◆ Verification Statement ◆ Verification Statement ◆ Verification Statement ◆

VERIFICATION STATEMENT

GLOBE Performance Solutions

Verifies the **Operational On-Street Performance** for

TYMCO Model DST-6 Dustless Regenerative Air Street Sweeper

Developed by TYMCO, Inc.
Waco, TX, USA

Registration: GPS-ETV_VR2020-03-31-DST6B

In accordance with

ISO 14034:2016

Environmental Management —
Environmental Technology Verification (ETV)

John D. Wiebe, PhD
Executive Chairman
GLOBE Performance Solutions

March 31, 2020
Vancouver, BC, Canada

Verification Body
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Performance Claim(s)

The TYMCO Model DST-6 Dustless Regenerative Air Street Sweeper was operated according to the vendor's specification and was tested in accordance with the City of Toronto's Operational On-Street Test Protocol – May 2016.

The test section cleaning methodology described in the Protocol was used to determine test material removal efficiency of the sweeper.

The TYMCO Model DST-6 Dustless Regenerative Air Street Sweeper achieved the following collection efficiencies from a paved surface at a 95% confidence level:

1. On a wet paved surface – between 97.25% and 99.49% with an average collection efficiency of 98.37%;
2. When maneuvering around parked cars – between 26.79% and 35.74% with an average collection efficiency of 31.27%;
3. For leaf collection – between 98.27% and 99.79% with an average collection efficiency of 99.03%;
4. For large debris – between 90.00% and 97.00% with an average collection efficiency of 93.50%;
5. For heavy debris – between 98.85% and 99.61% with an average collection efficiency of 99.23%;
6. When operating in dustless mode – between 87.50% and may approach 99.99%[1] with an average collection efficiency of 95.13%.

[1] *Based upon the Protocol methodology where the highest three of four test values are used in the statistical assessment of equipment performance.*

Technology Description and Application

TYMCO Regenerative Air Dustless Sweeping Technology (DST) is designed to thoroughly clean roads and streets while minimizing the release of dust into the air. The street sweeper can have a positive environmental effect by reducing the amount of materials entering the storm sewers which may otherwise end up contaminating surface waters. Additionally, removal of particulate from streets may help reduce airborne contamination by such particulate matter, particularly on windy days.

The main components of TYMCO Regenerative Air Dustless Sweeping Technology (DST) are the blower, pickup head, pressurized hopper, multi-pass cylindrical centrifugal dust separator, and particulate air filters. The closed loop regenerative air system uses a large blower to develop airflow. The air enters a distribution manifold that runs across the pickup head, which has a discharge opening that directs a high velocity blast of air down and onto the pavement and into the cracks releasing dirt. The air and all captured dirt and debris are then drawn out of the pickup head through a hose and directed into the hopper. An operator controlled cylindrical broom rotating in the pickup head also assists in loosening material and releasing it into the air stream.

After the debris-laden air stream is drawn into the large hopper, the air loses velocity allowing the larger debris to fall to the bottom. A screen at the top of the hopper prevents items such as leaves, paper, cans, and rocks from leaving the hopper. The air then enters the centrifugal dust separator. The multi-pass centrifugal dust separator further cleans the air as it spins on the curved wall of the centrifugal chamber skimming off dust particles and returning them into the hopper. The cleaned air is returned through the blower to the pickup head to start the regenerative air cycle again.

A small portion of the air leaving the blower is exhausted to atmosphere so that less air enters the pickup head than is being drawn off, thus maintaining the necessary vacuum in the pickup head. Prior to being exhausted, this small portion of air is further cleaned by being first run through a bank of small cyclone pre-cleaners and then through four membrane filters that have a Minimum Efficiency Reporting Value (MERV) 16 Rating, with the ability to capture a minimum of 95% of 0.30 micron and larger size particles.[2]

[2] *The TYMCO Model DST-6 has always used Torit-Tex® filter cartridges, as declared by the manufacturer, Donaldson Company, Inc. Independent testing carried out in accordance with the American Society of Heating, Refrigeration, and Air Conditioning Engineers [ASHRAE] 52.2 testing criteria, has reportedly determined these membrane filters to achieve a MERV 16 rating with the ability to capture greater than 95% of 0.3 micron and larger particles. Previous filter manufacturer-selected testing had rated the filter cartridge's performance as the ability to capture 99.999% of 0.50 micron and larger-sized particles. This Verification Statement has been updated to reflect the declared ASHRAE 52.2 testing results.*

TYMCO Model DST-6 Dustless Regenerative Air Street Sweeper technology is engineered to allow the sweeper to perform in all types of weather conditions with no operator adjustments required.

Performance Conditions

Testing of the TYMCO Model DST-6 Dustless Regenerative Air Street Sweeper was conducted by the Prairie Agricultural Machinery Institute (PAMI) on local streets in Humboldt, Saskatchewan, according to the manufacturer's recommended operational settings, including specific settings of broom assisted sweeping using the broom assist pick-up head and no shrouds installed on the gutter brooms. The sweeper's operational configuration, including gutter broom tilt angle and dust suppression water application, was adjusted as required before each test section. The testing was performed over four test days from October 19 to 22, 2016. A manufacturer representative with street sweeper experience operated the test sweeper during testing with a PAMI employee in the cab observing and documenting all operational procedures.

As specified in the Protocol, each test run procedure involved the TYMCO Model DST-6 Regenerative Air Street Sweeper sweeping approximately 345 kg (761 lb) of test material spread out over six test sections, with each section measuring 30 m (98.4 ft) or 40 m (131.2 ft) long. The test section cleaning methodology described in the Protocol was used to determine test material removal efficiency of the sweeper.

Verification

This verification was first completed in March 2017 and is considered valid for subsequent renewal periods every three (3) years thereafter, subject to review and confirmation of the original performance and performance claims.

The original verification was completed by Ortech Consulting Inc. of Mississauga, Ontario, using the Canadian ETV Program General Verification Protocol (June 2012) and conforming to the ISO 14034:2016, Environmental Management -- Environmental Technology Verification (ETV). Testing of the TYMCO Model DST-6 Dustless Regenerative Air Street Sweeper was conducted by the Prairie Agricultural Machinery Institute (PAMI) on local streets in Humboldt, Saskatchewan.

This ETV renewal is considered to meet the equivalency of an ETV verification completed using the International Standard ***ISO 14034:2016 Environmental management -- Environmental technology verification (ETV)***.

What is ISO14034:2016 Environmental management – Environmental technology verification (ETV)?

ISO 14034:2016 specifies principles, procedures and requirements for environmental technology verification (ETV) and was developed and published by the *International Organization for Standardization (ISO)*. The objective of ETV is to provide credible, reliable and independent verification of the performance of environmental technologies. An environmental technology is a technology that either results in an environmental added value or measures parameters that indicate an environmental impact. Such technologies have an increasingly important role in addressing environmental challenges and achieving sustainable development.

For more information on TYMCO Model DST-6 Dustless Regenerative Air Street Sweeper please contact:

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