Norit Activated Carbon
leading in purification

INFORMATION SHEET

07-906-IS
Jun 2007

Norit Americas Inc. PORTA-PAC®
For Dry PAC Addition

Powdered Activated Carbon (PAC) injection into a flue gas stream is an established, cost effective method to control mercury, dioxin, and furan emissions. This treatment technology is in use or has been successfully tested at coal fired power plants, incinerators, industrial boilers, and metal smelters or furnaces. PAC injection technology is also recognized as the most effective technology (MACT) for control of mercury emissions at Municipal Waste Combustors. A simple and cost-effective system to meter PAC into a flue gas stream is the Norit Americas Inc. pneumatic PORTA-PAC feeder. The PORTA-PAC dry injection system pneumatically conveys a predetermined and adjustable amount of PAC from bulk bags into the flue gas stream being treated. The feeder is portable, and built in two eight-foot sections which make shipping, set-up, and relocation quick and easy. A volumetric feeder meters PAC into a pneumatic eductor where a motive air stream transfers the carbon to the injection point in the flue gas stream. Feeder operation is controlled with a series of interlocks, which allow local and/or remote operation and monitoring of the system.

Scope of supply

Tubular Steel Support Frame	3" square tubing, 6' x 6' footprint, 16 feet tall, primed and painted. Monorail for included chain hoist. Operator safety shield to isolate the operator from the bulk bag during attachment to the system. Four base plates allow 16 anchoring points to secure the system to the foundation (supplied by others).
Electric Chain Hoist With Trolley	Unit includes a one-ton electric chain hoist with handheld control pendant, and a motorized electric trolley for safe and effortless horizontal positioning.
Bulk Bag Lifting Adapter	Tubular steel lifting cross which facilitates the safe and easy lifting of the 900 pound bulk bag with the chain hoist.
Volumetric Feeder	Volumetric feeder to deliver between 1 – 400 lbs/hr of PAC. Unit includes an adjustable speed 1 HP DC motor, 3 ft^3 stainless steel supply hopper with a low carbon level switch. A digital controller regulates the feeder motor speed.
Pneumatic Blower & Eductor	Regenerative blower with a matching eductor to assure smooth, trouble-free transfer of the metered PAC to the injection point. The blower and eductor are sized based on the distance of the unit from the final injection point, and the desired carbon delivery rate. The package includes an inlet filter, inlet silencer, outlet silencer, pressure relief valve, and pressure gauge.
Pressure Switches	A blower discharge pressure switch is utilized to alarm if the blower discharge pressure is above or below set limits. An eductor suction pressure switch is utilized to alarm if the eductor suction pressure is above or below set limits.
System Control Panel	One NEMA 4X control panel houses the digital speed controller for the volumetric feeder, all operator interface devices, the PLC, system fuses, blower motor starter and timer, transformer, and the main system disconnect. A single 460V/3Ø/60Hz electrical feed is required for system operation.

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Description of System Operation

1. The bulk bag is staged under the extension of the monorail and the shrink-wrap is removed.
2. Lower the bulk bag lifting adapter to the top of the bulk bag using the supplied chain hoist.
3. The four straps of the bulk bag are placed around the four arms of the adapter and the bulk bag is lifted using the chain hoist. The hand held hoist control pendent hangs approximately three feet above grade and allows the operator to stand safely away from the suspended bag.

   Note: It is very important that the inner liner be tied to the bottom of the lifting adapter to prevent the liner from falling into the metering equipment and causing damage to the system.
4. When the bulk bag is at the top of the travel of the hoist, the operator moves the hoist using the electric trolley. The operator positions the bulk bag over the opening on top of the volumetric feeder hopper (center of the frame) and then lowers the bulk bag until it is resting on the safety shield.
5. From the ground, the operator reaches through the opening in the safety shield and unties the bottom flaps on the bulk bag, allowing the discharge chute to be pulled out. Carbon will not flow until the drawstring or strap has been released.
6. The discharge chute is unfurled, the inner liner is unfurled and placed inside the bag chute adapter and the outer shell chute is placed around the outside of the hopper connector. The supplied clamp is used to form a dust tight seal. The bulk bag is raised slightly to tighten the chute and then the drawstring or strap is released allowing the carbon to fall into the feeder hopper. If this procedure is followed, the full bag of PAC may be added to the volumetric feeder without dusting or product loss.
7. The air fluidization system should now be turned on using the panel-mounted operator interface (set to 'AUTO'). The PLC has a timer, which controls the time between pulses as well as the pulse. The carbon is partially fluidized, which prevents bridging and other flow problems.
8. The volumetric feeder is now turned on using the panel mounted operator interface and set to the desired dosing rate using the digital speed controller mounted on the face of the control panel. The controller can be configured to read out either in percentage of motor speed or in weight delivered per time period. The unit is supplied with a calibration curve, relating motor speed to lbs/hr of delivery.
9. Before the feeder starts operation, the blower must be running (system interlock). The pressure switch will cause an alarm to sound if the pressure downstream of the eductor is excessive, indicating a potential blockage. The blower is started from the control panel operator interface.
10. Once the feeder has started dosing carbon, the system is in normal operation, and needs no further operator attention. The dosed PAC falls into the “mouth” of the eductor. Motive air from the blower passes through the eductor nozzle and creates a suction, which pulls the dosed PAC into the eductor and moves it to the final injection point.
11. As the carbon level within the feeder hopper drops, more carbon will fall out of the bulk bag to replace it. Norit's exclusive air fluidization system assures good flow out of the bulk bag without over-fluidizing, which leads to flow control problems.
12. When the bag has mostly emptied, some carbon will remain on the bulk bag sides. Using the chain hoist, slowly lift the bag to straighten the sidewalls. The level switch located in the feeder hopper will indicate the low carbon situation. The system alarm will sound and the 'Hopper Level Low' indicator will illuminate. The system will continue to run when in the 'Hopper Level Low' alarm state.
13. At this point, the operator will need to remove the empty bag and load a full bag. Care should be taken when removing the empty bag, as some carbon will remain in the folds of the bag inner liner. By simply retightening the drawstring or strap before disconnecting the bag chute clamp, the bag removal process can be accomplished with minimal carbon dusting.

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Utility Requirements

The PORTA-PAC unit has the following utility requirements:

1. Electrical: Single 30 amp service, 460V/3Ø/60Hz (40 amp required for 10HP blowers)
2. Compressed Air: 1 scfm @ 30 psig (intermittent service for air fluidization)

NOTE: The system may be operated without the air fluidization system connected, but more operator attention will be required to assure that the carbon continues to fall out of the bulk bag into the feeder hopper.

Site Conditions

The unit may be located inside or out. The system design allows outdoor operation and the bulk bags with inner liners protect the PAC from rain or atmospheric moisture.

The PORTA-PAC unit should be located on a concrete surface, so that any of the 'quick anchors' can be used to secure the unit against overturn. **Due to the overturn loads associated with the lifting of a full bulk bag, the unit MUST be SECURED to a suitable foundation BEFORE a bag can be loaded. There is a major overturn moment due to the relatively narrow footprint and the combined weight of the chain hoist at the end of the monorail, a 900 lb bulk bag of PAC, and the weight of the lifting adapter.**

Pneumatic Conveying Piping

The conveying piping/tubing from the eductor discharge to the injection point must be of smooth commercial finish with sweeping elbows used wherever possible. Two-foot centerline radius elbows are sufficient to limit pressure drop in the conveying line. The total elevation change from the eductor discharge to the injection point should be limited as much as possible and dead legs must be avoided.

Please contact **Norit Americas Inc**. by phone (800.641.9245), fax (903.923.1003), or email (info@norit-americas.com) to discuss your application and inquire about availability and pricing.

Norit is your One Source for Carbon Technology!

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As shown at left, the Norit PORTA-PAC is easily secured and assembled by two persons and a forklift in under an hour. The lower portion is anchored to a suitable concrete foundation with sixteen anchor bolts. The upper section can then be attached using the supplied bolts. At this point the electrical service and the delivery piping may be connected.

Once assembled, the prewired and pretested PORTA-PAC is ready for bulk bag loading and immediate operation. Bag loading requires only a single operator and about fifteen minutes to remove the empty bag and load a full one. After removing the shrink wrapping from the full bag, the bag is lifted into place with the hoist. The bag discharge chute is secured to the hopper inlet with the included clamp. The unit remains on-line and dosing during this procedure.

The Norit PORTA-PAC is engineered for use indoors or out. Supplied electrical equipment is suitable for outdoor installation. However, in very cold or very wet locations, placing the unit indoors will greatly reduce the amount of effort required to ensure proper operation of the unit. Additionally, while the bulk bags are shrink-wrapped and have a poly inner liner, care should be taken to store the bags out of the elements since standing water and very low temperatures can cause difficulties discharging the material.

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