

Dated: March 2013

## SPECIFICATIONS

ENVIRONMENTAL CAB CRAWLER TRACTOR WITH BLADE, 24-25" GROUSERS,  
REAR MOUNTED FIRE PLOW, 92-95 HP, LGP, 19,000 LB CLASS (550K/D4K2)

### SCOPE

The intent of this specification is to define a crawler tractor for use in forestry operations; with the primary use being wildfire suppression and related functions. The tractor must have the ability to perform drawbar work over long distances in extremely adverse conditions. The tractor must be able to pull a fireplow, heavy disc harrow or bulldoze firelines without overheating or otherwise malfunctioning. Parts and service must be readily available throughout the state of Alabama. The unit must be new, unused and be prepared for service when delivered to the specified location. It shall meet all State and Federal emission standards for Emergency Equipment (40 CFR Parts 85, 86, and 1039) at time of the delivery.

Not to include use of emission control systems or settings that could lead to this dozer, transports or wildland engines losing power, speed, or torque while en route to or suppressing a wildfire.

### 10. PERFORMANCE

- A. Top speed at full throttle on clear, level ground must be a minimum of 6.0 MPH.
- B. Tractor must be capable of developing and sustaining a minimum of 6800 pounds of sprocket pull at 3.0 MPH.

### 20. ENGINE

- A. Engine must be a current production crawler tractor engine offered by the manufacturer. Prototype or experimental engines are not acceptable.
- B. Engine must be diesel fueled, turbocharged, four stroke cycle, liquid cooled, minimum 92 HP net, per the latest issue of SAE J1349.
- C. Displacement must be a minimum of 4.4 liters.
- D. Fan must be blower type.
- E. Radiator must be suitable for forestry application. Fins shall be aluminum. Fin spacing shall be no closer than ten (10) fins per inch. Tube arrangement shall be inline. Maximum cooling capacity shall be provided. Cooling system shall be filled with coolant that provides freeze protection to -30 degrees F and maximum corrosion protection.
- F. A turbine type engine air prescreener shall be provided with a perforated guard that serves as a prescreener if air intake is above hood. If air intake

- is under the hood a vacuum-aspirated or multi-cyclone system shall be used. Air cleaner shall be dry type with safety element. Restriction indicator shall be provided in the operator's compartment.
- G. The turbocharger or particulate filter in the exhaust system shall function as spark arrester. The exhaust pipe shall be routed so that it is protected between the limb risers and the exhaust air passes above the cab. Exhaust system shall be weatherproof and protect the engine from rainfall during idle periods.
  - H. A severe-duty fuel-water separator with a spin-on replaceable element must be provided. It shall include a water detection system with a warning indicator on the dash.
  - I. An electric engine hourmeter shall be provided. It shall be activated when the engine is running.
  - J. All coolant hoses shall be protected by a fire and heat protective covering (Aeroquip AE102 or equivalent).
  - K. Engine shutoff shall be controlled by an electric solenoid valve. The wiring to the solenoid shall be protected by firesleeve (Aeroquip AE 102 or equivalent).
  - L. The cold weather starting aid shall be an electric engine block (coolant) heater, 110 volts. Ether start aid not allowed.
  - M. Tractor must be equipped with a foot operated decelerator. It must slow both the engine and/or transmission speeds and be capable of bringing the tractor to a complete stop.
  - N. Engine must be equipped with a spin-on, vertical mount oil filter.
  - O. Engine must be equipped with a primary fuel filter that is vertically mounted.

### 30. DRIVETRAIN

- A. Transmission shall be dual path hydrostatic drive. Transmission must be capable of full speed direction changes.
- B. Infinitely variable ratios must be available in the hydrostatic drive system. Hydrostatic transmission must be dual path design. It must feature "load sensing," "anti-stall," and "counter-rotation." The tractor must be capable of variable radius power turns. Turning radius must be consistent even when travel speed is varied.
- C. Steering must be single lever, joystick controlled. The joystick must control forward and reverse motion and must control left and right steering. It must also control counter-rotation. Speed control must be integrated into the joystick.
- D. The hydrostatic transmission must be plumbed with remote diagnostic test ports, conveniently located so as to permit diagnostic procedures without removal of any significant components.
- E. Final drives must be heavy-duty type, double or triple reduction.

- F. A vertical mounted transmission oil filter with a replaceable element shall be provided.
- G. The hydrostatic system can be separate from the hydraulic system, if not a separate system, must have a warning visual/or audible signal to warn of low fluid level. The reservoirs must be made of steel.

#### 40. UNDERCARRIAGE

- A. Track gauge shall be 68 - 70".
- B. Track shoes shall be center mounted, single grouser, 24" or 25" width. Maximum width, across the tracks, shall be 93".
- C. Length of track on ground shall be a minimum of 89", producing a minimum ground contact area of 4,400 square inches. Each track shall have a minimum of seven (7) track rollers.
- D. Ground pressure of the base machine, including blade but no options, based on the specifications listed in items A, B and C shall not exceed 5.4 psi.
- E. Track adjusters shall be hydraulic with covers over grease points to prevent inadvertent tightening. Recoil springs shall be covered. Recoil springs shall be heavy-duty versions, suitable for the maximum operating weight of the tractor and the operating conditions. Recoil system shall be equipped with over-pressure protection (relief valves in hydraulic track adjusters).
- F. Each track shall have a minimum of one (1) carrier roller.
- G. Track chain shall be sealed and lubricated, equipped with split master link.
- H. Rollers & idlers shall be provided with lifetime lubrication.
- I. The roller frame suspension shall be rigid.
- J. Tracks shall have front and rear guides and have "full-length rock guards".
- K. All undercarriage components, including roller frames, idlers, rails, sprockets, rollers, and shoes shall be heavy duty type, capable of continuous use per the defined application. The manufacture shall provide the most heavy-duty OEM undercarriage components available. Chain pitch to be a minimum of 171mm.
- L. Six track shoes, evenly spaced around the track chain, shall be equipped with "key slots," for the insertion and retention of ½" chain. Key slots shall accept and retain 3/8" & ½" chain for the purpose of self-rescue of a "stuck" tractor.

#### 50. CHASSIS

- A. Radiator grille must be rated for extreme service in forestry application. A louvered, quick release, extreme-service grille must be provided.
- B. Engine side shields shall be hinged and/or quick release mounted. The engine compartment must be instantly accessible (both sides) without the

- use of tools. The hood and engine compartment side shields shall be perforated to the maximum extent offered by the manufacturer.
- C. A fuel tank shutoff valve shall be located within reach of the seated operator and must be operable without the use of tools. Fuel tank will be constructed of metal and the capacity shall be 51 gallons, minimum.
  - D. A fuel tank drain must be provided and protected from brush damage. It must be reasonably accessible with the use of tools, but without having to remove any major components.
  - E. Primary fuel lines must be metal or stainless steel braided fuel lines or lines must be covered with fire resistant sheathing, Aeorquip AE102, or equivalent. Hose connections shall be threaded with SAE or flat face o-ring connectors where possible.
  - H. A manual or electric fuel-priming pump must be provided.
  - I. Tractor must be equipped with a full length, extreme service bottom guard. Bottom guard must protect all components on the bottom of the tractor. Bottom guard thickness shall be no less than 1/2". The bottom guard must include a bolt-on access hatch located at the lowest part of the guard for flushing out debris.
  - H. The tractor must be equipped with a closed eye, front tow hook and two tow hooks (closed eye or D ring) on rear of tractor located on each side of the fire plow mount.
  - I. Tractor must be equipped with a vandalism protection group. Fill points shall be lockable. Padlocks are not required.
  - J. Two tie down rings shall be furnished on each roller frame. Rings shall be sized to meet federal transportation safety regulations and be located to minimize exposure to damage.
  - K. Ground clearance shall be a minimum of 13.0" as defined by the latest issue of SAE J1234.
  - L. A toolbox for hand tools must be provided inside cab.
  - M. Mounts must be provided for drip torch, and chain. Provision must be included to mount and safely carry an axe, rake and shovel.
  - N. Access to the engine compartment for service of the dipstick, oil fill, radiator cap and air cleaner shall be conveniently operated without the use of tools.

## 60. HYDRAULIC SYSTEM

- A. Hydraulic pump shall be gear type with a minimum flow rate of 15 gpm. System pressure shall be 2800 - 3000 psi.
- B. Blade controls shall be on a single T-bar" control (lift, angle and tilt). Blade lift valve section shall include a float position.
- C. An auxiliary hydraulic (4<sup>th</sup>) circuit shall be provided for the rear-mounted fireplow. A separate lever and valve section shall be included. The circuit

shall be equipped with a float position (lever forward) and two relief valves. The circuit shall connect to the plow via 1/2" breakaway couplers per the latest issue of SAE J1036. The couplers shall be located according to the latest issue of SAE J716. If tractor is equipped with a hydraulically converted v-blade or a hydraulic winch, a fifth valve section (5<sup>th</sup> circuit) with relief valves must be included for operation of the v-blade circuit. No diverter valve allowed.

- D. Hydraulic tank will be constructed of steel. All hydraulic tubing shall be prepainted or treated to prevent corrosion. It shall be securely mounted and protected to prevent damage and chafing.
- E. Hydraulic hoses in the engine compartment or belly within 12" of the bottom guards must be covered with fire resistant sheathing, Aeorquip AE102, or equivalent.
- F. Lift and angle cylinders must have steel guards.
- G. All hoses routed to the blade, and all exposed hydraulic fittings must be adequately guarded for the intended application. Exposed hoses must be covered with cordura protective sleeving or equivalent.
- H. The hydraulic system shall be equipped with a vertical mount oil filter.

#### 70. DOZER

- A. Dozer blade shall be mounted on an inside mounted, all hydraulic C-frame. Power lift, angle and tilt functions shall be provided. C-frame shall be "heavy duty" rated; suitable for the intended application.
- B. Dozer blade shall be 102"-104" width.
- C. Moldboard shall be equipped with bolt-on, replaceable, reversible end bits and cutting edges.
- D. Dozer blade shall be equipped with a full width brush guard, 15-18" high. The brush guard must be a tubular structure with the main structural elements consisting of 2" x 4" x 3/16" rectangular tubing and the interior vertical members consisting of 1/2" x 2" flat-bar or 0.25" laser cut and formed plate with 1/2" reinforcements on the back side. There shall be a minimum of six (6) vertical flat bars.

#### 80. DRAWBAR

Drawbar not required.

#### 90. FIREPLOW

Fireplow shall be rear mounted. Coulter shall be 24" diameter. Turning discs (2) shall be 26" diameter. A middle buster shall be included. Down pressure shall be transmitted via a spring rod. Plow shall be equipped with

a safety latch to hold the plow in the raised position. A latch release shall be provided that is operable from the cab. It shall be capable of disabling the plow safety latch operation.

## 100. ROPS CANOPY & OPERATOR PROTECTION

### A. Enclosed Cab

The operator's station shall be a fully enclosed, sound suppressed, ROPS cab. It shall be heated, air conditioned and pressurized. The Roll Over Protective Structure (ROPS) and Falling Object Protective Structure (FOPS) shall meet the requirements of the latest issues OSHA 1910.266 and of SAE J1040 and J231, and be fully certified.

### B. Windows

The windows shall be tempered safety glass, tinted 30%. It shall be heat resistant to 550 degrees F. The window glass shall be mounted in such a manner that the window glass will remain in place in the event of softening or melting of the window molding during a burnover occurrence. All windows shall be protected by protective screens meeting the requirements of ISO 8084. The screens shall be painted a dark, non-glare color. Protective screens shall be hinged to permit access (without tools) for window cleaning. Side screens are to be quick released, inside or outside operated, for an emergency exit.

### C. Operator Access

The operator's compartment shall have left side and right side access doors. Operator compartment access must meet the requirements of ISO 8084. The windows must be capable of being secured in the open position to allow for natural cross flow ventilation. The doors of the operator's compartment shall be lockable to prevent unauthorized entry and operation of the machine.

### D. Seat and Seat Belt

The operator's seat shall be a deluxe, full suspension seat with cloth cover. The seat belt shall be three inches (3") wide and retractable. The seat belt shall meet the requirements of SAE J386.

### E. Window Wipers and Washers

The cab windows, front, rear, and doors; shall be equipped with

windshield wipers and washers. The washer reservoir shall have a minimum water capacity of one-half (1/2) gallon.

F. Environmental Cab Cooling, Heating and Pressurizing System

The operator's cab shall be cooled with an air conditioning system capable of 24,000 Btu/hr. The air conditioning system shall be R-134a compliant.

The condensing unit shall be mounted on the rear of the cab and be equipped with a guard having a minimum thickness of 1/4" that provides the maximum protection against damage from trees, tree limbs and brush. The pressurization system shall deliver air to the operator's compartment that has been filtered through a spark-arresting screen, a high efficiency particulate element (HEPA) and through an activated carbon element.

The particulate media shall have an efficiency rating of 93 DOP at 0.5 micron. The media material shall be fiberglass. The activated carbon element(s) shall have an "Activity Rating" of 60, minimum. Any externally mounted filters shall be protected from brush damage. The pressurizer fan shall be rated at 400 CFM, minimum. Vendor will provide six additional HEPA filters and six additional carbon filters.

The heater/defroster shall have a minimum capacity of 18,000 Btu/hr. The heating/cooling/pressurizing system shall conform to the requirements of SAE J1503/J1535D.

An independent defroster fan shall be provided to defog the windows at any time, whether the system is being used for cooling or heating.

- G. Limb risers shall be of the point-to-point design and shall be constructed of square tubing not less than 3" x 3" x 1/4". Limb risers to serve as protection for the exhaust pipe.

110. ELECTRICAL SYSTEM

- A. The electrical system shall be 12 or 24 volt, negative ground, and shall meet the requirements of the latest issue of SAE J821. A "24-Volt Electrical System" decal shall be visible inside the cab and in the battery box. Decal letters shall be 3/4" tall minimum with a white background and black border.
- B. The alternator shall have a nominal capacity of at least 90 amps.
- C. Tractor shall be equipped with dual storage batteries (low maintenance design) with a minimum of 165 minutes reserve capacity and 900 CCA each. A manual master electrical disconnect switch shall be provided.
- D. Tractor shall be equipped with eight halogen work lights, minimum 55 watts each, paired as follows: One pair shall be mounted in the grille. One pair shall be mounted overhead facing forward. One pair shall be

mounted overhead, facing forward, angled outboard. One pair shall be mounted inside the rear screen, facing rearward. Each pair of lights shall be switched on an independent circuit, using clearly labeled switches. Each circuit shall be protected by an independent, self-resetting, circuit breaker. All exterior lights must be mounted and guarded so as to withstand highly abusive contact with heavy tree limbs and brush.

- E. The starting system shall be direct, electric.
- F. An electronic monitoring system shall be provided to monitor all internal operating systems. It shall include audible and/or visual alarms for the charging system, hydraulic and transmission filter restriction, engine coolant temperature, engine oil pressure, air cleaner restriction and seat belt. Gauges shall be provided for engine oil pressure and engine coolant temperature. A fuel level gauge shall be provided.
- J. An engine tachometer shall be provided.
- K. A 12-volt power port shall be provided in the operator's compartment. It shall have a capacity of 10 amps minimum.
- L. All wiring, essential to the continued safe operation of the tractor, shall be adequately protected from belly pan fires by fire sleeve (Aeroquip AE-102 or equivalent).
- M. The tractor shall be equipped with a white strobe light system that is visible from all directions and adequately protected by a guard.
- N. A thirty (30)-ampere fused circuit, wired with ten (10)-gauge copper wire, shall be installed. This circuit shall be wired through the master switch and will be used for installation of a two-way radio. The wiring will be terminated with positive and negative lugs, equipped with a safety cover, permanently attached to the inside of the cab on the left side of seat.

## 120. WEIGHTS AND DIMENSIONS

- A. Operating weight of the base tractor; including blade, but not including a fireplow, shall be 18,500 – 20,000 pounds.
- B. Overall machine height, including grousers, shall be no more than 113".

## 130. SAFETY ITEMS

- A. The tractor must be equipped with a back alarm, per the latest issue of SAE J994, type A, 112 dB (A).
- B. The tractor must be equipped with a warning horn, per the latest issue of SAE J1105, type J, 117 dB(A).
- C. The service braking, secondary stopping and parking brake systems must meet the requirements of the latest issue of ISO 10265. Hydrostatic drive system must provide dynamic braking. Parking brake must be wet disk.
- D. The tractor shall be equipped with self-cleaning, anti-skid surfaces and hand grips as needed for safely mounting and dismounting the tractor and

for all maintenance operations normally performed weekly, per the latest issue of SAE J185. Grab handles for mounting and dismounting shall be provided at each rear corner of the tractor.

- E. The tractor must be equipped with a convex mirror, mounted inside the operator's compartment. It must have a 26 square inch viewing area, minimum.
- F. At least one floorplate in the operator's compartment shall be quick release mounted for instant access without the use of tools for fire suppression in the belly pan. Minimum size of 10" x 10".
- G. The tractor shall be equipped with one five pound, ABC dry chemical fire extinguisher per the requirements of the latest issue of SAE J1212. It shall be securely mounted in the cab and not interfere with operation, visibility or ingress/egress.
- H. The tractor shall be equipped with provisions to prevent unauthorized starting or movement of the machine, per the latest issue of SAE J1083.
- I. The tractor must conform to the latest issue of SAE J1212, Fire Prevention on Forestry Equipment.
- J. Safety signs shall meet the requirements of the latest issue of SAE J115.
- K. Vender may be required to provide documentation that all specifications listed have been met.
- L. Vendor will provide digital models / geometry of all protections items upon request.

#### 140. PAINT

- A. The exterior of the tractor is to be painted (manufacturer's standard) industrial yellow.
- B. The brush screens and limb risers are to be painted a dark, non-glare color (gray or black).
- C. Interior of the cab is to be painted a non-glare color.
- D. The hood is to be painted a non-glare color (gray or black).
- E. Top of the cab (outside) is to be painted white.

#### 150. WATER SYSTEM

- A. The tractor shall be equipped with a water system for the suppression of "belly pan fires." The system shall include a minimum of twelve (12) gallons water capacity; pre-mix foam capability; an electric pump capable of 5 gpm and 45 psi; and a hand held, pistol grip nozzle with fifteen (15) feet of 3/8" self-storing hose.

## 160. CONDITIONS

- A. In addition to the equipment specified, the tractor shall be equipped with all standard equipment provided by the manufacturer for commercial or industrial use as specified in literature published by the manufacturer. The tractor shall comply with all federal and state safety regulations and standards.
- B. The supplier shall be responsible for delivering the tractor properly serviced, clean and in first class operating condition. Predelivery service, at a minimum, shall include:
  - 1. Complete lubrication.
  - 2. Check and fill all fluids.
  - 3. Verification of proper engine settings.
  - 4. Adjust tracks to proper tension.
  - 5. Check operation of all functions, gauges and accessories.
  - 6. Clean and remove unnecessary tags, stickers, marks, etc.
- C. Each tractor shall be supplied with one Operator's Manual and one digital copy of the Parts Manual.
- D. Each tractor is to be completely assembled (unless noted otherwise in this specification), including options and attachments; thoroughly tested and ready for operation upon delivery.
- E. The manufacturers warranty must be, at a minimum, twelve (12) months, full coverage. The warranty effective date shall be the date that tractor is put into service. Copies of the warranty and a Manufacturers Certificate of Origin are to be delivered with each invoice.
- F. Tractor Outfitting - All tractor outfitting shall be performed at an authorized facility, approved both by the tractor manufacturer and the Alabama Forestry Commission.
- G. Four hours of operator training shall be provided for each tractor at each location. It shall include operational, service and safety training.

## 170 OPTIONS

- A. Vendor shall quote bid with extended power train warranty for five (5) years or 1500 hours.