

USX RETRACTABLE SOOT BLOWER DESCRIPTION

The Utility Service Extra Heavy (USX) Sootblower is a long retractable sootblower designed for the cleaning of boiler heating surfaces requiring extended travels of greater than 35' in length. The model USX Sootblower uses the potential energy in the blowing medium (steam or air) and transforms it almost completely into kinetic energy by means of venturii nozzles. The extra large cross flow sections in the lance and feed tube avoids high-pressure drop inside the sootblower and minimizes noise emissions.

All components of the USX Sootblower are built for trouble free operation and are designed to meet extra heavy duty applications found in some utility boiler or similar applications.

Normal travel speed is 106"/min. An optional hi speed gearbox is available at a travel speed of 136"/min. The unit may be mounted vertically or horizontally. When mounted vertically, a brake is required.

The blowing element of the model USX sootblower is the lance tube with two opposing venturii nozzles arranged at the front end. The lance tube is helically inserted into the flue gas pass, and then returned to the rest position by means of the gear-motor driven carriage. Thereby the two blowing jets ensure a full cleaning coverage along the entire blowing distance. The blowing medium is fed to the lance tube via the poppet valve and the fixed feed tube. The poppet valve is mechanically opened once the venturii have passed into the boiler and then closes before they reach the boiler wall while returning to the rest position. To improve the cleaning effect and to reduce erosions, the sootblower

is retracted on a different helical path ("indexed") each time the blower is operated.

Because the lance tube is fully retracted from the furnace and cooled through the blowing medium, the long retractable sootblower can be used in areas with higher flue gas temperature than any other sootblower type. However, it is important that the blower design conditions are being met at all times and that proper cooling is maintained.

The cleaning effect of the Sootblower depends generally on the following:

- a. Size of the venturii being used as determined by the inside diameters of the venturii.
- b. Pressure of the blowing medium in front of the venturii.
- c. Distance between the location of the venturii and the boiler tube.
- d. Type of contamination (slagging or fouling conditions, etc.)

The blowing pressure of the USX Sootblower has to be carefully monitored to prevent insufficient cleaning (blowing pressure probably too low!) and to avoid excessive erosions on boiler tubes (blowing pressure probably too high!). With steam being used, it is very important to properly design and operate the steam supply to avoid condensate blowing, which could cause severe damage to boiler and sootblower.

It is important that all safety precautions be strictly enforced, as advised later in this manual, to avoid injuries and damages. The

USX RETRACTABLE SOOT BLOWER DESCRIPTION

steam supply and the electrical supply must be shut down before any maintenance or repair work is performed on any sootblower components.

The housing is a 5/16" heavy-duty formed steel canopy that provides rigid support and protection for the blower components. The design of the USX sootblower intentionally gives easy access to all parts that require regular maintenance or repair work. Square rails and angles with bolt-on style gear racks are attached to both sides of the canopy to provide support to the blower carriage, and a means for the carriage to travel the length of the canopy. A removable top cover at the rest position allows replacement of the gearbox or motor through the top of the canopy while leaving the spindle housing, lance and feed tube, and poppet valve, in place.

The blower carriage consists of two separate components: the lower spindle housing and the upper gearbox/motor. Thus, excessive heat transfer from the hot spindle housing to the blower gearbox is avoided and lubricant leakage is minimized.

The electric motor is mounted directly to the front of the gearbox using a standard C frame adapter. The rear of the gearbox has two output drive shafts; one for lance rotation and one for an emergency retract tool. Each side of the gearbox has guide rollers on a vertical and horizontal plain, which guide the blower carriage down the length of the canopy on rails. There are support rollers and drive pinion mounted on either side of the gearbox on the main output shaft resulting in a dual rack and pinion drive system.

The USX Sootblower lance tube is designed to meet the specific requirements of each

application. The standard lance sizes can be 3.5"; 4" and 5" O.D. with full penetration welded flanges for a safe connection to the spindle.

The fixed feed tube ensures proper packing sealing while the lance tube is inserting or retracting. The feed tube is connected to the poppet valve via an easily removable split ring and a clamp plate. The standard feed tube is 304 stainless steel, 2.75" O.D.

The blowing medium is delivered to the feed and lance tube through a poppet valve, which has a standard ANSI 600# R.F. flange. The flange on the poppet valve is connected to the blowing medium supply piping. The valve stem is sealed off by means of pure graphite valve stem packing. A matching set of cone, stem, seat and packing is available for replacement and readily assembled for installation.

When the blower carriage starts inserting, the poppet valve is opened via the valve latch and arm assembly, and closed again on the return travel. The opening forces are well centered due to the dual linkage support system. The switching travel is adjustable to suit the actual requirements by relocating the trip pin in the trip bar. The valve control location is easily accessible for adjustments and maintenance work.

The pressure from the supply line can be independently adjusted with respect to the valve opening via the pressure control disc. The model USX comes standard with the externally adjustable poppet valve.

Depending on the furnace pressure conditions, two types of wallboxes are available:

USX RETRACTABLE SOOT BLOWER DESCRIPTION

- a. A negative pressure wallbox is supplied for furnaces with a reliable negative gas pressure condition. A spring loaded floating plate seals the boiler opening sufficiently and still provides proper lance tube clearance.
- b. For positive flue gas conditions a positive pressure wallbox with sealing air connection is recommended to avoid gas leaks from the sootblower wall openings. This wallbox also has a connection for steam purge to clean the wall sleeve and scavenging air to pressurize the lance and feed tube when not in operation.

The rear of the sootblower has a slotted plate that is used to support the back of the sootblower. A pin is inserted through two hanger rods and the slotted plates to support the rear of the sootblower. With the pivot pins at the front of the sootblower and the solid support point at the back, the sootblower effectively an boiler movement the may occur due to thermal expansion.

The USX Sootblowers travel is constrained by two limit switches, one at the rest and one at the reverse position. An adjustable trip lever bolted on the spindle housing activates these limit switches.

The electric motor power for the blower carriage drive is supplied through a four wire S.O. cable that is guided by the E-chain trailing device.

The limit switches and motor power supply can be accessed in an electrical box that is mounted to the side of the sootblower housing. These boxes have insert and retract local push buttons and can also have power/control voltage disconnects. The motor starters are sometimes mounted in these boxes also.

The USX sootblower is supplied with a lance and feed tube support. The requirement for this is based on the longer travel length required. This device is supplied to give support to the lance tube when the sootblower is in the rest position; thereby preventing deformation of the lance from cooling after it has retracted from the boiler. This device also gives support to the feed tube when the lance is fully extended, also preventing deformation of the feed tube.

This device is actuated using a cam mounted to the feed tube support weldment. There is an actuation lever between the feed tube support weldment and the lance tube axle weldment that rotates these two components to the proper orientation. When the sootblower is in the rest position the lance support assembly is supporting the lance. As the sootblower travels into the boiler a trip pin mounted to the carriage will come into contact with and rotate the cam mounted to the feed tube support weldment. By linear travel of the sootblower this cam will be rotated. This action will rotate the feed tube support assembly up into place while at the same time rotate the lance tube support assembly down out of place. The opposite will take place when the sootblower retracts out of the boiler.

The USX sootblower is supplied with front support roller assemblies that incorporate droop correction. This assembly supports the weight of the sootblower lance tube while also allowing for linear travel and rotary motion. This front plate assembly is a combination of two plates (Fixed Front Plate and Adjustable Front Plate). The fixed front plate is welded to the sootblower housing. The adjustable front plate is bolted to the fixed front plate. The adjustable front plate has multiple functions. It has the ability to

USX RETRACTABLE SOOT BLOWER DESCRIPTION

adjust for droop correction of the lance tube
as well as having a pivoting roller assembly

to account for any angling of the lance tube
as a result of droop correction.

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Housing	-	5/16" Thick Cold Rolled Steel
Motor	-	2 H.P. (230/460V, 3 phase, 60 Hz, 1800 RPM), TEFC
Lance	-	3.5"/4"/5" O.D. Alloy – T11 Standard 4130, 17-22sa or Stainless for higher Temp. Applications
Nozzle Indexing	-	Through Timer in PLC or Local Enclosure.
Feed Tube	-	Type 304 Stainless Steel
Nozzle Head	-	Type 310 Stainless Steel
Valve		
Body	-	Carbon Steel, ASTM A216 Grade WCB or Alloy, ASTM A217 Grade WC6
Plug	-	Type 440 Stainless Steel
Seat	-	Type 416 Stainless Steel
Lance Rotation Chain	-	RC-60H 3/4" Pitch
Side Bars	-	Straight Bar, Nickel Plated
Bushings	-	Type 410 Stainless Steel
Rollers	-	Nickel Plated
Pins	-	Type 420 Stainless Steel
Limit Switches	-	Heavy Duty, NEMA 4 – Other Options Available
Electrical Box	-	NEMA 4 Standard – Other Options Available
Components	-	Terminal Strips and Insert/Retract Pushbuttons
Options Include	-	Integrally Mounted Motor Starter Cabinets
Wiring – Box		
Conductor	-	16 AWG for Power - 16 or 18 AWG for Control
Insulation	-	(THHN) or (MTW) 90°C Rated
Sheath	-	Stranded Copper
Wiring – Cable		
Cable Sheath	-	Stranded Copper
Wiring	-	3 & 5 Conductor NEC type MC, 14 AWG Stranded (Class B) annealed copper, 90°C, 600V, flame-retardant.

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- Lubrication
 - Spindle Bearings – CBI Grease
 - Gearbox – CBI Oil - Chain/Rack – CBI Spray
- Coating
 - Galvanized as Standard
 - Primer Base with Acrylic or Enamel Paint as Option
 - Color: Standard Blue (Any Color Available as Option)

