The Mining Truck T 282 B

Maximum Operating Weight: 592 t / 1,305,000 lbs
Payload Class 363 t / 400 ton

Photo shows optional diagonal access stair and customized paint

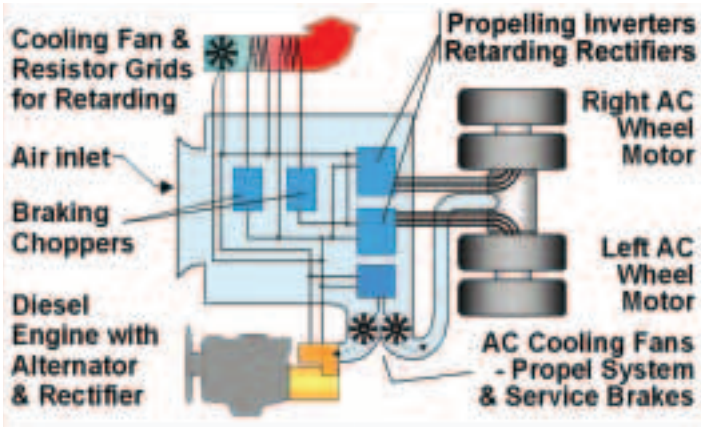
LIEBHERR

The T 282 B

The Siemens-Liebherr AC drive of the T 282 B features convincingly low maintenance. AC alternator and travel drive motors are virtually maintenance free, since their rotors are the only moving parts. The system is controlled via electronic solid state controllers, which are small, extremely fast and have no moving components to wear out.
Lighter than either a DC or a mechanical drive, an AC system allows for better payload-to-EVW ratios, stronger acceleration and faster travel speeds. This results in shorter cycle times and lower cost per moved ton.

Travel Drive

How it works: Current from the engine driven AC-alternator is converted to DC current for easier and more efficient electronic control in the control box. The DC current is then changed back to variable frequency AC by inverters to power the rear wheel motors.
Each wheel motor has its own inverter to allow for totally independent power supply to either set of rear wheels.



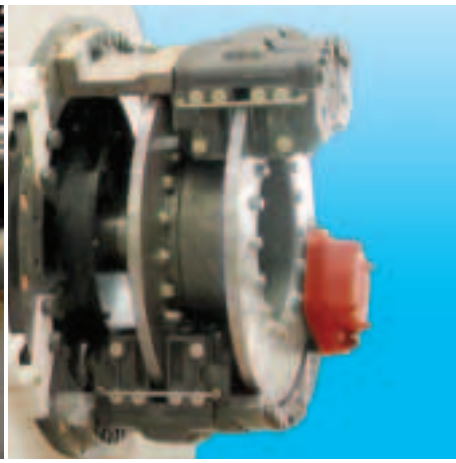
Electric Dynamic Retarding

Continuous safe downhill retarding is fully electric without the use of service brakes. There is no mechanical wear and no need for cooling liquids.
When retarding, each electric wheel motor is driven by it's set of rear wheels and turns into an AC current producing alternator. The electric energy produced is dissipated into the air by a DC cooling fan via the resistor grids.
Since retarding power is determined by the motor size it is considerably stronger (4480 kW / 6030 hp) than the available propel power from the diesel engine which, during retarding, runs at low idle enabling it to cool down and conserve fuel.

Stopping

When stopping, electric retarding will slow the truck to a virtual stand still, at which time the service brakes are automatically and gradually applied by the computer control system without the operator having to do anything but apply the retarder pedal.
Dry disc brakes on front and rear wheels are used to bring the truck to a safe stop, automatically, after electric retarding has slowed the vehicle down to a near stop of 0.5 mph / 0.8 kph. They are designed and are tested to fully comply with ISO 3450.
Rear service brakes are cooled by forced air, eliminating the need for an additional hydraulic cooling system.


Front brake


Rear brake

Chassis

Frame

Two rail, hollow box frame manufactured from high strength steel. Torque tubes connect the two frame rails to absorb warping stresses. This, plus the independent cross carriage results in a strong, lighter weight frame. Frame rails are welded inside and out. Stress flow designed cast steel components are used in high stress areas.

The unique independent Cross Carriage transfers forces from the rear axle and the dump cylinders in a straight, direct line into the frame rails.

Suspension

The T 282 B features a “Double A-frame” Front Suspension. This unique geometry allows the tire contact point to move up and down in a straight line during travel and loading.

Immediate and accurate payload weighing is possible since there are no side loads on the struts.

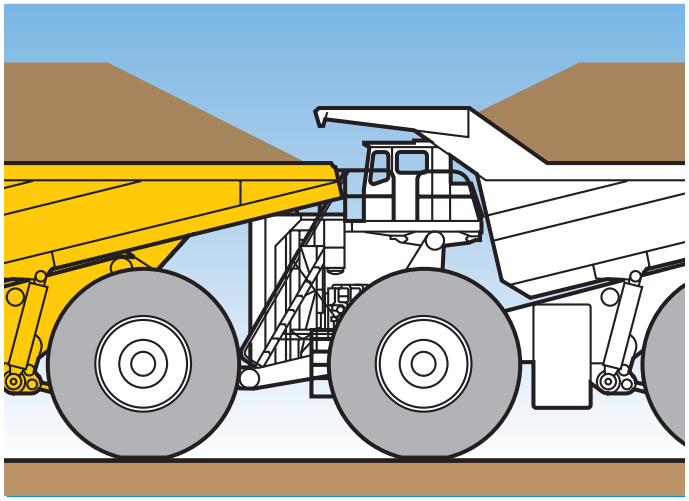
Due to the A-frame‘s lever action design there is longer vertical wheel travel than strut travel, resulting in reduced tire deflection.

The unique Rear Wheel Suspension replaces the traditional nose cone with two Drag Links and a triangular Rear Control Arm. All forces from the rear axle are transferred into the truck frame in straight lines.

Two Suspension Struts transfer all loads from the frame via the top of the axle box directly into the wheels. This allows for a shorter, lighter frame and does not create any torque within the axle box, saving weight.

Operator Cab

The cab with integrated ROPS features fully insulated double shell construction for safety and exceptional insulation. Six-way adjustable air suspended driver seat with adjustable double lumbar support and a full size second seat with mechanical suspension are standard in the spacious cab.
Two stair ladders with hand rails lead safely to the upper deck. Different access set ups are available as options.



To provide better operator protection in case of a rear end collision the cab is set well back on the upper deck. This is an outstanding and exclusive Liebherr safety feature.
For additional details on the cabs standard features please see last page “Standard / Optional Equipment”.

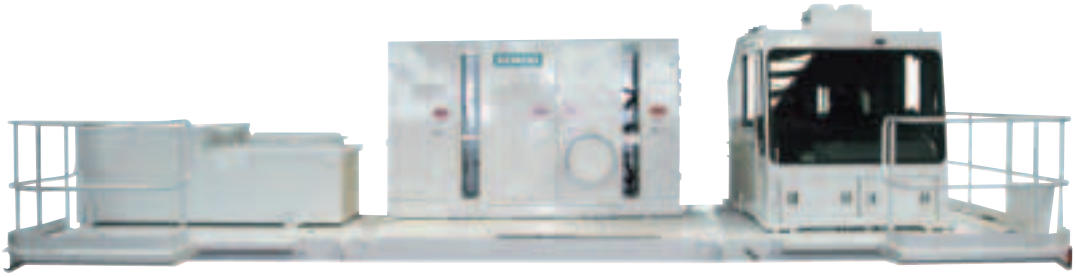
A standard equipped PayLoad System shows the actual payload on a separate display on the dashboard.
Operator information is state of the art “real time” digital and analog. A built in monitor offers three display screen options:
A- Primary: Vital Gauges - speedometer, tachometer, engine coolant temperature, volts, fuel gauge and cruise speed setting
B- Secondary: Additional Gauges for complete operator information
C- Fault history messages
Actual active faults are reported real time directly and automatically on any of the three screens.

Three Communication Ports are used for feeding and down loading required and desired information into and from the
- Engine control system
- Drive system
- PayLoad System.

Several security levels are provided for safety purposes.

Service Accessibility

The electrical AC-drive system of the T 282 B has few service points. Preventive maintenance and required service for the complete truck are reduced accordingly.



All control components for the complete travel drive and secondary systems as well as the resistor grid box for retarding are located on the upper deck for easy and fast access.

The exclusive Liebherr front wheel suspension transfers less stress into the horse collar. This design provides for a bigger opening inside the horse collar which in turn allows for excellent “walk-around” engine access with catwalks and service platforms for safe footing.

Ladders left and right allow safe access to the engine compartment.
All service requiring filters for engine and hydraulic systems are accessible either directly from the ground or from the engine service platforms.
All joints, bushings and bearings requiring lubrication on a regular basis are connected to six grouped lubrication locations serviceable from ground level. Automatic lubrication at predetermined intervals is an option.

Airfilter gauges are located inside the cab indicating the actual filter status.

Internal components of the rear axle box are easily reached through an access door with steps located in the front of the box.

Body

The standard V-shape Body of the T 282 B has a flat floor and a straight dumping edge for easy dumping.
Available options:

- Lighter Weight Bodies
- Canopy Extension
- Rock Guards
- Tail gates
- Abrasion Resistant Linings
- Side Wall Extensions
- Wedge Shape Bodies
- Heated Bodies

Heated Bodies are an available option, although recommended only for extremely cold applications and moist materials.
Liebherr will accept bodies designed and built by specialized companies per the mine's choice after application approval.

Safety Features

Access from ground for the components of the steering and dumping system which require regular service.
Safe access to all engine components. Service platforms and cat walks on either side provide "walk around" engine access.
Cab set back for protection in case of a rear end collision.
Slip/Slide Control uphill and downhill.
Two stair ladders with hand rails lead safely to and from the upper deck, one on either side of the radiator. Other set-ups are optional.
Anti rollback in forward and reverse.
Operator adjustable Cruise Control for both propel and retard. Will bring truck up/down to and hold at set speed.
The T 282 B system will retard with up to 4480 kW / 6030 hp on a continuous basis and down to a near stop of 0.8 kph / 0.5 mph. Retarding is virtually immediate with no perceptible delay.
Automatic Two Speed Over Speed automatically limits maximum speed by reducing propel torque or by applying retarding power. Separate settings for loaded and empty truck.
Full retarding with dead engine.
Automatic Brake Application. The T 282 B is brought to a final stop and held in place with it's disc brakes. They are applied automatically via the retarder pedal without having to push the pedal harder. A third pedal is available to apply the brakes at will, should this be necessary.

Fire Prevention by Design. Fuel and hydraulics carrying components and heat sources are separated as much as feasible. Critical hydraulic hoses are encased in non permeable hose sleeves. Hot parts of turbo chargers are shielded by covers and exhaust pipes are covered and insulated by special non burning tubes impervious to oil. They are preshaped to fit each individual pipe section.
Operator egress stair ladders are shielded by solid steel backs and fire aprons between stair ladder and engine compartment.

AC-Drive Standard Features

The Liebherr-Siemens AC-Drive system in the T 282 B is the most advanced truck drive system available today. It offers a multitude of advantageous features, some of which are exclusive to this system. Proven over countless hours in electric locomotive drives it is very dependable, very easy to service and maintain and offers a very long life expectancy. Besides continuous acceleration and retarding without having to shift gears there are many built-in safety features appreciated by both operators and service personnel as well as the owner.

SIBAS Monitor Program

This electronic program provides communication between the truck's drive system and the operator and/or outside computers at different access levels, providing:

- real time information during operation
- snap shots during fault events, stored within SIBAS and retrievable at a later time
- "Load boxing"

Load Boxing

This is a built in electronic system to test-check the electric travel drive system at full diesel engine power while the truck is parked.
During the process the engine runs at full throttle and the alternator delivers its current via the control box directly to the resistor grid box, where it is converted into heat and dissipated into the air.
Vital functions of the drive system can be tested without a test stand and without having to move the truck.

Slip/Slide Control

Propel power as well as retarding power are automatically corrected individually for each set of rear wheels to minimize spinning or sliding of one or both sets in adverse ground conditions.
The mandatory left/right rear wheel rpm difference during curve travel is automatically considered by monitoring the front wheel steering angle.

Anti Rollback

When facing uphill and with the travel lever in forward or when facing down hill and with the lever in reverse the truck will not roll down hill when starting to drive from a stand still.

Brake Blending

Service brakes are applied automatically and gradually by the computer when stopping the truck. The driver operates the retarding pedal only.

Steering Support

When traveling through a curve the system automatically will send more power (torque and speed) to the outside rear wheel drive helping to reduce tire wear.

Inside rear wheel drive torque can be as low as zero.

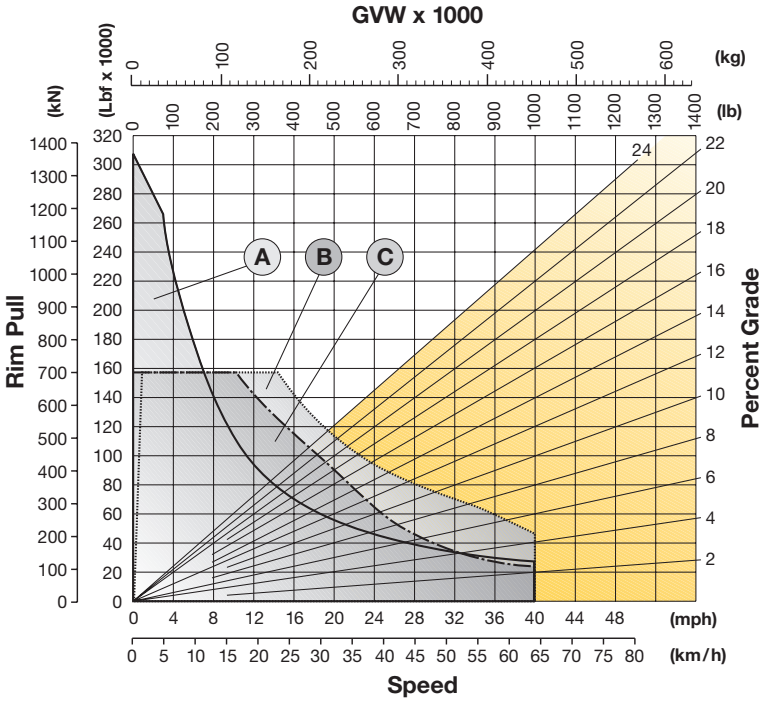
Two Speed Over Speed

Preset by the factory and adjustable by the mine, it will automatically limit the truck speed by reducing propel torque or starting the retarding process to prevent the truck from going faster than the set limit, if set to match mine conditions.
There are two different automatic settings, one for loaded and one for empty.
As a safety feature Two Speed Over Speed will override the cruise control setting.

Cruise Control

There are two Cruise Control modes available: Retard Only Cruise and Full Cruise.
Retard Only Cruise (standard) is adjustable by the operator and controls retarding only to hold the truck at the set speed during downhill travel. It will NOT be disabled by the retard or brake pedal, but can be disabled by switching off Cruise Control. The accelerator pedal will temporarily override the speed setting.
The Full Cruise option is adjustable by the operator and controls both propel and retard, within the trucks performance parameters to maintain the speed selected by the operator. Full Cruise can be disabled by pressing the retarding or the brake pedal or by switching off Cruise Control.

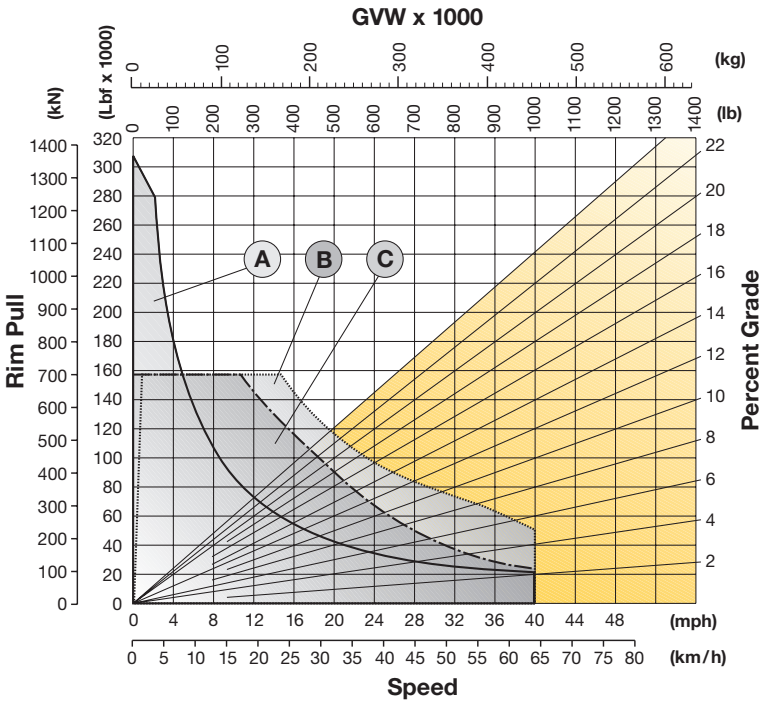
Performance Charts



Performance Chart	DDC/MTU 20V4000 Cummins QSK 78*
Brake power at fly wheel:	2610 kW / 3650 hp up to an altitude of 3700 m/12000 ft
Tires	55/80R63
Gear ratio	37.3
AC alternator	Siemens
El. wheel motors	Siemens

All curves based on zero % rolling resistance.
Rolling resistance to be added to grade percentage for propel and deducted for retarding
A: - Travel performance curve
B: - Dynamic electric retarding curve
C: - Maximum performance curve with optional electric trolley drive

*QSK 78 - 2610 kW / 3500 hp.
Performance curve approximately 4% less than shown



Performance Chart	Cummins QSK 60 DDC/MTU 16V4000
Brake power at fly wheel:	2015 kW / 2700 hp up to an altitude of 3000 m/10000 ft
Tires	55/80R63
Gear ratio	37.3
AC alternator	Siemens
El. wheel motors	Siemens

All curves based on zero % rolling resistance.
Rolling resistance to be added to grade percentage for propel and deducted for retarding
A: - Travel performance curve
B: - Dynamic electric retarding curve
C: - Maximum performance curve with optional electric trolley drive

Note: The travel performance curves depend on the available fly wheel hp of the installed diesel engine, gear ratio and tire diameter. The curves indicating the dynamic electric retarding performance and the trolley performance depend on the electric wheel motors, the gear ratio and the tire diameter.

Technical Data

Engine

DDC/MTU	20V 4000, 20 cylinders
Brake power, 1800 rpm	2725 kW / 3650 hp
Displacement	90 ltr / 5488 cu.in
Weight wet	10 480 kg / 23 100 lbs
Cummins	QSK 78, 18 cylinders
Brake power, 1900 rpm	2610 kW / 3500 hp
Displacement	78 ltr / 4760 cu.in
Weight wet	11 300 kg / 24 900 lbs
DDC/MTU	16V 4000, 16 cylinders
Brake power, 1800 rpm	2015 kW / 2700 hp
Displacement	65 ltr / 3967 cu.in
Weight wet	7 490 kg / 16 500 lbs
Cummins	QSK 60, 16 cylinders
Brake power, 1900 rpm	2015 kW / 2700 hp
Displacement	60 ltr / 3661 cu.in
Weight wet	9 300 kg / 20 500 lbs
Fan Clutch	Rockford variable speed, temperature controlled
Air cleaners	Two units, restriction gauges in cab
Radiator	Mesabi
Starter	Air (electric optional)
Roll-out power module	Radiator, engine, alternator/rectifier on separate sub frame
Batteries	4 x 12 Volt, 1200 CCA each at -18° C / 0° F

Electric Drive System

System Power	AC
Manufacturer	Siemens/Liebherr
Alternator	AC brush less, direct drive with top mounted rectifier
Wheel Motors	AC induction motors
Ratio	Standard 37.3, optional 43.7
Max. Travel Speed	64.4 kph / 40 mph
Controller	Micro processor system
Cooling fan	AC drive, two impeller radial fan

Suspensions

Front Suspension	Double A-frame with “inclined king pin” design pivot and spindle
Rear Suspension	Three bar linkage: triangular upper link plus two bottom drag links
Suspension Struts	Nitrogen/Oil with integral damping. Cushioning for both over stroke and rebound. Complete inter-changeability of front and rear internal components
Maximum Stroke	Rear: 286 mm / 11.25” Front: 286 mm / 11.25”
Max. front wheel travel	415 mm / 16.3”
Rear axle oscillation	Max. ± 9°

Braking Systems

Continuously rated fan blown resistor grids with full retarding at engine idle, forward & reverse
Full retarding capability with engine off

Electric Dynamic Retarding	Max: 4480 kW / 6030 hp 30 min rating: 4480 kW / 6030 hp
Extended Speed Range	Full retarding down to 0.8 kph / 0.5 mph. Automatic stop with computer controlled service brakes
Cruise Control	Operator settable. Will auto retard truck on downhill grade
Two Speed Overspeed	Automatic speed settings for empty and loaded truck. Mine adjustable
Slip/slide Traction Control	Computer controlled, propel and retard, forward and reverse, fully independent left and right
Service Brakes Front	Single disc, wheel speed, five calipers each
Service Brakes Rear	Dual discs per side, one caliper each, armature speed
System Accumulators	Two, total 15.2 ltr / 4 gal Separate for front and rear axle
Secondary Braking System	Wheel braking systems (Separate circuits front/rear) plus full electric retarding
Parking Brakes	Spring applied, pressure released. One caliper per each rear disc. Will hold max. GVW on 15% grade
Filtration	Cleanliness level ISO 15/13

Steering

Ackermann center point lever system. Full hydraulic power-steering with accumulator safety back up
Fully separate from dump hydraulic system
Two double acting hydraulic cylinders

Hydraulic accumulator	170 ltr / 45 gal cap. (SAE J53)
Filtration	Cleanliness level ISO 15/13
Turning radius (SAE)	16.8 m / 55’ 03” (Tire center)
Vehicle clearance radius	18.3 m / 59’ 11” (Front bumper)

Frame

Design	Closed box structure w/ multiple torque tube cross members, internal stiffeners and integrated front bumper
Material	High strength steel with high impact resistance and good fatigue and welding properties. Steel castings in stress concentration areas
Welding	Frame girders welded inside and out with 100% ultrasonic inspection to AWS D 1.1

Dimensions

A	Wheel base	6.6 m / 21’ 06”
B	Front track	7.3 m / 23’ 11”
C1	Rear track, outside tire	7.4 m / 24’ 02”
C2	Rear track, inside tire	3.9 m / 12’ 08”
D	Length - overall	14.5 m / 47’ 06”
E	Width - overall	8.8 m / 28’ 10”
F	Height - over canopy	7.4 m / 24’ 03”
G	Height - loading	6.5 m / 21’ 02”
H	Height - body up	13.3 m / 43’ 07”
K	Height - body rear edge	5.9 m / 19’ 06”
L	Berm height	1.6 m / 5’ 05”
M	Body inside width	8.4 m / 27’ 05”
N	Body inside length	10.9 m / 35’ 09”
O	Rear axle to rear body	4.6 m / 15’ 02”
P	Ground to front bumper*	1.1 m / 3’ 08”
Q	Ground clearance rear axle*	1.1 m / 3’ 08”

Operator Cab

Deluxe operator station, incorporating ROPS and double wall design for best insulation. Set well back on upper deck. Two full size seats. Fully adjustable air suspension Isringhausen operator seat with double lumbar support.
Tilt and telescoping steering wheel. Heater/defroster and optional A/C. Digital real time information on vital truck conditions. Errors and deviations from nominal conditions are shown real time and are recorded for later retrieval.
For additional features, please see last page.

Dump System

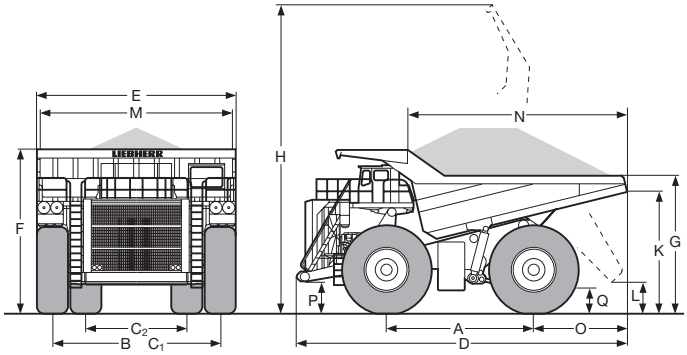
Two double stage, double acting hoist cylinders with interstage and end cushioning in both directions.
Electronic joy stick with full modulating control both up and down.

Dump angle	45°	
Dump cycle	Raise	28 sec
	Down power	18 sec
Remote dump	Quick disconnects for external power dumping (buddy dump), accessible from ground level	
Filtration	Cleanliness level ISO 15/13	

Weights

Payload Class	363 t / 400 ton, 800 000 lbs
Max. Operating Weight	592 t / 1 305 000 lbs
Body weight, custom.	33 - 58 t / 72 000 - 127 000 lbs
Chassis weight**	187 t / 412 000 lbs
Frame capacity***	405 t / 893 000 lbs
Weight distribution	empty 46/54 %
	loaded 34/66 %

** depending on options, *** total weight of body and payload



* Loaded dimensions

Body

Standard design	All welded, deep-V, flat floor, straight dump edge

Body sizes to fit customer’s requirements and specific applications. Modifications such as rear extensions and/or sideboards are available to accommodate different material densities. Tailgates available for certain applications.

Tires

Low profile radial tires	55/80R63 or 56/80R63
Cold inflation pressure	6.0 bar / 600 kPa / 87 psi

Sound

Sound ratings meet OSHA and MSHA occupational noise criteria for truck operator weighted sound exposure level.

Sound exposure	Per ANSI/SAE J1166, May 1990: less than 82 dB(A)
“Quiet Truck” kit	Optional, contact factory

Fluid Capacities

Fuel tanks	4730 ltr / 1250 gal
	other capacities optional
Hydraulic tanks	
Hoist system	1510 ltr / 400 gal
Brake and steering	570 ltr / 150 gal
Cooling system*	456 ltr / 120 gal
Crank case*	240 ltr / 63 gal
Wheel motors, each	322 ltr / 85 gal

* engine dependent

Standard/Optional Equipment

Truck Standard Equipment

- AC drive system Siemens-Liebherr
- Full power, continuously extended electric retarding down to 0.8 kph / 0.5 mph
- Automatic retarding cruise control for empty and loaded
- Cast steel components in stress areas
- Double A-frame front suspension system with inclined king pin
- Nitrogen/oil suspension struts
- Three-bar linkage rear suspension w/ triangular upper link and two drag links
- Roll-out power module with radiator, engine and alternator / rectifier on sub frame
- Insulated exhaust pipes
- Mufflers
- Two stage hoist cylinders with inter-stage cushioning out and in, plus stroke end cushioning
- L&M (Mesabi) radiator
- Large diameter, low RPM radiator fan
- Rockford fan clutch
- Air starter
- 6 HD Batteries
- Engine shutdown and battery disconnect at ground level
- Bolted rims on rear wheels
- Spring applied-pressure released park brake
- Accumulator back-up on steering & hydraulic brake system with auto bleed down feature
- Dual deck access ladders and deck hand rails
- Dual ladder service access to engine area
- Catwalks/platforms left and right of engine
- Remote lubrication point groups. Six locations serviceable from ground level
- Centralized service center w/ dry break pressure refueling
- Headlights (4 x HID - High Intensity Discharge)
- Tail lights: Service brake, dynamic retard, back up, turn
- Deck mounted clearance lights
- Back-up warning alarm
- Service lights in engine compartment and axle box
- Ladder access lights
- Auxiliary dump, brake, and steering connectors
- Second fuel gauge on tank
- Sight glass on hydraulic tank
- Sight gauge on radiator header tank
- Mud flaps – in front of tanks and rear tires
- Rear wheel rock ejectors
- Hand held fire extinguishers (2)
- Payload weigh system with in cab display
- Liebherr white paint

Truck Optional Equipment

- Electric starter
- Wheel motor gear ratio 43.7
- Automatic air cleaner dust ejectors
- Full cruise control for empty and loaded
- Engine preheater
- Cold climate kits
- Centralized service system – additional functions
- Auto lube system
- Diagonal* and/or retractable access ladders
- Additional headlights
- Additional clearance lights
- High density fog lights
- Hub-odometer
- External display for payload weigh system
- Additional mud flaps
- Fire suppression systems (several options)
- “Quiet Truck” package
- Exhaust heated body
- Body liner/wear package(s)
- Tailgate for coal body
- Canopy spill guards
- Trolley drive
- Special paint*

* shown on front page photo

Cab Standard Equipment

- Integrated ROPS and double shell concept
- Fully adjustable operator seat w/ air suspension and double lumbar support
- Passenger seat w/ mechanical suspension
- Seat belts
- Safety glass all around with tinted windshield
- Power windows
- Windshield wiper, two blades, electric
- Rearview mirrors (right and left)
- Tilt and telescopic steering wheel with horn
- Sun visors (3), dome lights
- Fresh, filtered heater and defroster air
- Circuit breaker panel
- 12 Volt power supply
- Computerized dash instrumentation with: Speedometer, engine -oil pressure, -water temperature, -tachometer, engine fault, wheel motor air flow, park brake, steering pressure, brake pressure (low), body up, drive system fault, ground fault indicator, 24 V system voltage, fuel gauge, etc.
- Turn signals with emergency flashers
- Air cleaner restriction gauges

Cab Optional Equipment

- Air-Conditioning with filtered air
- Various radio configurations

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