

Stationary Vacuum Systems

FACT SHEET

RESIDENTIAL FLAT BUILDING WASTE
COLLECTION INFRASTRUCTURE

Overview

Automated waste collection systems (AWCS) or stationary vacuum systems comprise of a network of underground pipes that transport waste at high speeds from above-ground disposal locations (known as “inlets”) to a central terminal station. As air enters the pipe system under vacuum conditions, the storage valves located underneath each inlet are emptied of waste one by one into the pipeline.



Source: Copyright Envac

Wall Mounted Inlets, Sweden

Technical Information

- Inlets can be stand-alone or wall mounted, and located indoors (with garbage chutes) or outdoors
- Residential inlet chute capacity of 20 to 30 litres (and up to 120 litres for commercial uses)
- System is configurable for garbage, mixed recycling and organics (different inlets for each). ‘Revolver’ system is available to handle multiple streams within the same chute
- Not suitable for collection of bulky cardboard boxes, other bulky wastes, or large quantities of glass
- Compactors or screw tanks can be stored below disposal inlets to streamline waste transfer into the pipe system
- System operates 24/7, 365 days per year and is self-cleaning with air valves and inspection manholes provided at regular intervals
- Computerised control system, remotely monitored by about 2 full time operators
- Pipes are commonly made out of carbon and steel, composite alternatives are also available
- Pipe diameter ranges from 300 to 500 millimetres and requires a trench depth of 1.5 metres
- Pipeline should not exceed an inclination of 20 degrees, can be built and extended in stages and has a lifetime of about 30 years
- Terminal station houses bulk waste containers, compactors, exhaust fans, air cooling system, a control/electric room and dust filters
- Terminal station is typically located within 2 kilometres of the central pipe network
- Construction timeline of about 20 months

This project is a NSW EPA Waste Less, Recycle More initiative funded from the waste levy.

Suitable Building Types

Best suited to residential flat buildings with 1,000 or more dwellings and between 3 to 50 floors, or as part of a residential and commercial precinct where waste is generated in sufficient quantities for the system to be feasible. Implementation at new, greenfield sites is most cost effective. Retrofits and staged implementation are also possible.

Education Needs

Residential education to target:

- If inlets are placed at ground level, disposal of small bags of waste as residents travel in and out of their building and past disposal inlets
- Disposal of hazardous wastes such as batteries, and bulky wastes such as cardboard boxes, via other residential collection systems
- Source separation of recyclables and disposal of recyclables as loose items (without containment in a plastic bag)

Contractors engaged to implement the vacuum system should work with councils to roll out effective education.

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Case Studies

Sunshine Coast Council is currently implementing a vacuum system at the new 53 hectare Maroochydore City Centre. The 6.5 kilometre pipe network will be installed in 3 stages over the next 10 to 12 years and inlets for organic, recyclables and garbage will be provided. Waste will be transported from residential buildings (2,000 dwellings), commercial buildings and public areas to a central terminal station. It will cost approximately \$21 million to install (to be recovered from city centre occupants over the life of the system).

A vacuum system was installed in **Quebec City in Canada** during 2012 to 2013 at La Cité Verte, an ecocity incorporating sustainable solutions such as rain water recycling and better management of urban transport. Food organics, mixed recyclables and garbage are collected in the system. It has 48 residential inlets serving 800 units, 9 commercial inlets, and a pipeline network of 1.2 kilometres buried 3 metres deep. Waste transfer through the pipeline usually occurs two to five times a day and takes about 15 minutes each time.



Outdoor Waste Inlets, Sweden

Strengths

- Significantly increased waste storage capacity and collection efficiency
- Ability to adjust to fluctuations in waste volumes and 24/7 service availability
- Ability to incorporate user identification systems
- Improvements to the conditions of living and the aesthetics of an area with reduced truck movements, noise, odour and vermin, and removal of bins from streets
- Improved WHS as system operatives are not required to manually handle bins
- Inlets are robust, are unable to be moved or stolen, and are therefore less susceptible to damage than typical bins
- Pipeline can be installed in stages and retrofit into buildings
- Blockages are not common occurrences and are easily fixed

Weaknesses

- Requires suitably sized terminal station
- Significant upfront capital costs to install system
- Requires sufficient waste tonnages for the system to be financially feasible
- Significant civil infrastructure works and planning required (can be installed as part of wider civil engineering project)
- Installation in an existing built up area may contribute to congestion of underground utilities
- Power required to operate exhaust fans from central terminal station.

Compliance

- Suitably qualified welders required for pipeline construction to comply with local standards for high pressure water mains and gas pipelines
- Air moved during the operation is cleaned using a cyclone separator and purified by activated charcoal filters to prevent dust and odour nuisance.

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