	LoTherme GS-352/OA-457S
19	Girth Gear Drive Pinion	Cast Steel	Fatigue/Friction	LoTherme-352 + 618	LoTherme GS-352
20	Burner Nozzle	Stainless Steel	Heat/Abrasion	LoTherme-464 + 618	LoTherme OA-612
21	Clinker Inlet	Alloy Steel	Heat/Abrasion	LoTherme-464 + T904	LoTherme OA-612
22	Cooler -Plates	Alloy Steel	Heat/Abrasion	LoTherme-464 + T904	LoTherme OA-612
23	Lifting Arm & Roller	Mild Steel	Friction	LoTherme-352	LoTherme GS-352
24	Loco/Crane Wheels	Cast Steel	Friction	LoTherme-352	LoTherme GS-352
25	Elevator Rim/Drum	Mild Steel	Abrasion	LoTherme-352	LoTherme GS-352
26	Inlet Neck/Body	Cast Iron	Heat/ Abrasion	LoTherme-703	-
27	Cylinder Block/Head	Cast Iron	Impact	LoTherme-705	-
28	Crane Crab	Mild Steel	Abrasion	LoTherme-611	Lotherme OA-611
29	Drag-Chain Sprockets	Carbon Steel	Friction	LoTherme-457	Lotherme OA-457S
30	Slurry-Pump Shaft	Carbon Steel	Corrosion/Friction	LoTherme-468	LoTherme OA-468S
31	I.D. Fan Blades	Mild Steel	Abrasion	LoTherme-T901	LoTherme OA-605 (SPL)
32	Coal Pipe Bends	Cast Steel	Abrasion	LoTherme-603	LoTherme GS-633
33	Pump Housing	Cast Iron	Impact	LoTherme-705	-
34	Kiln-Support Roller	Cast Iron	Fatigue/Friction	LoTherme-352 + 602	LoTherme GS-352 + GS-602

APPLICATION GUIDE
POWER SECTOR

In any growing economy the power sector is quite often not able to meet the demand and hence these is on immense pressers on the pace of power generation. This leads to constant breakdowns, wear and tear of critical components. Factors of wear involved are several like, Abrasion, Impact, Erosion, Corrosion, Cavitation etc. Replacement of worn out components is an expensive proposition. Lotherme R&D offers a series of solution to combat wear & tear with minimal cost.

Sr. No.	Name of Components	Base Material	Wear Factors	Recommended D&H Sécheron Consumables	
				SMAW	FCAW
COAL HANDLING PLANT					
1	Coal Mill Vertical Shaft	A. Steel	Wear	LoTherme-468	LoTherme-OA-468S
2	Roller Yoke	C. Steel	Wear	LoTherme-603	LoTherme-OA-603
3	Coal Bend	CI	Wear	LoTherme-701	-
4	Coal Orifice	CI	Wear	LoTherme-701	-
5	Boiler Feed Pump	A.Steel	Wear	LoTherme-468	LoTherme-OA-468S
6	Coal Burner Nozzle	S.G. Iron	Wear	LoTherme-603	LoTherme-OA-603
7	Nozzle Tip	SS 310	Wear	LoTherme-464 + T904	-
8	ID Fan Shaft	A. Steel	Wear	LoTherme-468	LoTherme-OA-468S
9	Mill House	C. Steel	Wear	LoTherme-352	LoTherme-OA-352
APPLICATIONS IN POWER INDUSTRY					
10	Points & Crossing	Mn. Steel	Wear	LoTherme-457IVR	-
11	Wagon Tippler Gear	C. Steel/CI	Wear	LoTherme-352 + 611	LoTherme-OA-352 + OA611
12	Slurry Gear/Pinion	C. Steel	Wear	LoTherme-602	LoTherme-OA-602
13	Reclaimer Wheel	C. Steel	Wear	LoTherme-352 + 611	LoTherme-OA-352 + OA611
14	Dozer Cutting Edge	Mn. Steel	Wear	LoTherme-607 + 611	LoTherme-OA-607 + OA-611
15	Dozer Arms	C. Steel	Wear	LoTherme-607	LoTherme-OA-607

16	Dozer H Frame	H.T. Steel	Crack	LoTherme-352	LoTherme-OA-352
17	Track Pads	Mn. Steel	Wear	LoTherme-625	LoTherme-OA-625
18	Track Links	Mn. Steel	Wear	LoTherme-625	LoTherme-OA-625
19	Idler	Mn. Steel	Wear	LoTherme-625	LoTherme-OA-625
20	Rollers	Mn. Steel	Wear	LoTherme-607	LoTherme-OA-607
21	Ring & Tooth Hammers	Mn. Steel	Wear	LoTherme-607 + 611	LoTherme-OA-607 + OA-611
ASH HANDLING PLANT					
22	Clinker Grinder Liners	Mn. Steel	Wear	LoTherme-611	LoTherme-OA-611
23	Universal Slide Valve	SS 304	Wear	LoTherme-452	-

APPLICATION GUIDE

EARTH MOVING & MINING INDUSTRIES

Our continuous research and interaction into the aspects of wear and tear in the Mining and Earth Moving Industry has given us immense experience to combat wear. In fact we do not recommend you wait for a break down or components to wear out before suggesting solutions. We advice the OEM to initiate the action. Even before the new equipments and components are put to use we recommend you to PROTECT. Protect with the right kind of alloy for Hardfacing / Rebuilding to resist the wear, most effectively.

Sr. No.	Name of Components	Base Material	Wear Factors	Recommended D&H Sécheron Consumables	
				SMAW	FCAW
1	Bucket Tooth	Mn. Steel	Abrasion/ Impact	LoTherme-607	LoTherme-OA-607
2	Bucket Lip	Mn. Steel	Abrasion/ Impact	LoTherme-607	LoTherme-OA-607
3	Track Shoes	Mn. Steel	Friction/ Abrasion	LoTherme-625	LoTherme-OA-625
4	Sprocket	Steel	Friction/ Abrasion	LoTherme-602B	-
5	Rack Pinion	Steel	Friction	LoTherme-352	LoTherme-GS-352
6	Rack Teeth	Steel	Friction	LoTherme-625	LoTherme-OA-625
7	Bucket Body	Mn. Steel	Abrasion/ Impact	LoTherme-625	LoTherme-OA-625
8	Latch Bar	Mn. Steel	Friction/ Abrasion	LoTherme-625	LoTherme-OA-625
9	Latch Keeper	Mn. Steel	Friction/ Abrasion	LoTherme-625	LoTherme-OA-625
10	Slides	Steel	Friction	LoTherme-625	LoTherme-OA-625
11	Intermediate Hoist Shaft	Steel	Friction	LoTherme-468	LoTherme-OA-468S

12	Boom Stick	Steel	Friction	LoTherme-468	LoTherme-OA-468S
13	Swing Drum	Steel	Cracks	LoTherme-352	LoTherme-GS-352
14	Take up Axel Shaft	Steel	Friction	LoTherme-352	LoTherme-GS-352
15	Shaft for Rack Pinion	Steel	Friction	LoTherme-468	LoTherme-OA-468S
16	Bevel Gear	Steel	Friction	LoTherme-468	LoTherme-OA-468S
17	Idlers	Steel	Friction	LoTherme-352	LoTherme-GS-352
		DRILL MASTER			
18	Chassis	Steel	Cracks	LoTherme-352/457	LoTherme-GS-352/OA-457S
19	Main Base Frame	Steel	Cracks	LoTherme-352/457	LoTherme-GS-352/OA-457S
20	Support Lever	Steel	Cracks	LoTherme-468	LoTherme-OA-468S
21	Spool Valve Handler	Steel	Cracks	LoTherme-352	LoTherme-GS-352
22	DRP-2 Rotary Head Floating Spindles	Steel	Friction	LoTherme-468	LoTherme-OA-468S
23	Spindle Complete	Steel	Friction	LoTherme-468	LoTherme-OA-468S
24	Hoisting Winch motor	Steel	Cracks	LoTherme-352	LoTherme-GS-352
25	Break Lever	Steel	Cracks	LoTherme-352	LoTherme-GS-352

29	Drill Rod Support Plate Guides	Steel	Friction	LoTherme-352	LoTherme-GS-352
30	Tower Support Bracket	Steel	Cracks	LoTherme-352	LoTherme-GS-352
31	Pivot Pin	Alloy Steel	Friction	LoTherme-468	LoTherme-OA-468S
32	Suspension Eye	Alloy Steel	Cracks	LoTherme-457 + 468	LoTherme-OA-457S/OA-468S
33	Pivot Pinion Carrier	Alloy Steel	Friction	LoTherme-468	LoTherme-OA-468S
COAL DRILL					
34	Track Frame	Steel	Cracks	LoTherme-457	LoTherme-OA-457S
35	Chassis	Steel	Cracks	LoTherme-457	LoTherme-OA-457S
36	Tower	Steel	Cracks	LoTherme-468	LoTherme-OA-468S
37	Tower Bracket D 14 HAMMER	Steel	Cracks	LoTherme-352	LoTherme-GS-352
38	Chuck D 14 HAMMER	Steel	Friction/ Abrasion	LoTherme-352	LoTherme-GS-352
39	Back Head	Steel	Friction	LoTherme-352	LoTherme-GS-352
40	Cleaves (Dump Shaft)	Steel	Cracks	LoTherme-468	LoTherme-OA-468S
41	Carrier Rollers	Steel	Friction/ Abrasion	LoTherme-602	LoTherme-OA-602
42	Idlers	Steel	Friction/ Abrasion	LoTherme-602	LoTherme-OA-602

43	Sprocket	Steel	Friction/Abrasion	LoTherme-602	LoTherme-OA-602
44	"C" Frame	Steel	Friction/Abrasion	LoTherme-602	LoTherme-OA-602
45	Track Roller	Steel	Friction	LoTherme-602	LoTherme-OA-602
46	"C" Frame Bracket	Steel	Cracks	LoTherme-352/457	LoTherme-GS-352/OA-457S
47	Base Arms	Steel	Abrasion/Cracks	LoTherme-352	LoTherme-GS-352
48	Blade Assembly	Mn. Steel	Impact/Abrasion	LoTherme-625	LoTherme-OA-625
49	Gear Shilling Lever	Steel	Friction	LoTherme-468	LoTherme-OA-468S
50	Track Farm	Steel	Crack	LoTherme-352	LoTherme-GS-352
51	Idler Shaft	Steel	Friction/Abrasion	LoTherme-352	LoTherme-GS-352
52	Track Frame Lever	Steel	Crack	LoTherme-468	LoTherme-OA-468S
		BOTTOM DUMPER			
53	Goose Neck	Steel	Crack	LoTherme-352	LoTherme-GS-352
54	Goose Neckside Corner Box	Steel	Crack	LoTherme-468	LoTherme-OA-468S
55	Door Opening Cylinder	Steel	Crack	LoTherme-468	LoTherme-OA-468S
56	Exhaust Main Delivery Pipe	Cast Iron	Crack	LoTherme-703	LoTherme-GS-352

57	Water Pump Bracket	Steel	Crack	LoTherme-352	LoTherme-GS-352
58	Chassis	Steel	Crack	LoTherme-352	LoTherme-GS-352
59	Bucket Body	Steel	Abrasion	LoTherme-603	LoTherme-OA-603
60	Bucket Bracket	Steel	Shock Load Cracks	LoTherme-352	LoTherme-GS-352
61	Cutting Edges	Mn. Steel	Impact/Abrasion	LoTherme-625/611	LoTherme-OA-625/OA-611
62	Brake Head Cover	Mild Steel	Crack	LoTherme-352	LoTherme-GS-352
63	Bucket Tooth	Mn.Steel	Abrasion/ Impact	LoTherme-625	LoTherme-OA-625
64	Hoist Arms	Steel	Crack	LoTherme-352	LoTherme-GS-352
65	Blade Lifting Arm	Steel	Crack	LoTherme-352	LoTherme-GS-352
66	Brake Drum	Cast Iron	Friction	LoTherme-703	-
67	Lifting Housing Mounting Bracket	Steel	Crack	LoTherme-352	LoTherme-GS-352
68	Axle Housing	Steel	Friction	LoTherme-352	LoTherme-GS-352
69	Hydraulic Pipe	Steel	Leakage	LoTherme-352	LoTherme-GS-352
70	Rooms	Steel	Crack	LoTherme-468	LoTherme-OA-468S
71	Body	Steel	Crack	LoTherme-468	LoTherme-OA-468S

APPLICATION GUIDE

MARINE SECTOR

Sea-Water Corrosion, Constant, Variations in temperatures, Metal Fatigue, Metal to Metal wear, has lead to several breakdowns and repairs of Sea-faring vessels. Our latest technology offer solutions to minimize wear and down time for the maintenance in the repair docks.

S. No.	Components	Base Metals	Wear Factors	Recommended Electrodes
01	Pump Impellers	Steel/Bronze	Corrosion/ Abrasion	533
02	Heat Exchange tubes	Cu - Ni Alloys	Corrosion	512
03	Water pump housing	Cast Iron	Erosion/ Corrosion	705
04	Condenser pipes	Cu Nickel Alloys	Corrosion	512
05	Engine Blocks	Cast Iron	Impact	703
06	Valve seat	Stainless Steel	Heat/Impact	606

APPLICATION GUIDE

RAILWAY SECTOR

In a fast changing world, railway in growing leaps and bounds, continuous and extended houses of running causes wear and tear in several components. These need not to be replaced by expensive spares. Instead repair and rebuild worn out ports to prolong life. Lotherme will help you find solutions to save considerably.

S. No.	Components	Base Metals	Recommended Electrodes
01	Roof Truss/Under Frames	Alloy Steel/ Carbon Steel	352
02	Crank Case	Carbon Steel	352
03	Brake Equipment/levers/rods	Carbon Steel	352
04	Exhaust Muffers & Mainfolds	Alloy Steel	464 + 511 N
05	Rail Ends, Crossings	Austenitic Manganese Steels	468
06	Diesel Valve	High Temperature Steel	606
07	Cylinder Head	Cast Iron	703
08	Journal Box	Manganese Steel	468
09	Bearing Ends	Copper Alloy	533 / 532
10	Loco Wheels	Steel	468
11	Crane Case	Cast Iron	705
12	Machine Housings	Cast Iron	701 / 705

HARDNESS CONVERSION TABLE (APPROX.)

ROCKWELL HARDNESS C-150 Kg. Load, Diamond	ROCKWELL HARDNESS B-100 Kg. Load, 1/16" Ball	VICKERS HARDNESS Diamond Pyramid	VICKERS HARDNESS Tungsten Carbide Ball	BRINELL HARDNESS Steel Ball	BRINELL HARDNESS Tensile Strength, 1000 Psi
67	-	918	820	-	-
66	-	884	796	-	-
65	-	852	774	-	-
64	-	822	753	-	-
63	-	793	732	-	-
62	-	765	711	-	-
61	-	740	693	-	-
60	-	717	675	-	-
59	-	694	657	-	-
58	-	672	639	-	-
57	-	650	621	-	-
56	-	630	604	-	-
55	-	611	588	-	-
54	-	592	571	-	-
53	-	573	554	-	283
52	-	556	538	-	273
51	-	539	523	500	264

ROCKWELL HARDNESS C-150 Kg. Load, Diamond	ROCKWELL HARDNESS B-100 Kg. Load, 1/16" Ball	VICKERS HARDNESS Diamond Pyramid	VICKERS HARDNESS Tungsten Carbide Ball	BRINELL HARDNESS Steel Ball	BRINELL HARDNESS Tensile Strength, 1000 Psi
20	98.9	240	231	225	107
19	98.1	235	226	220	106
18	97.5	231	222	215	103
17	96.9	227	218	210	102
16	96.2	223	214	206	100
15	95.5	219	210	201	99
14	94.9	215	206	197	97
13	94.1	211	202	193	95
12	93.4	207	199	190	93
11	92.6	203	195	186	91
10	91.8	199	191	183	90
9	91.2	196	187	180	89
8	90.3	192	184	177	88
7	89.7	189	180	174	87
6	89.0	186	177	171	85
5	88.3	183	174	168	84
4	87.5	179	171	165	83

50	-	523	508	488	256	3	87.0	177	169	162	82	
49	-	508	494	476	246	2	86.0	173	165	160	81	
48	-	493	479	464	237	1	85.5	171	163	158	80	
47	-	479	465	453	231	0	84.5	167	159	154	78	
46	-	465	452	442	221	-	83.2	162	153	150	76	
45	-	452	440	430	215	-	82.0	157	148	145	74	
44	-	440	427	419	208	-	80.5	153	144	140	72	
43	-	428	415	408	201	-	79.0	149	140	136	70	
42	-	417	405	398	194	-	77.5	143	134	131	68	
41	-	406	394	387	188	-	76.0	139	130	127	66	
40	-	396	385	377	181	-	74.0	135	126	122	64	
39	-	386	375	367	176	-	72.0	129	120	117	62	
38	-	376	365	357	170	-	70.0	125	116	113	60	
37	-	367	356	347	165	-	68.0	120	111	108	58	
36	-	357	346	337	160	-	66.0	116	107	104	56	
35	-	348	337	327	155	-	64.0	112	104	100	54	
34	-	339	329	318	149	-	61.0	108	100	96	52	
33	-	330	319	309	147	-	58.0	104	95	92	50	
32	-	321	310	301	142	-	55.0	99	91	87	48	
31	-	312	302	294	139	-	51.0	95	86	83	46	
30	-	304	293	286	136	-	47.0	91	83	79	44	
29	-	296	286	279	132	-?	44.0	88	80	76	42	
28	-	288	278	272	129	-	39.0	84	76	72	40	
27	-	281	271	265	126	-	35.0	80	72	68	38	
26	-	274	264	259	123	-	30.0	76	67	64	36	
25	-	267	258	253	120	-	24.0	72	64	60	34	
24	-	261	252	247	118	-	20.0	69	61	57	32	
23	-	255	246	241	115	-	11.0	65	57	53	30	
22	100.2	250	241	235	112	-	0.0	62	54	50	28	
21	99.5	245	236	230	110							

EN SERIES - BRITISH STANDARD SCHEDULE 970-1955

En No.	Type of steel and example of application	Chemical Composition - Percent C	Mn	Si	Cr	Ni	Mo
1A	Free cutting machinig steel for low duty bolts, nuts, studs, etc.	0.07-0.15	0.80-1.20	0.10 Max.	-	-	-
8	40 Carbon steel (as rolled or normalised). For bolts and machine rods and crankshfts and part requiring strength and wear resistance (without grain size control).	0.35-0.45	0.60-1.00	0.05-0.35	-	-	-
9	55 Carbon steel (normalised or hardened and tempered or cold drawn). Suitable for cylinders, gears, mahince tools, rifle barrels and breech machanisms.	0.50-0.60	0.50-0.80	0.05-0.35	-	-	-
15	Carbon - Manganese steel (higher tensile)	0.30-0.40	1.30-1.70	0.10-0.35	-	-	-
16	Manganese-Molybdenum steel. Suitable for tensile ranges of 45/75 tons / sq.in. according to the ruling section.	0.30-0.40	1.30-1.80	0.10-0.35	-	-	-

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LOTHERME

DNH sécheron Complete Welding Support Estd. 1986

18	1 percent Chromium steel, Suitable for tensile ranges of 45/65 tons/sq.in. according to the ruling section.	0.35-0.45	0.60-0.95	0.10-0.35	0.85-1.15	-	-	
19	1 percent Chromium Molybdenum steel. Suitable for tensile ranges of 45/80 tons / sq.in. according to the ruling section of the part.	0.35-0.45	0.50-0.80	0.10-0.35	0.90-1.50	-	0.20-0.40	
24	1.5 percent Nickel - Chromium - Molybdenum steel. Suitable for tensile ranges of 50/100 tons / sq.in. according to the ruling section of the part.	0.35-0.45	0.45-0.70	0.10-0.35	0.90-1.40	1.30-1.80	0.20 0.35	
31	1 percent Carbon-Chromium steel. For parts of maximum hardness such as ball races.	0.90-1.20	0.30-0.75	0.10 0.35	1.00 1.60	-	-	
36A	3 pecent Nickel-Chromium case hardening steel	0.15 max.	0.30-0.60	0.10-0.35	0.60-1.10	3.00-3.75	-	
36B	As above	0.12-0.18	0.30-0.60	0.10-0.35	0.60-1.10	3.00-3.75	-	

En No.	Type of steel and example of application	Chemical Composition - Percent C	Mn	Si	Cr	Ni	Mo
36C	3 percent Nickel - Chromium - Molybdenum case hardening steel.	0.12-0.18	0.30-0.60	0.10-0.35	0.60-1.10	3.00-3.75	0.10-0.25
40A	3 percent Chromium - Molybdenum nitriding steel. Suitable for tensile strengths of 45/70 tons/sq.in. Cylinder linings, crank-shafts and airscrews shafts.	0.10-0.20	0.40-0.65	0.10-0.35	2.90-3.50	0.40 Max.	0.40-0.70
40B	3 percent Chromium - Molybdenum nitriding steel. Uses as for En 40A	0.20-0.30	0.40-0.65	0.10-0.35	2.90-3.50	0.40 Max.	0.40 0.70
40C	3 percent Chromium - Molybdenum - Vandium nitriding steel. Uses as for En 10A	0.30-0.50	0.40-0.80	0.10-0.35	2.50-3.50	0.40 max.	0.70 1.20
41A	1.5 percent Chromium - Alumininum - Molybdenum nitriding steel	0.25-0.35	0.65 max.	0.10-0.45	1.40-1.80	0.40 max.	0.10-0.25
41B	1.5 percent Chromium - Alumininum - Molybdenum nitriding steel	0.35-0.45	0.65 max.	0.10-0.45	1.40-1.80	0.40 max.	0.10-0.25

Complete Welding Support
Estd. 1958

45	Silicon - Manganese spring steel for oil hardening and tempering	0.55-0.60	0.70-1.00	0.15-2.00	--	--	--
47	1 percent Chromium - Vanadium spring steel for oil hardening and tempering.	0.45-0.55	0.50-0.80	0.50 max.	0.80-1.20	--	--
48	1 percent Chromium spring steel for oil hardening and tempering.	0.45-0.55	0.50-0.80	0.10-0.50	1.00-1.40	--	--
52	Silicon - Chromium value steel for forgings and drop forgings, bars for machining, bright bars.	0.40-0.50	0.30-0.60	3.00-3.75	7.50-9.50	0.50 max.	--
351	3/4 percent Nickel - Chromium case hardening steel.	0.20 max.	0.60-1.00	0.35 max.	0.40-0.80	0.60-1.00	0.10 max.
352	1 percent Nickel - Chromium case hardening steel.	0.20 max.	0.50-1.00	0.35 max.	0.60-1.00	0.85-1.25	0.10 max.
353	1.25 percent Nickel - Chromium case hardening steel.	0.20 max.	0.50-1.00	0.35 max.	0.75-1.25	1.00-1.50	0.08-0.25
354	1.75 percent Nickel - Chromium - Molybdenum case hardening steel.	0.20 max.	0.50-1.00	0.35 max.	0.75-1.25	1.50-2.00	0.10-0.20

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Head office -
Estd. 1966
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