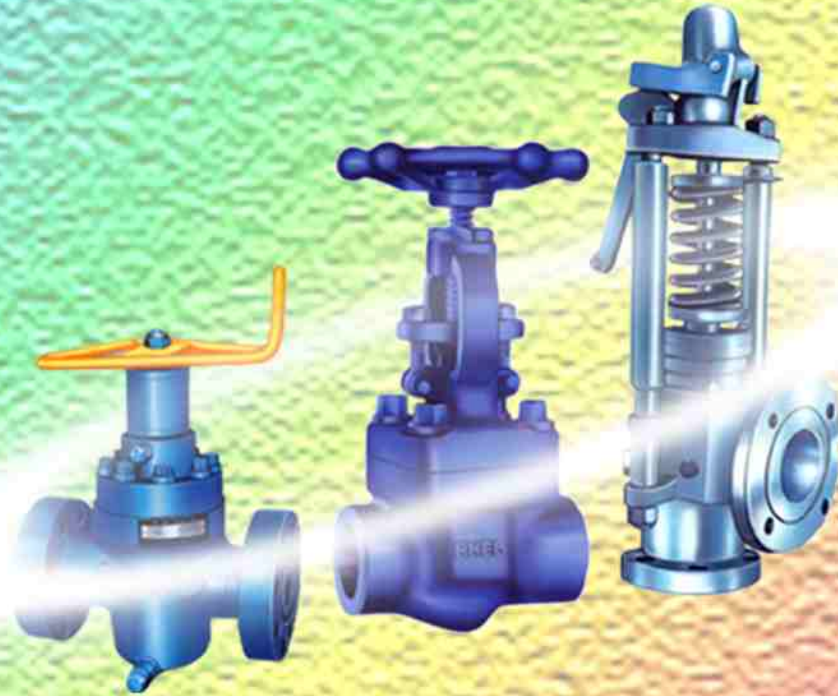


BHEL VALVES

A Guide to World Class Valves



Contents

To start, click on 'Contents'

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Tiruchirapalli

Long Retractable Soot Blower

Long Retractable Soot Blower

LRS IE Electric Long Retractable Soot Blower

LRD IE Electric Long Retractable Soot Blower

LRD IIE Electric Long Retractable Soot Blower

Soot Blower Control System

Allied Products

Technical Specification for Soot Blower

Engineering Information Required for Soot Blowers

Introduction



BHEL Long Retractable Soot Blowers are custom-built to meet the cleaning requirements of furnaces operating with various types of fuels, heat transfer surfaces, environmental conditions, hazardous gases and other furnace variables. BHEL blowers are designed to serve under the most stringent conditions.

BHEL blowers manufactured with the technology originally obtained from Copes Vulcan, USA, are satisfactorily working today in a number of Thermal Power Stations, Fertilizer Plants, Refineries etc., in India and abroad.

Contd...

Introduction



BHEL Long Retractable Soot Blowers are available in various basic models designed for travel upto 12.2 m. to suit the cleaning requirements of different furnace sizes, heat recovery coil arrangements etc. These blowers are available with single motor drive, dual motor drive and non-rotating lance. They can be operated electrically or pneumatically.

The following pages explain the various models of the Long Retractable Soot Blowers available from BHEL. To help BHEL in selecting and to engineer the best suited model for the customer, a carefully designed technical information sheet has been presented at the end of this catalogue. Customers may furnish information in the format indicated to ensure the most appropriate blower selection by BHEL.

Long Retractable Soot Blower

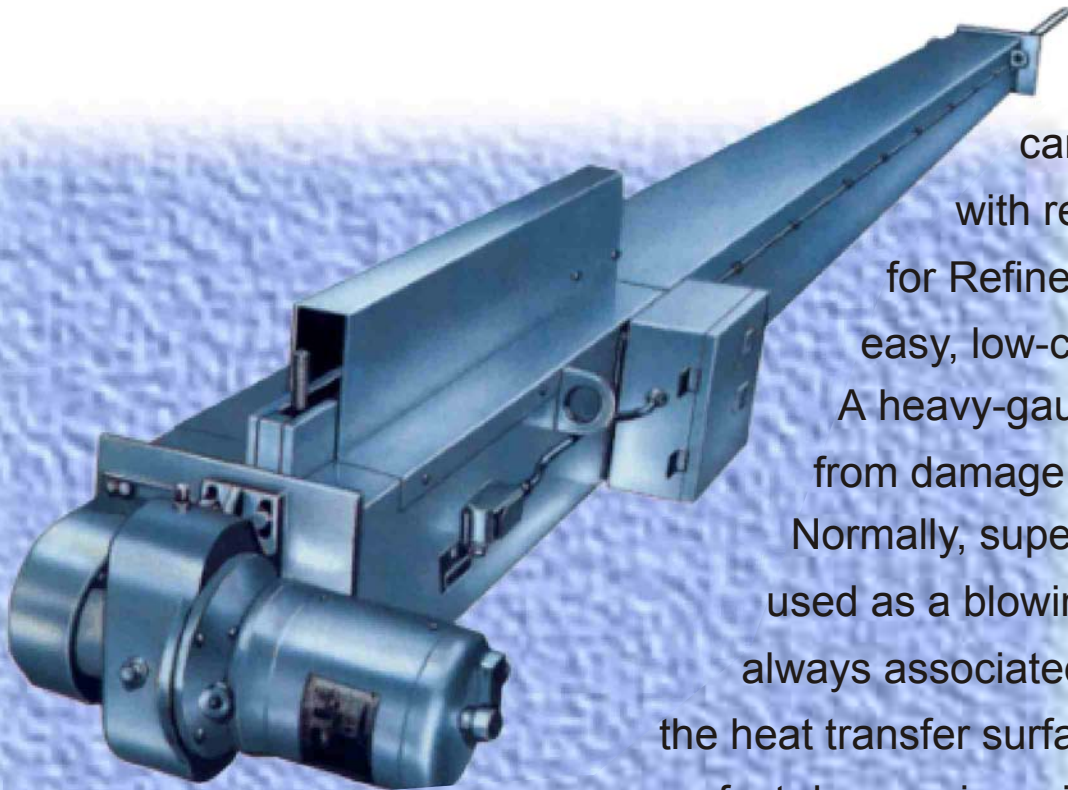
LRS IE Electric Long Retractable Soot Blower

The electrically operated BHEL-LRS IE Long Retractable Soot Blower is designed for a wide range of travel - from 0.6 m to 6 m.

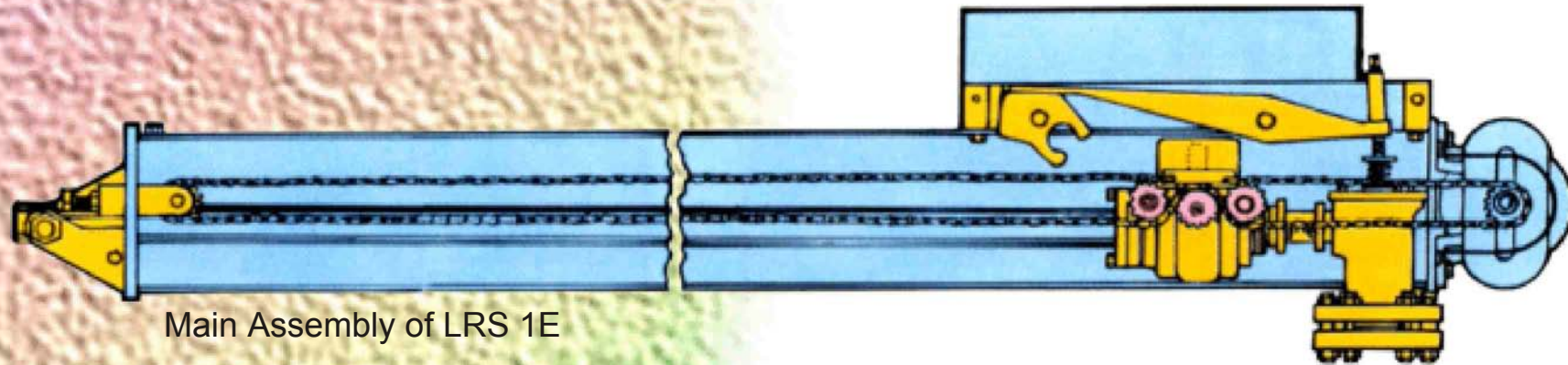
It is built for reliable operation, indoors or outdoors, in all weather conditions. The blowers can be supplied for hazardous areas to match with requirements of IS 2148 Gas groups IIA and IIB for Refinery applications. It sets new standards for easy, low-cost maintenance.

A heavy-gauge steel housing protects working parts from damage.

Normally, super-heated steam or dry compressed air is used as a blowing medium. Blowing with saturated steam is always associated with the danger of water particles hitting the heat transfer surfaces, resulting in possible erosion, unless perfect dryness is maintained at blower inlet. Outside adjustment of nozzle pressure, which may be from 10-30 kg/sq.cm., is made possible by the mechanically-operated head of the long Retractable Soot Blower.



LRS IE Electric Long Retractable Soot Blower



The LRS IE has a single electric-motor drive that moves the lance into and out of the boiler while rotating it, all are operated by one drive chain.

For efficient dislodging of deposits and minimising tube erosion a standard traverse speed of 2.45 mpm with 10.5 rpm is maintained.

The valve has positive direct mechanical action. It has no internal threads to wear or corrode. The packing gland is a hardened stainless steel cartridge type, easily accessible for maintenance.

BHEL soot blowers are designed with operators in mind. They keep boilers clean for optimum output and efficiency, with easy maintenance.

Contd...

LRS IE Electric Long Retractable Soot Blower

For example, the travelling carriage is pre-lubricated so it requires no oiling.

The connection between the lance and carriage is flanged. The motor, high-speed gear train and controls are stationary and located away from the path of the blowing medium.

The stainless steel feed pipe is ground and polished to prevent binding and wear as the carriage slides along it

The feed pipe and lance have no hidden, inaccessible parts which might clog or corrode or inhibit flow of the blowing medium. The single-stuffing box is accessible and easily repacked.

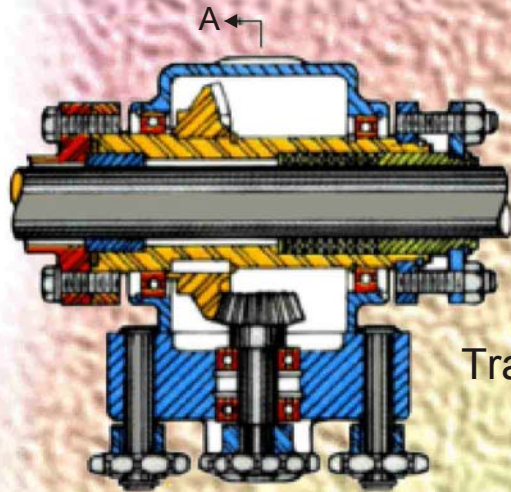
The low-friction BHEL chain drive is pre-lubricated, self-cleaning and corrosion-resistant. It is easily inspected and maintained.

Electric drive developed for BHEL-LRS IE provides efficient operation.

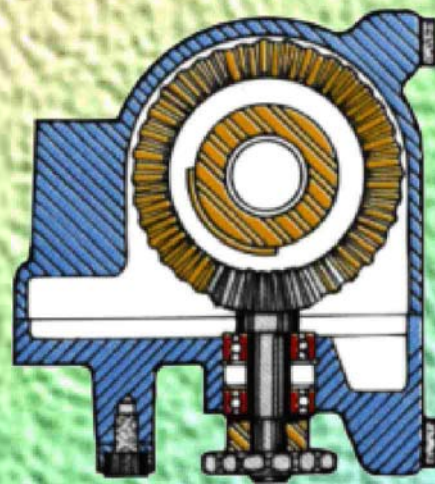
The motor is custom built for BHEL. It is a totally enclosed, non-ventilated, 3-phase moisture-resistant type with high constant torque, and Class B/F insulation.

Contd...

LRS IE Electric Long Retractable Soot Blower



Travelling Carriage



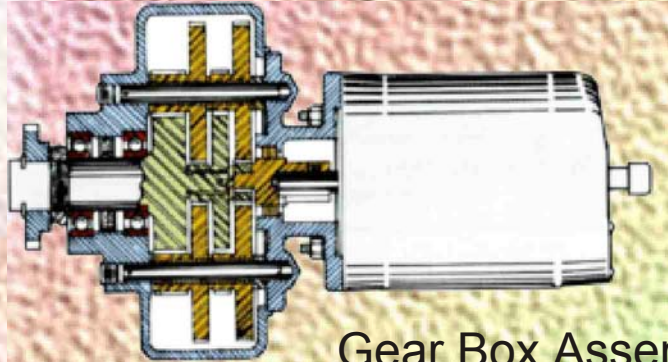
Travelling Carriage(Section AA)

Travelling carriage - driven by a special corrosion-resistant chain to avoid troublesome drive shafts, racks and pinions - rotates and directs the lance. Simple trouble-free bevel gear drive rotates the lance. High speed gear trains and controls are away from the hot boiler wall and path of blowing medium.

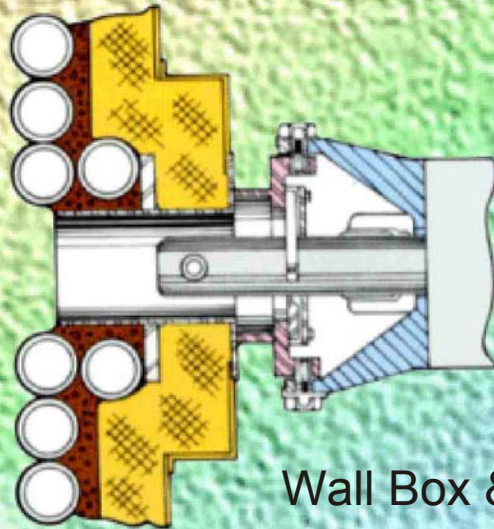
The gear train safely carries maximum torque and thrust forces on longest travels. Inside contour of gear box and design of gears, each of material best suited for its service, has been approved by gear-oil manufacturers for proper distribution of lubricant to all working parts, whether the installation be indoors or outdoors.

Contd...

LRS IE Electric Long Retractable Soot Blower



Gear Box Assembly



Wall Box & Seal Box

All particles of soot and slag are stripped off the lance as it retracts by a hardened-steel scraper plate adjacent to the boiler wall. This two-piece plate is easily replaced by removing only its retainer.

Two 90-degree nozzles are standard. Other arrangements are virtually unlimited. Nozzle inserts are made out of stainless steel, with shape and diameter designed for each job. Drain holes are provided in nozzle head when blowing medium is steam. Where tube banks are closely spaced, opposed right-angle nozzles are used to obtain this effective cleaning pattern with no obstruction of tubes.

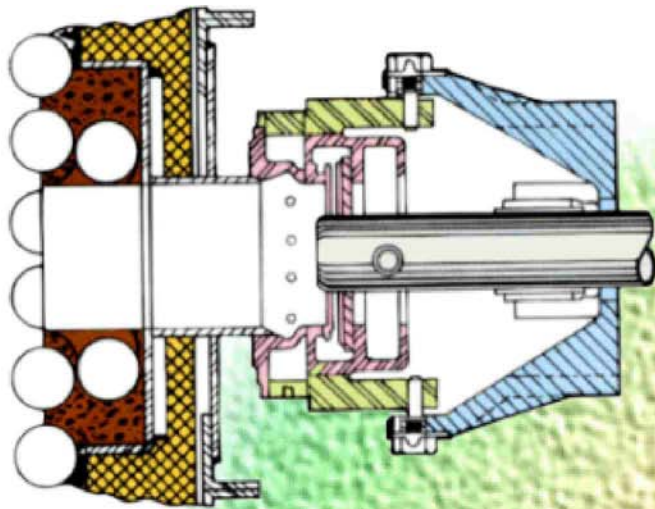
Contd...

LRS IE Electric Long Retractable Soot Blower

For pressurised furnaces, an air seal is provided to prevent escape of boiler gases. An aspirator can be added to seal in the gases, to remove the soot blower while the boiler is on line.

Leading and trailing nozzles are normally angled 15 degrees from vertical, but may be at any angle from 0 to 45 degrees.

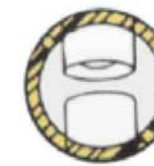
Nozzle design precludes imbalance or whip. Both sides of widely spaced platens are cleaned thoroughly when leading and trailing nozzles are used to direct jet action as shown by this pattern.



Wall Box & Seal Box
(Pressurised Furnace)



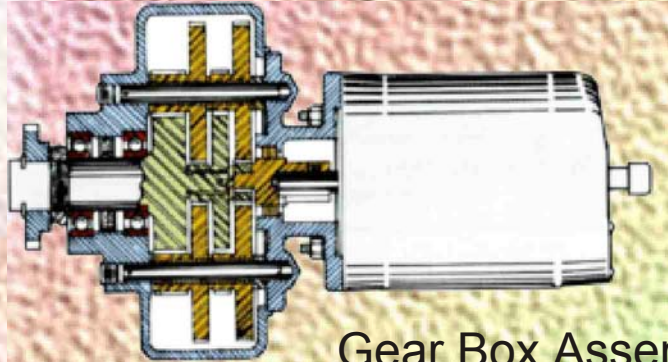
Nozzle Head



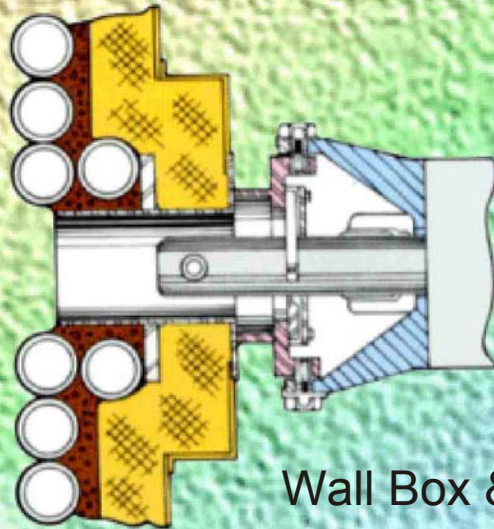
Nozzle Head

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LRS IE Electric Long Retractable Soot Blower



Gear Box Assembly



Wall Box & Seal Box

All particles of soot and slag are stripped off the lance as it retracts by a hardened-steel scraper plate adjacent to the boiler wall. This two-piece plate is easily replaced by removing only its retainer.

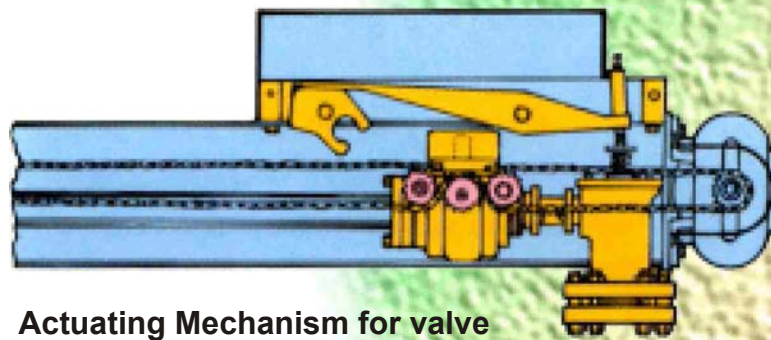
Two 90-degree nozzles are standard. Other arrangements are virtually unlimited. Nozzle inserts are made out of stainless steel, with shape and diameter designed for each job. Drain holes are provided in nozzle head when blowing medium is steam. Where tube banks are closely spaced, opposed right-angle nozzles are used to obtain this effective cleaning pattern with no obstruction of tubes.

Contd...

LRS IE Electric Long Retractable Soot Blower

Hardened stainless steel cartridge packing gland is easy to maintain. Cam and valve lever shaft require no lubrication. Nozzle pressure can be precisely adjusted even while blowing, by means of the screw on top of the valve.

LRS IE Long Retractable Soot Blowers are also available with air operated motors and flame-proof electric motors.



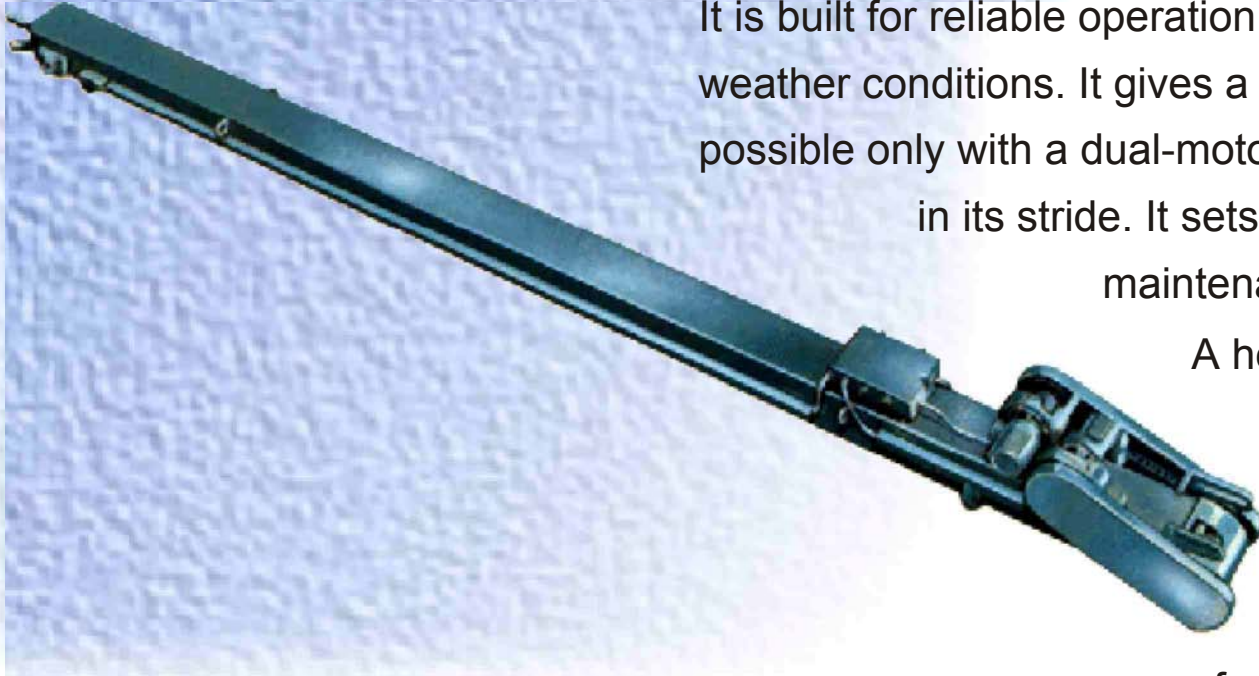
Actuating Mechanism for valve

LRD IE Electric Long Retractable Soot Blower

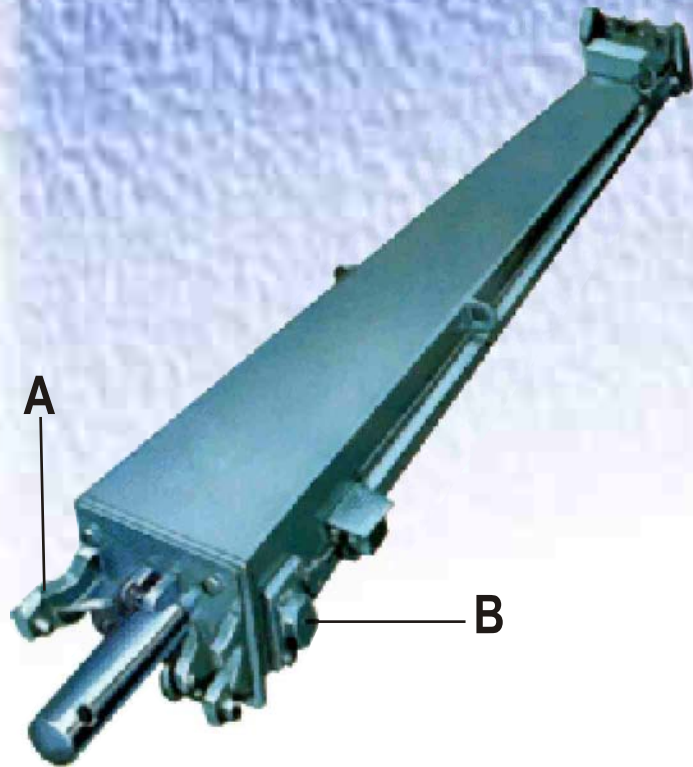
The electrically-operated LRD IE Long Retractable Soot Blower is designed for a wide range of travel - from 0.8 m. to 7.6 m. It is built for reliable operation, indoors or outdoors, in all weather conditions. It gives a thorough cleaning of all heating surfaces possible only with a dual-motor drive. It takes the toughest jobs in its stride. It sets new standards for easy, low cost maintenance.

A heavy-gauge steel housing protects all working parts from damage caused by an outside source. The housing is so rugged that inspection cat-walks can hang from it. This cuts installation costs.

Contd...



LRD IE Electric Long Retractable Soot Blower

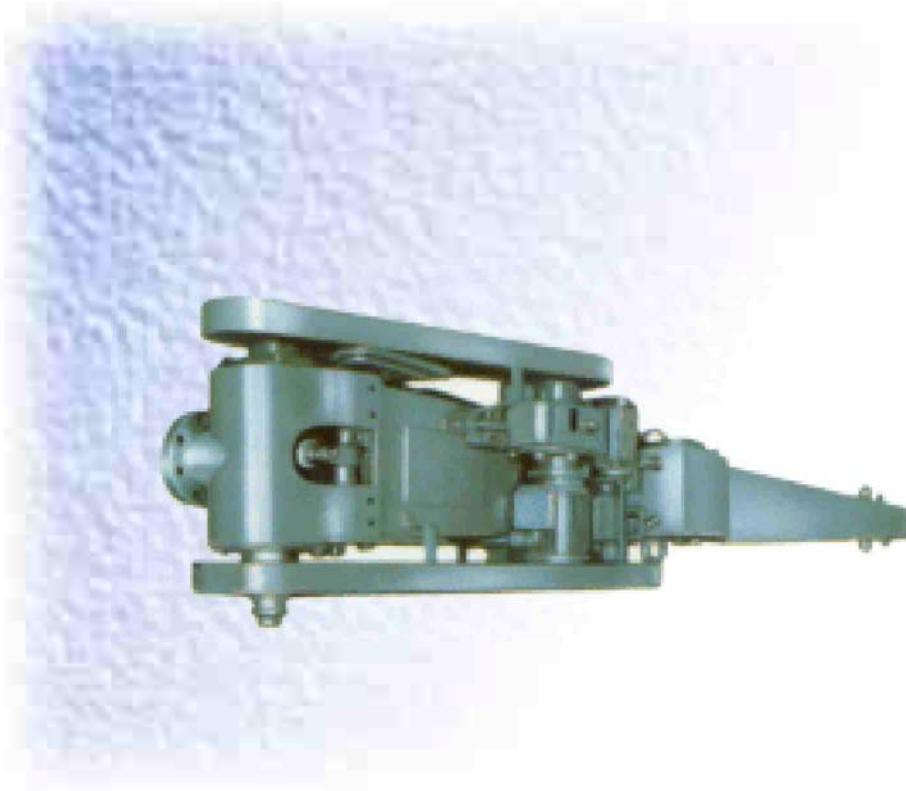


Normally, superheated steam or dry compressed air is used as a blowing medium. Blowing with saturated steam is always associated with the danger of water particles hitting the heat transfer surfaces, resulting in possible erosion, unless perfect dryness is maintained at blower inlet. Outside adjustment of nozzle pressure, which may be from 10 to 30 kg./sq cm., is made possible by the mechanically-operated head of the Long Retractable Soot Blower.

The LRD IE has a dual electric-motor drive. One motor moves the lance into and out of the boiler. The other rotates it, always in the same direction. Rotation is continuous from the moment the lance starts to extend until retraction is completed. With no step-stop action at the end of the travel into the boiler, the two jets always return over a different path than that taken while the lance was extending. This means optimum cleaning.

Contd...

LRD IE Electric Long Retractable Soot Blower

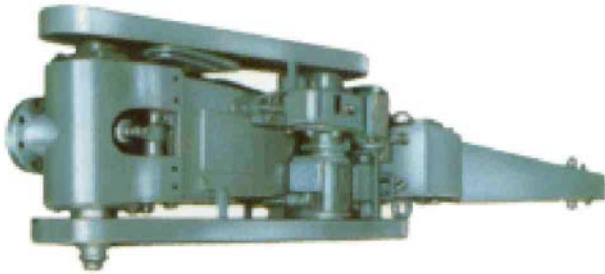


The lance is moved and directed by the travelling carriage. The connection between these two components is flanged. The lance always rotates in the same direction. The carriage has no operating unit that can be affected by temperature. Motors, high speed gear trains and controls are anchored away from the path of the blowing medium.

The stainless steel feed pipe is ground and polished to prevent binding and wear as the carriage slides along it - even with blowing steam at 427°C.

Contd...

LRD IE Electric Long Retractable Soot Blower



The feed pipe and lance have no hidden, inaccessible parts which might clog or corrode, or retard travel of the blowing medium. The single stuffing box is exposed and easily repacked.

Electric drives developed for the LRD IE give clean, powerful, quiet operation with precise speed control. They require minimum maintenance, whether installed indoors or outdoors. Both are enclosed in rugged housings for positive protection.

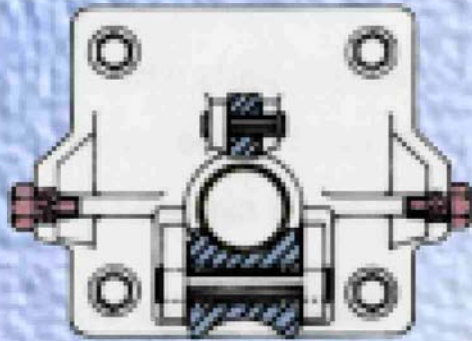
The motors are built specially for BHEL. They are totally enclosed, heavy-duty, 3-phase moisture-resistant type weather-proof with high constant torque.

Where blowing-medium capacity is a problem, a 2-speed traversing motor may be used to cut total operating cycle by as much as 25 per cent and thus save up to 25 per cent of the blowing medium.

Contd...

LRD IE Electric Long Retractable Soot Blower

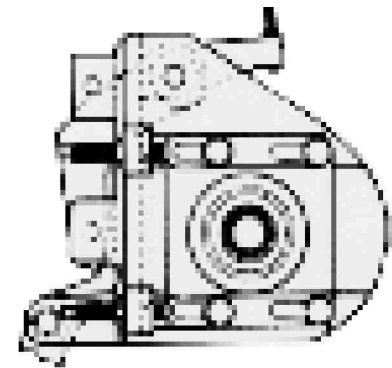
With a 2-speed motor, the lance can extend or retract twice as fast as it moves in the opposite direction, without significant effect on the speed of rotation. This is possible only with a Long Retractable Soot Blower having dual-motor drive.



Bearing & Yoke Plate

A bearing and yoke (A) support and guide the lance. This yoke provides the only boiler-end mounting needed. Power packs are in normal position. Either may be relocated to avoid obstructions or high ambient temperatures. Chain drives are housed for protection.

Idler ends of the chain (B) are also housed for protection. Flange connection to blowing-medium supply line conforms to ANSI standards. Removable plates on top and sides of the housing give easy access to the travelling carriage for inspection and maintenance.



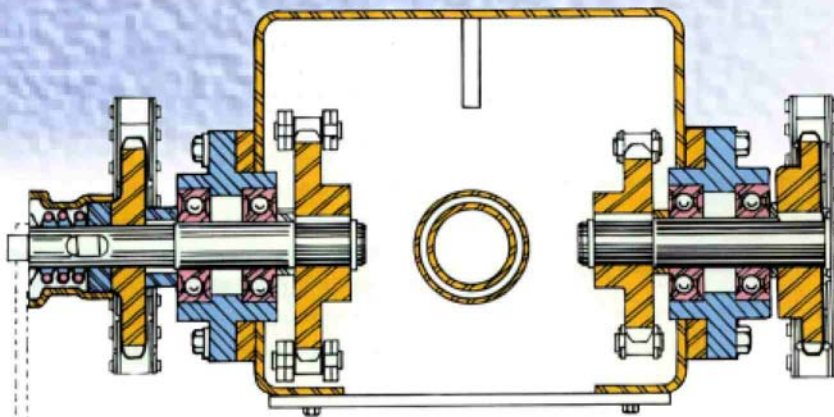
Chain Tightening mechanism

Contd...

LRD IE Electric Long Retractable Soot Blower

Lower-roller, hour-glass for maximum guidance, is hardened to support heavy overhanging load as the lance extends. The bushings, designed for high temperatures and thrust loading are sealed and needs no lubrication. Upper roller prevents lance play. Standard swivel mount is the only support needed at the boiler-end of the Long Retractable Soot Blower.

Chain tightening Mechanism



Jackshaft Sprocket

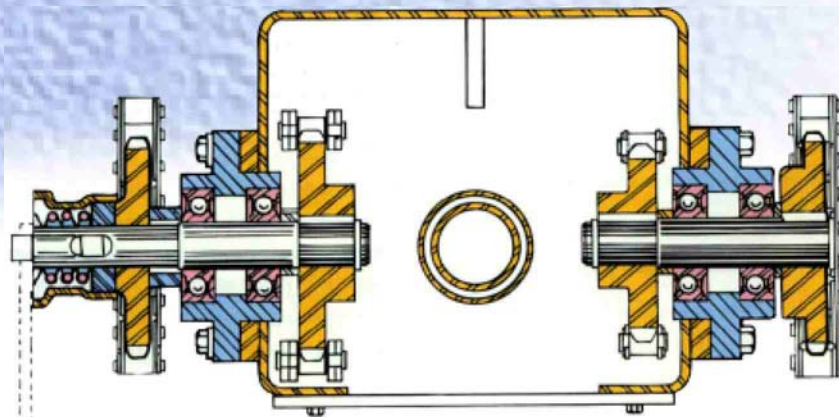
Each chain drive is pre-stretched to minimise possibility of stretching while in service. Should chain tension ever need adjustment, this tightener permits it to be done externally, even while the soot blower is operating.

Contd...

LRD IE Electric Long Retractable Soot Blower

Applied power of the external rotating and traversing motor is transmitted through the housing to the travelling carriage gear box by jack shafts. These shafts are designed for friction-free operation and built to withstand the most rigorous service conditions. The sprockets for either rotating or traversing drives may be changed to vary speeds from normal. (Ball bearing supports are pre-lubricated and sealed.) Lance may be extended or retracted manually by means of the crank, shown dotted, for test or maintenance purposes. Traversing motor drive is then disengaged by the clutch normally held in place by a spring.

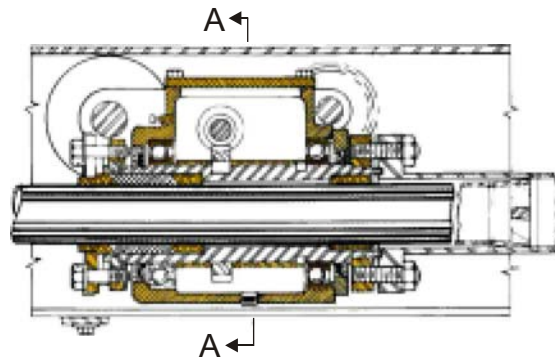
Chain tightening Mechanism



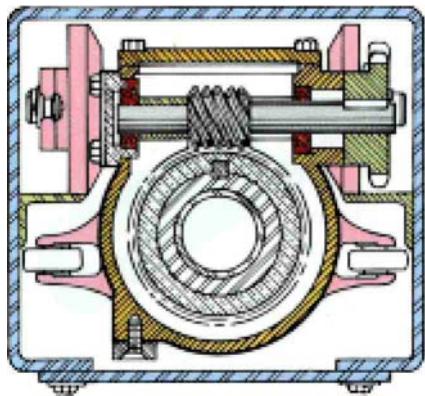
Jackshaft Sprocket

Contd...

LRD IE Electric Long Retractable Soot Blower



Travelling Carriage



Section AA

Travelling carriage - driven by flexible removable-link chains to avoid troublesome drive shafts, racks and pinions - rotates and directs the lance. Dual side-roller support eliminates carriage swing, increases load capacity. High-speed gear trains and controls are away from the hot boiler wall and path of the blowing medium. Diffuser head on end of feed pipe forces blowing medium against inside surface of the lance, greatly increasing heat transfer so that less blowing medium is needed to cool the lance.

Positive mechanical action of rugged cam and linkage opens and locks blowing medium valve as the lance extends, closes it as the lance retracts. All pins resist corrosion. Blowing adjustment bar permits delaying or accelerating valve opening in relation to start of the lance travel.

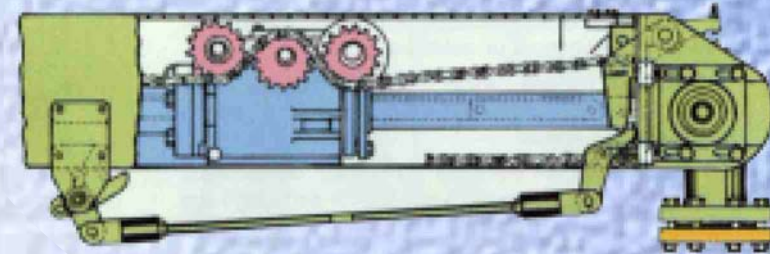
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LRD IE Electric Long Retractable Soot Blower

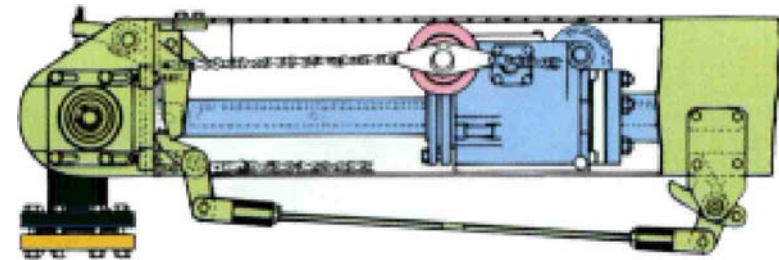
The travelling carriage is extended and retracted by a rugged chain drive of simple design. Its durability adds to the dependable performance of the long retractables.

LRD IE Long Retractable Soot Blowers are also available with air operated motors and flame-proof electric motors.

These Blowers are suitable for both pressurised and non-pressurised furnaces, with suitable wall sleeves. Blowers required for Chemical Recovery Boilers shall be with steam purging arrangement. Blowers required for hazardous areas for refinery applications shall have explosion proof electrical parts (i.e. Motors, Limit Switches and Control Boxes.)



Valve operating Mechanism



LRD IIE Electric Long Retractable Soot Blower



The LRD IIE Electric Long Retractable Soot Blower with proven dependability in utility service, can be used for a wide range of travel - from 7.7 m to 12.2 m. Built to withstand the severest requirements of outdoor installations in all weather conditions, it takes the toughest jobs in its stride - setting new standards for effective cleaning and trouble-free operation.

SALIENT FEATURES

Thorough cleaning of all heating surfaces, as is possible only with dual-motor drive.

Mechanically-actuated head, permitting outside adjustment of nozzle pressure while blowing.

Blowing with steam or air, or any combination of fluids.

Contd...

LRD IIE Electric Long Retractable Soot Blower

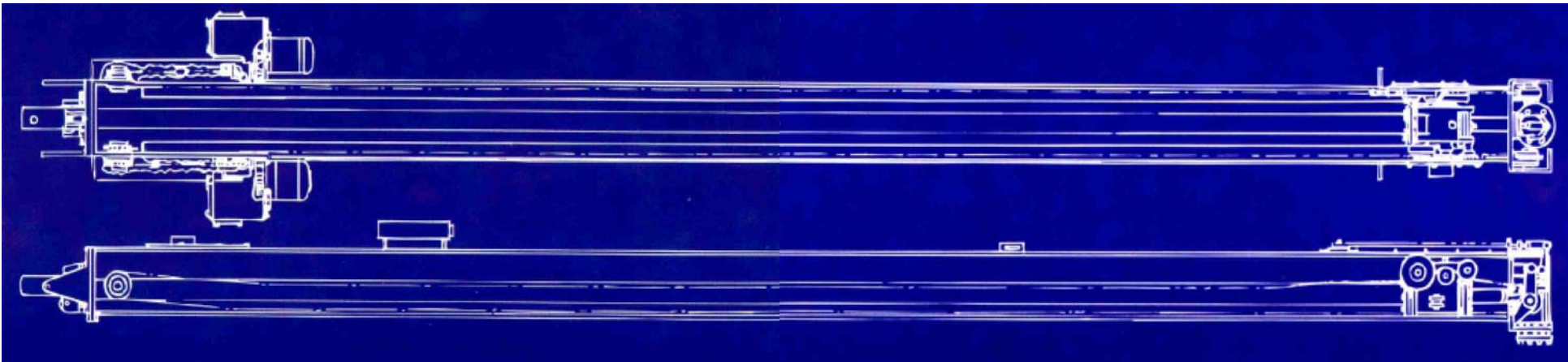
Enclosed structure, protecting all working parts from damage caused by any outside source - so rugged that inspection cat-walks can hang from the soot blower housing itself, thus cutting installation costs.

Electric drive, for cleaner, more powerful, quieter operation with better speed control; for lower maintenance; indoors or outdoors.

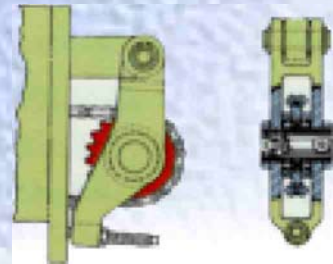
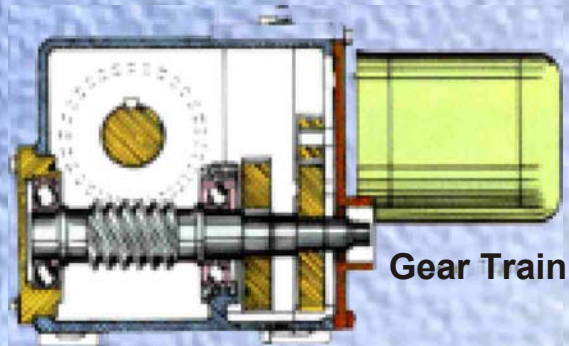
Another feature - either motor may be mounted at any of the several points along the housing, as needed to clear interferences.

Simplicity of working parts, for dependable operation with a minimum of outages for servicing - no hidden indexing or timing devices. No lubrication fittings.

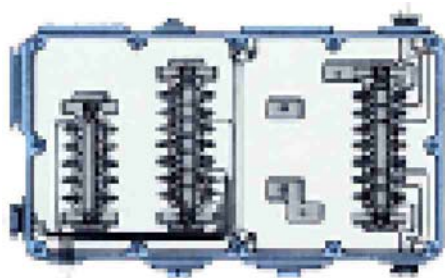
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LRD IIE Electric Long Retractable Soot Blower



Chain Tightening Mechanism



Junction Box

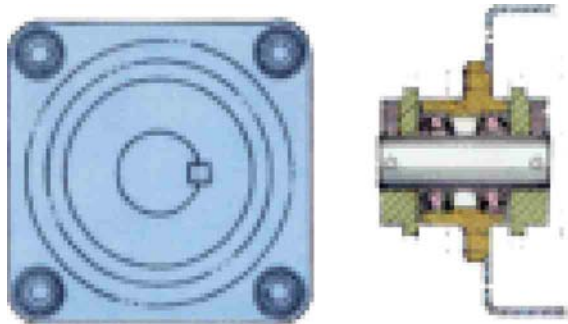
Gear train safely carries maximum torque and thrust forces on lengthy travels. Inside contour of gear box and design of gears (each material best suited for its service) approved by gear-oil manufacturers for proper distribution of lubricant to all working parts, indoors or outdoors. All parts are easily accessible.

Each chain is pre-stretched to minimise possibility of stretching while in service. This tightener provides a simple external adjustment of the chain tension, should this ever be necessary, even while the LRD IIE is in operation.

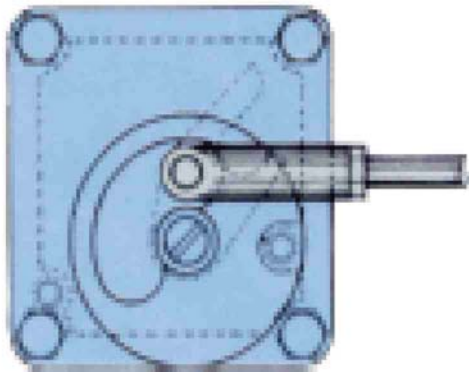
Applied power of the external traversing and rotating motors is transmitted through the soot blower housing to travelling carriage gear box by jack shafts. They are designed for friction-free operation and built to withstand the most rigorous service conditions.

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LRD IIE Electric Long Retractable Soot Blower



Jackshaft Sprocket



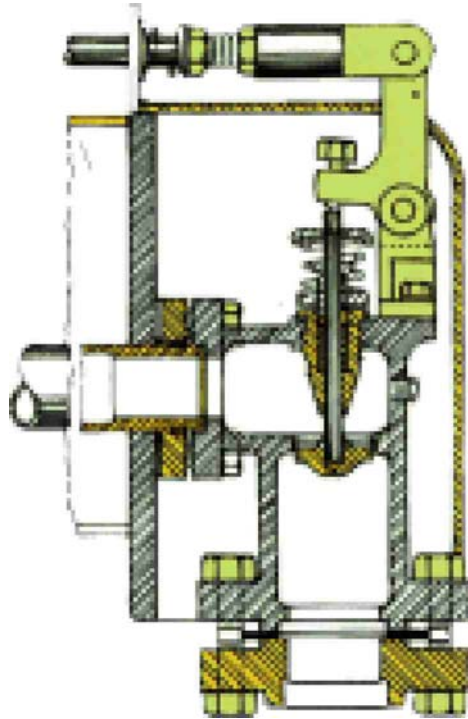
Valve Operating Mechanism

The rugged cam gives positive mechanical action to open and lock blowing-medium control valve as the lance extends, and to close it as the lance retracts. Set screw provides simple external adjustment of nozzle pressure while blowing.

Barriered terminal-strip junction box saves time and money in field-wiring. The LRD IIE motors and switches are wired to the junction box with insulated aluminium sheathed cable. Dust and moisture-proof case protects connections from fouling or other damage.

Contd...

LRD IIE Electric Long Retractable Soot Blower



Valve is direct-acting. Hardened stainless steel cartridge packing gland is easily accessible for maintenance. No internal threads.

Better Cleaning, Lower Maintenance

The LRD has one electric motor to move the lance in and out, a second to rotate it - always in the same direction. With no step-stop action at the end of travel, repeated cycles give an infinite number of double-helix patterns.

This minimises danger of tube cutting or erosion and ensures uniform cleaning of all surfaces. Low rotating speed increases range and penetration of cleaning, decreases wear, eliminates whip and permits proper cleaning with faster traversing speeds. Rotating and traversing speeds may be adjusted independently by speed-change gears or sprockets.

Contd...

LRD IIE Electric Long Retractable Soot Blower

Lance and feed pipe have no inaccessible parts to clog, corrode or retard blowing-medium travel. Both are flanged for easy maintenance. Feed pipe is ground and polished stainless steel to prevent binding and wear from carriage movement. Single exposed stuffing box is easily repacked.

Self-cleaning, low friction BHEL chain drive needs no lubrication, and is easy to inspect and maintain. No auxiliary carriage is needed or used. Method of support - never more than two points - is tailored to the needs of each installation.

Both electric motors are stationary, away from hot furnace gases. Custom built for BHEL they are totally enclosed, non-ventilated, 3-phase, heavy-duty hoist type with special boiler room insulation and protection against internal corrosion.

Contd...

Long Retractable Non-Rotating Soot Blower

LRNR

Electric Long Retractable Non-Rotating Soot Blower

The BHEL LRNR Soot Blower is based on the design of the Electric Long Retractable Soot Blower but without the rotary motion of the lance. All the advantages of the long retractable blower are included in this, such as heavy gauge housing, stationary motor, stainless steel feed pipe, efficient and reliable chain drive, simplified gear boxes, external pressure adjustment etc. This blower is useful for cleaning regenerative air heaters or tubular air heaters. Based on the use, the nozzle arrangement may vary with either a twin nozzle head or with a multiple nozzle mass blowing element arm. The BHEL LRNR Soot Blowers have been supplied to various customers in India.

Contd...

SERVICES

BHEL services starts at the drawing board. Each Blower location is selected for optimum cleaning. Each lance, a chrome-molybdenum-vanadium alloy, has nozzles individually designed for the tube layout.

Each installation is inspected by a factory-trained service engineer who also instructs plant personnel in proper preventive maintenance.

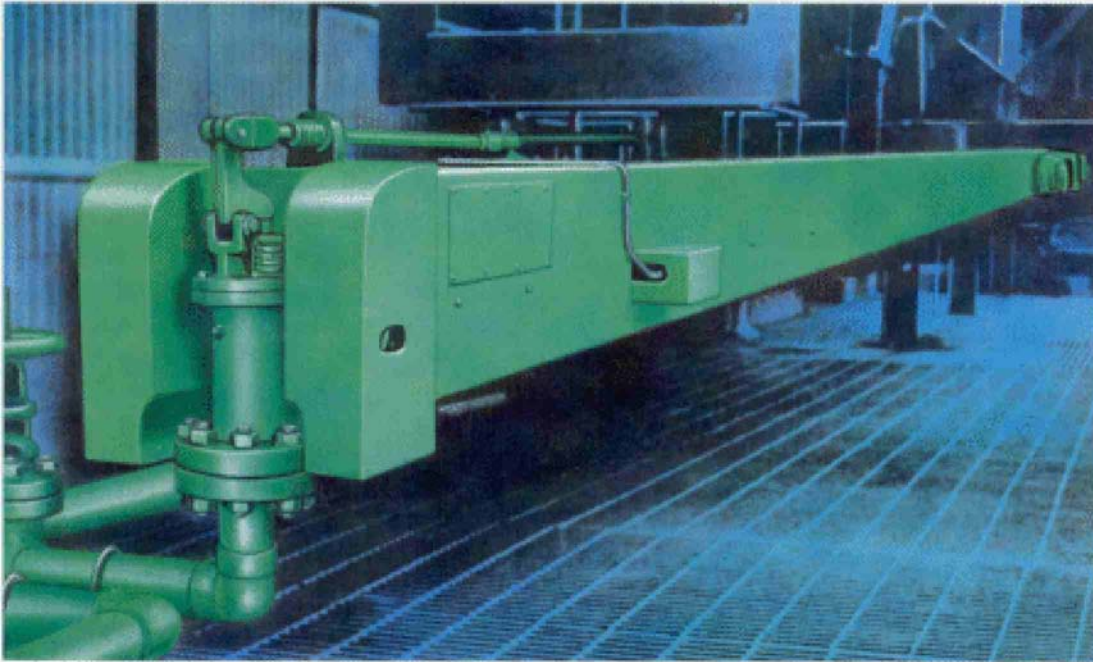
Soot Blower Control System

The soot blower starter-cum-control panel can be offered for sequential operation of soot blowers. The panel houses starter components and relays for sequential logic

implementation. Facilities for remote-manual operation, sequential operation and bypass of any blower are provided. Ordinary weather-proof design or flame-proof/pressurised versions can be offered to suit customers' needs.

For smaller number of blowers, local starter boxes/starter panels can be offered for a cost-effective system.

For large number of blowers, separate control panel (relay logic, solid state or microprocessor based) and motor control centre can be offered to customer specifications.



Typical installation of LRD II E
on one of the 500 MW units

Allied Products



WALL DESLAGGER

Travel : 305 mm

Blowing

Medium : Steam/Compressed air

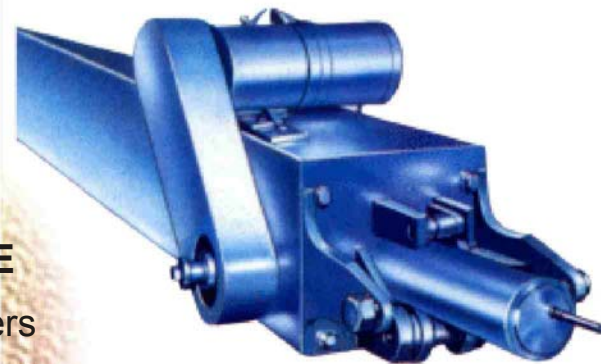
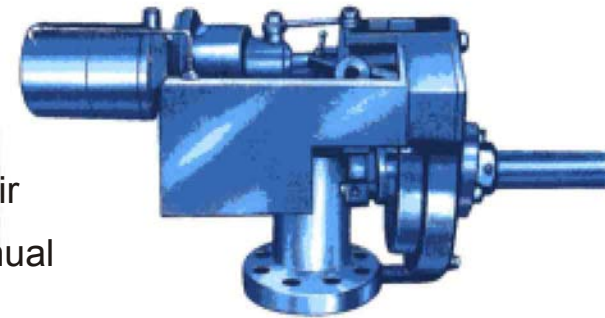
Drive : Electric motor

ROTARY SOOT BLOWER

Blowing

Medium : Steam/Compressed air

Drive : Electric/Air Motor/Manual



TEMPERATURE PROBE

Travel upto : 12.2 Meters

Models : Air Cooled/Non Cooled

Max. Temp.

Measurement : 815°C with air cooling &
538°C without air cooling

Drive : Electric Motor

Technical Specifications for Soot Blowers

(To be furnished by customer)

I BOILER DETAILS

01. Customer : Project :
02. Type of boiler/heater :
03. Boiler dimension : Width : Breadth :
04. Furnace pressure : Positive/Negative
05. Fuel fired : Coal/Oil/Gas/Others (pl. specify)
06. Fuel Analysis :
C % S % H % V ppm Na ppm Ash %
07. Ash characteristics/Constitutents :
Initial deformation temp. °C softening temp. °C Hemispherical temp. °C Fluid temp °C
08. Flue gas temp. °C (1) (2) (3) (4) (5)
(at SB locations)

Contd...

Technical Specifications for Soot Blowers

(To be furnished by customer)

- 09. Blowing medium : Steam/Air
- 10. Blowing medium available : (at SB valve inlet)
Pr. Kg/Cm². T °C Flow Kg/hr.
- 11. Power/control supply :
V 3 Ph Hz/V Hz
- 12. Ref. drg. enclosed :
- 13. Seal/purge air required : Yes/No
- 14. Area classification : Hazardous/Non-hazardous (Specify Gas Group)

II SOOT BLOWER

Long retractable Nos. Rotary blower Nos. Operation mode : Air⁺ / Electric / Manual **

**For Rotary Blower only

⁺5 to 7 Kg/cm² air required at Soot Blower inlet for Air Motor.

Contd...

Technical Specifications For Soot Blowers

(To be furnished by customer)

III CONTROL DESIRED

Local/Remote Manual/Auto sequential

Local Push button : Required/Not Required

IV OTHER REQUIREMENTS : REF. ANNEXURE 1

(to be furnished by customer)

V ENGG. INFORMATION

(Ref. Annexure 1)

SIGNATURE

NOTE

Drawings indicating furnace dimensions, soot blower locations, coil arrangement, seal box dimension/insulation/setting details at soot blower locations are to be enclosed along with the enquiry. Furnishing of the above required details will enable BHEL to select proper soot blowing equipment best suited to customers' cleaning requirements.

Engineering Information Required for Soot Blowers

ANNEXURE 1

01. Cross-sectional arrangement of boiler.
02. Width between side wall tubes and width between side walls if there are no wall tubes.
03. All boiler, SH, RH, and Eco. tube sizes, pitching and their positions relative to one another.
04. Positions and dimensions of all baffles and kick tiles.
05. Soot blower locations related to pressure parts.
06. Wall construction local to soot blower and total wall and casing thickness. Pay special attention to out-of-line tubes or change in wall sections.
07. Method of supporting from boiler, i.e., from boiler tubes or casing.
08. Expansion of tubes being cleaned and the tubes from which the soot blowers are supported.

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Engineering Information Required for Soot Blowers

ANNEXURE 1

09. Expansion of casings and refractories.
10. Steam and pipe work drawing.
11. Distance between Boiler Centres.
12. Distance between casings and any external obstructions immediately to the rear of soot blowers.
13. Can elements of rotary blower be erected in one length or do they require splitting and socketing.
14. Type of element supports for rotary blowers.

NOTE

In all cases the mounting plate should be fastened to vertical or horizontal steel work members, such that the position of mounting plate relative to the side wall tubes or side wall is constant under all conditions. This is absolutely imperative in the case of short retractable soot blower used for cleaning wall tubes.