DELTA SCIENTIFIC CORPORATION
PALMDALE, CALIFORNIA, 93551
USA
WWW.DELTASCIENTIFIC.COM
info@Deltascientific.com
661 575-1100

MODEL DSC 550

PHALANX™ TYPE BARRICADE SYSTEM
Electromechanical or Hydraulically Operated

Crash Tested and Certified ASTM M50 / P1
ASTM F 2656-07/F2656-20

Nothing to Hide Behind

Open Frame Barricade

Document: DSC 550 Electromechanical or Hydraulic Procurement Specification
Effective Date: 8/27/2020 rev 2

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SYNOPSIS OF FULL SCALE CRASH CERTIFICATION

FULL SCALE CRASH TEST CERTIFICATION

- The DSC 550 Barricade System has been tested and certified to the highest United States Vehicle Barricade Standard.

- This barricade exceeds ASTM F 2656-07/F2656-20 M50 P1. Testing by an independent testing laboratory confirms that it will stop and destroy a heavily loaded truck moving at high speeds and remain standing for a second attack.

1.0 SCOPE

1.1 Full Scale Crash Test Certification

1.2 This specification defines the procurement of a PHALANX™ SYSTEM, Model DSC 550, consisting of one vehicle Barricade operating (independently or in sets of two, three or four) Barricade(s), an independent ELECTRICAL MECHANICAL OR HYDRAULIC POWER SYSTEM, the CONTROLS AND LOGIC CIRCUITS, FEATURES and OPTIONS as defined herein.

1.3 SAFETY AND ENVIRONMENTAL OPTIONS include signal lights, gate arm barriers; safety loops; IR beams, heaters and sump pumps. Rear and front facing warning lights.

1.4 TOUCH SCREEN CONTROL PANELS or PUSH BUTTON CONTROL PANELS. Remotes and Masters.

2.0 SITE SPECIFIC REQUIREMENTS

2.1 The Barrier ram when installed shall provide a level or co-planar surface relative to surrounding roadways. (Ref. Std. Specifications for Construction of Roads and Bridges on Federal Highway Projects FP-96).

2.2 The Barricade rear plates shall be removable sections providing service access portal.

2.3 The Barricade shall safely handle heavy truck traffic with loads up to 20,000 lbs. per axle.

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3.0 SYSTEM CONFIGURATION

3.1. Barricade(s)

3.1.1 Barricade Construction. Barricade shall be a shallow frame below grade assembly that can be cast in a foundation of nominal 24 inches [610 mm] in depth. The assembly shall have a heavy steel ram weldment capable of being rotated to an above grade position. The guard position shall present a formidable obstacle to approaching vehicles. Upon impact, forces shall be first absorbed by the ram weldment and then transmitted to the foundation of the unit.

3.1.2 Barricade Height (Deployed). Height of the Barricade shall be 41.5 inches [1.0 M] as measured from the top of the foundation frame to the top of the barrier inclusive of the top road plate.

3.1.3 Barricade Ram Length. Barricade ram length shall be 116 inches [2.9 M] or a minimum length of 60 inches [1.52 M]). Available in additional widths in 28 inch (711 mm) increments.

3.1.4 Foundation Depth. The frame of the Barrier shall be a nominal 24 inches [610 mm].

3.1.5 Safety Lights and painted stripes shall be provided.

3.2 **OPTION 1** HYDRAULIC POWER UNIT (HPU)

3.2.1 Hydraulic Circuit. Circuit shall incorporate the design concepts as described by US Patent # 4,490,068. Unit shall consist of an electrically driven hydraulic pump which shall pressurize a high pressure manifold connected to a hydraulic accumulator. Electrically actuated valves shall be installed on the manifold to allow oil to be directed to the hydraulic cylinders to raise and lower the Barricade. The hydraulic circuit shall include all necessary control logic devices, interconnect lines and valves to override and lock out the normal speed control valve(s) for emergency fast operation of the Barricade(s).

3.2.2 Main Power. The electric motor driving the hydraulic pump shall be fed from (specify actual sit voltage, phase and frequency, i.e. 230/3/60). Motor shall be sufficiently sized for the expected number of Barricade operations.

3.2.3 Power Off Operation. The accumulator shall be sized to allow _____(specify number of half-cycle operations required) of a single Barricade in the event of a power outage. Enhanced power off capability can be selected as an option. The control valves shall also be manually operable in this case.

3.2.4 Manual Operation. A hand pump shall be furnished to allow the Barricades to be raised manually in the event of a prolonged power interruption.

3.2.5 Peak Operating Rate, The actuator and accessories shall be sized to maintain a through put rate of of _____(specify number of full-cycle operations required) cycles per hour of the Barrier(s) for a period of 60 minutes.

3.2.6 Construction. The hydraulic power unit and accessories shall be mounted and wired on an integral steel skid. The HPU shall fit in an envelope 60 inches W x 36 inches D x 60 inches H [1524 mm W x 914 mm D x 1524 mm H].

3.3 OPTION 2 Electrical Mechanical System (EMS)

3.3.1 The EMS shall include an electro-mechanical actuator, internal encoder, variable frequency drive, programmable logic controller, power cables and Delta counter balance system, command and control station(s), control logic.

3.3.2 Main Power. The EMS shall be fed from _____ (specify actual site voltage, phase and frequency, i.e. 230/3/60 as an example).

3.3.3 Power Off Operation. Back up batteries and counter balance reservoir shall be sized to allow _____ operations of the barrier (s).

3.3.4 Hourly Throughput Rate, The actuator and accessories shall be sized to maintain a through put rate of _____ per hour of the Barrier(s).

3.3.5 Peak Operating Rate, The actuator and accessories shall be sized to maintain a through put rate of _____ per hour of the Barrier(s) for a period of _____minutes.

3.3.6 Construction. The electro-mechanical actuator and cables shall be rated IP-67. The actuator controls, system components, counter balance and power off equipment shall be mounted and wired on integral steel skid(s). Dimension will be defined for site specific applications. The controls shall be installed indoors or in an optional weather resistant enclosure see 3.6.

3.3.7 Electromechanical operator shall not exceed 2000W or draw more than 15A using a 200V single phase power source.

3.3.8 Electromechanical operator shall not utilize any type of spring, coiled, torsion, or pneumatic.

3.4 Control and Logic Circuits

3.4.1 The following circuits and control stations shall be furnished:

3.4.2 Control Circuit. A control circuit shall be provided to interface between all Barricade control stations and the hydraulic power unit. This circuit shall contain all relays, timers and other devices necessary for the Barricade operation.

3.4.3 Voltage. The control circuit shall operate from a 120/240 volt, 50/60 Hz supply (optionally 24 VDC). An internally mounted transformer shall reduce this to 24 VDC for all external control stations.

3.4.4 Power Consumption. The control circuit power consumption shall not exceed 250 watts basic load. This does not include the power consumption for optional heaters.

3.4.5 Construction. The control circuit shall be mounted in a general purpose enclosure. All device interconnect lines shall be run to terminal strips.

3.4.6 Maintenance Touch Screen Control Panel. The control circuit shall include a touch screen panel in the control circuit enclosure that allows the operator to control the barrier locally with the following options:

1. Secure Barrier Control – Ability to jog barrier or operate normally with secure password protection.

2. Real time data – Monitor output current, temperature, position, actuator health.

3. Troubleshooting Guide – Displays Possible Causes and Actions/Solutions for any potential faults.

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3.5 Touch Screen Control Panels - Master Panel or Slave Panel(s)

3.5.1 Touch Screen Panels. Touch Panel controls can be provided as an option. Touch Screens are available in standard sizes from 8 to 15 inches in a rack mount or table top console.

3.5.2 Configurations. The master and slave Touch Screens have all the standard functionality of the Remote Control panels in sections 3.6 and these additional features:

3.5.3 Data Logging – Records and maintains a time stamped record of all command signals issued from the Touch Panel and any Auxiliary Controls. This record log can be easily exported into a spreadsheet on computers.

3.5.4 Layering – Locations with multiple barriers can be presented in a layered fashion allowing control from one convenient panel opposed to multiple panels or one large pushbutton panel.

3.5.5 Customizable – The operator can customize location names, alarm time delays and auto-close time delays if used.

3.5.6 Cycle Count and Alarms – The Touch Screen can monitor the number of cycles a barrier completes and will alert the operator when maintenance is due (based on cycles or days depending on site).

3.5.7 Passwords – The Touch Screens offer passwords that can be set up at different operating levels allowing access to differing functional configurations per user

3.5.8 Video – Video Touch Screen models are available for control. This option displays the vehicle barricade directly above the control “buttons” which operate the barricade. Having a live feed of the barriers allows the operator to more safely monitor and control the area from a distant remote location.

3.5.9 The standard touch screen supports Ethernet communication wiring. Fiber Optic communications can be supported if required.

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3.6 Push Button Control – Master or Slave Panel(s)

3.6.1 Push Button. Specify Remote Control Master and the number of slave control panels or EFO push buttons required.

3.6.2 Remote Control Master Panel. A remote control master panel shall be supplied to control Barrier function. This panel shall have a key lockable main switch with "main power on" and "panel on" lights. Buttons to raise and lower each Barrier (or set) shall be provided. Barrier "up" and "down" indicator lights shall be included for each Barrier (or set). The Emergency Fast Operate (EFO) feature shall be operated from a covered toggle switch (optionally a push button larger than the normal controls). The EFO shall be furnished with EFO active light and reset button. The remote control master panel shall have a key lockable switch to arm or disarm the remote slave panel(s). An indicator light shall show if the slave panel is armed.

3.6.3 Remote Control Slave Panel. A remote control slave panel shall also be supplied to control the Barrier operation. This panel shall have a "panel on" light that is lit when enabled by a switch on the remote control master panel. Buttons to raise or lower each Barrier (or set) shall be provided. Barrier "up" and "down" indicator lights shall be included for each Barrier (or set). The Emergency Fast Operate (EFO) feature shall be operated from a push button larger than the normal controls (optionally a covered toggle switch). When the slave panel EFO is pushed, an EFO "active" lamp will light and operation of the Barrier(s) will not be possible until reset at the master panel.

3.6.4 Voltage. The remote control panel(s) shall operate on 24 VDC.

3.6.5 Construction. The rack mount panel is designed to fit in a standard 19” networking rack.

3.6.6 Panel(s) shall be equipped with a timer circuit to notify the operator via an annunciator that the barrier has been left in the down position for too long a time period. The time interval is adjustable using a potentiometer on the back side of the panel.

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4.0 ACCESSORY EQUIPMENT (Any or all of the following may be selected):

4.1 **Stop/Go Traffic Lights.** Red/Green 8 inch [200mm] standalone traffic lights shall be supplied to alert vehicle drivers of the Barricade position. The green light shall indicate that the Barricade is fully down. All other positions shall cause the light to show red. Brackets shall be supplied to allow light(s) to be located on a (3.5 inch OD post) (3.5 inch OD post - back to back). The light operating voltage shall be 120 Volt (alternately 240 Volt), power consumption is 13 watts LED.

4.2 **Sump Pump.** A self-priming sump pump shall be supplied to drain water collected in the Barricade foundation. The pump shall have the capacity to remove 1 inch per minute of rainfall a distance of 6 vertical feet to customer supplied discharge drain. Pump operating voltage shall be 120/1/50-60 (alternately 240/1/50-60).

4.3 **Vehicle Safety Loop Detector.** A vehicle safety loop detector shall be supplied to prevent the Barricade from being accidentally deployed on a vehicle. The detector automatically calibrates itself in order to ignore rebar and temperature fluctuations. All close commands will be ignored if an obstruction is detected unless EFO is activated. Two detectors shall be provided; one leading loop and one trailing loop. As long as a vehicle on over either of the safety devices, the barrier will not deploy.

4.4 **Weather Resistant Enclosure**. Optional for both electric and hydraulic systems. A lockable weather resistant enclosure shall be provided for the Hydraulic Pressure Unit (HPU) or Electromechanical Power Unit (EMPU). The design shall provide for easy access to the HPU/EMPU for maintenance and emergency operation of the hydraulic system. Enclosure shall be provided with a corrosion resistant coating and shall be 60 inches W x 36 inches D x 60 inches H [1524 mm W x 914 mm D x 1524 mm H].

4.5 **Battery Backup System.** Option for Electromechanical version: A set of AGM batteries and an inverter are supplied to provide backup power when local power is lost. The system will provide a minimum of 100 backup cycles in the event of a power loss.

4.6 **Required Spare Parts.** Spare parts should be provided with the system to support typical parts replacement of crucial items over the first one year of operation at a typical post. Parts will include frequent wear, maintenance and repair items.

4.7 **Barrier Heater**. Barrier sump should have a heater system to keep snow and ice from building inside the barrier frame. All drains shall be heat traced to keep water from freezing by the installer.

4.8 **Manual Hand Pump**. The barrier shall be able to be raised or lowered by means of a hand pump which shall be furnished to allow the Barricades to be raised manually in the event of a prolonged power interruption. For EM barriers, Delta's external lifting adaptor is provided to manually lift the barrier.

4.9 **Auxiliary Emergency Fast Operate Circuit**. A separate hydraulic circuit consisting of a pressure reserve source, operating control logic and interconnect lines and valves shall be supplied. This circuit shall provide an available source of power to operate the Barricade(s) at emergency fast speed (as specified in 5.3.2), even after power off or manual operation or high frequency operation has depleted the normal reserve capacity. This system will operate in conjunction with and from normal EFO controls.

4.10 **Enhanced Emergency Fast Operate**. Hydraulic System Option: The emergency fast operate components shall be sized and selected to provide emergency rise times of 0.75 seconds or less. Barrier systems shall be designed to permit the retrofitting of various speed enhancing components in the field, so that systems not originally ordered with the enhanced fast operate components may be upgraded in the future.

4.11 **Enhanced Power Off Capability.** The hydraulic accumulator shall be sized to provide ____ half cycle operations of a single Barricade (or sets of Barricades).

4.12 **Electro-Mechanical Signal Gate**. An electrically operated wood or aluminum arm signal gate shall be supplied to alert vehicle drivers of the Barricade position. The gate operate shall interface with the Barricade at the control circuit. The control circuit shall close the gate at the Barricade "up" command and remain closed until the Barricade is fully lowered. The wood arm shall be ___ foot (6 to 12 foot can be specified) long and be striped with reflective yellow/black tape. The gate assembly shall be mountable directly to the roadway surface.

4.13 **Hot Dip Galvanization**. Complete barrier steel shall be hot dip galvanized per ASTM Specification ASTM123.

5.0 PERFORMANCE

5.1 **Experience.** Barricade and auxiliaries shall be of proven design. Manufacturer shall have 20,000 Phalanx™ type Barricades in field operation for a minimum of 30 years with documented field experience for all major components and design features.

5.2 **Qualification Tests.** Barricade design shall have successfully passed a full scale crash test conducted by qualified independent agency.

5.2.1 **Performance Evaluation.** The Barricade shall have successful performance evaluations based on full scale testing of vehicles as either defined by the agency or as set forth in the specifications noted in 5.2.2.

5.2.2 ASTM F 2656-07/F2656-20 M50/P1.

5.2.3 Second Strike Capability. After the full scale test the barricade and foundation remained in place and ready for a second attack.

5.2.4 Barricade(s) shall be designed to destroy a non-armored or non-tracked vehicle at energy levels of up to 1,300,000 foot –pounds

15,000 pounds at 50 mph
50,000 pounds at 67 mph

5.3 Speed of Operation.

5.3.1 **Normal Operation.** Each Barricade (or set) shall be capable of being raised or lowered in 3 to 5 seconds (adjustable) when operated at a repetition rate not greater than specified in paragraph 5.3. Barricade direction shall be instantly reversible at any point in its cycle from the control stations.

5.3.2 **Emergency Fast Operation.** Barricade shall rise to the guard position from fully down in 2.0 seconds when the emergency fast operate button is pushed. Barricade shall remain in the up and locked position (normal up/down buttons inoperable) until the EFO condition is reset.

5.3.3 **Frequency of Operation.** Barricade shall be capable of ____ (specify up to 120 cycles per hour) complete up/down cycles per hour.

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6.0 ENVIRONMENTAL DATA:

6.1 Barricade shall operate satisfactorily under the following environmental conditions:

6.2 Extremes in temperature
Yearly maximum drybulb temp _____f/c
Yearly minimum drybulb temp _____f/c

6.3 Rainfall
Yearly average _____inches
Maximum expected hourly rate_____inches/hour

6.4 Snowfall
Maximum expected hourly rate_____ inches/hour
Roadway will be (mechanically/manually/chemically) cleared _____.

7.0 QUALITY ASSURANCE PROVISIONS

7.1 **Testing.** Cycle testing shall be conducted by an independent test lab. The hinges and power actuators, both hydraulic and electromechanical have been cycle tested to 1,000,000 cycles without catastrophic failure.

7.2 Upon completion the procured Barricade system will be fully tested in the manufacturer's shop. In addition to cycle testing to verify function and operating speeds, the following checks shall be made:

7.3 **Identification.** A nameplate with manufacturer's name, model number, serial number and year built shall be located on the control circuit.

7.4 **Workmanship.** The barricade and subsystems are made in the USA using high quality parts.

7.5 **Dimensions.** Shall be checked against drawings and ordering information.

7.6 **Finish.** Coatings shall be checked against ordering information and shall be of the highest quality.

8.0 PREPARATION FOR SHIPMENT

8.1 The Barricade system shall be crated or mounted on skids as necessary to prevent damage from handling. Lifting points shall be of sufficient structural integrity to enable the assembly to be lifted and transported by overhead crane or forklift without failure.

9.0 MANUFACTURER'S DATA

9.1 Drawings and installation data. The Barricade system drawings and installation, maintenance and operating manuals shall be sent to purchaser within 4 weeks of order. Additional copies shall be supplied (1 copy supplied at no cost). AutoCAD drawings will be provided for installer to plot system components to ensure compatibility with site conditions with respect to layout.

10.0 DISCLAIMER

10.1 Please note - careful consideration must be devoted to the selection, placement and design of a Barricade installation. In the design of any Barricade system, perimeter security device or security gate that blocks a roadway or drive, care must be taken to ensure that approaching vehicles as well as pedestrians are fully aware of the Barricades and their operation. Proper illumination, clearly worded warning signs, auxiliary devices such as semaphore gates, stop-go signal lights, audible warning devices, speed bumps, flashing lights, beacons, etc. should be considered. Delta has information available on many such auxiliary safety equipment not specifically listed herein. It is strongly recommended that an architect and or a traffic and or safety engineer be consulted prior to installation of a Barricade system. Delta will offer all possible assistance in designing the operating equipment, controls and the overall system but we are not qualified nor do we purport to offer either traffic or safety engineering information.

11.0 PROCUREMENT SOURCE

11.1 The **Model DSC 550** Phalanx™ Barricade System shall be purchased from:

DELTA SCIENTIFIC CORPORATION
40355 Delta Lane
Palmdale, California, 91355, USA
Phone (661)575-1100
FAX (661)575-1109
Email info@deltascientific.com
www.deltascientific.com

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