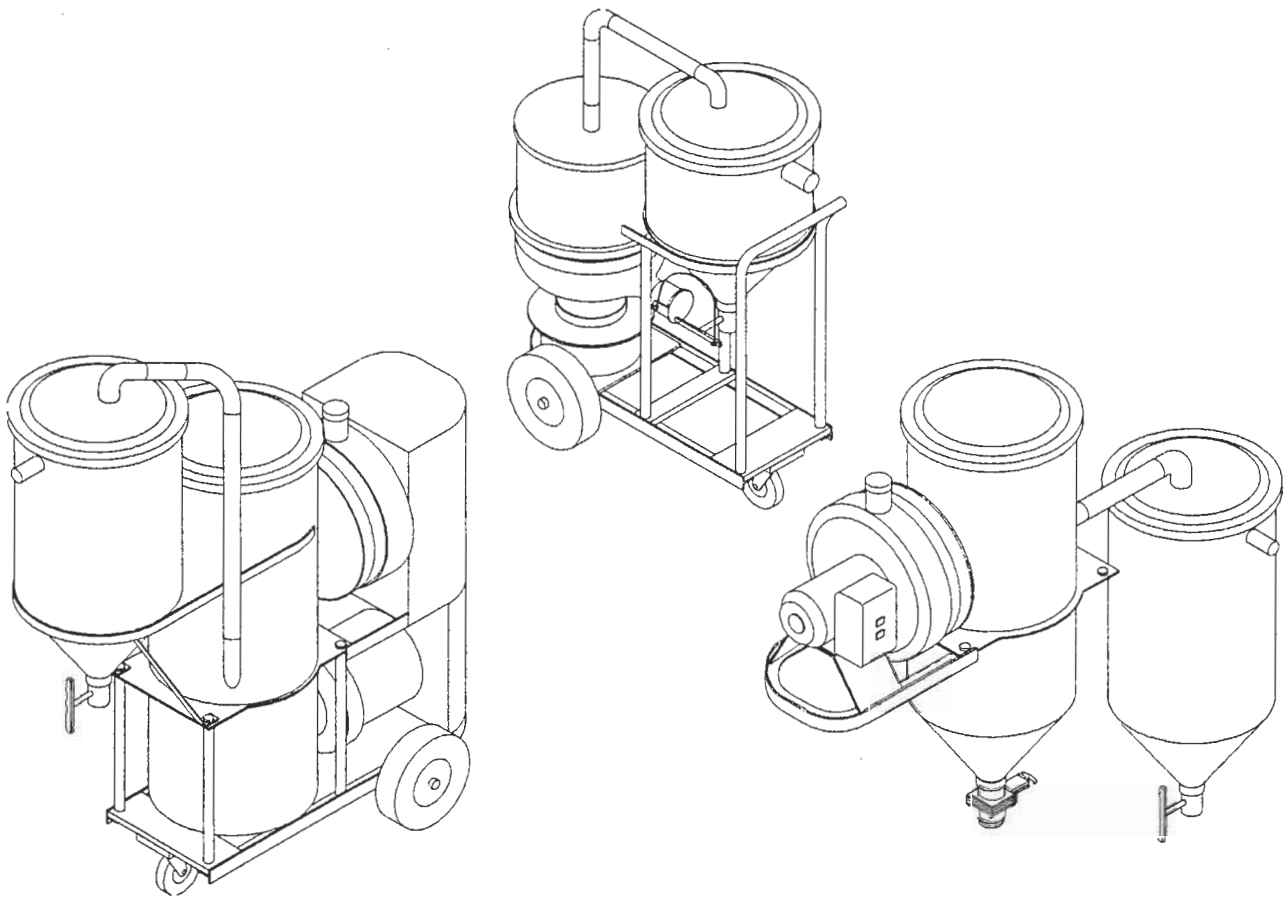


IN VINCIBLE[®]

AirFlow Systems



FLUX RECOVERY SYSTEM

OPERATIONS AND MAINTENANCE MANUAL

600 N. RAY ST., BALTIC, OHIO 43804

PHONE: 330-897-3200

FAX: 330-897-3400

TOLL FREE: 800-282-6999

TABLE OF CONTENTS

I..GENERAL INSTRUCTIONS.....	1-4
A.RECEIVING INSTRUCTIONS	
B. HANDLING INSTRUCTIONS	
C.GENERAL CAUTIONS	
D. INSTALLATION	
1.PIPING	
2.MOTOR	
II..OPERATION.....	5
A. PRE-START-UP	
B.OPERATION	
III..MACHINE.MAINTENANCE.....	6-7
A. LUBRICATION	
B.FILTER BAG REPLACEMENT	
IV..CONTINUOUS.FLOW.SYSTEM.....	8-10
A.MOUNTING INSTRUCTIONS	
B.MAINTENANCE	
APPENDIX A.....	MACHINE WARRANTY
APPENDIX B.....	TROUBLESHOOTING YOUR SYSTEM

I. GENERAL INSTRUCTIONS

A. RECEIVING INSTRUCTIONS:

All equipment should be inspected carefully upon receipt to insure that the equipment was not damaged in transit and that all items on the packing list were received.

All damages or shortages should be noted on the Bill of Lading. The purchaser should take steps

immediately to file reports and damage claims with the carrier.

It is the policy of Invincible AirFlow Systems to ship F.O.B. Shipping Point, ownership of all goods passes to the purchaser when they are loaded and accepted by the carrier. Any claims for in-transit damage or shortage must be brought against the carrier by the purchaser. In the event that a claim is filed, please contact Invincible AirFlow Systems immediately.

B. HANDLING INSTRUCTIONS:

The handling of equipment manufactured by Invincible AirFlow Systems is the responsibility of the user, and should be performed by personnel experienced in handling heavy machinery.

-Move equipment by lifting from beneath frame with forklift.

-DO NOT lift equipment with the eyebolt on the motor. This eyebolt is meant to support the weight of the motor ONLY.

-DO NOT drop or jar equipment.

-DO NOT allow foreign material to enter blower/exhauster.

NOTE: Each blower/exhauster is carefully balanced, the shaft aligned and the machine tested at our factory. It is

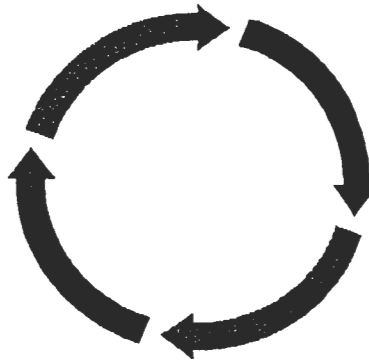
essential that the unit be handled with care during installation to assure satisfactory performance.

-KEEP HANDS, CLOTHING AND ALL FOREIGN OBJECTS AWAY FROM MACHINE WHILE OPERATING.

C. GENERAL CAUTIONS:

-This is not a material handling fan. All separation and filtration must precede the Invincible machine - CLEAN AIR ONLY.

-Rotation: The Invincible machine is designed to run in only one direction. The unit must rotate in the direction indicated on the side of the machine. Refer to decals on machine for proper rotation.



-Invincible blowers/exhausters should be used with filtration devices manufactured or certified by Invincible AirFlow Systems only. Failure to do so may invalidate machine warranty.

-Dismantling the blower/exhauster without written authorization from Invincible AirFlow Systems, will invalidate the machine warranty.

blower/exhauster, remove the flange covers and shipping tags and connect the blower/exhauster following these simple rules:

-The piping should be properly sized and supported independently of the blower/exhauster. Contact your Invincible AirFlow Systems' representative for proper piping procedures.

-DO NOT install rigid connections between piping system and blower/exhauster. Resilient connections are available and may be purchased from your Invincible AirFlow Systems' representative.

D. INSTALLATION:

1. PIPING

To prevent damage to your Invincible AirFlow Systems -DO NOT bolt blower/exhauster rigidly to a surface. Excessive tightening could cause frame to

distort and create shaft misalignment.

WARNING: DO NOT allow foreign material to enter blower/exhauster.

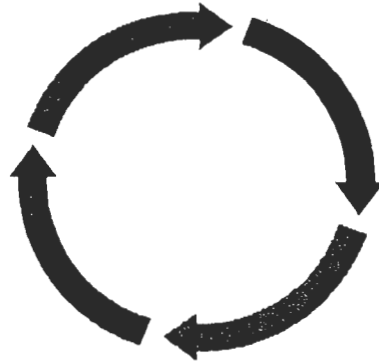
2. MOTOR:

ONLY qualified or trained personnel should install the machine. Electrical rotary equipment can cause property damage, serious injury or death when improperly installed. Equipment should be installed in accordance with the national electrical code, local codes and with NEMA MG2, safety standards for construction and guide for selection, installation and use of electric motors and generators.

Wiring: Connect the motor to the power supply of identical characteristics according to the connection diagram on the motor nameplate. Suitable fuses and overload protection must be provided.

Starting: The motor should start quickly and run smoothly with little noise. If the motor should fail to start, it may be that the load is too great for the motor, the voltage is low or the motor has been connected incorrectly. In any case, immediately shut motor off and investigate the cause.

Rotation Direction: To reverse the direction of rotation, interchange any two of the three line leads for three phase motors, for two phase four wire, interchange the line leads on any one phase. For two phase three wire, interchange phase one and phase two line leads.



II. OPERATION:

A. PRE-START-UP

1. Remove shipping covers and connect piping. Use flexible connections between the machine and all piping ductwork on inlet and outlet.
2. Make sure the motor has been properly wired for the electrical specification noted on the order and the outside of the starter box.
3. Verify that the piping system is void of any foreign materials.
4. Bump motor momentarily (maximum of 5 seconds) to check for direction of rotation. The correct direction of rotation should be clockwise when facing the inlet. Proper direction of rotation should be indicated on blower/exhauster housing. See motor instruction to change direction of rotation.

WARNING: All electrical connections should be made by a licensed electrician.

B. OPERATION

1. Before starting blower/exhauster, close off inlet (or outlet), open inlet (or outlet) only after motor has reached full operating speed. Do not permit motor load to exceed nameplate full load amperage.
2. Allow maximum volume of air to enter exhauster (staying within motor nameplate full load amperage rating) for a period of two to five minutes to purge

blower/exhauster and piping system of any loose material before final connection to process equipment.

III. MACHINE MAINTENANCE:

A. LUBRICATION

Proper maintenance is of extreme importance to ensure long, reliable performance from your Invincible AirFlow Systems equipment.

All flux machines manufactured by Invincible AirFlow Systems are equipped with sealed motors. These motors need no lubrication other than that supplied by the factory.

All hinges, valves and moving parts should be periodically lubricated using a heavy oil or light grease.

IV. CONTINUOUS FLOW SYSTEM

A. MOUNTING INSTRUCTIONS

Proper maintenance is of extreme importance to ensure long,

Caution: High Speed Rotating Equipment

- This is not a material handling fan. All separation and filtration must precede the Invincible machine - CLEAN AIR ONLY.
- **KEEP HANDS, CLOTHING AND ALL FOREIGN OBJECTS AWAY FROM MACHINE WHILE OPERATING.**
- Rotation: The Invincible machine is designed to run in only one direction. The unit must rotate in the direction indicated on the side of the machine.
- Use Invincible blowers / exhausters with filtration devices manufactured or certified by Invincible AirFlow Systems only. Failure to do so may invalidate machine warranty.
- Dismantling the blower / exhauster without written authorization from Invincible Airflow Systems, will invalidate the machine warranty.

APPENDIX A

MACHINE WARRANTY

MACHINE WARRANTY

Invincible AirFlow Systems warrants products manufactured by it to be free from defects in materials and workmanship under normal use and proper maintenance for a period of *five (5) years* from date of shipment, unless otherwise noted. If within that period any such products shall be proved to Invincible's reasonable satisfaction to be defective, such products shall be repaired or replaced at Invincible's option.

Invincible's obligation and Purchaser's exclusive remedy shall be limited to such repair and replacement following Purchaser's written notice of any defect no later than *ten (10) days* after its discovery, and at Invincible's option, the return of such products to Invincible, F.O.B. factory. Invincible reserves the right to satisfy its warranty obligation in full by reimbursing Purchaser for the equipment's full purchase price.

Components manufactured by others are not warranted by Invincible, however, to the extent possible, the company shall provide Purchaser with such other manufacturers' warranties as are available. Invincible makes no warranty with respect to wear or use items, such as belts, filters, bearings, or gaskets, which are sold strictly as is.

THESE WARRANTIES ARE EXPRESSLY IN LIEU OF ANY OTHER EXPRESS OR IMPLIED WARRANTY, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ANY OTHER OBLIGATION ON THE PART OF INVINCIBLE.

APPENDIX B

TROUBLESHOOTING YOUR SYSTEM

TROUBLESHOOTING YOUR SYSTEM

LACK OF PRESSURE OR VACUUM:

1. Check rotation and speed.
2. Make sure there are no stoppages in piping and that pipeline leakage is minimal.
3. Check motor lead: A machine operating beyond maximum motor nameplate amperage rating will develop reduced pressure or vacuum.
4. Check rubber sleeve or inlet, if used. If it should be collapsed, exchange for the outlet sleeve until a new one can be obtained.
5. If inlet filter is used (blower only), remove it temporarily and test the unit or clean the filter.

VIBRATION AND NOISE:

Misalignment between blower/exhauster and motor will cause vibration and noise. Restore proper alignment at once to prevent damage to bearings and/or drive.

A worn or damaged ball bearing will make a shrieking noise and cause vibration. If any abnormal operation is detected, replace the defective bearing.

WARNING: Misapplication or improper operations will void the machine warranty.

For assistance, please contact your nearest Invincible AirFlow Systems' representative or call us a **1-800-282-6999**.

Instructions for Changing Dust Bags

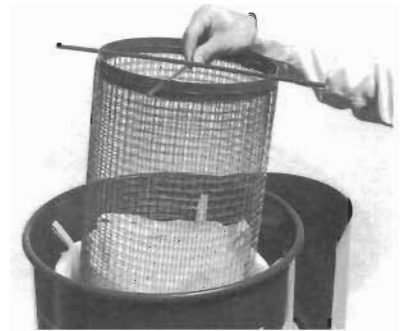
1000-4000 Portable Series



Remove tank cover.



Untie dust bag from spider on screen.



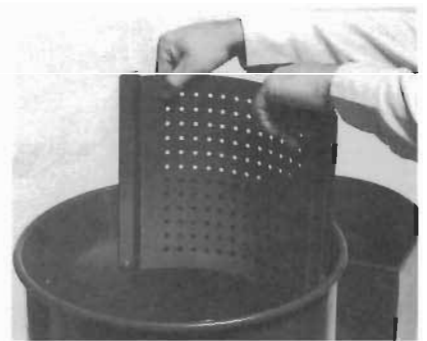
Remove screen by pulling up and out of tank.



Pull bag up and shake to remove accumulated material.



Remove (4) hook rings from screen supports.



Remove bag shield by pulling up out of retaining clips.



Release foot pedal; remove dust bucket.



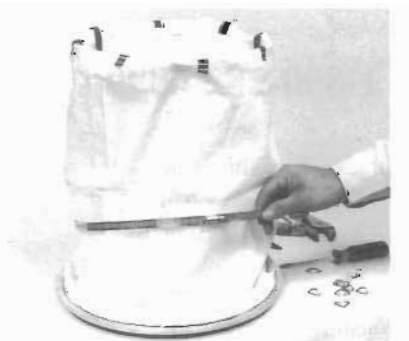
Reach up under tank and release (3) toggle clamps; make sure hooks are removed from bag ring.



Grasp bag and lift bag ring out of tank.



Clean all parts, particularly ring inside tank.



Remove bag clamp and hook rings; bag will pull free from ring.



Check O-ring and replace if needed.

See Reverse Side for Additional Instructions

Bag Changing Instructions Continued...



Remove old silicone sealant with wire brush or scraper and apply new sealant to perimeter of bag ring.



Replace hook rings. Use clamp to mount new bag on ring. Position top 1/8" of bag above clamp.



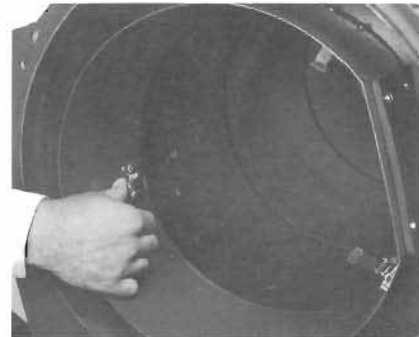
Lubricate O-ring with light grease.



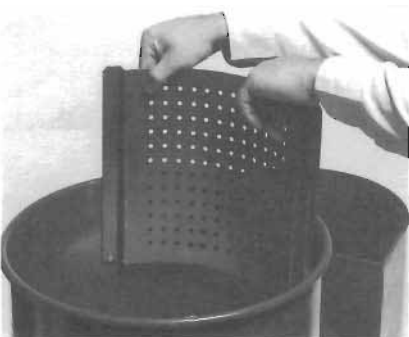
Put ring and bag into tank with bag clamp screw opposite exhaust inlet.



Place hook rings on screen supports.



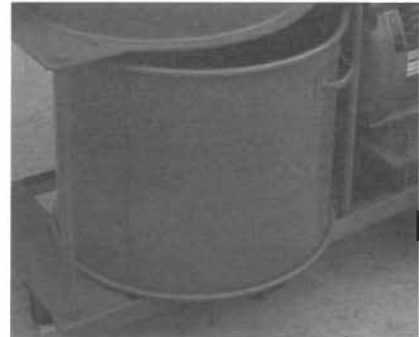
From bottom, pull ring securely into place; close toggle clamps.



Replace bag shield.



Replace screen while pulling bag up through screen center. Line up bag seams inside and outside screen & tie.



Replace cover and dust bucket.

QUESTIONS...CALL 1-800-282-6999

Note: Change dust bag on small portable and textile machines by releasing nylon tie that holds bag. Replace by stretching new bag over stretcher or ring and fasten securely with a nylon tie or 16 or 18 gauge wire.

Invincible AirFlow Systems will not be responsible for improper handling of toxic or hazardous materials when changing dust bags.

INVINCIBLE
AirFlow Systems

700 North Ray, P.O. Box 380
Baltic, Ohio 43804
Phone 330-897-3200
Fax 330-897-3400

Installation - Operation & Maintenance Instructions

INVINCIBLE Flux Recovery Equipment

Instructions

INVINCIBLE equipment is designed and built to give years of dependable service and maximum efficiency with a minimum of care and attention. However, in order to receive full benefit of *INVINCIBLE* performance, we ask that the following instructions be followed.

Before the equipment is placed in operation be sure that the motor is connected only, to an outlet or power line supplying the same voltage and current characteristics as stamped on the motor plate.

Note: It is imperative that the vacuum producer unit rotate in the direction indicated by the arrow plate on the side of the vacuum producer. This is important, reverse rotation will loosen the impeller shaft nut. To correct rotation, change position of two wires on the cable plug or motor starter. Note: The above precautions are for 3 phase motors only, single phase motors rotate in one direction only.

Lubrication

Machines are equipped with motors having pre-lubricated sealed bearings and require no lubrication. Wheels and casters should be lubricated with a light grease every three to four months depending on use and dust conditions.

Filter System

Particular attention should be given to the filter or dust bag on flux recovery equipment. To assure efficiency and performance it is imperative that the dust bag be manually agitated at regular intervals, at least every 8 hours, if the equipment is in continuous operation. To agitate or shake the dust bag - remove dust tank cover, grasp the steel spider, lift up and shake, then replace spider in position. This action will dislodge any accumulation of dust and keep the pores of the filter cloth open. Note: Failure to agitate the dust bag at regular intervals will result in lack of performance and excessive dust bag failure.

Due to the deteriorating effect of welding flux dust on cotton cloth, dust bags must be replaced more often than on other types of applications. Therefore, a replacement bag for each machine should be in stock at all times.

To Replace Filter Bag

Separate illustrative and descriptive instructions are enclosed for replacement of filter bag in machines equipped with dump bucket or cone bucket. *Note: The drop-in filter bag of the Model 682 and 690 is both a collection container and a filter, and is easy to change.* Remove the old bag from the bag stretcher by releasing the nylon tie around the stretcher. Replace by stretching new bag over the stretcher and fastening securely with nylon tie or 16 or 18 gage annealed wire. Be sure the wire is over the cloth.

Mounting Instructions For Continuous Flow System

A separate installation instruction sheet is enclosed for proper function of a continuous flow system (see "Welding Flux Recovery Systems" pg. 4). The primary tank should be mounted directly above the welding head. Example: For a 1 1/2 H.P. machine, the outlet hose connection at the bottom of the primary tank below the butterfly valve must be at least 46" higher than the hopper of the welding head. Attach a 48" length of 1 1/2" I.D. hose to the outlet hose connection and place the outer end of the hose in the hopper of the welder. The hose must be in a relatively straight line, no kinks or curves, if on an angle, not more than 30 degrees past center. *Note: The minimum height of the outlet hose increases with horsepower of the machine.*

The vacuum machine proper can be positioned at any convenient point. If mounted overhead on a parallel line with the primary tank a stationary unit such as the Model 482 is recommended. If at a lower level or on the floor a portable unit such as the Model 460 is recommended. The connecting hose between the primary separator tank and vacuum machine proper is 2" I.D.

After the primary tank has been properly positioned and return hose connected, place one or two bags of flux in the primary tank, STOP THE MOTOR, open butterfly valve and allow return HOSE and HOPPER of the welder to fill. The return hose must be filled with flux in order to create a vacuum seal, if the return hose is empty it will not refill until the vacuum in the primary tank is released. The installation is now ready for operation and will recover and discharge in a continuous flow. The butterfly valve remains open. The fine dust is carried over into the secondary tank by the air stream. Slag free, dust free, usable material is returned to the hopper of the welder.

If flux is to be recovered directly from the weld the recovery hose should be equipped with a suitable nozzle or recovery tool and this tool positioned approximately 5" or 6" behind the arc. The rear lip of the recovery tool should be notched to accommodate the slag seam and ride on the work, the front lip elevated to permit free air movement. If the installation or material being fabricated is such that flux cannot be recovered directly from the weld, a special hopper may be constructed and placed beneath the work to receive the flux as it spills from the weld and the recovery hose attached to this hopper as indicated on page 4 of the "Welding Flux Recovery Systems" brochure enclosed in your manual.

Every effort should be made to keep the installation as compact as possible, which will eliminate handling material through long lengths of line, therefore, 1 1/2 H.P. units have ample capacity for the average installation. However, if excessive lengths of line are required or the material to be handled is excessive in volume, large horsepower units are recommended. The size of unit is determined by the volume of material to be handled in pounds per minute. For performance data, refer to recovery capacity on page 3 of "Welding Flux Recovery Systems" brochure. On certain types of installations it is possible to recover from two welders simultaneously with one recovery system. However, individual recovery units are recommended for each welder.

For long, horizontal welds on which the welder travels out over the work and a continuous flow system is desired, some sort of carriage or provision must be made so that the primary tank can travel with the welder. The vacuum machine can be positioned at a convenient point in the center of the travel and connected to the primary tank with a suitable length of 2" I.D. hose. If this arrangement is not convenient or practical, it is suggested that the welder be equipped with a hopper of sufficient capacity to complete the weld and be refilled from the primary tank when it returns to the starting position. For this type of installation, the primary tank is mounted at a convenient point just high enough to clear the hopper of the welder. When the primary tank is not equipped with a return hose for continuous flow, the exhaust of the vacuum producer unit should be equipped with a clapper valve or slide valve, this valve can be manually operated or actuated by an air cylinder and is closed when the butterfly valve opens, thereby releasing the vacuum in the primary tank permitting discharge from the tank. Or the vacuum producer unit may be shut down during the change of work, thereby eliminating need for exhaust valve.

For additional information or recommendation for special or unusual installations, please contact the factory or nearest representative.

Maintenance

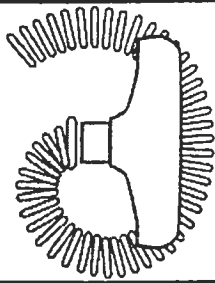
After the installation has been properly adjusted, the next step is to determine the amount of flux fused during a given period, for example; if 100 pounds of flux is fused during an 8 hr. run, 100 pounds of new flux must be added to the primary tank at this time, thereby assuring ample reserve and prevent a shutdown for refilling the tank while work is in process.

The equipment should be serviced at regular intervals, for example; at the end of each 8 hr. shift:

1. Empty slag screen in primary tank.
Note: The only purpose of the slag screen is to collect such fused particles that may be recovered from the weld. Do not chip off the slag seam or attempt to recover slag in volume; to do so will overload the screen, thereby preventing the unfused flux from passing through the screen - result, excess carry-over of usable material to secondary tank.
2. Refill primary tank, replacing the amount of flux consumed during the past 8 hr. run.
3. Agitate the dust bag.
4. In case of dust bag failure, shut down machine and replace at once. **DO NOT OPERATE THE UNIT WITHOUT DUST BAG OR WITH FAULTY DUST BAG.** A discharge of fine, white dust from the exhaust indicates dust bag failure of that material is being passed through the vacuum producer unit. Failure to correct immediately will result in expensive repairs.

Call Toll-free for further assistance.

800-282-6999

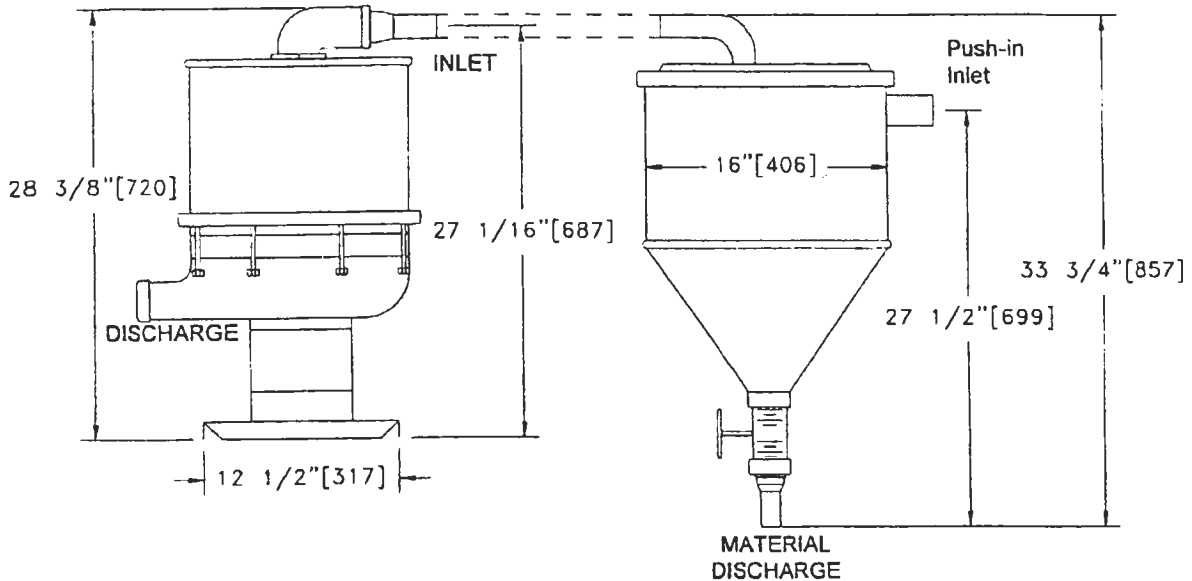


Welding Flux Recovery System

TECHNICAL DATA

Stationary Flux Recovery Series

Model 682



DIMENSIONAL INFORMATION

Dimensions in inches (alternate units in millimeters).
 Vacuum inlet connection.....1 1/2" O.D. swivel
 Collector inlet connection.....1 1/2" I.D. push-in
 Vacuum discharge.....2" O.D. diffused
 Collector discharge.....1 1/2" O.D.

DESIGN

Exhauster

Three-stage, backward-curved centrifugal impellers
 Motor RPM.....3500
 Motor.....115- 1 PH, 60Hz
 Or.....
 Horsepower.....3/4 HP [.55 kw]
 Approx. impeller tip speed.....191 ft/sec [58 m/sec]
 Sound level @ 1 meter.....72 dBA
 Filter.....6.5 ft² media

Drive:

Direct driven

Lubrication:

Sealed ball bearing
 No lubrication required

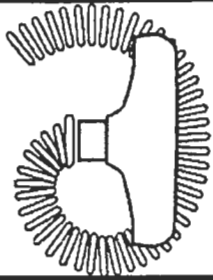
MATERIALS OF CONSTRUCTION

Inlet/exhaust casing.....319 Aluminum
 Impeller.....380 Aluminum
 Intermediate diffuser.....319 Aluminum
 Base.....14 ga. CRS
 Base Isolator (optional).....Molded neoprene
 Collector.....20 ga. CRS
 Discharge.....60° cone with 2" manual butterfly valve
 Interconnection hose.....2' x 1 1/2" I.D. smooth rubber
 Filter housing.....20 ga CRS
 Filter media.....9 oz. polyester twill

MISCELLANEOUS

Flux capacity.....30 lbs.
 Recovery Rate.....6-10 Lbs./minute
 Finish.....Industrial air dry enamel
 Weight - Model 682 3/4 HP
 (uncrated). 120 lbs. [59 Kg]
 (crated). 170 lbs. [77Kg]
 Crated Dimensions:20 x20x27 inches
 51x51x94 centimeters

Ref. DWG.#M682

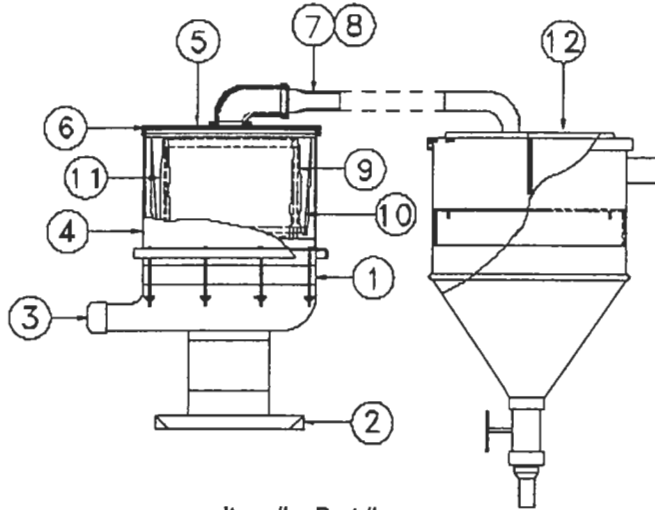


Welding Flux Recovery System

PARTS

Stationary Flux Recovery Series

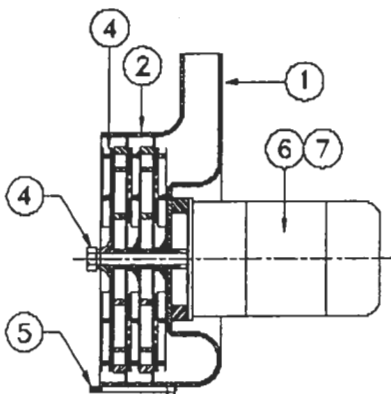
Model 682



PARTS LIST

Req'd.	Description	Item #	Part #
1	Vacuum Producer Assembly	1	3041
1	Blower Base	2	3245
1	Diffuser	3	2537
1	Dust Tank	4	2654
1	Dust Tank Cover	5	1612
1	Dust Tank Cover Gasket	6	1073
1	Inlet Assembly 1-1/2" O.D.	7	2663
1	Inlet Assembly 2" O.D.	8	2662
1	Bag Ring	9	2022
1	Bag Stretcher	10	2023
1	Dust Bag	11	1954
*1	Primary Separator Tank	12	

NOTE: *For primary tank options and parts breakdown see "Welding Flux Recovery Systems" brochure.



Vacuum Producer Assembly -- Part No. 3041

Disassembly/Assembly Instructions

1. Remove bolts in end cover. Remove end cover.
2. Remove left hand nut on impeller shaft by sharp blows with hammer on wrench.
3. Remove impeller, then case (alternate). Check for shims between impeller hubs.
4. Reverse this procedure to assemble.

Use shims between hubs to space impeller between case.

NOTE: If a new spacer is required, care must be taken to get a proper clearance on first impeller. This may require machining aluminum spacer to proper length as motor shaft hubs may vary.

PARTS LIST

Req'd.	Description	Item#	Part#
1	Exhaust Case	1	3048
2	Impeller Cases	2	1634
3	Impellers	3	1633
1	Motor Shaft Nut	4	2604
8	Clamp Bolts	5	3044
*1	Motor 3/4 hp., 3 ph	6	0742
*1	Motor 3/4 hp., 1ph	7	0741

*Starter not included on replacement assemblies P/N 3041 0

Gardner Denver Blower Division 100 Gardner Park Peachtree City, GA 30269
 Phone 800-543-7736 770-632-5000 FAX 770-486-5629 www.gardnerdenver.com
 ©2002 GDI Specifications subject to change without notice

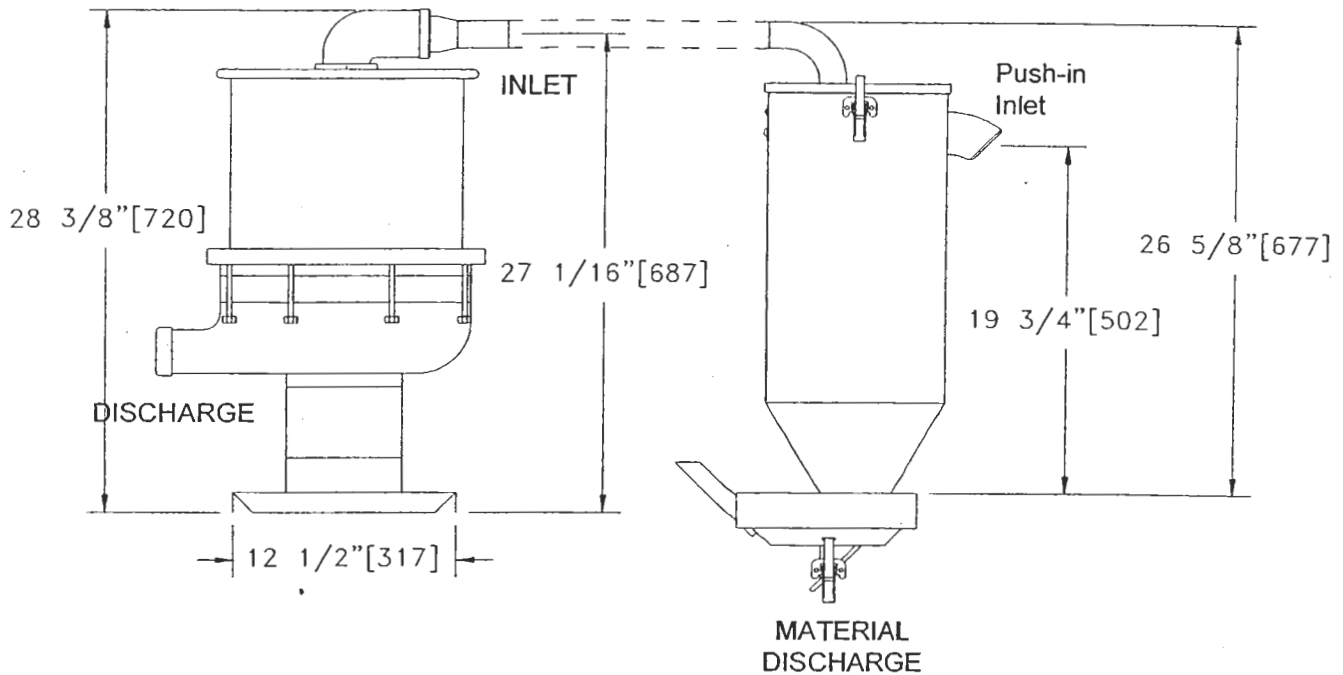
Recommended Spare Parts For Invincible Model 682

<u>Qty.</u>	<u>P/N</u>	<u>Item</u>
3	1633	Impellers
2	1634	Impeller Cases
2	1954	Dust Bags

Note: Please use serial number when ordering.

WARRANTY

INVINCIBLE AIRFLOW SYSTEMS, Baltic, Ohio warrants all parts of this machine to be free from defects in material or workmanship for a period of 5 years after date of purchase and will accept no responsibility for said parts or replacements on machines which have been altered outside of its own factory or have failed for lack of lubrication. This warranty does not cover motors, starters, etc. manufactured by others and does not cover erosion or corrosion of the machine.



DIMENSIONAL INFORMATION

Dimensions in inches (alternate units in millimeters).
 Vacuum inlet connection.....1 1/2" O.D. swivel
 Collector inlet connection.....1 1/2" I.D. push-in
 Vacuum outlet connection.....2" O.D. diffused
 Collector discharge.....4" O.D.

DESIGN

Exhauster

Three-stage, backward-curved centrifugal impellers
 Motor RPM..... 3500
 Motor.....115-230V, 1 PH, 60Hz
 or..... 230-460V, 3 PH, 60 Hz (208V optional)
 Horsepower..... 3/4 HP [.55 kw]
 Approx. impeller tip speed..... 191 ft/sec [58 m/sec]
 Sound level @ 1 meter..... 72 dBA
 Filter.....6.5 ft² media

Drive:

Direct driven

Lubrication:

Sealed ball bearing
 No lubrication required

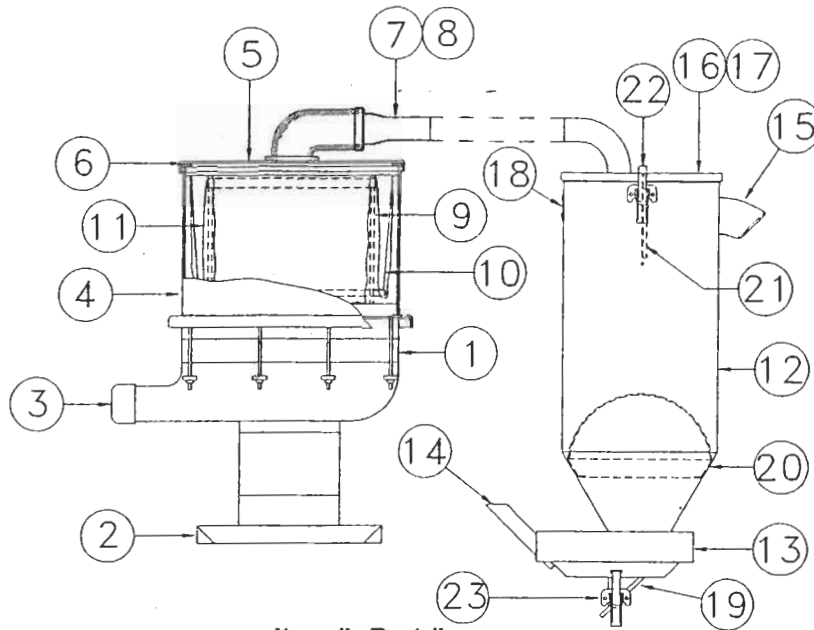
MATERIALS OF CONSTRUCTION

Inlet/exhaust casing..... 319 Aluminum
 Impeller..... 380 Aluminum
 Intermediate diffuser..... 319 Aluminum
 Base.....14 ga. CRS
 Base isolators (optional).....molded neoprene
 Collector.....20 ga. CRS
 Discharge......60° cone with 4" dump valve
 Interconnection hose.. 2' x 1 1/2" I.D. smooth rubber
 Filter housing..... 20 ga CRS
 Filter media..... 9 oz. polyester twill

MISCELLANEOUS

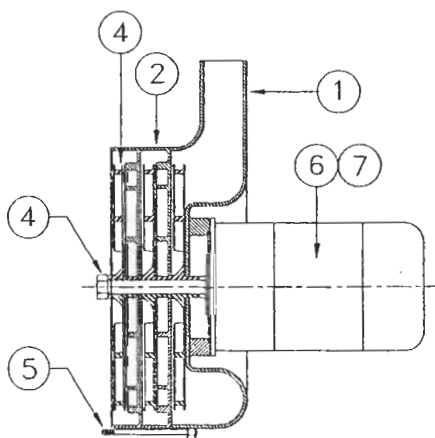
Finish.....industrial air dry enamel
 Weight:
 Model 682 3/4 HP..... 130 lbs. [58.5 KG]

MODEL 682 (primary tank #4003)



PARTS LIST

Req'd.	Description	Item #	Part #		
1	Vacuum Producer Assembly	1	3041	1	Mounting Base Plate
1	Blower Base	2	3245	1	Fill Shute
1	Diffuser	3	2537	1	1 1/2" Push-in Inlet
1	Dust Tank	4	2654	1	Dust Tank Cover, 1 1/2" Out
1	Dust Tank Cover	5	1612	1	Dust Tank Cover, 2" Out
1	Dust Tank Cover Gasket	6	1073	1	Dust Tank Cover Gasket
1	Inlet Assembly 1-1/2" O.D.	7	2663	1	Air Bleed-in Valve
1	Inlet Assembly 2" O.D.	8	2662	1	Rubber Valve Flapper
1	Bag Ring	9	2022	1	Slag Screen
1	Bag Stretcher	10	2023	1	Rubber Baffle
1	Dust Bag	11	1954	2	Cover Clamps
1	Primary Separator Tank	12	2805	2	Base Clamps
				13	3856
				14	
				15	3023
				16	2806
				17	2811
				18	X1067
				19	0929
				20	3867
				21	2660
				22	2349
				23	2349



Vacuum Producer Assembly -- Part No. 3041

Disassembly/Assembly Instructions

1. Remove bolts in end cover. Remove end cover.
2. Remove left hand nut on impeller shaft by sharp blows with hammer on wrench.
3. Remove impeller, then case (alternate). Check for shims between impeller hubs.
4. Reverse this procedure to assemble.

Use shims between hubs to space impeller between case.

NOTE: If a new spacer is required, care must be taken to get a proper clearance on first impeller. This may require machining aluminum spacer to proper length as motor shaft hubs may vary.

PARTS LIST

Req'd.	Description	Item#	Part#		
1	Exhaust Case	1	3048	*1	Motor 3/4 hp., 3 ph
2	Impeller Cases	2	1634	6	0742
3	Impellers	3	1633	*1	Motor 3/4 hp., 1ph
1	Motor Shaft Nut	4	2604	7	0741
8	Clamp Bolts	5	3044		

*Starter not included on replacement assemblies P/N 3041



WELDING FLUX RECOVERY SYSTEMS

The leader for over 50 years!

Invincible systems are made in six different horsepower series and offer cost saving advantages for virtually any submerged arc welding operation regardless of size or type. They're built for heavy-duty service. The sturdy induction motors deliver years of continuous operation with a minimum of maintenance. All units are carefully designed to resist the abrasive nature of welding flux - special inlets and rubber baffles are used and complete separation precedes the vacuum producer.

Every machine in our 600, 400, 300, 800 and 700 Series carries a 5-year guarantee!

Invincible equipment is compact, lightweight and easy to install. The variety of models and flexibility of design eliminates the need for custom-made installations in almost all cases.

Since 1905, Invincible equipment has thoroughly proved its worth in thousands of installations throughout the country. Some firms, extensively engaged in welding, employ whole batteries of Invincibles; in some cases, 100 and more units.

Save Valuable Flux

Invincibles recover all unused flux from the work, remove slag or fused particles

and return slag-free flux to the hopper of the welder, all in one continuous, automatic operation. When equipped with a primary separator, an Invincible system will completely remove flux flour, eliminating porosity in the weld.

Save Costly Man-Hours

Invincibles do the whole job automatically, far more rapidly and efficiently than old fashioned manual methods of salvage and screening. Silicosis hazard is dramatically reduced.

Save Expensive Rejects

Invincibles remove fine dust (flux flour) during the recovery process, thereby reducing welding rejects and speeding up production.

Central Systems Engineered

A central system offers unbeatable flexibility. It offers multiple pick-up points for welding flux recovery and can also power factory and office cleaning operations. Invincible can furnish the straight-run transport tubes you'll need, the bends, Y's, T's, steel couplings and neoprene rubber connecting sleeves, hangers, clearing valves...whatever it takes to install a reliable central system. We're also your best source for extractors, filters, silencers, timers, programmable controllers and both standard and specialized pick-up tools.

5-Year Guarantee

Our continuous duty machines are guaranteed for 5 years. Many Invincible systems still at work have given 30 years and more of service.



Model 482
Model 382
Model 882
Model 782

Model 490
Model 390
Model 890
Model 790



Taming Abrasive Flux

All competing flux recovery systems slide inlet hoses over the metal inlet fittings on separators. Flux is exceptionally abrasive and these metal inlets are soon worn away. Production must be halted while these metal fittings are replaced, a time-consuming and expensive repair. Invincible slips the rubber hose inside the metal separator inlet fittings. The easily replaceable hose takes all of the wear, protecting the vulnerable metal inlet fitting.

400 Series
300 Series
800 Series
700 Series



Model 460-F
Model 360-F
Model 860-BF
Model 760-F



Model 482
Model 382
Model 882
Model 782



*Powered by reliable
 3/4 to 10 hp continuous duty,
 induction-type motors*



Model 490
Model 390
Model 890
Model 790

400 Series - powered by a 1 1/2 hp induction-type motor with four-stage turbine type vacuum producer with aluminum cases and impellers. Designed for continuous service. **Model 460-F** may be used as a portable or stationary unit, does not have a primary separator, is capable of separating slag or fused particles, but is not equipped to separate flux flour. **Model 482** is a stationary mounted unit recommended for overhead installations. **Model 490** is a totally portable unit with synchronized valves to insure immediate discharge of flux from the primary separator tank while the motor is running. **Models 482 and 490**, having primary separators, are capable of separating all welding flux elements, including flux flour.

300 Series - powered by a 3 hp induction-type motor, is specially engineered for intermediate flux recovery applications. The rugged vacuum producer incorporates a three-stage turbine type vacuum producer with adjustable, multiple V-belt drive. Oversized ball bearings are sealed and pre-lubricated. With a 25 ft. 2" ID hose at a 10 ft. vertical rise, these units will recycle 31 pounds of flux every minute. **Model 300-F** can be used with portable welders or as a stationary unit. **Model 382** is a stationary unit, which can be mounted overhead. **Model 390** is a totally portable unit with primary separator tank attached. Both **Models 382 and 390**, having primary separators, are capable of separating all welding flux elements, including flux flour.

800 Series - powered by a 5 hp induction-type motor, it incorporates a four-stage turbine type vacuum producer with adjustable, multiple V-belt drive. A large, 3600 sq. in. inverted filter insures complete and positive separation. An excellent choice for medium-duty applications. **Model 809-BF** can be used as a portable or stationary unit without a primary separator. **Model 882** is a stationary unit recommended for applications where the entire assembly is mounted overhead. **Model 890** is a totally portable unit with primary separator tank attached. Both **Models 882 and 890**, having primary separators, are capable of separating all welding elements, including flux flour.

700 Series - powered by a choice of 7 1/2 or 10 hp induction-type motors, these heavy-duty machines are designed for big flux recovery jobs. Five-stage vacuum producers with aluminum cases and impellers. **Model 700-F** can be used as a portable or stationary unit. **Model 782** is a stationary that can be mounted overhead. **Model 790** is a totally portable unit with primary separator and synchronized control valves. Both **Models 782 and 790**, having primary separators, are capable of separating all welding elements, including flux flour.

600 Series



Powered by 3/4 hp continuous duty, induction-type motors

600 Series - powered by a continuous duty, induction-type 3/4 hp motor, these machines are for light applications which nevertheless demand efficiency and dependability. These 3/4 hp machines use 1-1/2" ID hose and at a vertical rise of 8 feet can recover 10 pounds of flux per minute. The powerful slow speed ball bearing motor insures long life with minimum maintenance. **Model 682** is

a lightweight stationary unit recommended for use with overhead assemblies and continuous flowing systems. **Model 690** is a portable lightweight unit specifically designed with a primary separator tank attached for intermittent applications.

Useful Sizing Formula

$$\frac{1/2 \text{ ABL}}{1728} = \text{Cubic Feet Per Minute}$$

- A = Height of Flux Bed
- B = Width of Flux Bed
- C = Length of Travel, Inches Per Minute

Cubic Feet Per Minute x 90 = Pounds Per Minute Usage
90 = Pounds Per Cubic Foot

Flux Recovery System SELECTION GUIDE

MODEL NO.		890	882	
3/4 H.P.	Recovery Capacity With 6' Vertical Rise (lbs. per min.)	1 1/2" Hose (I.D.)	10' 10 15' 8 25' 6	10 8 6
	Height"		46	30
	Width"		19	17
	Length"		38	36
	Weight (lbs.)		165	100

MODEL NO.		460	490	482	
1 3/4 H.P.	Recovery Capacity With 10' Vertical Rise (lbs. per min.)	1 1/2" Hose (I.D.)	10' 25 15' 22 25' 15	25 25 22 15	
	Height"		44	56	56
	Width"		20 1/2	26	17
	Length"		40	56	72
	Weight (lbs.)		315	340	300

MODEL NO.		300	390	382	
3 H.P.	Recovery Capacity With 10' Vertical Rise (lbs. per min.)	1 1/2" or 2" Hose (I.D.)	10' 45 15' 36 25' 31 50' 21	45 45 36 31 21	
	Height"		50	76	62
	Width"		20 1/2	26	17
	Length"		43	58	74
	Weight (lbs.)		330	375	370

MODEL NO.		889-B	890	882	
5 H.P.	Recovery Capacity With 10' Vertical Rise (lbs. per min.)	2" Hose (I.D.)	10' 84 15' 58 25' 47 50' 36	84 84 58 47 36	
	Height"		54 1/2	60	68
	Width"		23	26	19
	Length"		50	67	80
	Weight (lbs.)		460	520	500

MODEL NO.		700	790	782	
7 1/2 H.P.	Recovery Capacity With 10' Vertical Rise (lbs. per min.)	2" Hose (I.D.)	10' 115 15' 85 25' 70 50' 52	115 115 85 70 52	
	Height"		54 1/2	60	68
	Width"		23	26	19
	Length"		54	71	80
	Weight (lbs.)		550	610	590

MODEL NO.		700-10	790-10	782-10	
10 H.P.	Recovery Capacity With 10' Vertical Rise (lbs. per min.)	2" Hose (I.D.)	10' 125 15' 95 25' 78 50' 58	125 125 95 78 58	
	Height"		54 1/2	60	68
	Width"		23	26	19
	Length"		54	71	80
	Weight (lbs.)		570	630	610

Installations Suggestions

Initial Start

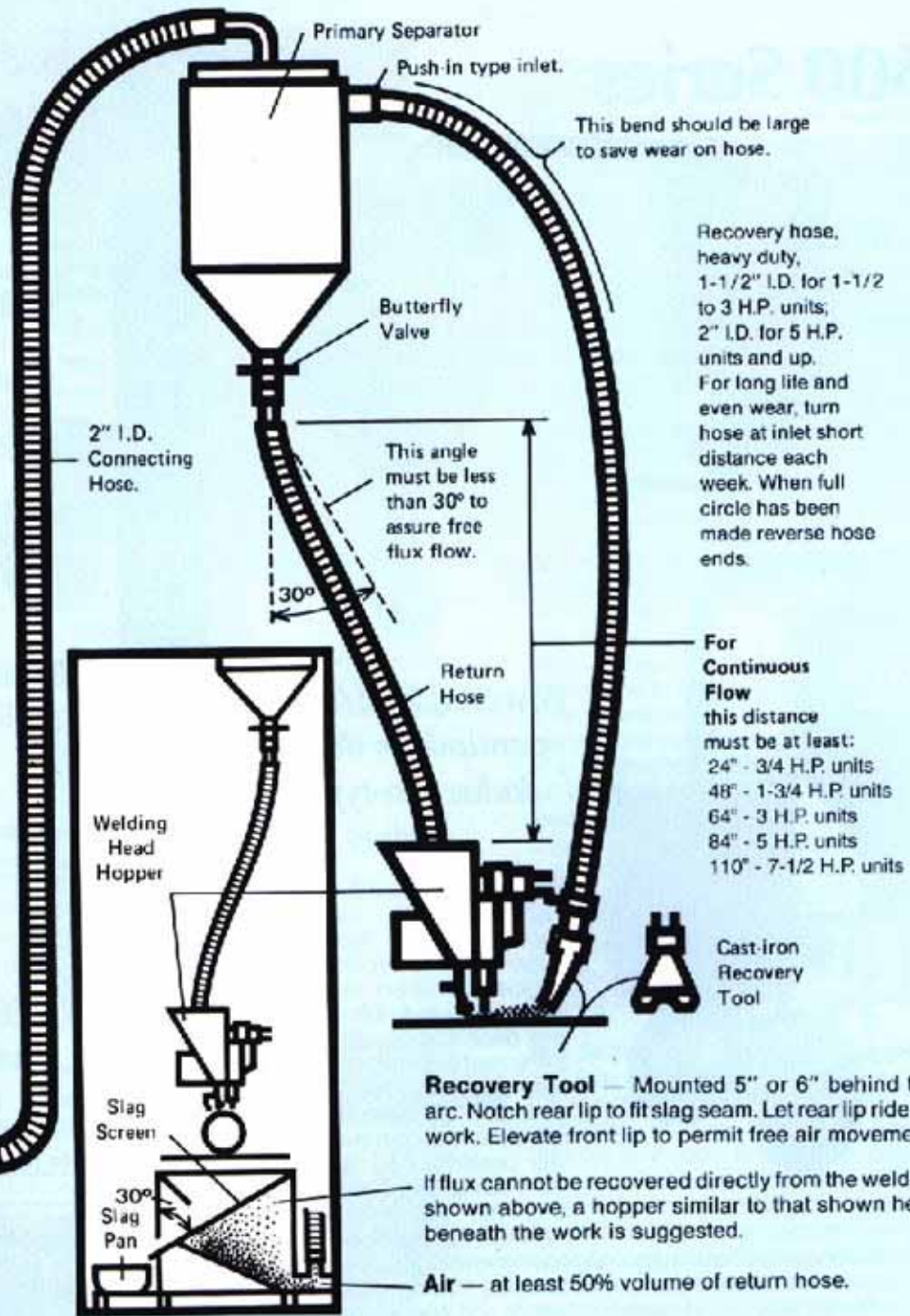
Place 100 pounds of flux in primary tank. Stop motor. Open Butterfly Valve. Allow return hose and welder hopper to fill with flux. Butterfly Valve remains open. Start motor. The installation will now recover and discharge flux continuously.

Preventive Maintenance

Every 8 hours: Agitate dust bag. Empty slag screen. Refill primary separator tank.

A Choice of Vacuum Units

May be positioned at any convenient location. Models 682, 382, 482, 782 or 882 may be used overhead, depending on horsepower requirements. At lower (floor) level, Models 690, 300, 390, 460, 490, 700, 790, 809B or 890 may be specified depending on power requirements.



Flux Recovery Tools Made of rugged cast iron, designed to mount behind the arc. Front lip is elevated to permit free air movement, rear lip rides on the work and can be notched to fit the slag seam.



Flux Recovery Hoses Especially designed to resist damage from abrasive welding flux, and available exclusively from Invincible. Fixed diameter molded ends fit inside push-in inlets for positive vacuum seal and to prevent inlet wear.



Butterfly Valves Rugged and dependable valves which offer almost unrestricted flow when open. Placed at the outlet of primary separators they give perfect control of recovered flux returning to the welder hopper.

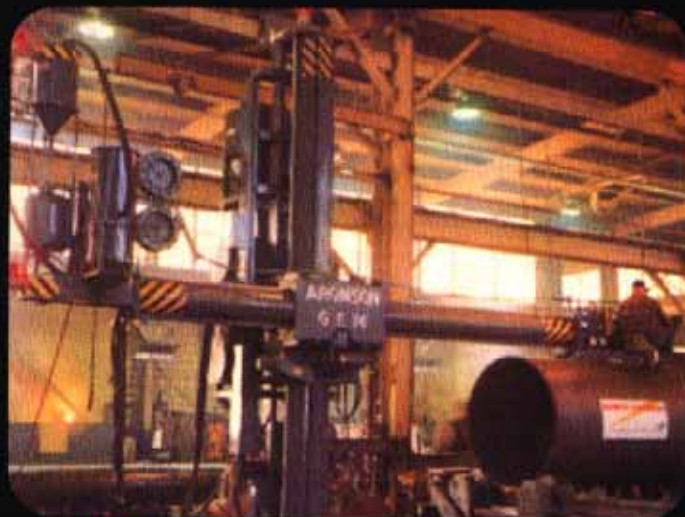
Scores of installations are saving labor, salvaging valuable material and improving production efficiency with

INVINCIBLE[®]

FLUX RECOVERY SYSTEMS



Primary separators are mounted high above the automatic welders, and at a distance from the vacuum source. Each separator serves two SAW flux hoppers.



Model 882 flux recovery system mounted on manipulator for tandem arc welding. Note position of remote manned weld heads.



Model 482 Invincible flux recovery systems are mounted high above the work. Each machine serves dual weld heads.



Twin Model 382 flux recovery systems, mounted on an overhead crane, return clean flux to two SAW flux hoppers on either side of the welding machine below.

Invincible "Redhead" flux recovery units can improve your submerged arc welding process



Model 4000 Automatic

Compact unit easily mounts directly atop most automatic SAW flux hoppers for intermittent use weld line applications.

Reclaim all unused flux, remove slag or fused particles and return clean flux to the hopper of the welder — all in one fast, continuous operation.

Universal type motors are made for intermittent operation with a minimum of maintenance. Designed to resist the abrasive nature of welding flux with special inlets and rubber baffling. Total separation precedes the vacuum producer.

Just fill the tank with flux to the bottom of the slag screen. The welder flux hopper will fill at the same time. Additional flux can easily be introduced into the system without interrupting the weld, using a convenient fill tube built into the unit for this purpose.



Model 4002 Portable

Self-contained, mobile unit can be wheeled into the tightest quarters in the shop for intermittent use flux recovery.



Model 4001 Tractor

Mates with most SAW tractors to provide flux recovery for uninterrupted operation and indefinite weld length.

	AUTOMATIC	PORTABLE	TRACTOR
Power	120v/1 phase, 60-cyc. 9, 9-amp universal brush type motor.	120v/1 phase, 60-cycle, 9-amp. universal brush type motor.	120v/1 phase, 60-cyc. e, 9-amp universal brush type motor.
Weight	40 lbs.	69 lbs.	26 lbs.
Height	24"	37"	31"
Diameter	10"	20" (6" tall base)	10"
Dia	7 1/2"	7 1/2"	7 1/2"
Hose (1" I.D.)	5 feet	7 feet	5 feet
Flux Capacity	30 lbs.	33 lbs.	30 lbs.
Recovery Rate	16 lbs./minute	15 lbs./minute	16 lbs./minute

Primary Separators

To insure efficient separation of reusable flux from slag and flux flour, Invincible units employ a dual separator system. The Primary Separator isolates slag and fused particles and enhances removal of flux flour. It also acts as a collection hopper for unused flux.

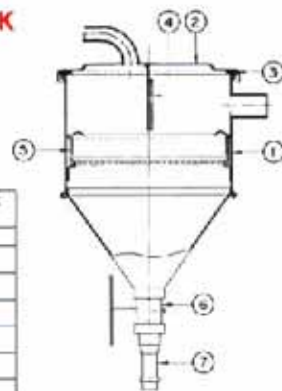
For the ultimate in separation efficiency for finer flux grades, a cyclone baffle on the separator cover creates circular flow as flux enters. This air motion allows reusable fine flux to settle, insuring complete separation from flux flour.

When ordering a complete separator tank, use proper number as indicated by (*). All specific parts as listed under each complete tank number will then be supplied. For individual replacement parts, use specific part number for desired item.

16" PRIMARY SEPARATOR TANK FOR MODEL NO. 682

Heated models of all separators available for high humidity locations

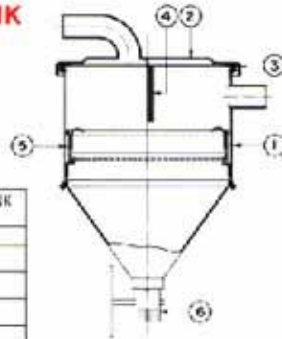
ITEM NO	PARTS LIST	PRIMARY TANK COMPLETE
		7111
1	Tank only with 1 1/2" inlet	2312
2	Tank Cover with Gasket	2315
3	Tank Cover Gasket	2375
4	Rubber Baffle	2286
5	Slag Screen	2366
6	Butterfly Valve	2378
7	Return Inse Connection 1 1/2"	2345



16" PRIMARY SEPARATOR TANK FOR MODEL NO. 690

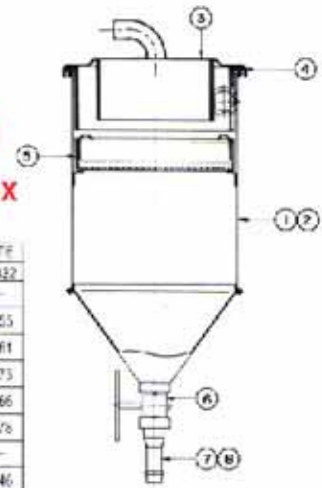
Heated models of all separators available for high humidity locations

ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE	
		'7170	'8319
1	Tank only with 1 1/2" inlet	3319	—
2	Tank Cover with Gasket	3344	—
3	Tank Cover Gasket only	2373	—
4	Rubber Baffle	3296	—
5	Slag Screen	2296	—
6	Butterfly Valve	2378	—



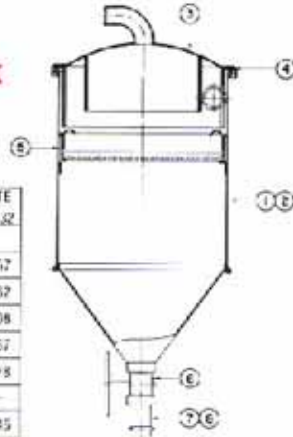
16" PRIMARY CYCLONE SEPARATOR TANK FOR MODEL NO. 300, 382, 460, 460-X, 482 & 482-X

ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE			
		'8331	'8332	'8421	'8422
1	Tank only with 1 1/2" inlet	3354	3354	—	—
2	Tank only with 2" inlet	—	—	3355	3355
3	Tank Cover with Gasket	3361	3361	3361	3361
4	Tank Cover Gasket only	2373	2373	2373	2373
5	Slag Screen	2386	2386	2386	2386
6	Butterfly Valve	2378	2378	2378	2378
7	Return Hose Connection 1 1/2"	3345	—	3345	—
8	Return Hose Connection 2"	—	3346	—	3346



18" PRIMARY CYCLONE SEPARATOR TANK FOR MODEL NO. 700, 782, 809-B & 882

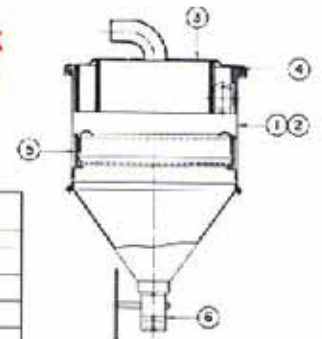
ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE			
		'933	'9332	'9333	'9332
1	Tank only with 1 1/2" inlet	3356	3356	—	—
2	Tank only with 2" inlet	—	—	3357	3357
3	Tank Cover with Gasket	3362	3362	3362	3362
4	Tank Cover Gasket only	2408	2408	2408	2408
5	Slag Screen	2567	2567	2567	2567
6	Butterfly Valve	2378	2378	2378	2378
7	Return Hose Connection 1 1/2"	3345	—	3345	—
8	Return Hose Connection 2"	—	3346	—	3346



16" PRIMARY CYCLONE SEPARATOR TANK FOR MODEL NO. 490 & 490-X

Heated models of all separators available for high humidity locations

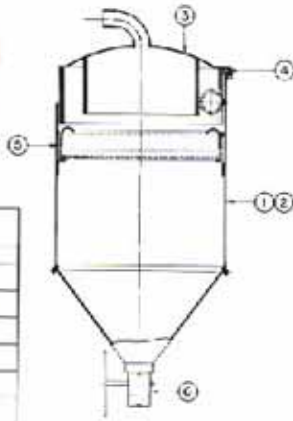
ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE	
		'7190	'7190
1	Tank only with 1 1/2" inlet	3352	—
2	Tank only with 2" inlet	—	3353
3	Tank Cover with Gasket	3350	3350
4	Tank Cover Gasket only	2373	2373
5	Slag Screen	2365	2366
6	Butterfly Valve	2378	2378



18" PRIMARY CYCLONE SEPARATOR TANK FOR MODEL NO. 790 & 890

Heated models of all separators available for high humidity locations

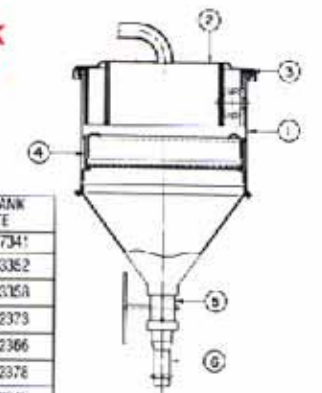
ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE	
		'8345	'8346
1	Tank only with 1 1/2" inlet	3356	—
2	Tank only with 2" inlet	—	3357
3	Tank Cover with Gasket	3353	3353
4	Tank Cover Gasket only	2408	2408
5	Slag Screen	2567	2567
6	Butterfly Valve	2378	2378



16" PRIMARY CYCLONE SEPARATOR TANK FOR MODEL NO. 682 & 690

Heated models of all separators available for high humidity locations

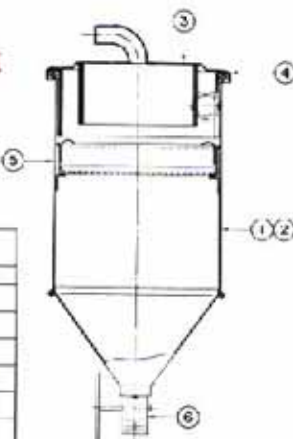
ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE	
		'7363	'7341
1	Tank only with 1 1/2" inlet	3362	3362
2	Tank Cover with Gasket	3359	3359
3	Tank Cover Gasket only	2373	2373
4	Slag Screen	2386	2386
5	Butterfly Valve	2378	2378
6	Return Hose Connection 1 1/2"	—	3346



16" PRIMARY CYCLONE SEPARATOR TANK FOR MODEL NO. 390

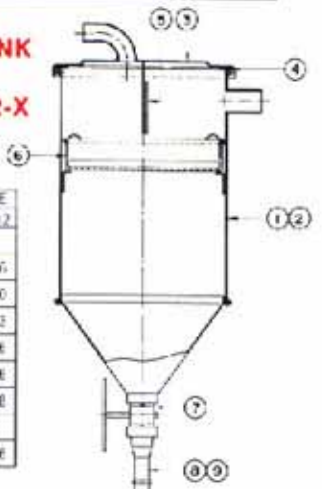
Heated models of all separators available for high humidity locations

ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE	
		'8343	'8443
1	Tank only with 1 1/2" inlet	3354	—
2	Tank only with 2" inlet	—	3355
3	Tank Cover with Gasket	3360	3360
4	Tank Cover Gasket only	2373	2373
5	Slag Screen	2366	2366
6	Butterfly Valve	2378	2378



16" PRIMARY SEPARATOR TANK FOR MODEL NO. 300, 382, 460, 460-X, 482 & 482-X

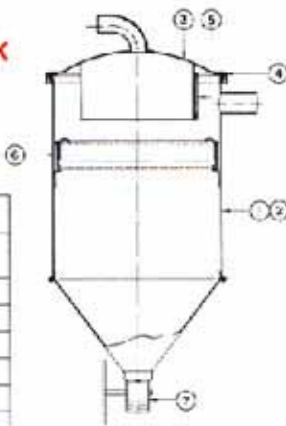
ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE			
		'8111	'8112	'8211	'8212
1	Tank only with 1 1/2" inlet	2415	2415	—	—
2	Tank only with 2" inlet	—	—	3276	3276
3	Tank Cover with Gasket	3280	3280	3280	3280
4	Tank Cover Gasket only	2373	2373	2373	2373
5	Rubber Baffle	3286	3286	3286	3286
6	Slag Screen	2386	2386	2386	2386
7	Butterfly Valve	2378	2378	2378	2378
8	Return Hose Connection 1 1/2"	3345	—	3345	—
9	Return Hose Connection 2"	—	3346	—	3346



18" PRIMARY SEPARATOR TANK FOR MODEL NO. 790 & 890

Heated models of all separators available for high humidity locations

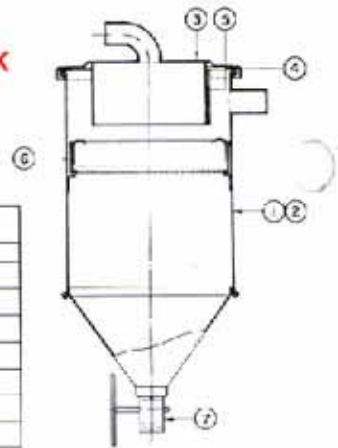
ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE	
		*8120	*8220
1	Tank only with 1 1/2" inlet	2587	—
2	Tank only with 2" inlet	—	3329
3	Tank Cover with Gasket	3323	3323
4	Tank Cover Gasket only	2468	2468
5	Rubber Baffle	3324	3324
6	Slag Screen	2567	2567
7	Butterfly Valve	2373	2373



16" PRIMARY SEPARATOR TANK FOR MODEL NO. 390

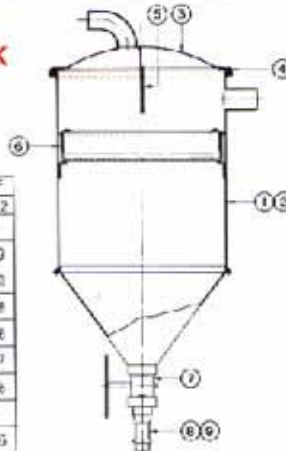
Heated models of all separators available for high humidity locations

ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE	
		*8120	*8220
1	Tank only with 1 1/2" inlet	2415	—
2	Tank only with 2" inlet	—	3276
3	Tank Cover with Gasket	3258	3258
4	Tank Cover Gasket only	2373	2373
5	Rubber Baffle	3220	3220
6	Slag Screen	2365	2365
7	Butterfly Valve	2378	2378



18" PRIMARY SEPARATOR TANK FOR MODEL NO. 700, 782, 809-B & 882

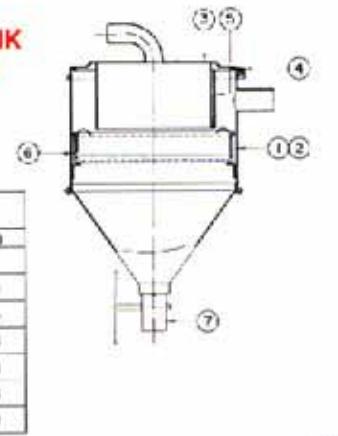
ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE			
		*9111	*9112	*9211	*9212
1	Tank only with 1 1/2" inlet	2597	2597	—	—
2	Tank only with 2" inlet	—	—	3329	3329
3	Tank Cover with Gasket	3330	3330	3330	3330
4	Tank Cover Gasket only	2408	2408	2408	2408
5	Rubber Baffle	3285	3285	3285	3285
6	Slag Screen	2567	2567	2567	2567
7	Butterfly Valve	2376	2376	2376	2376
8	Return Inlet Connector 1 1/2"	3345	—	3345	—
9	Return Inlet Connector 2"	—	3346	—	3346



16" PRIMARY SEPARATOR TANK FOR MODEL NO. 490 & 490-X

Heated models of all separators available for high humidity locations

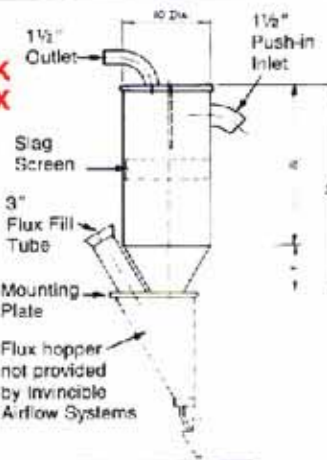
ITEM NO.	PARTS LIST	PRIMARY TANK COMPLETE	
		*7130	*7230
1	Tank only with 1 1/2" inlet	3312	—
2	Tank only with 2" inlet	—	3313
3	Tank Cover with Gasket	3265	3265
4	Tank Cover Gasket only	2373	2373
5	Rubber Baffle	3038	3038
6	Slag Screen	2566	2566
7	Butterfly Valve	2378	2378



HOPPER MOUNT 10" PRIMARY SEPARATOR TANK FOR MODEL NO. 682 & 682-X

Low profile eliminates height requirement

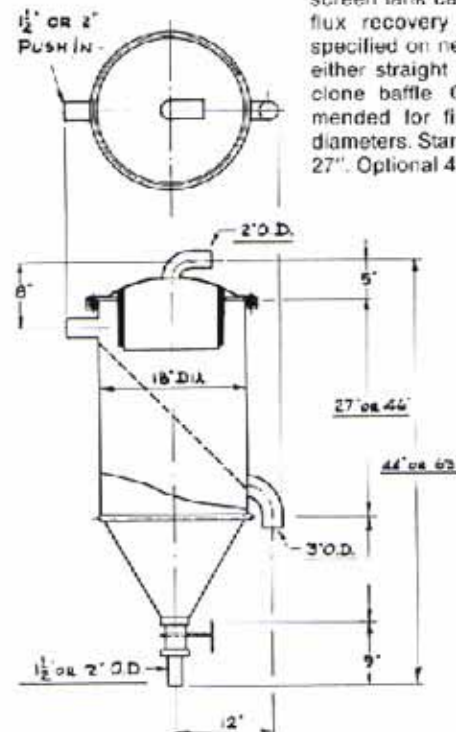
This low profile primary tank mounts directly to a submerged arc welding flux hopper eliminating the height required with our standard primary tank (see installation instructions page 4). Mounting plates are available to interface with most brands of flux hoppers.



Slant Screen Flux Recovery System

Prevents jamming, handles heavy slag accumulation

The slag screen, installed at a 45° angle, prevents slag accumulation. Saves downtime and costly man hours. Can be connected to an auxiliary slag collection tank to increase collection capacity. The slant screen tank can be added to existing flux recovery systems, or may be specified on new units. Available with either straight rubber covered or cyclone baffle. Cyclone baffle recommended for fine flux. Made in 18" diameters. Standard sidewall length is 27". Optional 48" length available.



Slant Slag Screen overcomes screen blockage problems in heavy slag accumulation applications. Slag particles slide down into the holding tank.



Gardner Denver Blower Division
100 Gardner Park, Peachtree City, GA 30269
Toll Free 800-543-7736

Phone 770-632-5000 Fax 770-486-5629
E-mail: blowersmktg@gardnerdenver.com
Visit our web site: www.gardnerdenver.com