



500 ZE

THE FIRST IN A NEW **ALL-ELECTRIC** GENERATION OF SWEEPERS



BY APPOINTMENT TO HER MAJESTY THE QUEEN
SUPPLIER OF SWEEPING MACHINES

500ZE

Even at close quarters and in confined spaces, pedestrians are unaffected by noise or emissions



The Electric Sweeper generation is here. Green Machines™ new 500ze uses innovative Lithium-ion technology to sweep a hard-working 8 hour non-stop shift (TÜV certified) without recharging. This significant step for carbon emission reduction means totally clean air operation – perfect for enclosed or crowded pedestrian areas. Combine this with remarkably low fuel costs* and Green Machines' specialist engineering expertise and you'll appreciate its environmental significance.



CARBON SAVING AGAINST A STANDARD 2M³ SWEEPER IS EQUIVALENT TO 40 CARS



6 KEY FACTS

- 8 hours full operation per charge
- virtually silent in transit
- absolutely zero emissions
- 2,000 cycles per battery minimum
- full performance municipal sweeper
- fuel cost €2.80* per day

*See back cover for fuel calculation



TURNING CIRCLE
205cm

THE ALL-ELECTRIC SWEEPER IS HERE

No fumes and quiet operation are valuable in and around shopping precincts where litter often collects



ZERO EMISSIONS

Annual carbon output of a 2m³ sweeper is 50 tonnes per year, the 500ze is zero. This saving is the equivalent to the carbon output of 40 cars. This means cleaner cities, cleaner air for pedestrians and strong step towards carbon emission targets.

VIRTUALLY SILENT IN TRANSIT

The 500ze is almost silent in transit and can operate with confidence in noise sensitive areas such as parks, schools, hospitals, residential areas and for early/late shifts. It is difficult to hear the 500ze over the gentle rustling of trees!

INNOVATIVE POWER

The 500ze is powered by two Lithium-ion batteries. Energy levels are intelligently balanced between the two, by trickle feeding and there is energy regeneration during braking. Performance is optimised throughout the battery's 2,000 cycle lifetime – without fall off. Short option recharging time is 4 hours, on or off-board, and batteries can be changed in 15 minutes (just time for a cup of tea).

RELIABLE AND LOW RUNNING COSTS

The power and efficiency of Lithium-ion technology makes energy supply as reliable as conventional fuel. The 500ze has live and accurate battery charge display, a low battery alarm and a 20km run-home capacity. The recharging of batteries at 2009/10 electricity prices will total approximately €2.80 for an 8 hour cleaning operation.

See back cover for comparative calculation against diesel.

SOPHISTICATED ELECTRONIC MANAGEMENT
The advanced control system offers 'sweep' or 'transit' intelligent switching with full logging and diagnosis. Drive-by-wire technology delivers precise manoeuvrability, matching speed to power via simple pedal operation.

EASY MAINTENANCE

The twin tipping of hopper and cab and easy removal of the batteries allows good access to all mechanics; parts are readily available 'off-the-shelf' industrial components.

VERSATILE, LIGHT AND COMPACT

At under 2,500kg the 500ze leaves delicate surfaces undamaged, and is easy to load on and off trailers. With a .75m³ capacity hopper, 1200 sweep path, 2.05metre turning circle, 2m clearance height, joystick-controlled brushes and no fumes, the 500ze can go almost anywhere!

SUPERIOR CLEANING AND DUST CONTROL

The 500ze's powerful suction is suited for even coarse debris, and effectively 'eats' dust, thanks to its 3-stage cyclonic separation and Cloudmaker™ misting system which dramatically reduces water consumption and extend operating time between water fills.

SWIFT, SAFE AND COMFORTABLE

Moving swiftly and silently between sweep areas at up to 25kph, the 500ze's fine-tuned coil-spring suspension gives a 'car-quality' ride. Cabin and controls are ergonomically designed with floor to roof windscreen. Rear monitor TV screen, radio/CD player and air con, add comfort and function.

A full 8 hours' operation with all facilities in use, plus a 20km run-home reserve, while reliable and accurate charge display removes driver 'range anxiety'



Fast food restaurants and busy shopping areas can be cleaned up to doorways without nuisance



SPECIFICATIONS

Batteries Twin Li-ion battery packs controlled via integrated Battery Management System (BMS) with live fuel gauging. Intelligent battery power level balancing system.

Battery endurance - Full 8 hours working shift (TÜV certified) plus 'return to base' reserve.

Charging time - single phase (220V 16A) 7 hours; three phase (400V 32A) 4 hours. Battery Packs are easily changed (15mins approx.) to provide double shift option.

Battery life minimum 2,000 cycles.

Brakes primary braking is provided by single pedal transmission (as in hydrostatics), with regenerative electrical braking, Hydrostatic Drum Brakes (Knott). Secondary braking is via hydraulic brakes on both front and rear wheels using emergency brake pedal. Mechanical brake on rear wheels provides parking brake.

Brushes 2 x 600mm polypropylene sweeping brushes (PET option) produce a sweep width from 1300mm up to 1800mm. Independent control of left and right brushes via joysticks in cab. Brush ground pressure adjustable from within cab. Automatic brush angle compensation means optimum sweeping efficiency is maintained as brushes wear down. Automatic brush park and lock. Brushes powered both in and out for easy cleaning of corners etc.

Cab constructed in high grade aluminium with a strong tubular safety cage, the operator cab is spacious, ergonomic and extremely well equipped. Standard features include: full length laminated safety glass windshield with electric heater element for rapid demisting; opening roof hatch and side-windows for ventilation; two speed fan heater; optional air-conditioning; fully adjustable premium comfort suspension seat and adjustable steering wheel; 'one button' sweeping for easy operation and with a host of safety/convenience features such as safety start interlock,

parking brake warning buzzer, internal door locks, seat belt, electric and hydraulic watchdog facilities, automatic suction nozzle lift etc. Easy to drive, with forward/neutral/reverse and independent brush controls mounted on the operator arm rest. Excellent instrumentation includes Battery Management System (BMS), displaying 'fuel gauge' energy consumption. Automatic sweeping system shutdown when 'gauge' enters 'vehicle return to base' mode (to ensure sufficient power to return to tip and clean). Cab options include a radio/CD player complete with overhead speakers, a colour CCTV reversing camera and two speed air-conditioning.

Chassis & suspension purpose-built chassis constructed from Chromweld stainless steel for maximum durability provides easy access to battery packs mounted on each side of the machine. Comes with 10-year anti-corrosion warranty for peace of mind. Fully independent fine tuned adjustable coil spring/shock absorbers on all four wheels gives near-automotive quality ride for excellent operator comfort and reduced vibration. Safe and smooth ride over irregular surfaces at speeds up to 25 km/h.

Drive systems Drive motor: 15kW high durability brushless Induction AC traction motor driving 18:1 reduction rear axle.

Auxiliary Drive: Power steering, hydraulic cylinders, brush drive via AC motor and dual hydraulic pump.

Selection of 'sweep mode' triggers autodeployment of the sweeping equipment. MMU provides 'automatic gearbox' driving characteristics with a limited slip differential to assist kerb climbing. It also provides extensive 'watchdog' shutdown capabilities plus logging for vehicle functional analysis in kilometres or miles, e.g. hours swept/distance swept, hours travelled/distance travelled/transit

FUEL COST COMPARISON

Fuel consumption

Figures based on a 2 metre³ sweeper.

	Electric	Diesel
Total machine run time	8hrs	8hrs
Consumption	5.79kw/hour	10 litres
Price per	€0.1 kw/hour	€1.00/l
Total 8 hour day shift cost	€2.80	€80.00

This is your only fuel bill, and there is no fall off in battery performance.

OPTIONAL FITTINGS

Air conditioning: two level cab air conditioning also controls in-cab humidity.

Pressure washer: high pressure water pump delivering 13 l/min (3.43 gal/min) at 90bar (1305psi). 5m (16.4ft) lance hose. Utilises onboard water supply of 120 litres.

Wander hose: lightweight 110mm x 3m (4.3" x 118") flexible hose.

speeds/ sweeping speeds/systems 'events'. Mobile 'phone connection facility allows factory access to remote diagnostic or machine test function if required (remote access and diagnostics available via external wireless modem when fitted).

Hopper High grade aluminium with capacity of 0.75m³ useable volume. has a high level pivot giving 1.3m clearance to allow tipping into standard skips or over RCV raves. Hopper tipping is by hydraulic ram, and hopper rear discharge door is opened by an independent hydraulic ram to provide easy access for swift cleaning and bulky item disposal. Hopper fitted with patented automatic water ejector to prevent wet weather over loading.

Lighting LED tail lamps, beacon and work lamps for energy conservation.

Power System 30A DC/DC converter supplying full automotive vehicle systems vehicle lighting complies with all current Construction and Use and EEC Lighting regulations. All systems are fully protected by fuses.

Speeds and gradient: maximum speed 25kph, enabling swift travel between depot and workplace.

Maximum climbing gradient 20%.

Steering Hydrostatic steering ensures maximum manoeuvrability in restricted spaces with minimal effort. Pivot-anchor beam with Ackerman steering coil spring over damper suspension with anti-roll system.

Suction system variable speed, electrically-driven 10 blade ø500mm stainless steel clean fan, hopper mounted, driven by three phase AC induction motor provides superb suction performance.

Multi-stage dust suppression includes: water spray on each brush, Cloudmaker™ - a patented rotary water atomiser at suction nozzle, a water jet within the inlet duct, side entry hopper cyclonic action and twin cyclonic inertial separators, providing maximum dust suppression. Water tank capacity is 120 litres.

Tyres & Wheels 155/70 R 12C, 104/102N tyres on 5 stud. 4.5J and 305mm rims fitted on front and rear axles, giving low footprint loadings when operated on paving slabs and other sensitive surfaces.

Specifications may be subject to change without notice.



INNOVATION IS OUR BUSINESS

Tennant Company - the parent company of Green Machines - is a world leader in designing, manufacturing and marketing solutions that help create a cleaner, safer world. In 2009 Tennant won the European Business Awards 'Business Innovation of the Year' for its groundbreaking ec-H2O™ technology, which converts plain tap water into a powerful cleaning agent without any added chemicals.

500ze Dimensions

Length - overall (incl. brushes) mm	3330
Length - over body	2765
Width - over body	1200
Height (excl. folding beacon)	1980
Wheelbase	1380
Wheel track (C/L tyres)	1000
Kerb weight (ready to sweep) kg	2300
Gross vehicle weight	2670

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