

**SPECIFICATION
FOR
TOOL CARRIER, INTEGRATED
(2 CU. YD. CLASS)**

This specification is released for procurement purposes until revised or rescinded.

SCOPE

This specification covers diesel engine-driven, articulated, pneumatic tired integrated tool carriers, wheel loader type, with hydraulically operated quick-coupling device. It does not include all types and sizes of commercially available units, but only the size generally used by the North Carolina Department of Transportation, Division of Highways.

I. CLASSIFICATION

This specification covers only one size integrated tool carrier.
(Integrated tool carrier is usually abbreviated hereinafter as "ITC.")

II. APPLICABLE STANDARDS

The following documents of issue in effect on the date of the Invitation for Bids shall form a part of this specification to the extent described in REQUIREMENTS.

SAE J732 - Specification Definitions - Loaders
SAE J742 - Capacity Rating - Loader Bucket
SAE J818 - Operating Load For Loaders
SAE J930 - Storage Batteries For Off-road Work Machines
SAE J1040 - Roll Over Protective Structures (ROPS)
SAE J1083 - Unauthorized Starting or Movement of Machines
SAE J1166 - Sound Measurement-Earthmoving Machinery-Operator-Work Cycle
SAE J1349 - Engine Test Code
SAE J1473 - Brake Performance -- Rubber-tired Earthmoving Machines
SAE J1511 - Steering for Off-Road, Rubber-Tired Machines

Society of Automotive Engineers, Inc. (SAE)

400 Commonwealth Drive
Warrendale, PA 15096

Federal Occupational Safety and Health Act Codes

U.S. Department of Labor
200 Constitutional Ave., NW
Washington, DC 20210

State Occupational Safety and Health Act Codes (OSHA)

N.C. Department of Labor
OSHA Division
4 West Edenton Street
Raleigh, N.C. 27601

III. REQUIREMENTS

A. GENERAL

This specification covers diesel, rear engine-mounted, pneumatic tired, four-wheel, articulated steer, four-wheel drive, integrated tool carriers with hydraulically operated quick- coupling device, and attachments of conventional design and heavy duty construction, complete with all necessary operating accessories customarily furnished by the manufacturer with ITC's of this type whether stipulated herein or not, together with such modifications and attachments as may be necessary to enable the unit to function reliably and efficiently in sustained operation.

The attachment lifting mechanism (e.g. parallel bar linkage) and all buckets and attachments requested herein and/or in the Invitation For Bids must be approved by the ITC manufacturer for ITC use. The State reserves the right to request specific written certification from the ITC manufacturer of such approval.

The State reserves the right, at its sole discretion, to consider as being equivalent any component or system differing in some respect from the design specified herein, provided such design differences do not in the State's determination compromise the ability of the component or system to perform in the particular manner intended by the specification.

1. Standard Product

The machine offered shall be new and the latest production model as represented in the manufacturer's current published literature intended for the general public. The specific configuration offered must be represented in such literature. Machines which are offered otherwise may be rejected.

2. Use Conditions

Design and construction shall be such that the ITC will withstand the extremely hard usage encountered in service, such as digging, lifting, transporting, dumping of materials, operation over rough terrain and storage and operation in the open air under all weather conditions for extended periods of time. Components, particularly of the electrical, fuel, and exhaust systems shall be so designed as to resist any harmful effects of dust or water.

It is essential that the ITC have a self-leveling feature for the attached tool. This feature is to provide the capability of lifting an attached set of forks through the lifting arc while automatically maintaining the forks in a level (horizontal) pitch position without attention from the operator. This capability is to be such that the load will not fall from the forks due to their deviating from the level position, free of attention from the operator, as the lifting arms travel through the lifting arc.

With the ITC as furnished, the seated operator shall be able to properly attach and detach tools to the ITC by using controls located in the cab, and without having to leave the cab. (Hydraulic connections are specifically exempted from this requirement.) After a tool is attached in this manner, it shall then be ready for operation without the operator having to leave the cab to attend to the tool, except when adjustments unrelated to the attachment operation must be made.

3. Ease of Maintenance

The design of the ITC and accessory installation shall permit ready accessibility for servicing, replacement, and adjustment of component parts and accessories with minimum disturbance of other elements.

4. Frame

The frame shall be designed to withstand maximum stresses under normal operating conditions and in addition, provide adequate support for attaching any device approved by the

ITC manufacturer for use in combination with the ITC. Rear frame shall provide for rear axle oscillation in each direction from horizontal. Front and rear articulated frames shall be joined by a rugged hinge assembly.

5. ITC Operating Weight

The ITC operating weight shall include:

- Manufacturer's standard advertised equipment and hydraulic controls
- Manufacturer's standard advertised general purpose bucket, which is to be at least of the size specified herein, with manufacturer's standard bolt-on cutting edge
- ROPS cab
- 175 lb. operator, fuel, oil, water, lubricants
- Standard advertised tires
- Operating weight shall not include any tire ballast
- Standard or optional advertised counterweight, but not to exceed 10.0% of operating weight as described above

Bidder is to furnish the manufacturer's published literature which will enable the State to compute the machine operating weight in the configuration specified above. This literature is to accompany the IFB.

The operating weight requirements outlined above are used solely as a standard to determine the acceptability of the machine and may not reflect the actual machine requirements specified herein.

6. Operating Load

The ITC operating load shall be in accordance with SAE-J818, with the ITC in a full turn position and equipped with the manufacturer's standard general purpose bucket.

7. Occupational Safety and Health Act

The loader shall be furnished with all applicable equipment and accessories as required by the Occupational Safety and Health Act (U.S. Dept. of Labor and N.C. Dept. of Labor), including the following:

29 CFR 1926.52 - Occupational Noise Exposure

The loader shall be constructed and assembled so that the noise at ear level of the seated operator, with all doors, windows and vents open; when measured in accordance with SAE-J1166 - Work Cycle Test, shall not exceed the permissible noise exposure limits of this regulation for 8-hour operator exposure.

29 CFR 1926.600 - Equipment

Safety glass for enclosed cab.

29 CFR 1926.602 - Material Handling Equipment

Seat belts, brakes, fenders, horn and back-up alarm.

29 CFR 1926.1000 - Rollover Protective Structures (ROPS) for material handling equipment.

29 CFR 1926.1001 - Minimum performance criteria for rollover protective structures for designated scrapers, loaders, dozers, graders, and crawler tractors.

29 CFR 1910.145 - Specifications for Accident Prevention Signs and Tags

Slow moving vehicle emblem.

B. OPERATING AND DIMENSIONAL REQUIREMENTS

The requirements given below are minimums, except for total cycle time. Unless otherwise specified, requirements are for machine in configuration specified in paragraph III.A.5, ITC Operating Weight.

Operating Weight (SAE J732)	21,000 lbs.
Tipping Load, Full Turn (SAE J732)	12,500 lbs.
Bucket Breakout Force	20,500 lbs.
Bucket Reach at full height & bucket dumped at 45°	39"
Bucket Dump Clearance at full height & dumped at 45° (Measured from manufacturer's standard bolt-on cutting edge mounted in manufacturer's standard position, with tires specified herein)	108"
Degree of Articulation (Left & Right)	40°
Net Brake Horsepower (SAE J1349)	110
Tire Size	17.5 x 25 - 12PR (L2)
Forward/Reverse Speeds	3/3
Travel Speed-Forward	20.0 MPH
Tread (CL to CL of tires)	73"
Total Cycle Time (Raise, Dump, Lower)	13.0 sec. max.
Height To CL of Hinge Pin (with tires specified herein)	146"

C. ENGINE

1. Diesel Engine

The engine shall be of the compression ignition type, two or four-stroke cycle, liquid or air cooled, and capable of operating on commercial diesel fuel as recommended by the manufacturer. The engine shall be equipped with an adequate and efficient fuel injection mechanism, heavy duty fuel oil filter system and heavy duty full flow type lubricating oil filter.

Air filter shall be heavy duty dry type, dual stage (primary and safety elements). Air cleaner hose shall be of metal or heavy duty flexible, non-collapsible type, (wire reinforced hose not acceptable) and with metal or molded rubber elbows. All air cleaner hose connections must be banded. Exhaust pipe shall be the deflector type. The minimum net brake horsepower at the engine flywheel shall be as shown in Item III.B.

2. Engine Governor

The engine governor shall be of the mechanical or hydraulic type and shall be driven from the engine. Provisions shall be made for permitting regulation of the governed speed-setting throughout the engine load range while the unit is in operation.

3. Engine Starting System

The manufacturer's standard electric starting system with heavy duty battery (SAE J930) shall be acceptable for cranking the loader engine. The engine starting system shall be capable of cranking the loader engine in an ambient temperature of -20F. The battery shall be specifically designed to withstand the shock, vibration, and dusty environment normally encountered by off-road work machines. A shock resistant battery mount is not an acceptable substitute for the type of battery required, though such mount may be furnished in addition to the proper battery. A means shall be provided to lock the starting controls and a concealed electrical disconnect shall be provided (SAE J1083). Locking doors on ROPS cab will be acceptable as means to lock the starting controls.

4. Engine Cooling System

a. Water Cooled - The unit shall have heavy duty radiator and blade type fan. The cooling system shall be protected to a minimum of -20°F.

b. Air Cooled - An audible alarm and engine shut down shall be provided to protect the engine in case of fan belt breakage.

5. Engine Lubricating System

The manufacturer's current standard production lubricating system is acceptable.

D. FUEL TANK

The manufacturer's standard fuel tank(s) is (are) acceptable and shall be located so as not to be affected by heat from the engine exhaust pipe or muffler.

E. POWER TRAIN

1. Torque Converter

The hydraulic torque converter shall be the manufacturer's standard, with a stall torque ratio to match the engine and transmission.

2. Transmission

The transmission shall be of the full power shift type. The minimum number of forward and reverse speeds shall be as stated in paragraph III.B.

An external transmission cooler shall be provided.

The machine shall be towable at slow speeds for 100' without damage to powertrain after a powertrain or other type failure has occurred.

A convenient means (such as a foot pedal) shall be provided for the seated operator to temporarily neutralize the transmission so that forward movement or pushing of ITC against truck will cease when ITC is dumping load into truck.

3. Differentials

Front and rear axles shall be equipped with (a) limited slip differentials in both, (b) no-spin in either, or (c) an operator-controlled differential lock-up in front.

F. STEERING

The ITC shall have an articulated frame and full power hydraulic steering. Emergency steering ability shall be furnished in the event of engine failure. Emergency steering reserve capacity shall allow operator to turn the frame a minimum of one full turn, lock to lock, when the engine is shut off. The emergency steering shall meet the requirements of SAE-J1511.

G. BRAKING SYSTEMS

The service brakes shall be four-wheel, foot controlled, either air over hydraulic or full hydraulic power actuated, and of the disc type. The service brake system shall have separate circuits for front and rear axles, or otherwise shall have a means to isolate the front axle circuit from the rear axle circuit in case of a loss of pressure in either circuit. The intent is to allow the machine, after experiencing such loss of pressure in either one of the circuits, to be immediately moved under its own power, with adequate service brake function maintained, to a safe site off the roadway where the machine does not present a hazard to passing traffic. An emergency stopping system and a parking system shall be provided.

The service brake system shall incorporate a stored energy source, an accumulator, or other means to effectively allow full operator-application of the system in the event any of the following fail: the engine, hydraulic or air pump, front or rear axle circuit.

A convenient means to release the emergency stopping system shall be provided in order to enable the machine to be towed after this system has been applied.

In addition to the above requirements, the service braking, emergency stopping and parking systems shall conform to the requirements of SAE-J1473.

H. TIRES

Tire size on all wheels shall be 17.5 x 25 - 12 PR (L2). Tires shall be tubeless, nylon loader tread pattern type or equivalent.

I. HYDRAULIC SYSTEM

The lift, bucket, and steering mechanisms shall be operated by hydraulic cylinders. Hydraulic pump shall be on a live drive from the engine or torque converter and shall provide adequate pressure for bucket operations. Ample pump and reservoir capacity shall be furnished for maximum operating cycles without overheating. A replaceable oil filter and system relief valve to prevent engine stall-out shall be provided.

J. ROPS CAB

The ROPS cab shall conform to SAE-J1040, be completely enclosed and equipped with tinted safety glass. The operator's seat shall be located within easy reach of all operating controls, and allow a good view of bucket and the work area. The seat shall be adjustable bucket type, foam rubber cushioned, upholstered, with arm rests and seat belt.

A heavy duty heater, defroster, windshield wipers (front and rear), sun visor, and inside rearview mirror shall be included.

K. BUCKET CONTROLS

The lift circuit shall provide the functions of raise, hold, lower and float. An automatic kickout, adjustable to full lift height, shall be provided. A self-leveling device shall be furnished. A bucket level indicator shall be furnished.

The tilt circuit shall provide the functions of roll back, hold and dump. An automatic bucket return-to-dig positioner, adjustable to desired loading angle, shall be furnished.

L. TOOLS AND LUBRICATING EQUIPMENT

Special tools and greasing equipment shall be furnished with the loader. A tool box with hasp and padlock shall be provided.

M. PAINTING

All exposed metal parts of the ITC shall be cleaned of all mill scale, rust, grease, etc, then primed and undercoated with a rust resistant paint in accordance with best industry practice. The finish coat shall be Department of Transportation, Division of Highways, Yellow, Dupont 93-54701A leadfree, or its acceptable equivalent. Interior of the cab shall be a non-glare color.

N. INSTRUMENTS AND GAUGES

The instrument panel shall be located in view of the seated operator. The manufacturer's standard instrumentation shall be furnished unless otherwise specified in the IFB.

O. EQUIPMENT

The following equipment shall be furnished with the loader:

1. Muffler
2. Air cleaner restriction indicator of the proper size and setting, Bacharach or equal.
3. Radiator guard
4. Slow moving vehicle emblem
5. Horn
6. Vandalism protection kit, with all locks keyed alike. The kit shall include locking cab doors. It shall also include lock type caps for all exposed filler locations and oil dipstick pipes, less padlocks. Filler locations and dipstick pipes which are located within the area protected by lockable engine side shields do not need to be furnished with lock type caps.
7. Removable side shields for engine, on each side (left and right). May be lockable (see item #6).
8. Front and rear work lights, stop light, instrument lights, and front and rear turn signals with hazard flasher
9. Tie-down hooks for transporting the loader
10. Backup alarm
11. Rear drawbar
12. Front fenders
13. Engine block heater, thermostatically controlled
14. In-line fuel heater located prior to fuel filter
15. AM/FM radio, installed, complete with antenna
16. One (1) fire extinguisher, 5 lb., Type BC, rechargeable, metal discharge valve, mounted in the cab.
17. Fused power distribution panel, 12-volt, with a minimum of four (4) outlet terminals.

P. BUCKET

A two (2) cubic yard (SAE heaped) (minimum) general purpose bucket shall be furnished with the ITC.

The bucket shall be equipped with a spill guard, replaceable (weld-on) cutting edge, and minimum seven (7) replaceable bolt-on teeth shipped loose. Two (2) ANSI approved lifting eyes, sized for 1/2" chain hook shall be provided on the bucket.

Q. DRAINS

All drains on the machine (e.g. engine oil, transmission fluid, engine coolant, fuel tank, etc.) are to be located or otherwise provided with drain extensions as required such that the draining fluid does not fall on any other part of the machine and such that the fluid may be readily and easily captured in a receiving basin or pan.

IV. WARRANTY

The contractor warrants to the owner that all equipment furnished under this specification will be new, of good material and workmanship and agrees to replace promptly any part or parts which by reason of defective material or workmanship shall fail under normal use, free of negligence or accident, for a minimum period of 12 months from date put in operation. Such replacement shall include all parts, labor and transportation costs to the location where equipment is down, free of any charge to the owner or his representative.

Under same and all conditions as above, the power train (engine, transmission, torque converter, and final drive) shall be covered for an additional period of at least 24 months. Any periodic inspections which may be performed by the contractor or his representative shall be without charge to the owner.

NOTE: The attachment of warranty terms and conditions to the proposal may lead to nullification of the bid.

V. SERVICE, PARTS, AND MANUALS

The contractor shall furnish a qualified representative to instruct the owner's operator(s) in the operation and maintenance of the equipment for a minimum period of eight hours at each destination specified in the Invitation For Bids.

An operator's manual, shop manual, complete parts book and line setting sheet shall be furnished as specified in the Invitation for Bids.

VI. ACCEPTANCE EVALUATION AND QUALITY ASSURANCE

Upon receipt of each ITC at the receiving point, the purchaser or his authorized representative shall arrange for an acceptance inspection for compliance with the provisions of this specification.

The contractor shall furnish a pilot model for examination, tests and possible modification and/or adjustment of attachments in accordance with this specification.

VII. DELIVERY AND PAYMENT

Delivery of and payment for ITC's under this specification shall be in accordance with the terms and conditions of the Invitation for Bids. The contractor shall be responsible for any packing, packaging, or protection required to insure delivery in an undamaged condition.

Each ITC shall be completely serviced and ready for operation when delivered.

VIII. ORDERING DATA (For Purchaser's Use Only)

Purchasers should exercise any desired option offered herein and should specify the following:

1. Title, number, and date of this specification
2. If ITC is to be painted other than Dupont 93-54701A LEADFREE.
3. If special instruments and gauges are required
4. If multi-purpose bucket is required, in lieu of general purpose bucket. Specify size.
5. If drawbar is not to be furnished
6. If manuals, parts books and line setting sheet are required
7. If on the job site training by a technician in the operation and maintenance of the loader is not required
8. If a pilot model is not to be furnished
9. If equipment in addition to that listed under paragraph III.O is needed.

****** END OF SPECIFICATION ******