

# ETV Canada Verified



## Tymco DST-6 Regenerative Air Street Sweeper Technology Fact Sheet for Tymco International LTD.

### Performance Claim

The Tymco DST-6 Regenerative Air Street Sweeper was operated according to the vendor specification at a speed limit of about 5 km/h in a controlled space where no water or any other liquids were permitted. No water sprays or gutter broom shrouds were used in the testing.<sup>1</sup>

The sweeper was delivered in its optimum balance of dry dust-less operational mode while also maximizing the pick-up and removal of test material (mean size of test material is 3 microns).

The Tymco DST-6 Regenerative-Air sweeper achieved the following:

- i) A removal efficiency of test material from surface greater than 90% (90% confidence)
- ii) Deposit on sidewalk efficiency less than 0.16% (95% confidence)
- iii) Maximum concentration of PM10 air contamination less than 0.08 mg/m<sup>3</sup>-kg (95% confidence)
- iv) Total concentration<sup>2</sup> of PM10 air contamination less than 10.0 mg/m<sup>3</sup>-kg (95% confidence)
- v) Maximum concentration of PM2.5 air contamination less than 0.02 mg/m<sup>3</sup>-kg (95% confidence)
- vi) Total concentration of PM2.5 air contamination less than 5.0 mg/m<sup>3</sup>-kg (95% confidence)

<sup>1</sup> As listed in "Street Sweeper Efficiency Test Report – Tymco DST – 6 dated January 20 2006 from City of Toronto, Transportation Services, and Environmental Services.

<sup>2</sup> Total concentration calculated by summing the 1200 readings taken at 1 second intervals over a 20 minute period starting at about 5 minutes before the maximum reading following the sweeper's pass and divided by the kilograms of material picked up and entrained inside the hopper

### Technology Application

The Regenerative Air Street Sweeper Technology is designed to thoroughly clean roads and streets while minimizing the dust released 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.

### Performance Conditions

The analysis is based on data collected over the three test days of September 27, 28 and 29, 2005. The test facility was an enclosed tent about 80 x 11 m. The test material was Camel Wite, which is a white powder with a mean diameter of about 3 microns. Approximately 270 kg were applied to the test track, which consisted of two strips that were 2.75 m x 30 m.

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## Performance Conditions (cont'd)

The sweeper was operated by a manufacturer representative at about 5 km/h in the 'dry' mode (no water spray) with the right gutter broom operating. The City of Toronto staff conducted the testing and measurement according to their Street Sweeper Test Protocol.

## Technology Description

The main components of the Regenerative Air Street Sweeper are the blower, pickup head, pressurized hopper, multipass cylindrical centrifugal dust separator, and 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 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.

## Verification

City of Toronto's test protocol was used for testing a Tymco DST-6 street sweeper. The testing took place at Disco Yard, Toronto. The verification was completed by Prairie Agricultural Machinery Institute (PAMI), Saskatchewan, using ETV General Verification Protocol (March 2000).

## What is the ETV Program?

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

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