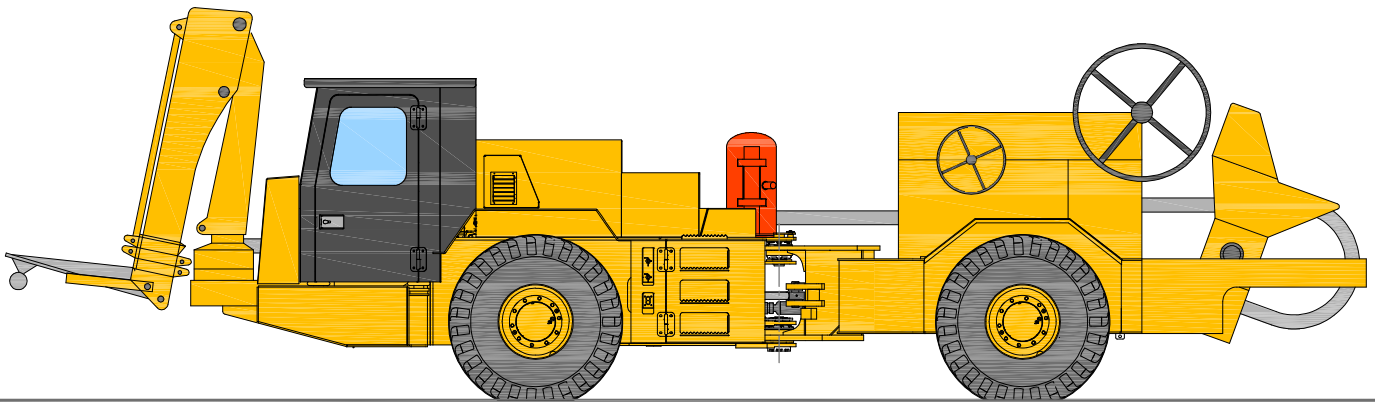


ELPHINSTONE

WR810 Underground Shotcreter Unit - with Robotic Arm



Engine

Engine Model	Cat C7.1 ACERT™
Gross Power - SAE J1995	168 kW / 228 hp
Net Power - SAE J1349	158 kW / 214 hp

Operating Weight

Tare	14,250 kg	31,416 lb
GVM	30,000 kg	66,000 lb

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Engine

The Cat engine delivers power, performance and durability.

Cat C7.1 Engine. The Cat C7.1 uses Caterpillar's breakthrough ACERT™ Technology to meet exhaust emission reduction standards. It features efficient fuel delivery, air management and electronic control for high productivity and exceptional service life.

Engine Design. The four-stroke engine provides efficient fuel combustion. Precise engineering and thorough testing assure durability, reliability and power. Built-in serviceability and excellent fuel economy lower operating costs.

ACERT™ Technology. Caterpillar optimizes engine performance while meeting EPA Tier 3 regulations. ACERT™ Technology reduces emissions during the combustion process by using advanced technology in the air and fuel systems, in conjunction with integrated electronics. The Caterpillar engine meets emission regulations at the combustion source rather than recycling exhaust gases.

ADEM A4 Control Module. This module controls the fuel injector solenoids to monitor fuel injection. This system provides automatic altitude compensation, and it will not allow the engine to fire until it has oil pressure, acting as cold start protection and a form of pre-lube.

Turbocharger. The C7.1 engine features a waste gate turbocharger that provides high boost over a wider range, improving engine response and peak torque, as well as providing low-end performance.

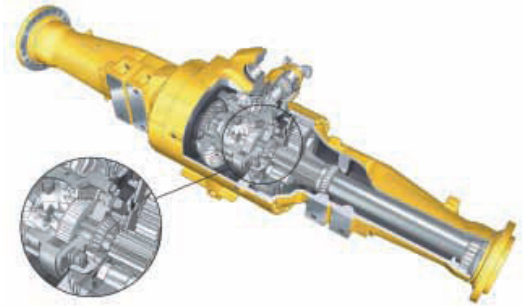
High Pressure Common Rail Fuel System. The High Pressure Common Rail Fuel System provides precise and efficient combustion, allowing for maximum performance, improved fuel efficiency and enhanced reliability. The engine is designed for maximum uptime and reduced operating costs, with world-class support from the Cat dealer network.

Maintenance. The C7.1 engine reduces costs and downtime with a 500-hour oil change interval. Extended service intervals can save thousands of dollars over the life of a machine. This machine is equipped with Caterpillar high efficiency oil filters, whose design doubles efficiency without increasing the change interval. They provide clean oil to the engine, reducing wear on all lubricated surfaces.

Commonality. The Caterpillar C7.1 engine is used in Cat products such as the 930K and 938K Medium Wheel Loader, 326D2 and 329D2 Excavators and the 525D Skidder. This engine commonality ensures the highest level of reliability and durability as well as superior parts availability worldwide.

Power Train

The integrated Cat power train delivers performance and reliability in tough conditions.



Five-Speed Transmission. The field proven Cat power shift countershaft transmission easily matches engine power to the load size and ground conditions. Electronic control makes fingertip controls possible, reducing operator fatigue and improving comfort.

Gear Application. Gear ratios are designed to maximize productivity in specific cycle segments:

- ▮ Gear 1 provides highest rimpull capability for heavy load applications
- ▮ Gears 2, 3 for normal loads and higher speed operations
- ▮ Gear 4, 5 provide excellent empty return and roading speeds

Torque Converter. The large, heavy-duty torque converter maximizes the productivity of the entire drive train. The torque converter is matched to the Cat C7.1 engine for excellent rimpull and performance.

Lock-up Clutch. The integral lockup clutch allows the machine to operate in converter drive for greater rimpull, or direct drive for high efficiency hauling and faster travel speeds. Direct drive capability allows up to 15% higher travel speeds when the lock-up clutch is engaged.

Auto Lock-up. The lock-up clutch automatically engages according to ground speed and engine speed conditions. This feature is handled electronically and allows for increased travel speeds in the same gear.

Reduced Shifting. Torque multiplication capability of the torque converter reduces the need for the operator to continually shift the transmission. This reduces operator effort and improves machine productivity.

Front Axle. The front axle features an oscillating pinion-mounted design to ensure four wheel ground contact for maximum traction and stability.

Fixed Rear Axle. The rear axle is rigidly mounted to the rear frame.

Service Brake Components. Brake components are housed inside the axles, protecting them from dirt, dust and wet ground conditions. Inboard brakes allow for splash lubrication and cooling. They are virtually maintenance free, and provide reliable brake performance.

Parking Brake. The parking brake is a spring applied oil released “fail to safe” enclosed wet disc wheel end brake.

Oil Sump. Full axle-length oil sump delivers excellent lubrication and heat rejection for long component life.

Splash Lubricated. All axle components are splash lubricated.

Heat Rejection. Oil capacity provides excellent heat rejection, ensuring proper lubrication of all axle components.

Operator Station

Easy to operate controls result in less fatigue.

Comfortable Work Station. An open operators station is standard. It combines safety, comfort and ease of machine operation. The work station includes the following features:

- ✓ ROPS/FOPS
- ✓ Suspension seat
- ✓ Safety belt
- ✓ Resilient mounting
- ✓ Enclosed operator station available as an option
- ✓ Forward mount or centre mount operator station options are available

Transmission Controls. The transmission control for forward, reverse and gear range is conveniently located for the operator's right hand. The operator can control machine functions with minimal effort, allowing greater concentration on vehicle operation and reduced operator fatigue.

Engine Protection System. An engine protection system is fitted that will shut down the engine if low engine oil pressure, low coolant level, or coolant over temperature conditions are experienced.

Additional. The cab is pre-wired for a 2-way radio (12V).

Cab Mounting. The modular ROPS/FOPS cabin is resiliently mounted on the truck/machine chassis, reducing vibration for greater comfort and a quieter ride.

Monitoring Controls. Conveniently located and easy-to see gauges and displays make monitoring machine systems as simple as possible.

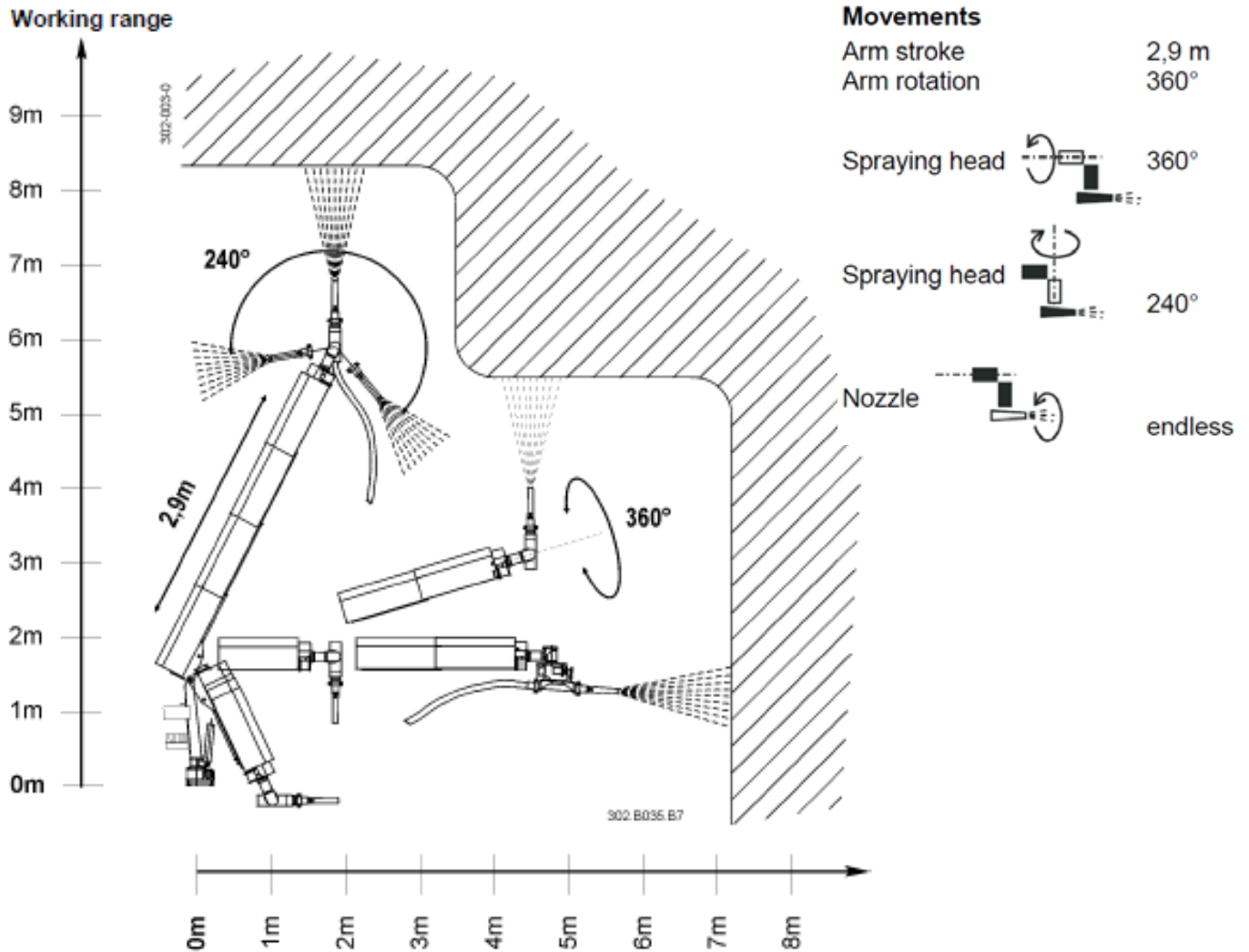
Ground Level Access. Allows convenient servicing to tanks, filters, lubrication points and compartment drains. Remote lubrication points make daily attention to hard-to-reach joints easy.

Monitoring System. Continuously provides critical machine data. A three-level warning system alerts the operator of any abnormal machine health conditions.

Steering Column. Tilts and is telescopic for comfortable operation.



Work Tools



Shotcreting Boom.

Nozzle rotation	360 Degrees
Nozzle tilting	240 Degrees
Boom rotation	360 Degrees
Extension	2900 mm

Remote Control.

15 metre lead for remote operation.

Pumping Capacity

Theoretical	1-34 m ³ /hr
(Practical)	4-25 m ³ /hr

Accelerator Pump.

Flow rate	1 - 14 L/min
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Accelerator Tanks.

Volume	2 at 350 L
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Water Hose Reel.

Manual hose reel with 30 metres of 3/4" hose.

Air Hose Reel.

Manual hose reel with 30 metres of 1" hose.

High Pressure Pumps.

Hydraulically operated Rock Washing Pump.

Water pressure	460 Bar
Water flow	50 L/min

Optional Machine Washdown Pump

Water pressure	200 Bar
Water flow	20 L/min

Air Compressor. Optional onboard electric Air Compressor available.

Load Sensing Hydraulics. A load sensing variable displacement pump and pressure compensating system continually monitor hydraulic power requirements, then provides power based on demand.

Steering. Fully hydraulic control. Meets the following standards: SAE J1511 OCT90, ISO 5010-1992.

Stabilisation Jacks. Hydraulically lowered and raised stabilisation jacks fitted with safety check valves are located front of the engine end frame for maximum stability.

Safety

Mining machines that are designed with safety as the first priority.



Product Safety. The WR810 is designed with safety as an integral part of all machine and systems design.

Centralised Machine Isolation. The single access point provides easy access to all engine machine isolation functions:

- Engine disconnect switch
- Starter isolation switch
- Jump start receptacle
- Fire system activation (if equipped)

Protective Structure. The operator station has integrated into its construction a ROPS/FOPS (Roll-Over Protective Structure), ISO 3471:2008, (Falling Object Protective Structure) ISO 3449:2005 that offers protection to the operator.

Additional Safety Features:

- Anti-skid deck surfaces
- 3 point access to cab and machine
- Two doors either side of machine to access operator station
- Suspension seat
- Inertia reel retractable seat belt
- Steering frame lock
- Hinged belly guards
- Ceramic coated exhaust manifold and turbine housing
- Triple insulated battery cables
- Electrical wiring run independent of all hosing
- Fuel water separators made of non-flammable material
- Firewall / heatshields
- Machine interlocks
- Centralised isolation point
- Integrated fire suppression systems (optional)

Ground Level Access. Allows convenient servicing to tanks, filters, lubrication points and compartment drains. Remote lubrication points make daily attention to hard-to-reach joints easy.

Handrails. Handrails are fitted standard in accordance with ISO 2867:2011.

Steering. Full hydraulic control. Meets ISO 5010:2007 standard.

Braking. Full hydraulic control. Meets ISO 3450:2011 standard.

Serviceability

Increased productivity through ease of service.

Engine Enclosures. Large, hinged engine enclosure doors make regular maintenance as easy and fast as possible. Easy access to daily service points increases the likelihood that maintenance will be done, and increases machine service life. In addition, less maintenance time means more working time and greater productivity.

Frame Access. Steps and grab handles are standard on the engine end and non engine end frame and cab for easy access to the service and operation areas.

Bolt-on Guards. Bolt-on guards offer protection to critical components, and are easily removable for servicing. Removable floor plates and side plate allow access to components under the cab.

Air Filters. Radial seal air filters makes them easy to change, reducing air filter maintenance times.

Extended Oil Service Intervals. A 500-hour oil change interval reduces downtime for service and lowers maintenance costs.

S-O-SSM Fluid Sampling Valves. Provides a fast, convenient way to gather uncontaminated fluid samples, which improves analysis reliability.

Pressure Taps. Conveniently located for easy access to hydraulic system pressure measurements.

Spin-on Oil Filters. Spin-on fuel and engine oil filters shorten downtime.

Electronic Transfer Pump. Eliminates the need to manually prime the fuel system.

Ecology Drains. All major fluid compartments (hydraulic tank, engine oil, radiator, axles and transmission) incorporate ecology drains to make regular maintenance easier, and protect the environment from accidental oil spills.

Centralised Service Centre. A centralised service center that includes fast fill and evacuation points, fluid sampling points.



Electrical System. The 24V electrical system delivers dependable electrical power for engine cranking, additional lighting, and engine diagnostics. Wiring circuits are color coded, numbered for easy diagnosis and repair. All circuits are protected by circuit breakers. Wiring is double insulated with sealed electrical connectors to prevent moisture and dirt access. Harnesses are covered with fire resistant material for additional protection. Battery cables are triple insulated for extra protection against abrasion.

On-Board Diagnostic Systems. The monitoring system continuously checks all critical machine functions and components, and helps locate faults quickly for faster repair. Extremes are recorded, including fluid temperatures, engine speed and electrical system events.

Hitch Hoses. The pilot hoses, pressure line and load sense lines have all been routed above the hitch, and been bulk-headed for easy hose replacement and fast service.

Specifications

Engine

Engine Model	Cat C7.1 ACERT™	
Net Flywheel Power	158 kW	214 hp
Net Power ISO9249	158 kW	214 hp
Net Power SAE J1349	158 kW	214 hp
Gross Power SAE J1995	168 kW	228 hp
Displacement	7.0131 L	428 in ³
Bore	105 mm	4 in
Stroke	135 mm	5 in
Number of Cylinders	6	
Max Torque @ Rated Speed	922 Nm @1400rpm	
Derating Altitude	3000 m	9843 ft
EPA Tier 3 Certified		
Alternator	100 amp	
Electrical System	24V	
Battery - Quantity	2	
Battery - Volts	12V	
Battery - Capacity	950CCA	
Starting System Direct Electric		
Fan Speed	1620 rpm	
Fan Type	Blower	

- These ratings apply at 1,800 rpm when tested under the specified standard conditions
- Net power advertised is the power available at the flywheel when the engine is equipped with fan, air cleaner, muffler and alternator. No Derating required up to 3,000 m (9,843 ft) altitude
- Based on standard air conditions of 25° C (77° F) and 99 kPa (29.32 in Hg) dry barometer. Used 35° API gravity fuel having an LHV of 42,780 kJ/kg (18,390 BTU/lb) when used at 30° C (86° F) [ref. A fuel density of 838.9 g/L (7.001 lb/gal)]

Power Train

Travel Speed - Fwd. 1st	5.5 km/h	3.4 mph
Travel Speed - Fwd. 2nd	8.9 km/h	5.5 mph
Travel Speed - Fwd. 3rd	14.4 km/h	8.9 mph
Travel Speed - Fwd. 4th	19.2 km/h	11.9 mph
Travel Speed - Fwd. 5th	30.9 km/h	19.2 mph
Travel Speed - Rev. 1st	5.5 km/h	3.4 mph
Travel Speed - Rev. 2nd	8.9 km/h	5.2 mph
Travel Speed - Rev. 3rd	19.2 km/h	11.9 mph
Torque Converter Type	Lock-up Clutch	
Transmission	5 fwd / 3 rev countershaft powershift	
Transmission Cooler Type	Plate	
Steering, Frame Articulation	+/- 45 degrees	
Brakes - Service Type	WET disc enclosed	
Brakes - Parking Type	Spring applied wheel ends	
Tyres	14.00	R20

Hydraulic System

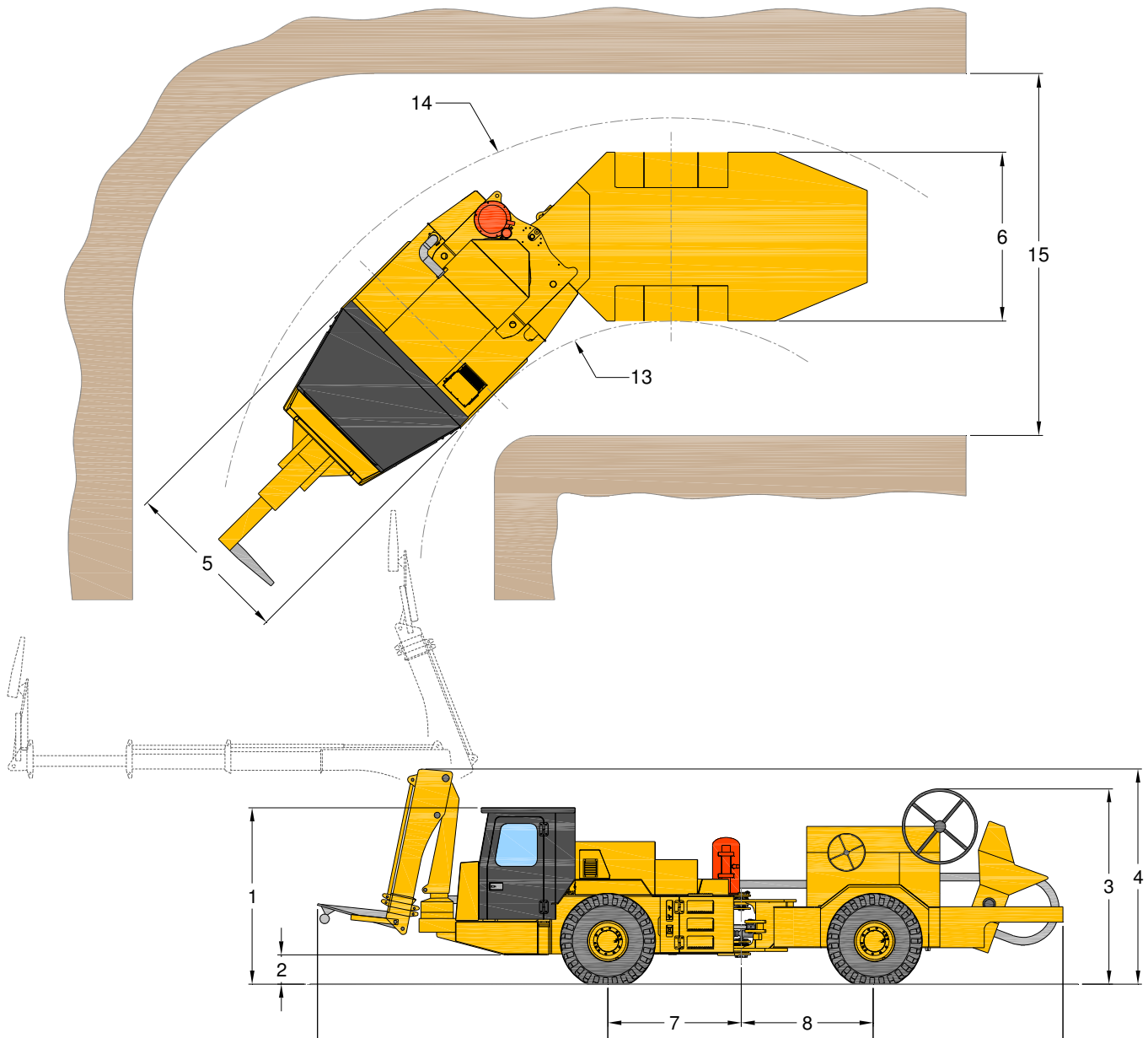
Circuit Type	Closed centre variable flow	
Pump type	Axial piston	
Pump Output	174 L/min	46 gal/min
Relief Valve Setting	21,000 kPa	3045 psi
Steering valve	Direct link, non follow	
Steering Cylinder - Bore	88.9 mm	3.5 in
Steering Cylinder - Stroke	437.5 mm	17.22 in
Steering Cylinder - Rod Dia	50.8 mm	2 in

Service Refill

Fuel Tank	175 L	46.2 gal
Cooling System	57 L	15.0 gal
Differential, Final Drive - F	52 L	13.7 gal
Differential, Final Drive - R	52 L	13.7 gal
Engine Oil	27 L	7.1 gal
Transmission, Torque Converter	54 L	14.3 gal
Hydraulic Tank	100 L	26.4 gal

Specifications

Forward mount operator station.



Dimensions

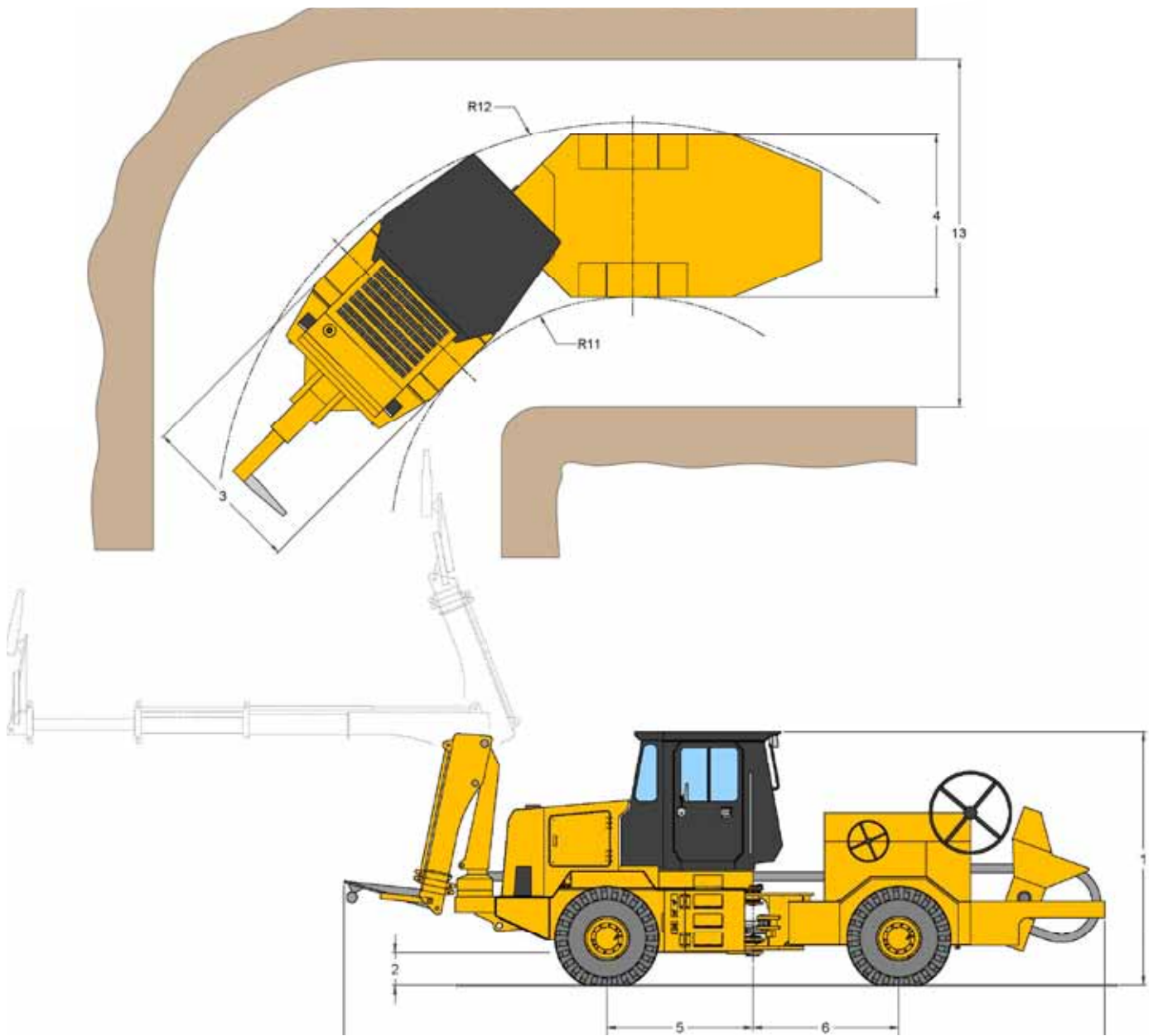
1	Height-Top of Cabin	2,280 mm	89.8 in
2	Height-Ground Clearance	370 mm	14.6 in
3	Height-Top of Unit	2,530 mm	99.6 in
4	Height-Top of Boom	2,785 mm	109.6 in
5	Width-Machine Front Frame	2,100 mm	82.7 in
6	Width-Machine Rear Frame	2,100 mm	82.7 in
7	Length-Front Axle to Hitch	1,725 mm	67.9 in
8	Length-Hitch to Rear Axle	1,725 mm	67.9 in
9	Length-Front Axle to Boom	3,760 mm	148.0 in
10	Length-Wheel Base	3,455 mm	136.0 in
11	Length-Rear Axle to Frame	2,440 mm	96.1 in
12	Length-Overall	9,655 mm	380.1 in

Turning Dimensions

13	Radius-Inside Clearance	3,120 mm	122.8 in
14	Radius-Outside Clearance	5,645 mm	222.2 in
15	Width-Drive Clearance	4,500 mm	177.2 in
	Articulation Angle	45°	
Gross Vehicle Mass (Estimated)		14,250 kg	31,416 lb

Specifications

Centre mount operator station.



Dimensions

1	Height-Top of Cabin	3,000 mm	118.1 in
2	Height-Ground Clearance	370 mm	14.6 in
3	Width-Machine Front Frame	2,100 mm	82.7 in
4	Width-Machine Rear Frame	2,100 mm	82.7 in
5	Length-Front Axle to Hitch	1,725 mm	67.9 in
6	Length-Hitch to Rear Axle	1,725 mm	67.9 in
7	Length-Front Axle to Boom	3,110 mm	122.4 in
8	Length-Wheel Base	3,455 mm	136.0 in
9	Length-Rear Axle to Frame	2,440 mm	96.1 in
10	Length-Overall	9,005 mm	354.5 in

Turning Dimensions

11	Radius-Inside Clearance	4,785 mm	188.4 in
12	Radius-Outside Clearance	7,615 mm	299.8 in
13	Width-Drive Clearance	4,500 mm	177.2 in
Articulation Angle		45°	
Gross Vehicle Mass (Estimated)		14,250 kg	31,416 lb

Machine Equipment

Standard equipment.

ELECTRICAL

- Accessory power port (12V)
- Alarm, back-up
- Alternator, 100 amp
- Anti-corrosion protection spray
- Batteries, maintenance free (2-1000 CCA)
- Battery isolation, lockable disconnect switch (2 post)
- Brake and tail lights
- Electronic monitoring system
- Diagnostic connector
- Emergency stop switch (ground level)
- Headlights with dip switch
- Horn, warning
- Rear work lights (cab mounted)
- Reversing lights
- Sealed electrical connectors
- Starting and charging system, 24V
- Starter, electric, heavy duty
- Starter isolator, lockable

OPERATOR ENVIRONMENT

- Computerised monitoring system
 - Instrumentation, gauges:
 - Engine coolant temperature
 - Fuel level
 - Hydraulic oil temperature
 - Tachometer
 - Torque converter oil temperature
 - Instrumentation, warning indicators:
 - Brake oil pressure
 - Engine oil pressure
 - Lockup clutch
 - Parking brake application
 - Primary steering pressure
 - Secondary steering pressure (if equipped)
 - System voltage
 - Transmission filter bypass
 - Work lights
 - Instrumentation, digital data:
 - Computerised diagnostics and monitoring
 - Engine rpm
 - Gear and direction
 - Odometer
 - Service hour meter
- Dome light
- Mirrors, rear view
- Open operator station, FOPS/ROPS:
 - Seat, suspension with retractable seat belt
 - Steering wheel, tilt and telescoping

POWER TRAIN

- Air cleaner, 2-stage with pre-cleaner
- Brakes:
 - Parking, four wheel spring applied, enclosed disc
 - Service, four-wheel pressure applied enclosed disc
- Driveline slip-joint, lubed for life
- Engine, Cat C7.1, ACERT Technology, ATAAC
- Engine overspeed inhibitor
- Fan, blower
- Filters, fuel/engine air, primary/secondary
- Final drives, inboard planetary
- Fuel transfer pump (electric)
- Fuel tank, high capacity
- Lock-up torque converter
- Long-life coolant (-50°C protection)
- Muffler/catalytic converter
- Oscillating front axle
- Radiator
- Steering, rotary metering pump
- Transmission, countershaft powershift (5F/3R)
- Universal joints, lubed for life

HYDRAULICS

- Closed center-load sensing system
- Hydraulic oil cooler
- Line filter, full flow return
- Spin-on filters
- Variable displacement piston pump:
 - 174.1 L/min (46 gal/min)

OTHER STANDARD EQUIPMENT

- Articulation lock link
- Ecology drains (engine, hyd tank, axles, transmission)
- Engine enclosures, hinged
- Firewall
- Guards, hinged - under engine and transmission
- Manual pressure release radiator cap
- Mudguards
- SOSSM oil sampling ports
- Tie down points and tow-pins (front and rear)
- Tyres and tubeless rims (14.00 R20)

Machine Equipment

Optional equipment.

ELECTRICAL

- Alternator, high output
- Auxiliary start receptacle
- Emergency stop switch:
 - Cabin
 - Ground level – rear
- Jump start receptacle
- Turn indicators

OPERATOR ENVIRONMENT

- Air conditioning system - modular
- Automatic brake retarder control
- Brake system oil pressure gauges
- Camera/monitor, reversing
- Dual speed control
- Enclosed air conditioned cabin (FOPS/ROPS):
 - Windshield wiper washer
 - Window, sliding, operator
 - Heater, cabin
- Manual brake retarder control

POWER TRAIN

- Engine exhaust, flow-through filter
- Engine exhaust, particulate filter
- Engine shutdown system to idle/stop
- External stainless steel braided fuel lines
- Fast-fill system:
 - Coolant
 - Engine oil
 - Fuel
 - Hydraulic oil
 - Transmission oil
- Low transmission oil pressure monitoring
- Shielded engine exhaust manifolds

HYDRAULICS

- Heat-shielding on hoses
- Hydraulic tank level alarm

OTHER OPTIONAL EQUIPMENT

- Anti-corrosion protection spray
- Centralised service centre
- Fire extinguisher, hand held
- Fire suppression system - foam
- Fire suppression system - dry chemical
- Grease lubrication system, centralised manual
- Grease lubrication system, automatic
- Manual brake release pump
- Secondary steering

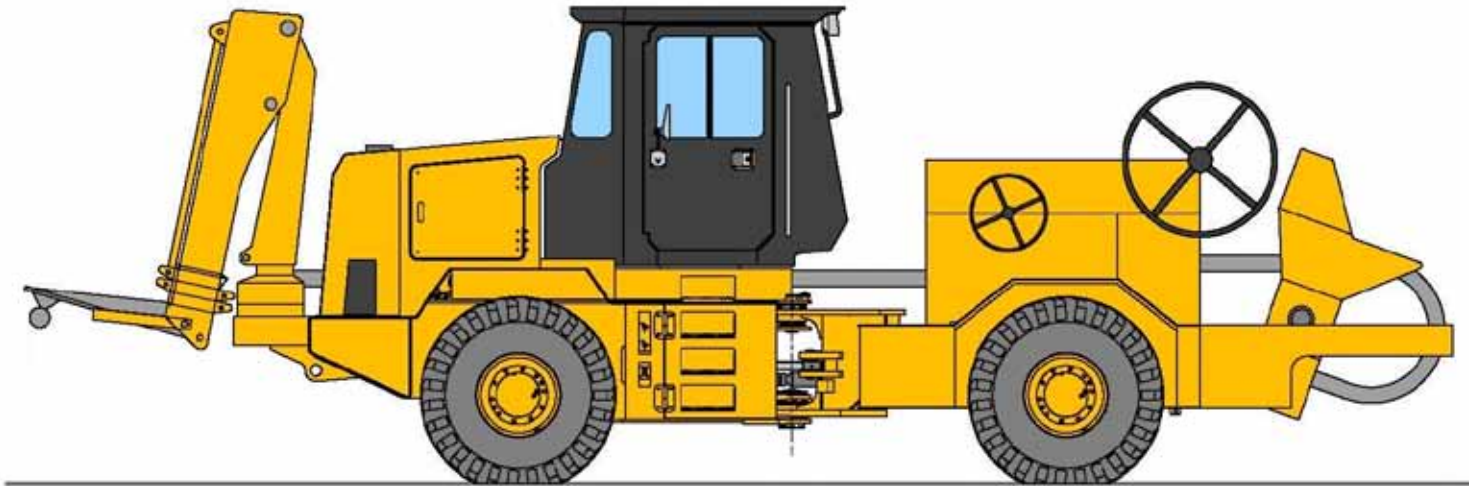
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WR810

Underground Shotcreter Unit – with Robotic Arm



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