

**SPECIFICATION  
FOR  
LOADERS, CRAWLER TYPE**

(This specification is released for procurement purposes until amended or rescinded.)

**SCOPE**

This specification covers diesel engine-driven, crawler type loaders. It does not include all types and sizes of commercially available crawler loaders.

**I. CLASSIFICATION**

The loaders shall be of the sizes specified in Table 1, page 2.

**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 and Table 1, page 2.

J732 - Specification Definitions - Front End Loader

J742 - Capacity Rating - Loader Bucket

J818 - Operating Load For Loaders

J1026 - Braking Performance-In-Service Crawler  
Tractors and Crawler Loaders

J1040 - ROPS

J1166 - Sound Measurement - Earthmoving Machinery - Operator-Work Cycle

J1349 - Engine Power Test code - Spark Ignition and Diesel

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 Avenue, NW

Washington, DC 20210

State Occupational Safety and Health Act Codes

N.C. Department of Labor

OSHA Division

4 West Edenton Street

Raleigh, N. C. 27601

**760-44-00**

### III. REQUIREMENTS

**TABLE 1**

**LOADER MINIMUM REQUIREMENTS**

Loader Size (Nom.)	Bucket SAE Rating J742		Length of Track on Ground (in.)	Track Gauge (in.)	Tipping Load SAE Rating J732 (lbs.)		Engine Net HP SAE J1349	Operating Weight (lbs.)	
	*GP	*MP			*GP	*MP		*GP	*MP
1 ½	1 ½	1 ¼	78	60	12,850	10,700	78	20,000	21,000
1-3/4	1-3/4	1 ½	85	62	15,000	12,850	100	25,000	27,000
2	2	1-3/4	86	63	17,140	15,000	110	29,000	30,000
2.5	2.6	2.15	96	68	22,285	18,425	150	37,400	38,500

\*GP - General Purpose Bucket

\*MP - Multipurpose Bucket

**TABLE 2**

**LOADER LIFT AND BUCKET MINIMUM REQUIREMENTS**

	Loader Size (Nom.)			
	1 ½	1 3/4	2	2.5
1. Height to center of hinge pin fully raised.	125"	130"	135"	150"
2. Cutting edge clearance from ground when front dumped at 45° (a) General purpose bucket (b) Multipurpose bucket	102" 97"	104" 103"	107" 104"	---- 108"
3. Reach at not less than Item 2 cutting edge clearance, front of loader to front of cutting edge dumped at 45° angle. (a) General purpose bucket (b) Multipurpose bucket	32" 32"	38" 40"	38" 40"	---- 40"
4. Digging depth below ground with bucket bottom and cutting edge horizontal. (a) General purpose bucket (b) Multipurpose bucket	2" 2.8"	2.8" 2.8"	2.8" 2.8"	---- 6"
5. Bucket tip back at ground level. (a) General purpose bucket (b) Multipurpose bucket	36° 36°	36° 36°	36° 36°	---- 40°
6. Breakout force with bucket hinge pin as pivot point. (SAE-J732) (lbs.) (a) General purpose bucket (b) Multipurpose bucket	14,500 14,000	18,000 17,000	22,000 19,000	---- 33,500

**A. GENERAL**

This specification covers diesel engine-driven, crawler type front end loaders and attachments of conventional design and heavy duty construction, complete with all necessary operating accessories customarily furnished by the manufacturer with loaders 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.

1. Standard Products

The loader offered shall be new and a standard production model of latest design and equipped as specified herein.

2. Use Conditions

Design and construction shall be such that the loader 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 (salt or fresh).

3. Ease of Maintenance

The design of the loader 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 loader manufacturer for use in combination with the loader.

5. Loader Operating Weight

The loader operating weight shall include the multi-purpose bucket, ROPS canopy, 175 pound operator, fuel oil, water, lubricants, standard advertised track shoes, standard counterweight, standard advertised equipment, and hydraulic controls. Not more than the following heavy duty attachments shall be included in the operating weight: crankcase guard, transmission guard, radiator guards, and sprocket roller and idler guards. The loader operating weight shall not include additional optional counterweight.

6. Operating Load

The loader operating load shall be in accordance with SAE-J818 for the size buckets in Table 1. The specified operating load for each size bucket shall be based on 3,000 lbs/cu.yd. material, as follows:

1¼ - 3,750 lbs.	1-3/4 - 5,250 lbs.
1½ - 4,500 lbs.	2 - 6,000 lbs.
	2.6 - 7,800 lbs.

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. Department of Labor and N.C. Department 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, horn and back-up alarm.

29 CFR 1926.1000 - Rollover Protective Structures

Cab, ROPS canopy, or combination cab and ROPS canopy

**B. ENGINE**

1. Diesel Engine

The engine shall be of the compression ignition type, two or four-stroke cycle, 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. 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 of the deflector type. The minimum net horsepower at the engine flywheel shall be as shown in Table 1 for the specified size.

2. Engine Governor

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

3. Engine Starting System

The manufacturer's standard electric starting system, including battery(ies) for cranking the tractor engine shall be furnished. The starting system shall be capable of cranking the engine for starting in an ambient temperature of -20°F.

4. Engine Cooling System

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

**C. FUEL TANK**

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

**D. ENGINE TO TRANSMISSION DRIVE**

1. Power Shift Type

Hydraulically actuated clutches, hydraulic torque converter, or hydrostatic-type drive shall be the manufacturer's current standard production.

## **E. TRANSMISSION**

### 1. Transmission Drive

Unless otherwise stated in the Invitation for Bids, the loader shall be furnished with either a power shift transmission with hydraulic torque converter or hydraulically actuated clutch, or a hydrostatic-type transmission. The hydrostatic transmission shall have speeds within the limits of acceptable system pressures. The power shift transmission shall have at least three forward and three reverse speed ranges.

### 2. Transmission Input Torque Capacity

The transmission input torque capacity shall be greater than the maximum gross torque developed by the engine plus the torque converter or the hydrostatic type drives.

## **F. STEERING DEVICES**

The manufacturer's current standard production steering devices for crawler loaders shall be acceptable.

## **G. FINAL DRIVE UNITS**

The final drive gears shall be in housings adequately sealed against mud, dust and water. The final drive gears shall be heat-treated steel with machine-cut teeth fully enclosed and lubricated. The drive sprockets on Size 2 and size 2.5 loaders shall be replaceable without removing the track frame.

## **H. TRACK**

### 1. Track Assembly

Track links, pins, and bushings shall be of heat-treated steel, replaceable and interchangeable. A recoil mechanism for cushioning the front idlers shall be included. Hydraulic track adjusters and sprocket guards shall be furnished. The top and bottom track rollers shall be lubricated and permanently sealed.

### 2. Track Shoes and Grousers

The track shoes shall be of heat-treated steel, offering a maximum resistance to wear and abrasion. The track shoe type and width shall be as specified in the Invitation for Bids.

## **I. HYDRAULIC SYSTEM**

The lift and bucket mechanism shall be operated by double acting hydraulic cylinders. Hydraulic pump shall be on a live drive from the engine and shall provide adequate pressure for lifting the fully loaded bucket in all positions. Ample pump and reservoir capacity shall be furnished for maximum operating cycles without overheating, and an oil filter shall be provided.

## **J. OPERATOR'S SEAT AND CONTROLS**

### **1. Seat**

The operator's position shall have a full suspension, adjustable, upholstered seat, armrests, backrest and a safetybelt, with controls convenient to the seated operator.

### **2. Loader Hydraulic Controls**

Loader hydraulic lift control shall provide for raise, hold, lower, and float positions. General purpose bucket control shall have tilt-back, hold and dump positions. Lift and bucket controls shall be easily operable with one hand.

An additional hydraulic control shall be furnished with the multi-purpose bucket for clam close, hold and open positions. An indicator visible to the loader operator shall show the clam position. If optional front-mounted or hydraulically operated rear-mounted ripper is specified, the necessary hydraulic controls shall be furnished for convenient and easy operation.

## **K. 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.

## **L. PAINTING**

All exposed metal parts of the loader and attachments shall be cleaned of all mill scale, rust, grease, etc., then primed and undercoated with a rust resistant paint in accordance with the acceptable shop practice. The finish coat shall be Department of Transportation, Division of Highways, yellow, Moline MPM#11-Y169A (lead free) or equivalent. Interior of the cab shall be a non-glare color.

## **M. INSTRUMENTS AND GAUGES**

The instrument panel shall be located in full view of the seated operator. The manufacturer's standard instrumentation shall be furnished but are to include the following as a minimum: oil pressure, water temperature, ammeter or voltmeter, hour meter, fuel level, torque converter oil temperature and/or transmission oil temperature, and tachometer. Audio warnings are required on instrumentation relating to engine oil pressure and engine water temperature.

## **N. EQUIPMENT**

Loader shall be furnished with the following:

1. Muffler, (including turbocharged engines if manufacturer's standard item.)
2. Air cleaner restriction indicator of the proper size and setting (Bacharach or equivalent).
3. Manufacturer's heavy duty radiator and fan guard, crankcase guard, transmission guard; sprocket, roller and idler guards.
4. Vandalism protection kit shall include locking instrument panel cover, lock type caps for exposed filler caps and oil dipstick pipe (less padlocks).
5. Engine hood with side doors or shields
6. Front and rear work lights
7. Automatic bucket repositioner
8. Bucket level indicator

9. Backup alarm
10. Engine block heater
11. Concealed electrical disconnect

**O. ATTACHMENTS**

Attachments shall be of heavy duty construction and capable of handling the full power output of the specified loader under severe operating conditions.

1. Bucket

A multi-purpose bucket of the size called for in the Invitation for Bids, shall be furnished. Bucket teeth shall be replaceable type.

2. Drawbar

The drawbar shall be heavy duty rigid type.

**P. CAB AND ROPS**

The loader is to be equipped with a cab and ROPS unless otherwise specified in the Invitation for Bids. The cab shall be a fully enclosed waterproof steel cab with insulation and tinted safety glass throughout. It shall be designed to give a full view of the machine operations. The cab shall have at least one door with latch for securing in open position and with keyed lock handle. Window or door glass on each side shall open for ventilation purposes and be equipped with inside locks or latches. Otherwise, an acceptable equivalent means to allow for cab ventilation will be required. The windshield shall be full view designed and equipped with a heavy duty windshield wiper and washer. Furnish a heavy duty heater and defroster.

The combination cab and ROPS shall conform to SAE-J1040 and be of the sound-suppression type as currently offered by the manufacturer.

**Q. ROPS CANOPY**

When specified a ROPS canopy shall be furnished in lieu of a cab and ROPS and it shall conform to SAE-J1040. No interior overhead structural member shall protrude into the overhead space so as to create a hazard to the operator when standing or seated.

**R. OPTIONAL EQUIPMENT**

The following optional equipment shall be furnished only when called for in the Invitation for Bids:

1. Ripper

A ripper assembly, complete with hydraulic control valves, shall be furnished when called for in the Invitation for Bids.

2. General Purpose Bucket

The general purpose bucket, in lieu of the multi-purpose bucket, shall be furnished when called for in the Invitation for Bids. It shall have replaceable type teeth.

**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 of 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.

Under same and all conditions as above, the power train (engine, transmission, torque converter and final drive) and structural members 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 State.

## **V. SERVICE, PARTS, AND MANUALS**

If specified in the Invitation for Bids, 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.

Unless otherwise specified, successful bidder shall furnish operator's manual, shop manual, complete parts book and line setting sheet for each unit.

## **VI. ACCEPTANCE EVALUATION AND QUALITY ASSURANCE**

Upon receipt of each loader at the receiving point, the purchaser or his authorized representative shall arrange for an acceptance inspection for compliance with the provisions of this specification. If specified in the Invitation for Bids, 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 loaders 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.

Loaders 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. Size loader required (see Table 1)
3. If the transmission is to be limited to either the power shift or hydrostatic type
4. Track shoe width required.
5. Track shoe type required.
6. If manufacturer's standard painting is required
7. If drawbar is not required
8. If ROPS canopy is required
9. If additional manuals and parts books are required (see Item V.)
10. If training in operation and maintenance of the loader is required (see Item V.)
11. If a pilot model is required (see Item VI.)
12. If ripper is required
13. If general purpose bucket is required