

# 3 - 4.5 Tonne (Hydrostatic)

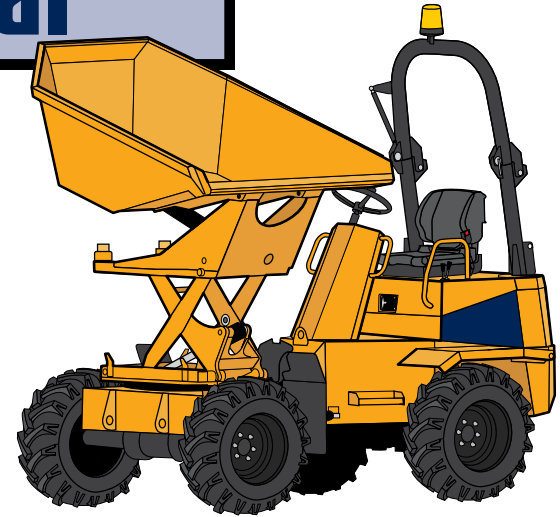
Thwaites

Mach 443, Mach 444, Mach 474,  
Mach 475

## Operator's Instruction Manual



Mach 474 - 3.5 Tonne Powerswivel



Mach 475 - 3 Tonne Hi-Swivel



## Thwaites Limited puts Safety First

It is the policy of Thwaites Limited to promote safety in the operation of its machines and to create a general awareness of site safety and safe working practices for the operators of its machines.

This Operator's Instruction Manual is intended for both new and experienced machine operators. It should remain with the machine at all times. All operators should be aware of its location and contents.

It is important that all operators are fully trained and familiar with the machine and that they have read and understood the information contained within this book before they attempt to operate in the site conditions for which the machine was designed.

This book details practices and operations which Thwaites Limited recommends. DO NOT operate this machine in ways other than those detailed within this book.

This machine is designed for customary construction site operations, and the transportation of bulk materials commonly carried on such sites; that is their 'intended use'. Under certain controlled conditions the dumper may be used for towing wheeled loads.

Due to the varied nature of the operation of site dumpers and the absence of an agreed test standard, any figures quoted by Thwaites in relation to vibration values and exposure are for reference purposes only. It is the responsibility of the employer to assess vibration exposure based on the actual site conditions, and operating practices, at the point of use.

**Hand Arm Vibration** - The daily exposure Action/Limit Values of between 2.5 - 5.0m/s<sup>2</sup> (A8) are unlikely to be exceeded in an eight-hour reference period.

**Whole Body Vibration** - The daily exposure can only be accurately determined at the point of use. This exposure must be managed in respect of the Action/Limit Values of 0.5 and 1.15 m/s<sup>2</sup> (A8) respectively.

Employers should not rely solely on published vibration figures when undertaking risk assessments. Depending on the site conditions, cycle times may need to be adjusted in order to reduce operator exposure levels.

Vibration values based on typical duty cycles are available on request from Thwaites. These may be used for reference purposes only.

## Safety Symbols



- Attention!
- Be alert!
- Your safety is involved!



- Correct action



- Incorrect action/procedure which should NOT be carried out

## Signal words:

Signal words are used on the machine and within this manual to identify levels of hazard seriousness:



**DANGER**



**WARNING**



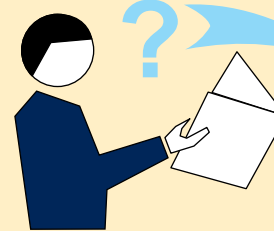
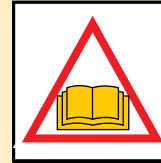
**CAUTION**

# 1 Before operating this machine

**Thwaites**



## Read this manual



**Thwaites**  
**Distributor**

- 1 Contact your Thwaites dealer in case of further questions
- 2 Learn to operate this machine
- 3 Ensure you are fit to operate
- 4 Wear correct safety clothing and ensure that safety equipment is available

Complete Checks in Section

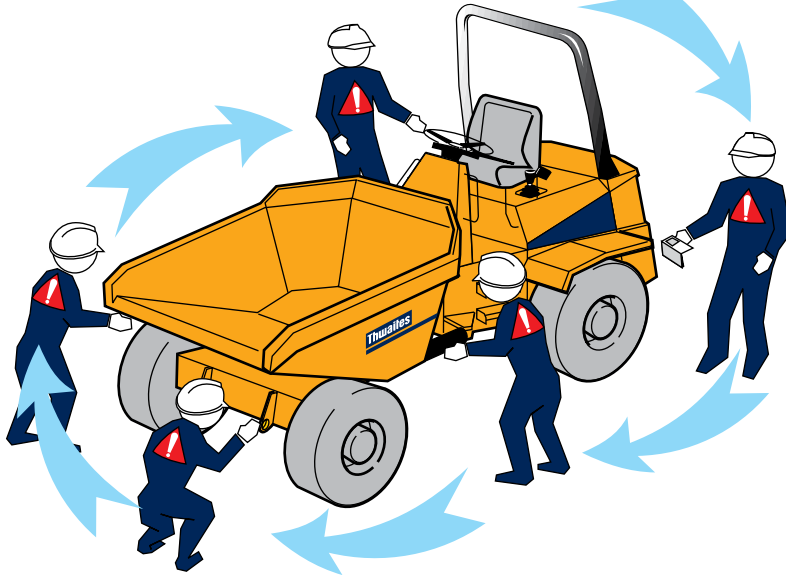


Before Starting The Engine

# 1 Before operating this machine

**Thwaites**

Walk Around The Machine



## Visually check the machine

- 1 Are the chassis lock and the skip lock disengaged?
- 2 Are the controls, crush zone and hydraulic rams clean, and clear of debris?
- 3 Is the Roll-Over Protective frame (ROPS frame) secure, fully upright and undamaged?
- 4 Is the seatbelt anchorage secure and serviceable?
- 5 Are the covers and mudguards secure?
- 6 Are the hoses free from fluid leaks?
- 7 Are all safety decals legible?
- 8 Are the tyres free of cuts or splits?
- 9 Are all bolts tight and in position?
- 10 Are the steering wheel and the steering column undamaged?
- 11 **Have the daily maintenance tasks been performed? (See rear cover)**

Report all faults immediately.



**DO NOT OPERATE THE MACHINE UNTIL ALL FAULTS HAVE BEEN RECTIFIED.**

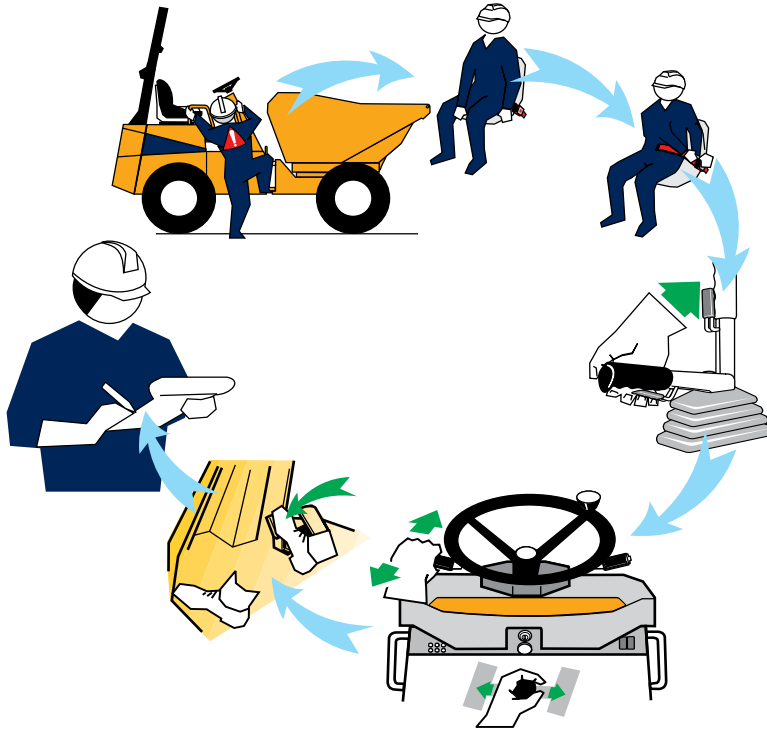
Complete Checks in Section



Before Starting The Engine

# 1 Before operating this machine

Thwaites



## Mount the machine and check the controls

- 1 Use the grabrails and foot steps provided to manoeuvre into seating position. Face the machine at all times when mounting and dismounting
- 2 Is the engine cover secure and locked?
- 3 Adjust the seat position for comfort and easy access to controls
- 4 Fasten the seatbelt. Adjust accordingly for safety and comfort
- 5 Is the hand brake ON?
- 6 Set the transmission to neutral
- 7 Does the foot brake feel firm?
- 8 Do not operate the machine without understanding all its controls as described in the following pages



## WARNING

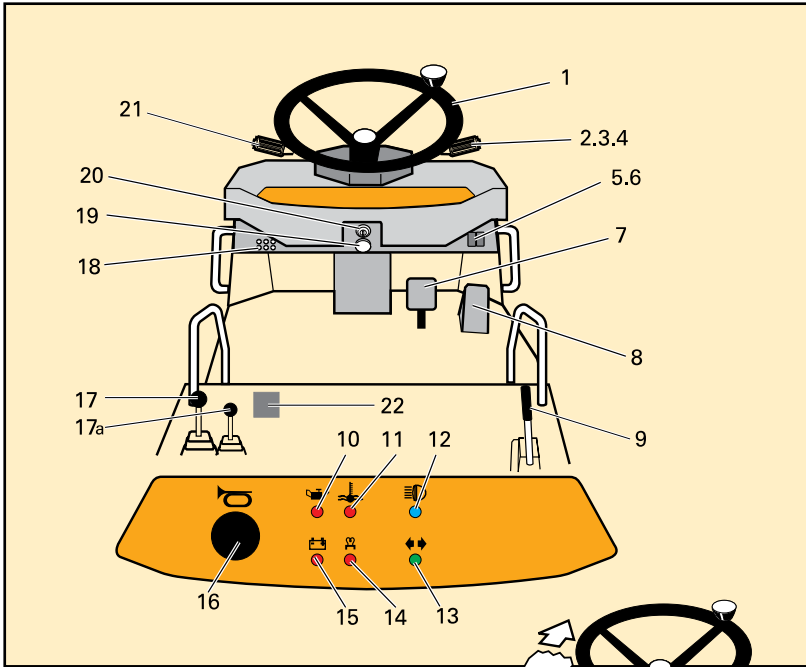
Seatbelt **MUST BE WORN** when operating machines fitted with a ROPS frame.

Complete Checks in Section



Before Starting The Engine

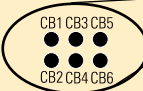
# 1 Layout of controls



## Control locations & functions

- 1 Steering wheel.
- 2 Direction lever - forward = left turn - back = right turn.
- 3 Lights - twist 1 = sidelights ON - twist 2 = Dipped headlights ON
- 4 Up = flash. Down = main beam
- 5 Hazard warning light switch
- 6 Beacon switch\*
- 7 Foot brake pedal/inching
- 8 Throttle pedal
- 9 Hand brake lever
- 10 Engine oil pressure warning light
- 11 Water temperature warning light
- 12 Headlamp main beam pilot light
- 13 Direction indicator pilot light
- 14 Heat/start pilot light
- 15 Battery charging warning light
- 16 Horn push
- 17 Skip-tip and Skip-rotate lever
- 17a Skip-raise lever (Hi-Swivel only)
- 18 Circuit breakers (push to reset)
- 19 Warning buzzer
- 20 Ignition switch
- 21 Forward/Reverse/High/Low Speed Lever (FNR lever)
- 22 Maxi fuse (under engine cover)

- CB1 Fuel/direction solenoids
- CB2 Instrumentation/warning
- CB3 Lights
- CB4 Flash
- CB5 L/H sidelights
- CB6 R/H sidelights



Complete Checks in Section



Before Starting The Engine

# 1 Control Functions – in depth

Thwaites

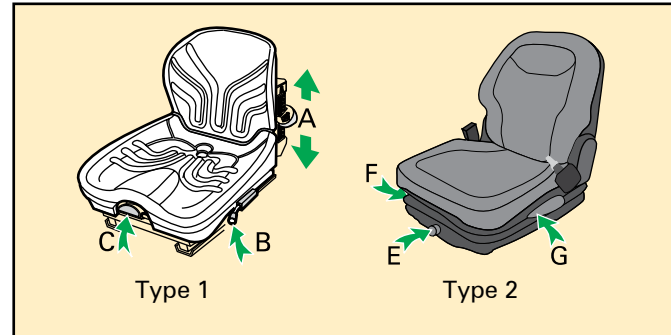
## Seat adjustment

Type 1:

- A – Push down to set driver weight (seat empty)  
Push fully down and release to reset (seat empty)
- B – Lift to slide seat assembly forwards/backwards
- C – Lift to slide cushion forward and set backrest


Type 2:

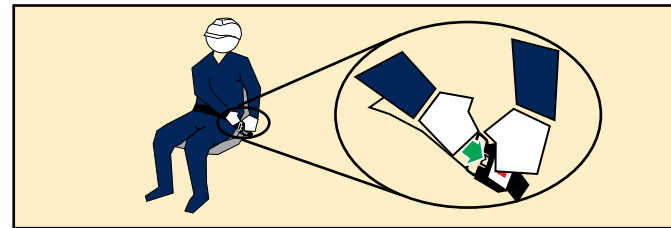
- E – Turn knob to set driver weight
- F – Lift to slide seat assembly forwards/backwards
- G – Lift handle to adjust backrest



## Seatbelt (if fitted)

- Adjust length of belt when seated on machine
- Press buckle blade into buckle lock
- Pull belt webbing through buckle blade to remove slack

 Seatbelt should not be worn loose. It should pass comfortably across the hips and not the abdomen.




## Throttle pedal – right foot

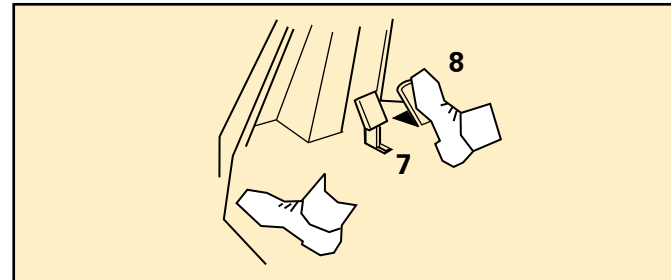
- Apply pressure to increase speed
- Release pressure from the pedal to reduce speed

## Foot brake pedal+inching pedal – right foot

- Push down on the pedal to slow/stop the machine.

 Use left foot when inching is required.

Push down while pressing throttle pedal (B) with right foot and release to move machine.



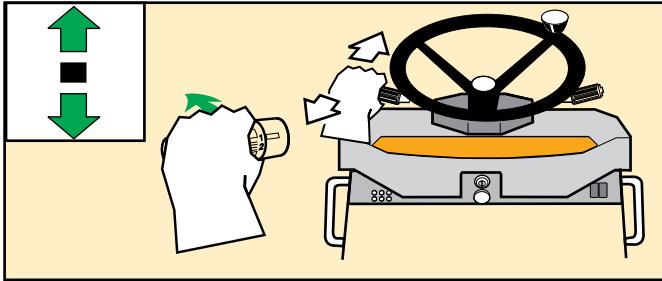
Complete Checks in Section



Before Starting The Engine

# 1 Control Functions – in depth

**Thwaites**

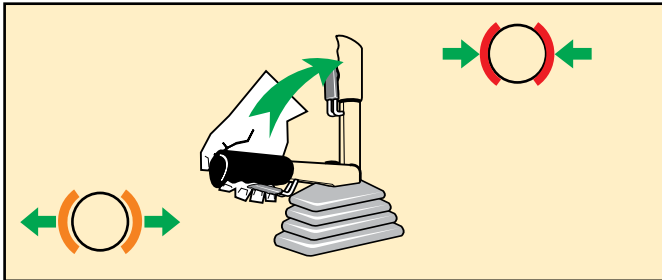


## FNR/High and low speed lever – left hand

- Push forwards to travel in a forward direction
- Lever centred = neutral.
- Pull back to travel in a reverse direction

Twist lever anti-clockwise (2) for HIGH speed travel

Twist lever clockwise (1) for LOW speed travel



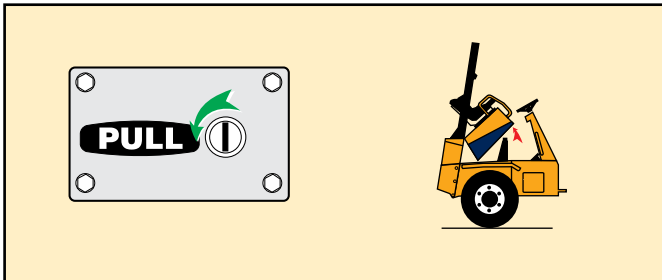
## Hand brake lever – right hand

When the machine is stationary (or in an emergency):

- Pull up to apply
- Pull catch and lower to release



*An audible warning device is fitted to your machine. This will sound when the hand brake is engaged and the engine is running.*



## Opening and closing the engine cover

- Insert ignition key and turn anti-clockwise to unlock
- Pull handle to release and raise cover
- Lower cover, secure and lock before driving

Complete Checks in Section



Before Starting The Engine




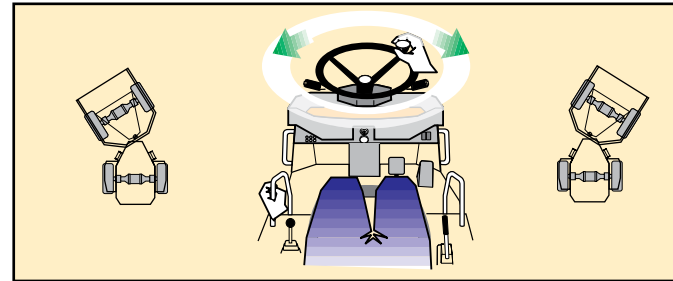
# 1 Control Functions – in depth

Thwaites


## Steering wheel – both hands


- Turn the wheel clockwise to turn machine to right
- Turn the wheel anti-clockwise to turn machine to left

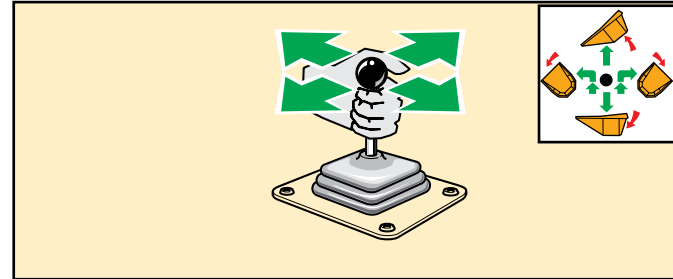
 Ensure the non-steering hand is on the engine cover grabrail when using the spinner knob for low-speed single-handed steering.



## Skip-Rotate lever (Powerswivel and Hi-Swivel models) – left hand

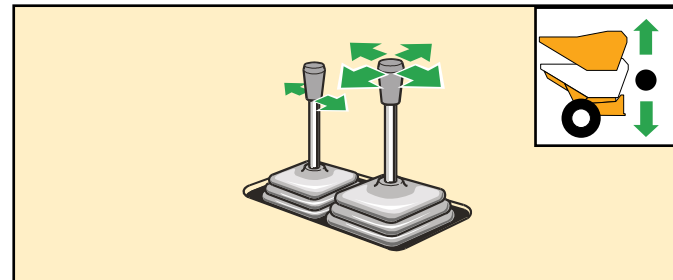
- Tip skip 100 mm (4") to disengage pivot centring lock
-  Rotate skip, fully lowered to centre to automatically engage centring lock.
- Push lever to the right to rotate skip to right
- Push lever to the left to rotate skip to left
- An increased engine speed will reduce cycle times

 Movement of the skip is disabled if the steering wheel is moved (priority steering).



## Skip-raise lever (Hi-Swivel model) – left hand

- push forward to raise skip
- push backwards to lower skip



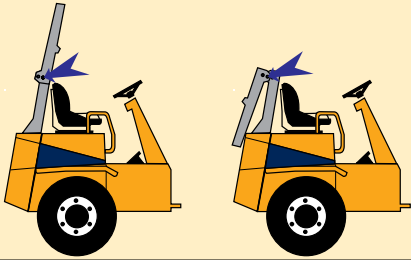
Complete Checks in Section



Before Starting The Engine

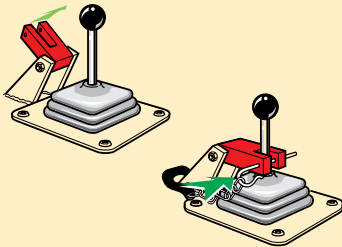
# 1 Control Functions – in depth

**Thwaites**



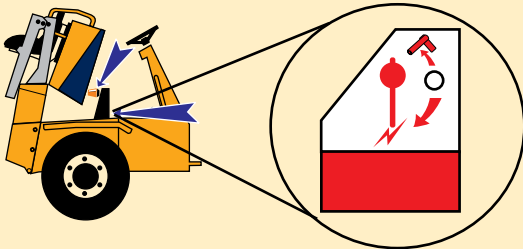
## Lowering and raising the folding ROPS frame

- Remove linch pins and withdraw frame lock pins
- Lower frame and insert lock pins and linch pins in new position
- Reverse the procedure to raise the frame
- Ensure all pins are secure before driving



## Skip-tip lever lock (if fitted)

- Place yoke over tipping lever and secure with linch pin to lock
- Fold back the yoke and secure using linch pin when not in use



## Beacon storage

- Unplug and remove beacon
- Secure beacon on bracket provided beneath bonnet

## Battery isolator (Beneath engine cover)

- Turn key anti-clockwise to isolate the battery power supply

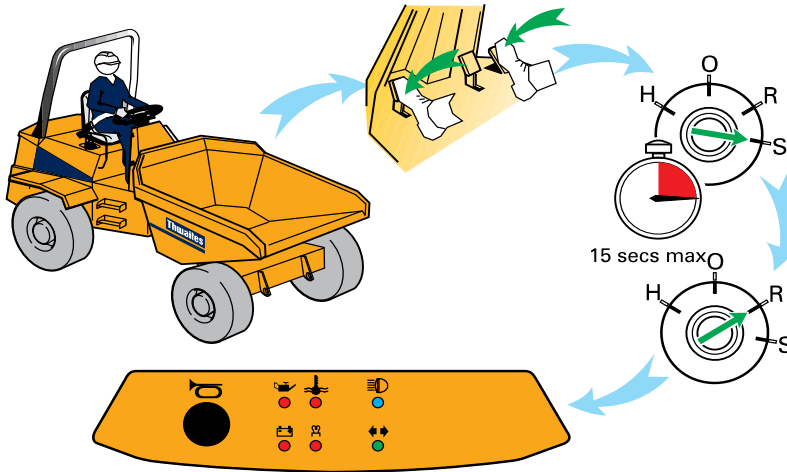
*Complete Checks in Section*



*Before Starting The Engine*

## 2 How to START and STOP the engine

Thwaites



### To start the engine

- Set FNR lever to neutral
- Depress accelerator pedal fully and turn the key clockwise to the start position 'S'  
*All panel lights self-test (illuminate) and should extinguish on start-up.*
- Allow the engine to turn for 15 seconds max.  
*If the engine does not start within 15 seconds, return key to position 'O' and wait 30 seconds before turning to 'S' again.*
- When the engine fires, release key.  
*(The key will spring back to 'Run' position 'R').*
- Reduce accelerator pedal pressure to prevent over-revving.

### Cold start aid

*Turn key to position 'H'. When panel light extinguishes start engine (as above).*

### To Stop The Engine

- Turn key to position 'O'.



### CAUTION

- Do not use unauthorised starting aids
- Do not tow or bump start
- If a panel light remains on switch off engine (key to 'O') and investigate the problem.

### WARNING

Do not start the engine unless you are sitting in the driver's seat.

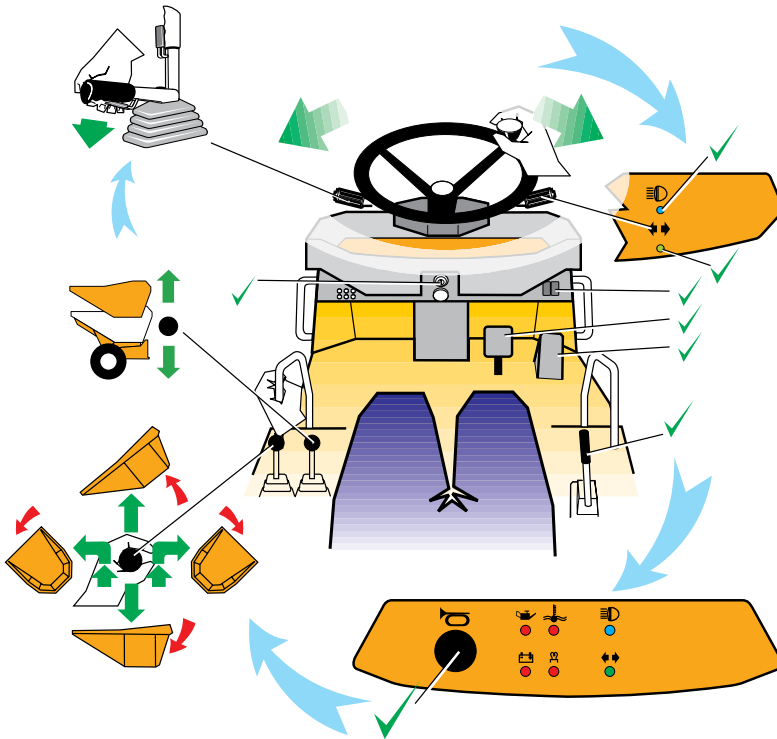
Complete Checks In Section



Before Loading The Machine

## 2 Preliminary checks

Thwaites



### Function Checks - Engine ON

#### Brakes

- Does the foot brake feel firm?
- Does the hand brake keep the machine stationary when applied?

#### Steering

- Rotate the steering wheel clockwise and anti-clockwise

#### Electrics

- Does the horn sound?
- Does the reverse alarm sound? (Optional).
- Does the beacon flash? (Optional)
- Do all the lights function correctly?
  - \* Side
  - \* Main
  - \* Stop
  - \* Indicators
  - \* Hazards

#### Skip-tip and skip-rotate lever

- Tip and return skip
- Rotate skip clockwise and anti-clockwise

#### Skip-raise lever (Hi-Swivel model)

- Raise and lower skip



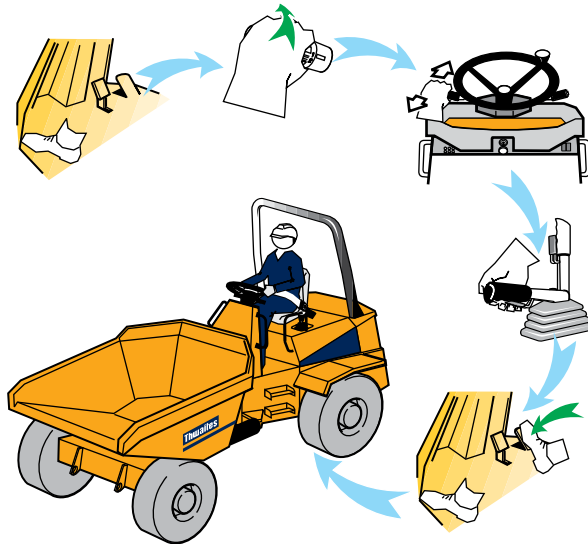
Complete Checks In Section



Before Loading The Machine

## 2 Driving procedure and safe parking

Thwaites



### Moving from rest and stopping

- Select forward or reverse
- Select low ratio
- Release hand brake
- Slowly depress accelerator and move away
- Hold steering wheel with both hands
- Remove foot from accelerator pedal
- Brake gently to a halt using foot brake
- Apply hand brake when stationary

### Changing speed/direction

- Select high ratio
- The machine must be stationary and the hand brake must be engaged before changing direction (forward/reverse).

### After operating - park safely

- Always leave skip empty when not in use
- Ensure machine is on firm level ground
- Apply hand brake
- Engage neutral (FNR lever)
- Hydraulic system at rest in a safe condition
- Stop engine and remove key
- Lock engine cover



### CAUTION

- Novice operators should always start with forward motion on clear, level ground
- A low gear should always be selected when a driver is unfamiliar with machine type

Complete Checks In Section



Before Loading The Machine

3

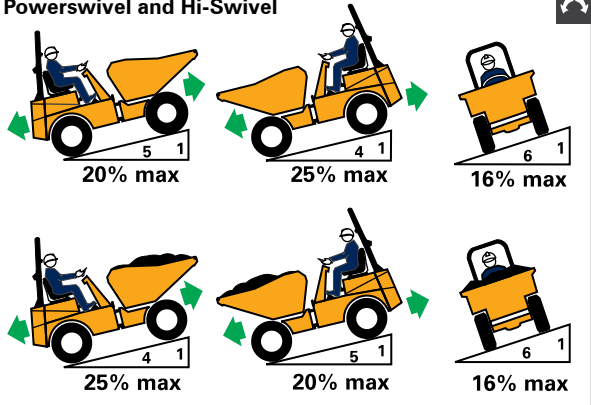


DANGER

IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH

Thwaites

Powerswivel and Hi-Swivel



WORKING ON GRADIENTS

DO NOT exceed maximum stated gradients



DO NOT turn across gradients



DO NOT brake suddenly in wet, muddy, icy conditions or when operating on loose surfaces



DO NOT run downhill with controls in neutral



DO NOT operate raise mechanism on sloping ground (Hi swivel model only) - check spirit-level indicator



Travel straight up, down or along a gradient



Keep speed to a minimum and use the foot brake to reduce speed when travelling down gradients

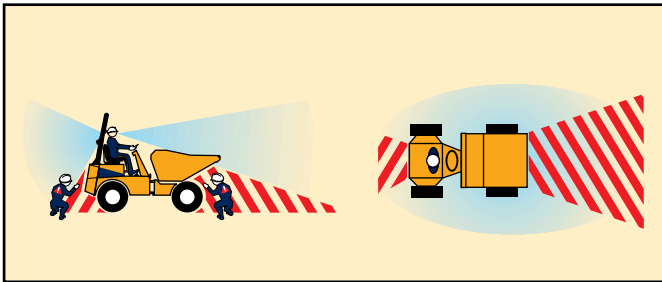


Always engage hand brake when stopped on sloping ground to prevent movement, and, in addition, chock wheels securely when leaving the machine unattended



Always position swivel skip in central lock



**3****DANGER****IMMEDIATE HAZARDS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH****Thwaites****VISIBILITY**

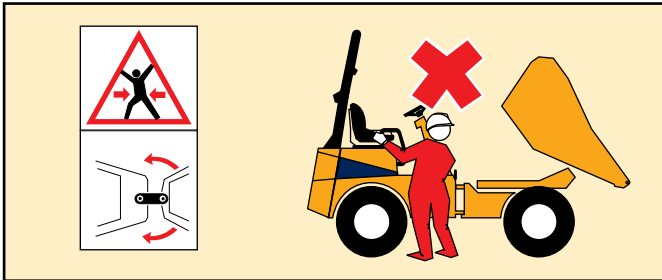
Check ahead and behind machine before operation



Be aware of low-visibility areas when operating



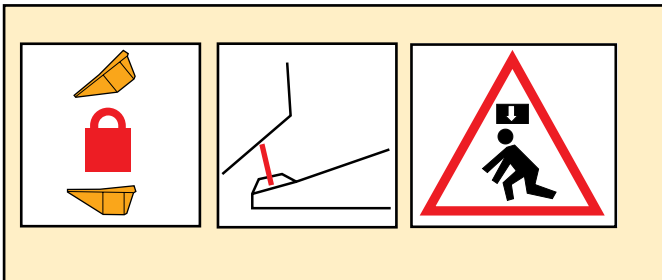
Before operating, sound the horn to warn people in the immediate area

**CRUSH ZONE**

Stay clear of articulation area when the engine is running.



Never operate the machine's controls when standing on either side of machine

**WORKING UNDER A RAISED SKIP**

Lock skip safety prop during maintenance



Never work under an un-propped skip



When using skip safety prop engage skip-tip lever lock (if fitted)

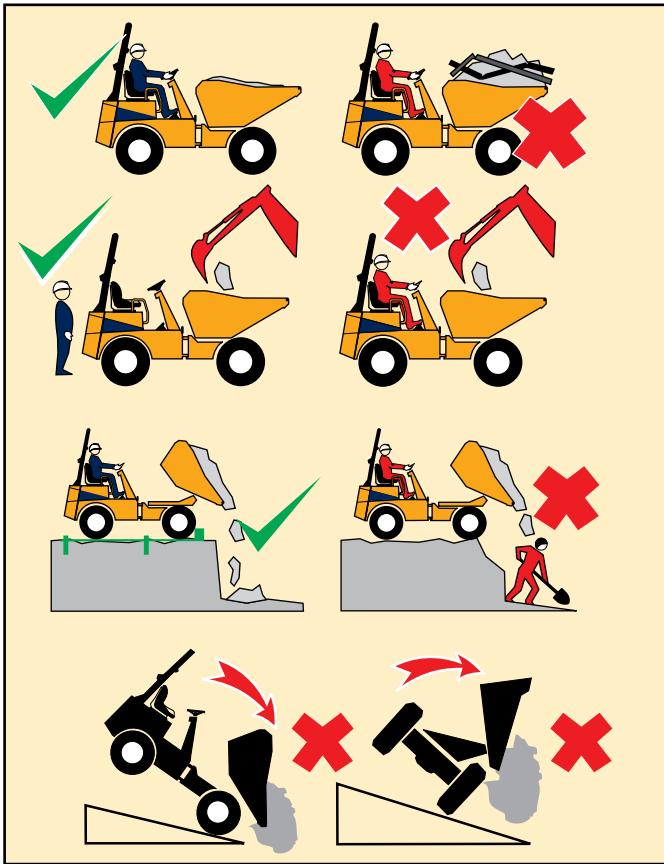
*Attention! Section**Correct and Incorrect Working Practices*

3



**WARNING**

**HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH**



**LOADING THE MACHINE**



**DO NOT** exceed machine's rated capacity



Apply hand brake, set transmission to **NEUTRAL**, turn engine **OFF**, disembark the machine and **STAND CLEAR**



Clear debris from controls



Ensure **SAFE STABLE LOW** load which allows good visibility.



Reduce payload if materials being carried are not free flowing

**UNLOADING THE MACHINE**



Use **STOPBOARDS** and **SUPPORT** walls on trenches



**DO NOT** tip skip if load is sticking



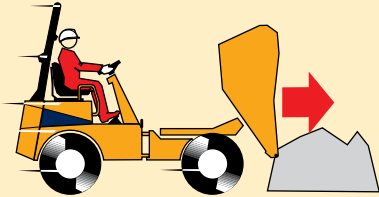
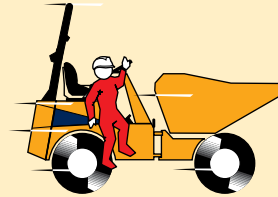
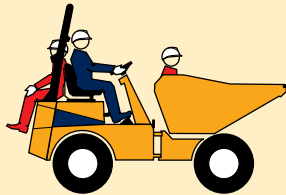
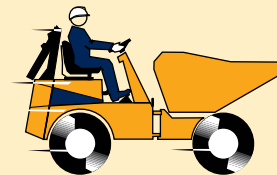
**DO NOT** discharge load when working on sloping ground

Attention! Section



Correct and Incorrect Working Practices



**3****WARNING****HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH****Thwaites****DRIVING****DO NOT** drive with the skip tipped (bulldozing)**NEVER** dismount from a moving machine**DO NOT** carry passengers**Avoid** confined work areas - exhaust fumes and noise can be a hazard**Site hazards to avoid:** adverse weather conditions; icy surfaces; people**DO NOT** operate with the ROPS frame folded*Attention! Section**Correct and Incorrect Working Practices*

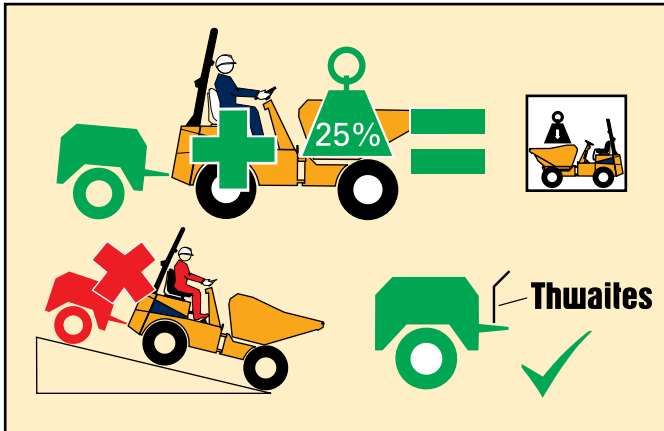
3



WARNING

HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH

Thwaites

**TOWING A TRAILER**

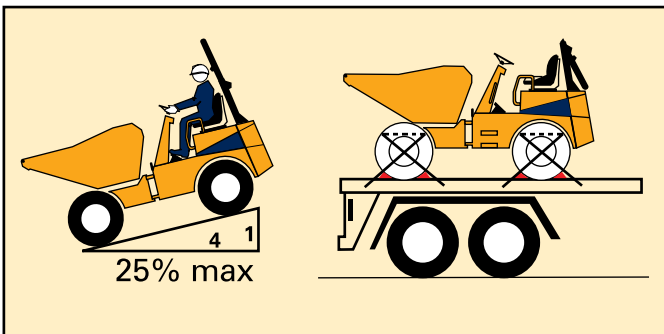
Place ballast load in skip. This load should be a minimum of 25% of the machine's rated payload

The gross weight to be towed plus the ballast load **MUST NOT** exceed rated payload of machine**DO NOT** exceed maximum tow bar pull or vertical load

Towing must not be carried out on sloping ground



Always use a Thwaites-approved towing pin

**TRANSPORTATION**

Reverse machine slowly onto a suitable trailer

**DO NOT** drive the machine forwards when loading

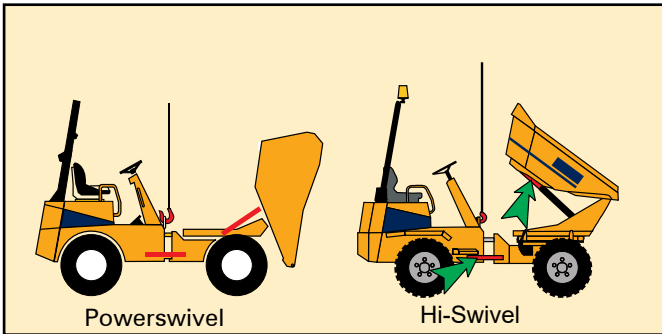
- 1 Apply hand brake
- 2 Stop engine
- 3 Chock wheels (*To prevent movement*)
- 4 Engage chassis locking bar
- 5 Secure to trailer
- 6 Ensure legal load (*Height/weight*)



Attention! Section

3

Correct and Incorrect Working Practices

**3****CAUTION**HAZARDS OR UNSAFE PRACTICES WHICH **COULD** RESULT IN MINOR PERSONAL INJURY OR PRODUCT OR PROPERTY DAMAGE**Thwaites****USING A CRANE TO LIFT THE MACHINE**

Tip skip fully forward



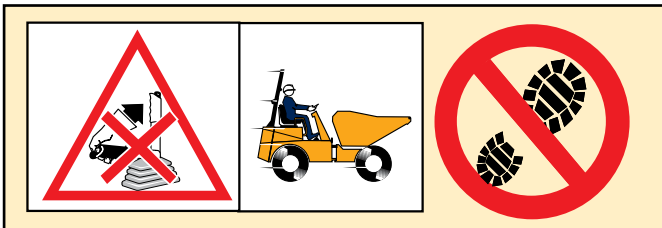
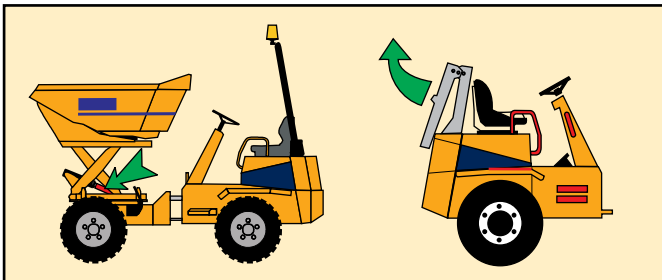
Place the locking channel over the tipping ram-rod, then reset the skip until it is impeded by the channel



Engage chassis locking bar



Lift using centre eye provided

**HAND BRAKE****DO NOT** apply hand brake if the machine is moving (except in an emergency)**SLOPING SURFACES****DO NOT** step on the rear mudguards' sloping surfaces**SCISSOR LIFT (HI-SWIVEL MODEL ONLY)**

In order to secure the skip in a raised position, place the locking channel over the lifting-ram rod

**HINGED ROPS**

Use grab handles, tread grips (if fitted) and steps when standing on the machine to lower the ROPS frame

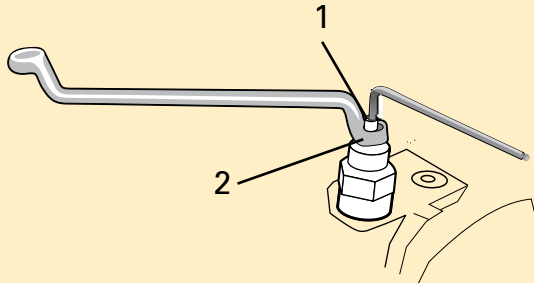
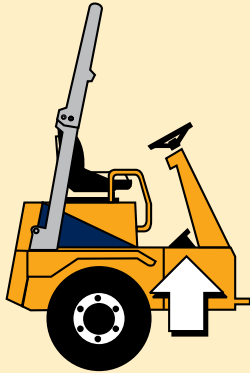


Avoid wet surfaces

Attention! Section



Correct and Incorrect Working Practices

**3****CAUTION****HAZARDS OR UNSAFE PRACTICES WHICH COULD RESULT IN MINOR PERSONAL INJURY OR PRODUCT OR PROPERTY DAMAGE****Thwaites****CAUTION - MACHINE RECOVERY**

In order to tow the machine, the high-pressure circuit at the hydrostatic pump must be opened.

To open the pump, follow this procedure:

At the left side of the pump below the floor plate there is one high-pressure control valve at the top, and another at the bottom.

To activate the hydrostatic transmission bypass:

- release lock nut (2);
- screw in grub screw (1) until flush with top of nut (2);
- tighten nut (2).
- Reverse procedure prior to machine being placed back into service.

**TOWING THE MACHINE**




- The maximum towing speed of 2 km/h should not be exceeded.
- The towing distance should not exceed 1 km.

Attention! Section



*Correct and Incorrect Working Practices*

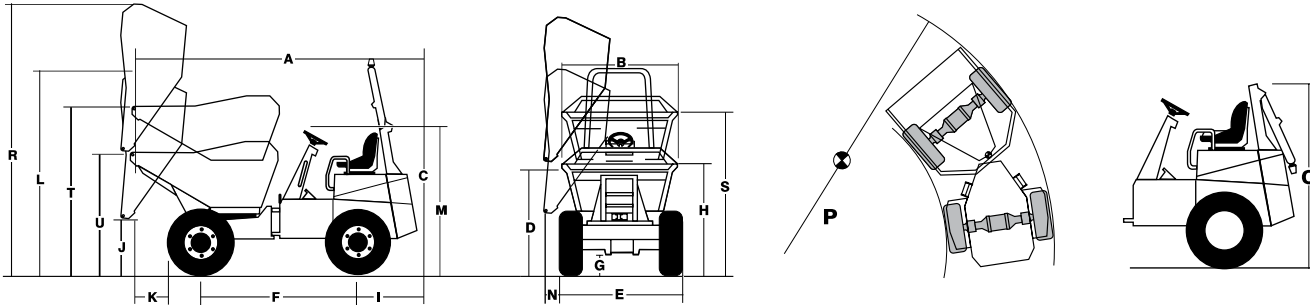
# 4 Troubleshooting

Problem	Reason	Solution
Engine will not start	Isolator switch is switched OFF Battery voltage too low Faulty fuel supply Electrical stop on fuel pump defective. Circuit breaker tripped	Switch on isolator switch Check battery and connections Check fuel level and connections Check connections Reset (Push to reset)
Complete loss of electrical functions	Maxi fuse blown	Rectify electrical fault and replace fuse
Maxi Fuse blown	Faulty starter motor/solenoid (Current drawn by solenoid exceeds 25A) Short circuit on main feed or starter solenoid cables	Replace motor/solenoid and maxi fuse (only replace with a 30 amp fuse) locate and repair
Engine stops soon after start-up	Blocked fuel or air filter Air in fuel system	Replace fuel or air filter Check fuel line connections
Black engine smoke	Air filter clogged (Indicator red) Fuel system defect Wrong fuel	Replace or clean air filter Contact Thwaites dealer Replace fuel and filter
 ● Engine oil pressure  ● High engine temperature  ● Irregular alternator	Low oil level  Radiator choked Low coolant level  Defective or loose alternator belt	Top up engine oil  Clean radiator Top up coolant  Adjust, or, if necessary, replace alternator belt

*Always investigate panel warning lights, tripped circuit breakers and a blown maxi fuse.*

# 4 Data Chart – Hi-Swivel

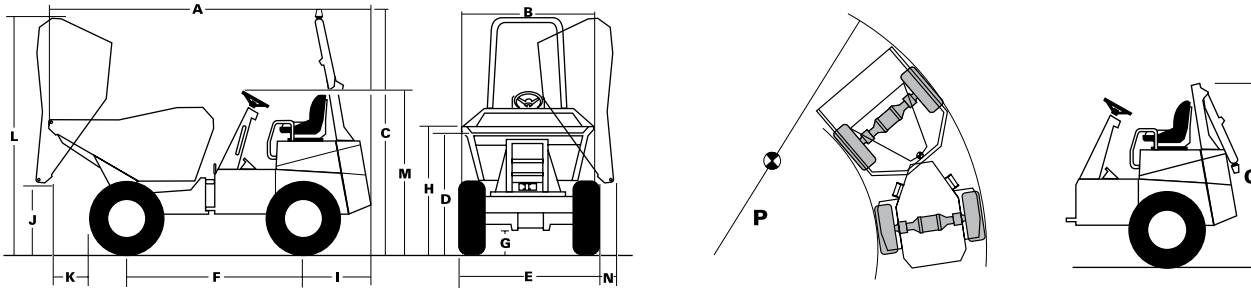
# Thwaites





Dimensions (mm)	3T	Weight (Kg)	3T	Noise
A. Length	3972	<b>Unladen</b>		Airborne (10 m) 
B. Width	1770	Front axle	1140	
C. Height (ROPS frame & beacon)	3140	Rear axle	1700	Operator 
D. Skip lip height	1600	Total	2840	
E. Width over tyres	1750	<b>Laden (including driver at 80 kg)</b>		
F. Wheelbase	1980	Rated payload	3000	
G. Ground clearance	280	Front axle	3840	
H. Skip load height	1650	Rear axle	2080	
I. Axle to rear	1130	Total	5920	
J. Tipping ground clearance	1260	<b>Towbar (Max)</b>		
K. Tipping tyre clearance	391	Pull load	2250	
L. Height tipped (Skip)	3440	Vertical load	500	
M. Max height without ROPS frame	2013	<b>Tyre Pressure</b>		
N. Tipping side clearance	220	Bar (psi) Front	4.2 (61)	
P. Tyre clearance diameter (m)	0.8	Rear	2.2 (32)	
Q. Height (ROPS frame folded)	2120			
R. Max height tipped (raised skip)	4030			
S. Skip load height (raised skip)	2240			
T. Skip lip height (raised skip)	2170			
U. Tipping ground clearance (raised skip)	1850			

# 4 Data Chart – Powerswivel

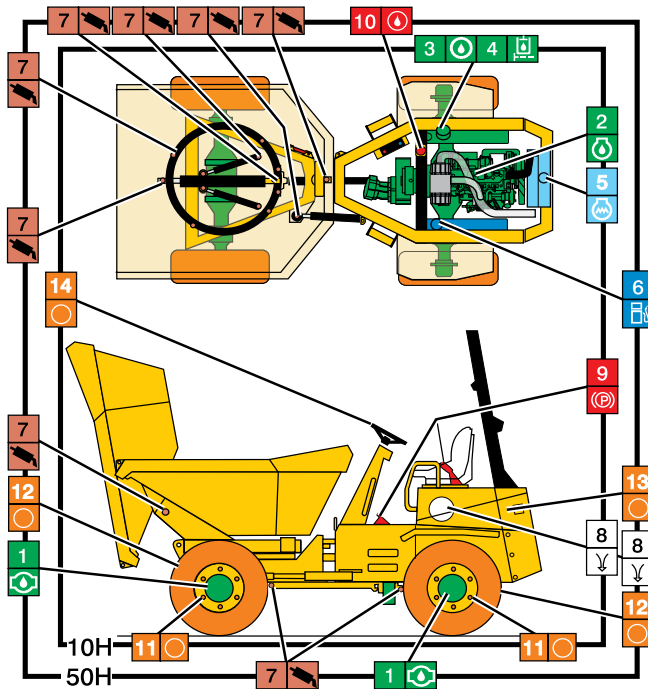
# Thwaites



Dimensions (mm)	3.5T		4.5T		Weight (Kg)	3.5T		4.5T		Noise
A. Length	4010	4107	<b>Unladen</b>							Airborne (10 m)  L <sub>WA</sub> <b>101</b> dB Operator  L <sub>PA</sub> <b>84</b>
B. Width	1770	1859	Front axle		920	1040				
C. Height (ROPS frame & beacon)	3140	3210	Rear axle		1605	1715				
D. Skip lip height	1520	1595	Total		2525	2755				
E. Width over tyres	1750	1840	<b>Laden (including driver at 80 kg)</b>							
F. Wheelbase	1980	1980	Rated payload		3500	4500				
G. Ground clearance	250	310	Front axle		4065	5130				
H. Skip load height	1600	1710	Rear axle		2040	2205				
I. Axle to rear	1130	1130	Total		6105	7335				
J. Tipping ground clearance	1110	1068	<b>Towbar (Max)</b>							
K. Tipping tyre clearance	530	422	Pull load		2625	3375				
L. Height tipped (Skip)	3290	3408	Vertical load		500	500				
M. Max height without ROPS frame	2013	2040	<b>Tyre Pressure</b>							
N. Tipping side clearance	190	220	Bar (psi) Front		4.2(61)	4.8(70)				
P. Tyre clearance diameter(m)	8	8.4	Rear		2.2(32)	2.7(39)				
Q. Height (ROPS frame folded)	2120	2180								

# 4 Daily/Weekly Checks

# Thwaites



	AXLE OIL (Hubs and centre case)	1	TRACTELF SF3
	ENGINE OIL	2	BP Vanellus C5 Global 15W 40
	TRANSMISSION OIL	3	BP Bartran HV46
	HYDRAULIC OIL	3	BP Bartran HV46
	COOLANT LEVEL	5	H <sub>2</sub> O + 50% Antifreeze
	FUEL LEVEL	6	Diesel
	GREASE	7	Fill all points
	AIR CLEANER	8	Check indicator
	BRAKES	9	Test hand & foot brake
	BRAKE OIL	10	BP Bartran HV32
	WHEEL NUTS	11	330 Nm
	TYRE PRESSURE	12	See Data Chart
	FAN BELT	13	Condition/Tension
	STEERING WHEEL/COLUMN	14	Check condition

## This machine must be serviced after first 50 hours

Normal service intervals:

250 hours      500 hours      1000 hours      2000 hours

Contact local Thwaites Distributor for details or [www.thwaitesdumpers.co.uk](http://www.thwaitesdumpers.co.uk)

Note: failure to use Thwaites-approved lubricants may invalidate your warranty