

Container handler, DRF

# Reachstackers 42 – 45 tonnes



TECHNICAL INFORMATION

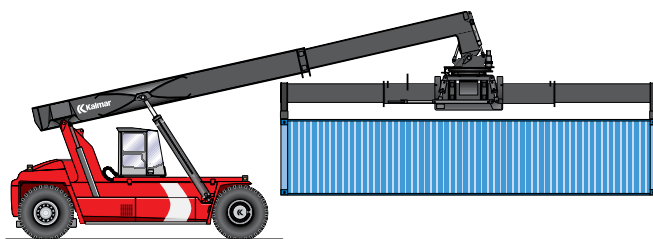
# DRF420-450L

## Introduction

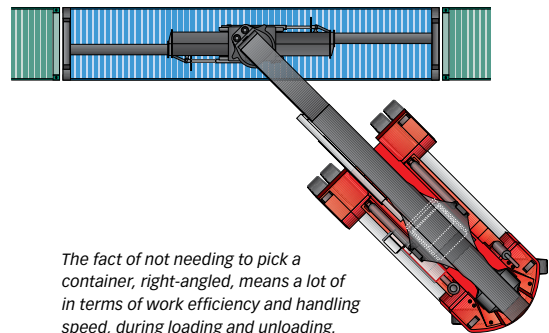
# Flexible container handling

We can see a dramatically growing need for cost-effective, productive and flexible container handling, even beyond the big seaports.

The Kalmar reachstacker model L is designed for container handling. Nothing more, nothing less. Therefore you will not be able to choose from all the options available on the regular DRF. The L model's performance and functions have been specially developed for the day-to-day reality in the container handling business, where lifting and lowering speed is not the key factors in your choice of machine.



*Containers can be lifted lengthwise making it possible to deliver the container into and through workshop doors, port shed gates, etc in then low, longitudinal position.*



*The fact of not needing to pick a container, right-angled, means a lot of in terms of work efficiency and handling speed, during loading and unloading.*

Whatever Kalmar Reachstackers you choose you will get a perfect combination of performance, comfort and reliability for your needs. Container handling with a reachstacker is one of the most flexible handling solutions. They allow you to handle loaded containers quickly and efficiently in narrow spaces, while still ensuring the driver has optimum visibility.

The extensive freedom allowed by the lifting equipment, boom and attachment, and its rotation possibilities, gives that the driver can improve the work efficiency of the unit, by not needing to approach the container from a 90 degrees position.

Instead, the container can be picked or dropped-off by the unit approaching from any angle <90 degree. And by rotating the spreader and reaching the boom to suitable length, the driver can handle the container from any position. As an additional advan-

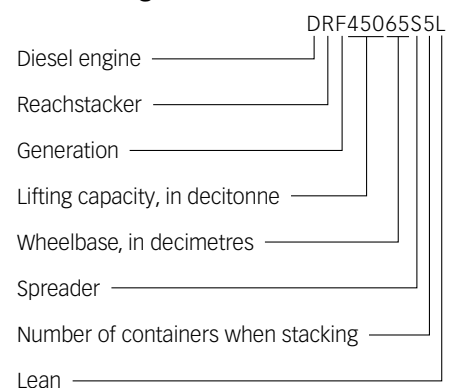
tage, the aisle width – driving space depth, needed – can be squeezed, as well. Wear on the machine and the working surface can be reduced if the reachstacker is used in the right way. Compared to a conventional forklift, a larger proportion of the lifting manoeuvre can be performed while the unit is stationary.

Containers can also be lifted and transported lengthwise, making it possible to deliver the container into and through workshop doors, port shed gates, etc in then low, longitudinal position. This can be a vital ability for the possibility of container stripping and stuffing inside the sheds.

With the L model, as all other Kalmar reachstackers, you can count on low energy consumption and low maintenance costs.

Any driver with the ability to take advantage of the machine's capacity and technical benefits will find this reachstacker a powerful, flexible tool for handling containers with the lowest possible operating and maintenance costs.

### Model designation



## Capacity and dimensions

# Maximum lifting capacity in confined spaces

The chassis and lifting equipment is developed to ensure the best possible performance, strength and user-friendliness. The nature of the working environment and capacity requirements at different load centres determine which of the two model is the most suitable.

### Lifting boom

The lifting boom carries the load. The design has been optimised using computer simulations and extensive field tests. The optimized geometry has a minimal number of welds for maximum strength. The boom's fixture in the frame and the lifting cylinders are fitted with spherical plane thrust bearings. The width of the rear fixture (boom suspension) increases the overall rigidity and the good rearward vis-

ibility. The boom has two sections, the inner and outer boom. The sliding plates between the inner and outer boom require no lubrication. The cable-chain which leads hydraulic hoses and cabling to the attachment is made of maintenance-free plastic.

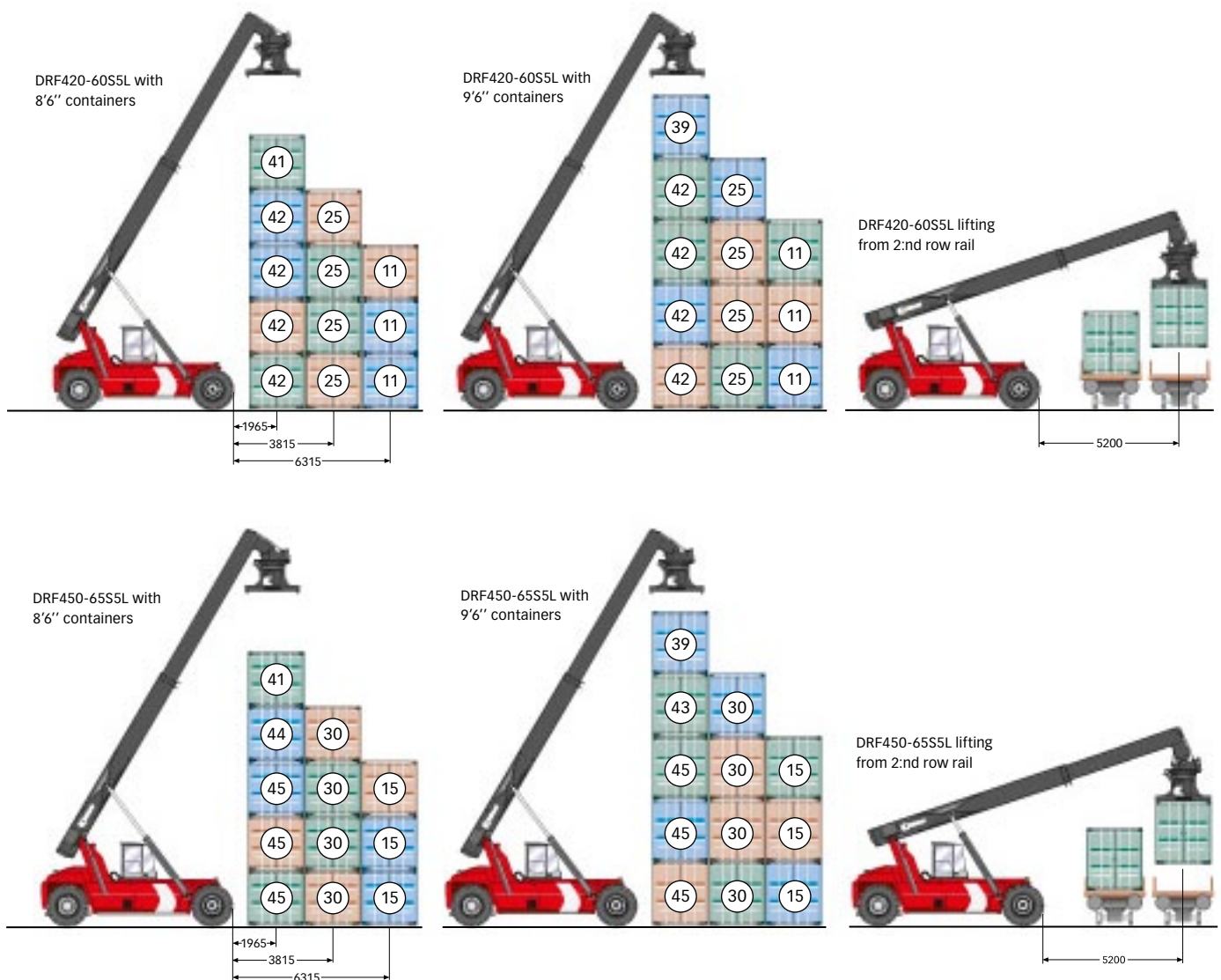
### Lifting boom hydraulics

Oil is feed to the boom functions by load sensing pumps. To reduce pressure drops, wide hydraulic hoses have been used for the boom functions. A wider hose produces a lower flow rate with the same volume, thereby reducing friction and heat development. The blocking valves on the lifting and extension cylinders block the oil flow when the boom functions are not in use, which secures the boom position. The base of the lifting

cylinders has a design that produces smooth stopping and starting movements. The boom's lifting and extension function is damped in the end positions for reduced wear and greater comfort.

### Rotator

The rotator is fixed in the inner boom and enables the container to be rotated. The rotator consists of an upper and a lower yoke joined with a powerful bearing. Rotation is enabled by two hydraulic motors, which drive a gear-ring. Two hydraulic dampers help prevent the container from swinging lengthwise.



**Attachment**

The primary function of the attachment is to firmly attach the container during lifting. This is done with four twistlocks which rotate, thereby securely gripping the container’s corner fittings. The mechanical levelling ensures that the twistlocks reach the corners, even if the container is leaning. The attachment can easily be adapted to different container standards. A hydraulic motor drives the function via chains. The container can also be moved sideways to facilitate loading and unloading, or to compensate for unbalanced loads. Two hydraulic cylinders perform the side-shift movement.

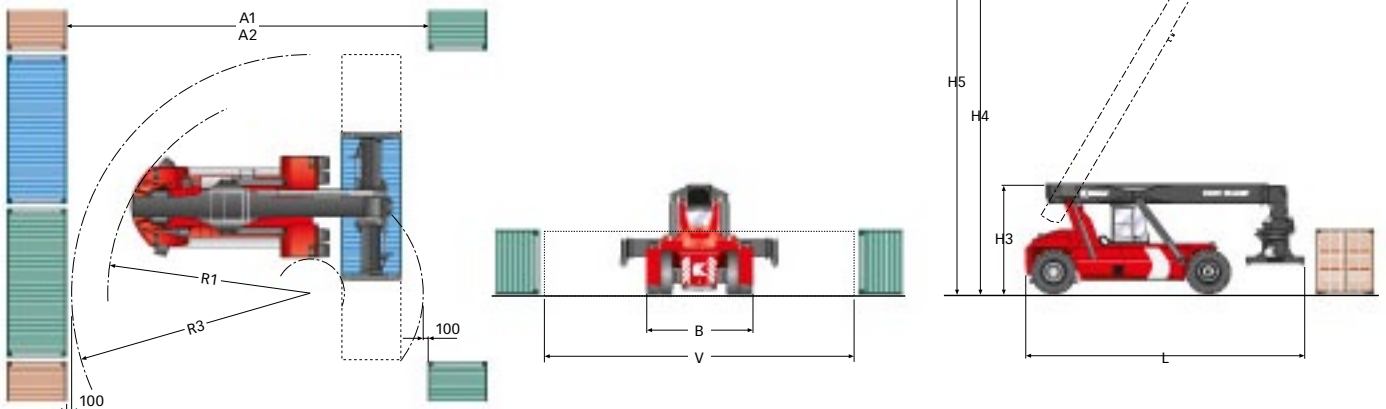
**Attachment and rotator hydraulics**

The functions are fed with a constant pressure, which means there is no pumping of hydraulic oil when the functions are not in use. One valve serves all the hydraulic functions in the attachment. The valve ensures that each hydraulic function is fed the exact amount of oil needed to optimise the speed of the functions’ movements. The attachment functions are damped in the end positions.

**Chassis**

The frame forms the basis of the machine’s lifting and manoeuvring characteristics. The frame’s beam construction, along with its width, makes the reachstacker stable, torsion resistant and service-friendly.

Firstly, a large number of computer simulations have been run in order to eliminate critical tensions under various kinds of strain. The simulations were characterised by uncompromising demands on the fundamental principles of stability, manoeuvrability and visibility. Secondly, the machine has then undergone extensive field-testing to fully ensure its dynamic strength. The reachstacker is available with a variety of wheelbases to fulfil demands on lifting capacity in relation to manoeuvrability and operating economy in the best way.



Dimensions	Aisle width (mm)		Turning radius (mm)		Main dimensions (mm)								Service weight (kg)
	A1 - 20 ft	A2 - 40 ft	R1 - 20 ft	R3 - 40 ft	B	V	L	H3	H4	H5	Clearance	Wheels	
DRF420-60SSL	11200	13600	8100	9400	4150	6055-12185	11200	4600	15100	18150	250	18.00x25, PR36, E4	64500
DRF450-65SSL	11600	13600	8500	9400	4150	6055-12185	11700	4600	15100	18150	250	18.00x25, PR40, E4	67700

Drive train		Standard
Engine	Manufacturer Model	Cummins QSM11 with air cooled intercooler
	Power	224 kW at 2000 rpm
	Peak torque	1575 Nm at 1400 rpm
Transmission		Dana – TE32418
Driving axle		Meritor – Differential and hub reduction

Performance			DRF420-60S5	DRF450-65S5
Lifting speed	unloaded	m/s	0,21	0,21
	at 70% of rated load	m/s	0,21	0,21
Lowering speed	unloaded	m/s	0,20	0,20
	at rated load	m/s	0,25	0,25
Driving speed	unloaded, F/R	km/h	25/25	25/25
	at rated load, F/R	km/h	21/21	21/21
Gradeability	at 2 km/h, unloaded	%	36	36
	at 2 km/h, at rated load	%	20	20
	max, unloaded	%	50	50
Draw pull	max	kN	380	380

## Ergonomics

# No machine is better than its driver

Kalmar's goal while developing the cabin has been to assure the driver the best conceivable safety, ergonomics and visibility.

### Sound and vibration

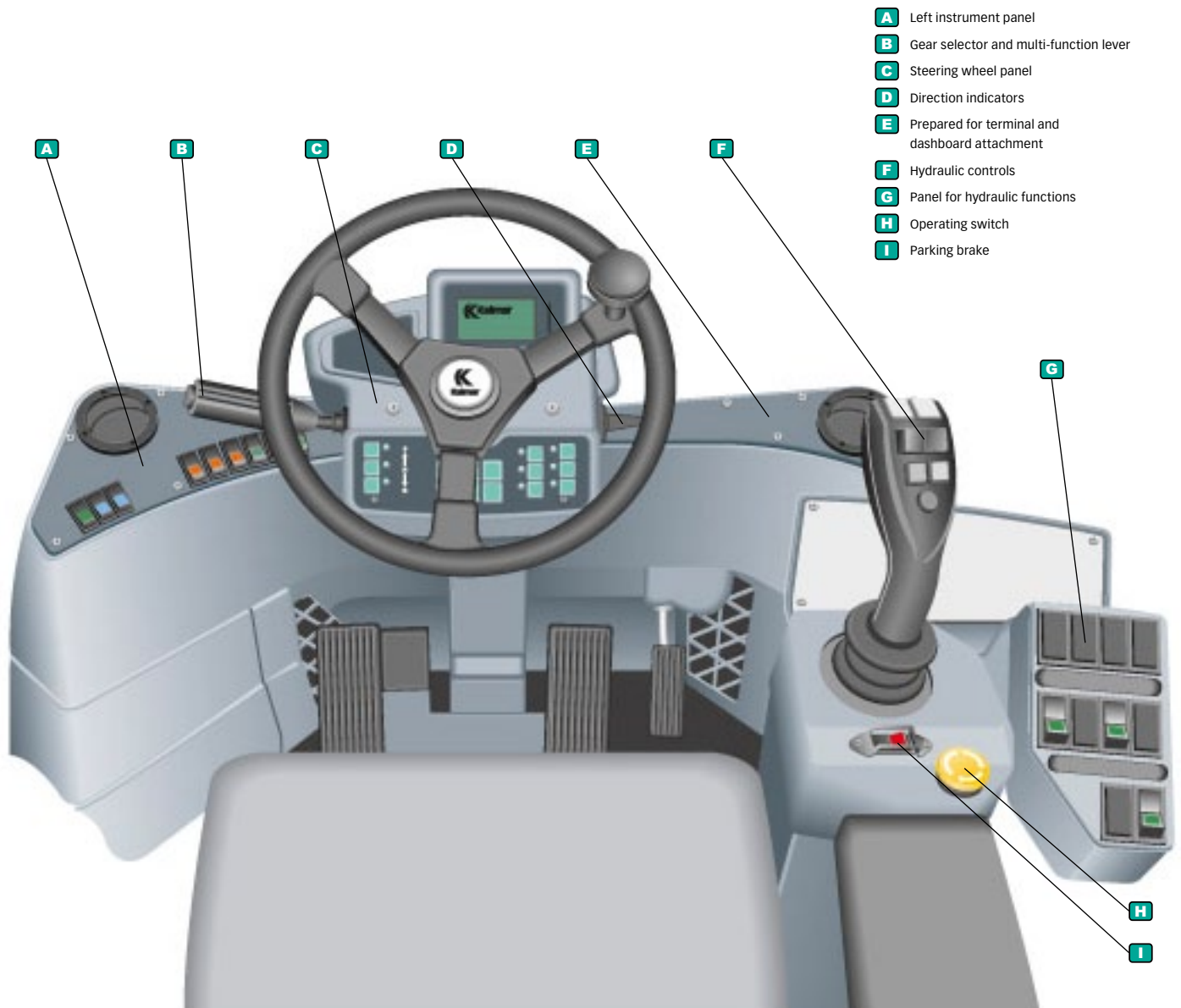
The cabin is separately suspended and isolated from the frame with powerful rubber dampers. Effective shock absorption minimises vibration. The cabin is fitted with insulation material both inside and out. The maximum noise level inside the cabin is 72 dB (A) measured according to EN12053.

### Ergonomics

Controls and instruments are intuitively positioned and work the way a driver would expect. Search lights in the buttons and switches make them easy to identify and use, even in darkness. In the centre above the steering wheel is a display showing operating information, warning messages, error codes etc. To the left of the display is the panel for warning and indication lamps. The driver's seat and control lever for the lifting functions can be adjusted to the optimum individual driving position. The pedals are designed for high comfort, with a hanging accelerator. The internal dimensions are otherwise generous, offering an open floor space.

### Climate

An electronic controlled heating and ventilation system comes as standard, as do filters for fresh air and recirculation. An air cooling system comes as an standard. The cooling system provides a good cooling effect, even in extremely high temperatures. A pollen filter is available as an optional extra.



# Standard equipment

## Norms and law regulations

- According to directive EN 1459
- According to directive ASME B56.1a

## Chassis

- Safe angled entrance
- Lifting eyes front/rear
- Towing pin (incasted)

## Cabin

### Structure

- Step for roof access
- Instep handle
- Sliding window on both sides
- Lockable doors (key)
- Door with air damper

### Comfort

- Fixed drivers seat BEGE
- Armrest right hand side
- Inside rear view mirror
- Interior light with fade away
- 24 V outlet
- Fixed steering column
- Steering wheel knob
- Horn
- Background button light

### Controls

- Joystick for boom and attachment functions
- Automatic gas at lifting/extension
- Control panel in cabin for top lift (std incl. 3 button)
- Brake pedal incl. Transmission Disconnection (declutch)
- Button for electronic hand brake
- Electric accelerator pedal (hanging)
- Automatic gear shifting
- Only first gear activated
- Only second gear activated

### Climate

- ECH, electronic controlled heater
- Fresh air and recirculation filter
- Wipers/washers on front, rear and roof pane
- Interval wipers on front, rear and roof pane
- Tinted windows

### Information systems

- Graphic display with automatic fault analyses
  - Alignment indicator spreader
  - Twistlock indicator
  - System voltage
  - Actual gear
  - Engine rpm

- Travelling speed
- Fuel bar
- Hydraulic oil temperature
- Transmission oil temperature
- Engine oil pressure
- Engine coolant temperature
- Overload warning
- Overload warning steering axle
- Clock

- Hour meter
- Charging
- Low brake pressure
- Failure indicator
- Safety system disconnected
- High engine coolant temperature
- Low engine oil pressure
- Preheating engine
- Transmission oil temperature
- Low fuel level
- Hydraulic oil temperature
- High beam
- Direction indicator
- Parking brake
- Indication locked twistlock
- Indication alignment
- Indication opened twistlock
- Warning buzzer for not activated hand brake, leaving seat

## Steering system

- Rear axle: Kalmar
- Double acting steering cylinder

## Drive train

- Engine: Cummins QSM11
- Transmission: Dana TE32418
- Engine protection system
- Transmission protection system
- Preheating engine
- Front axle: Meritor

## Lifting boom

- Lifting boom std 5 high

## Hydraulics

- Return filters hydr. Oil (10 micron)
- Pressure filter brakes (10 micron)
- Load sensing pumps (3 pcs)
- Vane pumps (cooling)
- Visual level glass hydraulic tank/brake tank

- Regeneration system (lift and extension boom)
- Environmental air filter hydraulic tank
- By-pass filter

## Body

- Steps with anti slip protection
- Rear view mirrors on each side

## Electrical system

- Electrical system 24 V
- Main power switch
- 2 working lights on attachment
- 2 working lights on boom
- 2 working lights on front edge cabin
- 2 rear lights on fenders activated in reverse
- 2 head lights on front fenders
- 2 position lights on each side
- Lights high/low beam front
- Tail lights, brake lights
- Blinkers front and rear
- Rotating beacon
- Flashing brake lights when reversing
- Acousting signal when reversing

## Wheels

- Std wheel 18.00x25
- Wheel nut protection

## Colour

Cab: Grey RAL 7037

Chassis: Red RAL 3000

Lifting boom: Black RAL 7021

## Documentation and decals

- Load chart diagram in cabin
- Machine data plate chassi incl. load chart
- Warning stickers
- Information stickers
- Fuse diagram
- Instruction manual
- Maintenance manual
- Spare parts catalogue

## Attachment

- Top lift 20'-40' (cap. 45 ton)
  - Sideshift  $\pm 800$  mm
  - Mechanical levelling  $\pm 5^\circ$
  - Rotation  $+195^\circ/-105^\circ$
  - Hook on corners for slings
- Floating ISO twistlocks

# Optional equipment

## Chassis

- DRF420-60S5L (L3=6000mm)
- DRF450-65S5L (L3=6500mm)

## Cabin

### Structure

- Hydraulic sliding cab
- Welded bars at the corners with ledge-mounted screens
- Front pane, laminated glass/AS2

### Comfort

- Bege std seat incl heating
- Extra seat
- Bracket for terminal and monitor, right side
- Writing pad with reading lamp
- Adjustable steering column

### Controls

- Key switch replace std override switch

### Climate

- ECC, electronic climate control
- Sun visor frontscreen
- Sun visor roof pane
- Sun visor roof pane
- Microfilter in addition to std filter
- AC switched off when door is open
- Postheating

### Additional

- Radio with CD, 24V
- 24/12V transducer communication radio
- Electric air pressure horn
- Printer

## Drive train

- Automatic engine and ignition stop at idle
- Precleaner AIR intake incl raised air intake
- Speed limitation

## Hydraulics

- High pressure filter
- Separate tanks for working hydraulic and brakes incl. cooling

## Body

- Anti-slip protection, fenders, and tanks.

## Electrical system

- Container counter with reset function
- Extra working light fitted on boom 70 w/pair
- Extra working light fitted on fenders 70 w/4 pcs
- Extra working light fitted on spreader 70 w/pair
- All std working lights replaced by xenon
- Extra working light fitted on boom 70 w/pair, xenon
- Extra working light fitted on fenders 70 w/4 pcs, xenon
- Extra working light fitted on spreader 70 w/pair, xenon
- US indication on the display
- Diagnostic driving information on the display
- Service interval indication in display

## Wheels

- Spare wheel 18.00x25

## Colour

- Other colour than std, chassis
- Other colour than std, cab
- Reinforced anti-corrosion protection

## Documentation and decals

- Extra set of documentation
- Workshop manual
- Cummins troubleshooting and repair kit
- Loadchart lbs//inch inside cab and sign "no riders"
- Documentation on cd

## Attachment

- Rotations stop on spreader +/- 25 degrees with override switch
- Automatic extension 20'-40' incl 30' stop
- Synchronized lift
- Flexible scale incl synchronized lift

## Additional equipment

- Tool kit
- Fire extinguisher 6 kg, powder
- Lockable fuel cap
- Engine heater incl. cab heater
- Engine/ hydraulic oil heater incl. cab heater
- Central greasing base machine
- Central greasing spreader
- Filter kit 2000 hrs

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