

Specifications for a Hybrid Propane/Gasoline or Hybrid Diesel Powered Combination Rider Sweeper/Scrubber with 61 inch (154 cm) Sweep Path and 48 inch (122 cm) Scrub Path

INTENT: The intent of these specifications is to describe a dedicated sweeper/scrubber combination rider machine offering dry cylindrical sweeping and wet disc scrubbing. This machine is powered by either liquid propane, gasoline or a diesel fueled engine system as part of an electric hybrid drive system. This machine is capable of sweeping and scrubbing surfaces such as concrete, asphalt, tile, marble, or terrazzo flooring.

To minimize labor costs, the capacities of this machine are critical as well the design of dedicated front dry sweeping and wet rear scrubbing functions. The dedicated sweeping and scrubbing functions avoid unnecessary clean-up and maintenance costs associated with cylindrical scrubber/sweeper technologies that sweep wet debris into a common hopper.

All exceptions to the Specifications must be clearly identified and submitted, in writing, on a separate sheet of paper marked “Exceptions”. Bidders who fail to submit their exceptions will not be considered.

POWER SOURCES: Machine shall have a high efficiency, electric, hybrid drive system offering a up to a 30 percent reduction in fuel consumption and green house gas emissions compared to conventional engine driven hydraulic scrubbers and sweeper/scrubbers of similar capacity and productivity ratings. Reduced fuel consumption also permits up to twice the amount of run time on a tank of fuel. For optimal energy efficiency all systems are to be electronically controlled and powered using electric motors and actuators. Minimal use of hydraulics also provides leak-free, environmentally friendly operation. This includes an intermittently operated self-contained electrically driven hydraulic power unit and cylinder for the hopper raise and lower function.

System shall also contain a 36 Volt gel battery or equivalent system capable of providing other essential functional capabilities including: up to 30 minute machine transport or up to 15 minutes of scrubbing/sweeping capability without engine power. This allows driving the machine to a refueling point or intermittent sweeper/scrubbing in areas where noise and exhaust emissions would be unacceptable including confined spaces, areas in close proximity to workers or other noise and exhaust sensitive environments.

Power system utilizes industrial design Kubota engines for maximum life and high capacity 36 Volt A/C brushless alternator and propulsion motor that requires no routine maintenance compared to typical hydraulic pumps and motors.

	CS7000 LP/Gas Hybrid	CS7000 Diesel Hybrid
Engine Configuration	Kubota WG972 3 cyl., 0.96 L 30 hp (22.0 kW) rated	Kubota D1305 3 cyl., 1.26 L 29 hp (21.7 kW) rated
Alternator Configuration	36 V A/C Brushless	
Propulsion System	36 V A/C Brushless	
Hybrid Battery	(3) 12 V, 98 Ah Gel	
Water Ingression Rating	All electric drive motors and actuators rated IP55 for water wash-down	

SWEEPING SYSTEM: Must include a complete standalone dry sweep system with single direct throw main broom and hopper located at the front of the machine that can be used independently of components of the scrub system. Debris must be captured dry for easy handling and dumping. Dual side broom sweeping path must be 61 inches (154 cm) with an independent cylindrical style main broom of 36 inches (90 cm) with minimum 12 inch (31 cm) diameter. The sweep path must fully sweep the squeegee path to prevent debris from breaching the squeegee seal. The hopper must have a minimum capacity of 7 ft³ (198 L) and have a variable dump height up to 60 inches (152 cm). Sweeping system must include system that increases safety and reduces broom wear by disengaging the entire sweep system and dust control system when the machine is stopped. When set to active, the sweep system must start and stop with the machine's motion.

Full sweep and dust control system activation through the touch of a single switch in the operator area. Both main broom and side broom height are adjustable from the operator's seat providing convenience plus simplified and safe operation of the machine. Relative main broom height is displayed graphically on a LCD screen providing the operator indication of when the main broom is near wear limits and needs to be replaced.

When the machine is in sweep and scrub mode and being propelled backwards, the sweep system main broom will automatically be raised momentarily for a programmable time interval to prevent sweeping water from the scrub system into the dry hopper.

Independent switches must be clearly labeled for hopper dumping tasks and for other sweeper based operations like filter shaker cycle, wet sweep bypass, side broom on/off and height adjust.

DUST CONTROL SYSTEM: A full dust control system must be employed that starts at the side brooms with water mist dust suppression to keep fugitive dust emissions at a minimum. System must utilize skirting at the main broom chamber and a vacuum system to prevent dust leaving the broom chamber to atmosphere. Must include a dust filter that is of fluted (not pleated) technology for 10 percent greater dust capacity prior to plugging and more consistent filter dust shake out with surface area no less than 115 ft² (10.7 m²). The dust filter must have an efficiency >98% on 0.3 – 1.0 micron particles to assure excellent dust control. The filter must be located in the dry debris hopper away from the water areas of the scrub system since water on a dust filter greatly reduces its performance. Captured dust must be shaken directly back into the dry debris hopper with a 15 second timed vibratory shaker system that is in direct contact with the filter media and provides vibration energy at variable frequencies to assure maximum liberation of dust from filter. Filter shaker cycle must be programmable to all shake cycle to last up to 40 seconds. Filter shaker system must execute by activation by the operator or automatically each time the main broom is raised.

SCRUBBING SYSTEM: Must contain a complete, independent scrub system with disc brushes. Scrub deck must utilize a three 17 inch (43 cm) disc brush design to provide an effective 48 inch (122 cm) scrub path. Right side of the scrub deck must project outside the frame profile of the machine to provide edge scrubbing capabilities and minimize the need for secondary scrubbing/cleaning operations. Right side of scrub deck must be allowed to pivot inward such that impact with solid objects will not damage the deck, machine, or facility and will not compromise operator safety. Deck pivot tension mechanism can be manually released to allow the operator easier access to the center disc brush.

Whenever the scrub function is activated, brush rotation shall begin automatically whenever the machine is propelled in either forward or reverse direction. Solution flow and optional detergent dispensing is also automatically initiated only when propelling the machine. Solution flow rate is automatically increased in response to operator demanded increases in brush pressure to provide more effective cleaning. Solution flow rate is also independently adjustable from other scrubbing parameters. Machine must provide protection to the floor by ceasing brush rotation whenever the machine is stationary as well as stop all solution flow to prevent solution puddles.

The machine shall be able to operate at five preprogrammed flow rates ranging from 1 - 3 GPM (3.79 – 11.36 L/min). This allows sufficient flexibility for cleaning a wide range of surfaces, to both minimize water use and dump/refill cycles.

With optional detergent dispensing, four distinct scrubbing modes are possible to minimize water, detergent, and energy consumption, while extending scrub brush life.

Single switch activates full scrub, vacuum and solution system which does not begin operation until the machine is in motion and stops again when the machine stops to prevent floor damage, increase safety and prevent flooding.

Three programmed scrub settings are preset with down pressure up to 400 lb (182 kg) of down force at maximum setting. Each setting has a preset solution flow, increased flow for higher down pressure, for the pressure setting that can be manually overridden. Down pressure and water flow for each of the scrub settings is programmable if customer desires to deviate from the factory settings.

Solution water dispensed to the scrub deck may be heated with an optional onboard heat exchanger to deliver an increased temperature of up to 20° F (11° C) for increased cleaning efficiency and reduced detergent usage. The system uses waste heat from the engine cooling system and requires no additional fuel consumption for operation.

Rear squeegee and vacuum system can be used independent of the scrub system for picking up standing water.

Double scrubbing is possible by raising the rear and side squeegees and using the scrub system on any down pressure setting.

Cleaning cycles can be extended by utilizing the Extended Scrub functionality. Extended Scrub will take water from the recovery tank, add proper dilution of the cleaning chemical and apply it to the scrub deck after the solution tank is empty. Extended scrub system shall not introduce reclaimed water from the floor into the solution tank system to minimize cleaning requirements and the risk of microbial formation.

ONBOARD DETERGENT SYSTEM: Machine shall be capable of dispensing detergent into the clean water solution flow using any suitable manufacturers' liquid detergent placed into a refillable reservoir having a minimum capacity of 5 gallons (19 L) split between 2.5 gallon (9.5 L) containers that can contain different detergents for different applications. A single switch shall be provided to provide a momentary 60 second increase in brush pressure and solution flow rate with increased chemical strength. This allows more effective cleaning of floor areas with higher soil levels. After 60 seconds the machine will automatically revert back to green cleaning mode without operator input to reduce detergent and water consumption as well as minimize brush wear.

System must be capable of purging all detergent from the supply line. Rapid interchange of multiple detergent reservoirs for varied cleaning applications without the need for tools. Shall incorporate separate detergent pump for dispensing solution to the scrub brushes. Detergent system bottles must be refillable and shall be able to accommodate and be compatible with various liquid detergents and concentrations from multiple manufacturers.

Green cleaning characteristics include:

1. Low concentration detergent (programmable by user)
2. Maximum concentration detergent (programmable by user)
3. One touch 60 second momentary increase in cleaning power by increasing brush pressure, solution flow rate, and detergent concentration (resumes to Green cleaning mode automatically after 60 seconds)
4. Cleaning with pure water

Three programmable cleaning options combining brush pressure, solution flow rate, and detergent concentration that can be selected with a single switch to optimize the cleaning performance to support various application areas and levels of cleanliness within a particular facility.

VACUUM RECOVERY SYSTEM: To be equipped with dual vacuum fan motors capable of delivering 54 inches (137 cm) of waterlift and high velocity air flow to permit the use of a 3 inch (7.6 cm) diameter recovery hose. This combination provides superior water recovery capabilities, reduces plugging, and assures safe dry floors.

Vacuum motors are protected with a ball float and full recovery tank vacuum fan shutoff. Vacuum fan shall continue to operate for 10 seconds after squeegee is lifted from the floor to clear the vacuum hose of excess water.

SQUEEGEE DESIGN: Shall have a minimum width of 53 inches (135 cm) from roller end to roller edge with four-sided wiping blades, quick-release mechanism, and “break-away” design. Shall be constructed using corrosion resistant material and require no tools for adjustment or blade replacement. Squeegee design must be wide enough to capture water from the scrub deck and shift during turns to better capture water. Squeegee frame width must contain guide wheels at the outer edge of the squeegee to guide the squeegee along walls.

SOLUTION / RECOVERY TANKS: Two separate tanks with fixed volume must handle the solution and recovered water. The solution tank must have a minimum capacity of 75 gallons (285 L) and the solution tank must be equal to the solution tank volume. Tanks must be capable of handling solution up to 150° Fahrenheit (65° C), with construction consisting of roto-molded polyethylene or equivalent. Solution tank shall be refillable from the rear of the machine.

The recovery tank must contain a drain hose with threaded cap for proper seal and pinch style flow control near the end to prevent overflowing the drain system. The tank drain location and design must ensure the majority of recovered debris and all water will exit the tank. To prevent tank odor, all inner surfaces of the recovery tank must be easily accessible for final rinse out with no captive or blind corners. Recovery tank shall require no tools to lift off for deeper cleaning when desired.

DRIVE SYSTEM: High efficiency A/C brushless drive motor coupled directly to a planetary gear box with no belts or chains allowed. Maximum transport speed is achievable at minimum engine speed and power minimizing fuel consumption and noise levels below maximum published levels.

Propel Speed - Transport: 5.5 mph (8.9 km/h)
 Scrubbing: 5.5 mph (8.9 km/h)

Gradeability - Transport (Full): 12°/21%
 Scrubbing and Sweeping (Full): 10°/17.6%

SOUND LEVEL: Shall not exceed the levels at operator position as follows:

	CS7000 LP/Gas Hybrid	CS7000 Diesel Hybrid
Sound Level (IEC60335-2-72)	82 dB A	81 dB A

MACHINE DIMENSIONS: For optimal maneuverability the overall maximum machine dimensions for each given capacity shall not exceed the following:

Scrubber Model	CS7000
Length	103 inches (262 cm)
Width	
Without Squeegee	48 inches (122 cm)
Squeegee	53 inches (135 cm)
Height	
Standard	59 inches (150 cm)
Standard Overhead Guard	82 inches (208 cm)
Low Clearance Overhead Guard	79 inches (201 cm)
Weight (GVW)	4,676 lb (2121 kg)

WHEELS: All wheels shall utilize non-marking urethane or similar material. Shall have two front wheels that are 16 inches (40.5 cm) diameter, deep lug vulcanized solid tire design. Rear drive wheel shall be 12.2 inches (31 cm) diameter with over 5.5 inches (14 cm) width and have 4 mm siping (thin cuts) for increased traction.

WHEEL LOADING: Shall not exceed maximum wheel loading when fully loaded as noted for weight and contact pressure.

Scrubber Model	CS7000 LP/Gas Hybrid	CS7000 Diesel Hybrid
Static Wheel Load		
Maximum Weight	1,769 lb (802 kg)	1,654 lb (750 kg)
Static Wheel Load		
Maximum Pressure	146 psi (100.7 N/m ²)	137 psi (94.5 N/m ²)

MINIMUM AISLE U-TURN: Shall have minimum aisle U-turn left or right that does not exceed 104 inches (264 cm).

OPERATING SYSTEM: Machine shall have integrated solution flow and scrub pressure into a one-touch pre-calibrated scrub settings. After selecting a scrub setting the machine will adjust the solution flow and scrub pressure accordingly.

CONTROLS: Simple membrane touch pad interface for all cleaning functions.

Motion: Machine shall have a rocker foot-pedal motion control interface allowing multiple foot locations during operation for comfort and to reduce cumulative stress. Control shall provide proportional speed control based on pedal position. During scrubbing or sweeping mode maximum speed will be limited to 5.5 mph (8.9 km/h).

Other user interface requirements:

- Master Key Switch
- Full Recovery Tank Indicator
- Empty Solution Tank Indicator
- Hour Meter
- Battery Level Indicator
- Onboard Diagnostics
- Solution On/Off Switch
- Vacuum Delay Shut Off
- Vacuum On/Off Switch
- Pre-wetting Brush Switch

APPROVALS: Shall have certification from ETL and CE and clearly displayed labels showing as such.

MANUFACTURING LOCATION: Machine must be designed and built in the United States.

WARRANTY: The warranty must provide the following minimum coverage:
2 years labor, 6 months travel, 3 years parts, 8 years roto-molded components.