

ETV Canada Verified



Elgin Crosswind® NX Street Sweeper Technology Fact Sheet for Elgin Sweeper Company

Performance Claim

The Elgin Crosswind® NX Street Sweeper is a truck-mounted regenerative-air street sweeper, which was operated by a Vendor's representative at an average speed of 5 km per hour in a controlled space where no water or any other liquids were permitted. The sweeper was operated with right-hand side broom (gutter broom) and the center broom operating. In addition, neither water spray nor gutter broom shrouds were used during testing.

The final average performance indicators – at the 95% confidence interval – of the Elgin Crosswind® NX Street Sweeper are as follows:

1. Maximum concentration of PM₁₀ air contamination of $0.010 \pm 0.002 \text{ mg} \cdot \text{m}^{-3} \cdot \text{kg}^{-1}$;
2. Total concentration of PM₁₀ air contamination of $6.12 \pm 0.43 \text{ mg} \cdot \text{m}^{-3} \cdot \text{kg}^{-1}$;
3. Maximum concentration of PM_{2.5} air contamination of $0.008 \pm 0.002 \text{ mg} \cdot \text{m}^{-3} \cdot \text{kg}^{-1}$;
4. Total concentration of PM_{2.5} air contamination of $4.71 \pm 1.93 \text{ mg} \cdot \text{m}^{-3} \cdot \text{kg}^{-1}$;
5. A removal efficiency of test material from surface of $81.8\% \pm 3.6\%$; and
6. Deposit of test material on sidewalk of $0.03\% \pm 0.03\%$.

Technology Application

Elgin's Crosswind® recirculating vacuum sweeper efficiently cleans large flat paved areas such as streets, parking lots, and airport runways. Mounted on the short-wheelbase chassis of either conventional or cab-over chassis, the Crosswind® is operated by simple rocker switches and comes with a complete set of gauges. A combination of large hopper and water tank provides the sweeper with a long work period between trips to dumping, re-watering and fueling sites.

Performance Conditions

The Elgin Crosswind® NX Street Sweeper was tested at the Prairie Agricultural Machinery Institute (PAMI) facility (Test Agent, TA) in Humboldt, Saskatchewan over three test days in October of 2008. The test facility was an enclosed tent about 80m x 11m. The test material was Camel-Wite®, manufactured by Debro Chemicals and Pharmaceuticals, a calcium carbonate-based powder with a mean diameter of about three microns. A total of $271 \pm 3 \text{ kg}$ were applied to the test track, which consisted of two strips that were 2.75 m x 30 m each. The TA conducted the testing and measurement according to the "PM₁₀ and PM_{2.5} Street Sweeper Efficiency Test Protocol Version 1" (City of Toronto, April 2008).

Environmental Technology Verification

Technology Description

The Elgin Crosswind® NX applies the Vendor's patented NX filtration technology (Federal Signal Corporation) as an optional feature to a standard Elgin Crosswind® sweeper. A regenerative-air sweeper incorporates a wide, laterally-positioned pick-up head (hood) that is drawn along the pavement by the truck.

Materials from the curb areas are moved into the pick-up head's path by side broom(s) (also known as gutter broom(s)) located on one or both sides of the sweeper. Within the pick-up head, a high velocity air flow is created across its entire width to loosen, lift and accelerate particles on the pavement and pneumatically convey them to a large diameter outlet duct, which is connected to the main collection hopper. Material and air enters the Crosswind®'s main collection hopper where conveying velocities are rapidly reduced by volumetric expansion, which causes most materials to separate from the air stream. As the air is drawn out of the hopper, it passes through an inertial separator (centrifugal type) designed to further remove particles from the air stream.

The total air flow is then separated into two flows, each having a dedicated air mover. The first flow is drawn through the patented, fine particulate filtration system before entering the air mover and being exhausted to the atmosphere. The second flow is drawn to the Crosswind®'s abrasion resistant fan and is returned to the pick-up head. Within the pick-up head, the return air is distributed to areas where its velocity acts upon materials on the pavement to accelerate and direct them toward the pick-up head outlet. This distribution is through a full-width pressure slot aimed at the ground and toward the direction of travel.

The pick-up head is equipped with flexible curtains to closely follow the road surface and assist in channeling the pick-up head airflow to the outlet duct with minimal leakage. By exhausting air from the first flow noted above, the street-facing portions of the pick-up head remain at a pressure slightly lower than atmospheric while the vehicle progresses and ingests particles, debris and some atmospheric air. The pick-up head is equipped with an optional center broom, which assists the high velocity air flows in loosening and lifting particles and debris from the pavement. This broom is laterally positioned relative to the direction of travel and is located behind the full-width pressure slot. Particles removed from the air stream by the NX technology filter are directed to an airlock device, which allows the particles to be disposed of when desired. This dust can be directed into a disposal receptacle or conveyed back to the main collection hopper (optional).

Verification

The verification was conducted by ORTECH Environmental of Mississauga, Ontario as the Verification Entity using ETV Canada's General Verification Protocol (February, 2007). The verification was based on information supplied by Elgin Sweeper Company, and the performance tests conducted by the TA on the Elgin Crosswind® NX Street Sweeper in October of 2008 according to the "PM₁₀ and PM_{2.5} Street Sweeper Efficiency Test Protocol Version 1" (City of Toronto, April 2008).

What is the ETV Program?

The Canadian Environmental Technology Verification (ETV) Program is delivered by The Bloom Centre for Sustainability (BLOOM) under a license agreement from Environment Canada. The Canadian ETV Program is designed to support Canada's environment industry by providing credible and independent verification of technology performance claims.

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