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**TESTING, TROUBLESHOOTING AND ADJUSTING**

# SAFETY

## To the Operator

**⚠ DANGER!!!**

**Unsafe use of the excavator could lead to serious injury or death. Operating procedures, maintenance and equipment practices or traveling or shipping methods that do not follow the safety guidelines on the following pages could cause serious, potentially fatal injuries or extensive damage to the machine or nearby property.**

## of a Daewoo Excavator

*Please respect the importance of taking responsibility for your own safety, and that of other people who may be affected by your actions.*

## Basic Excavator Operating Safety

The safety information on the following pages is organized into five topic sections:

I. **General Safety Essentials**
II. **Operation**
III. **Equipment**
IV. **Maintenance**
V. **Shipping and Transportation**

## General Safety Essentials

### Accessory Applications

The excavator has been primarily designed for moving earth with a bucket. For use as a grapple or for other object handling, contact Daewoo. Lifting-work applications are permitted in approved lift configuration, to rated capacity only, with no side-loading. DO NOT use the machine for activities for which it was not intended. DO NOT use the bucket for lifting work, unless lift slings are used in the approved configuration.

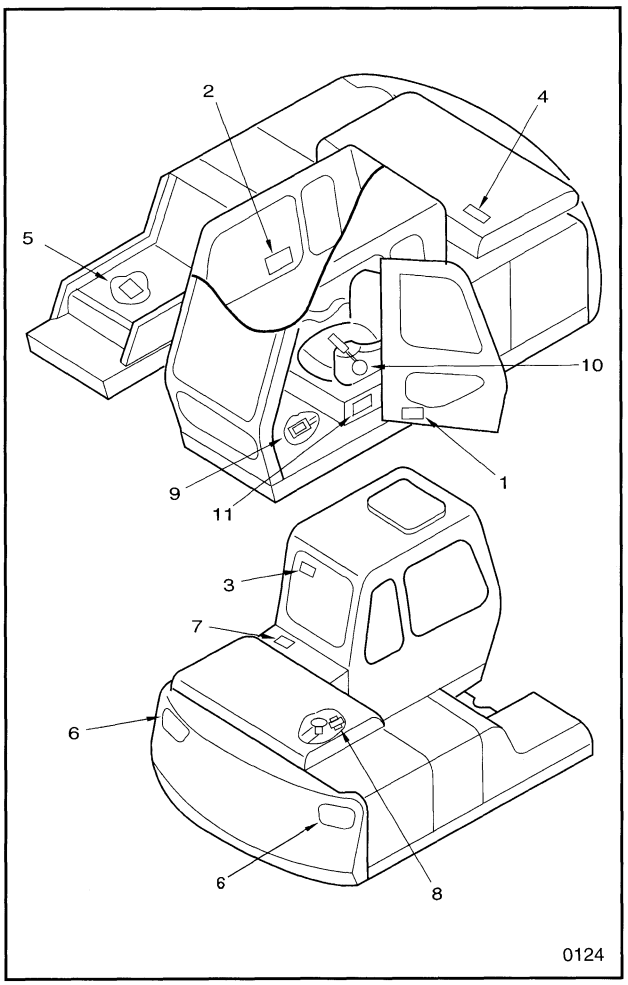
### Lifting

Lifting Mode capacity ratings that are printed at the end of this safety section are based on the machine being level, on a firm supporting surface, with hooks and slings attached in approved configuration. Loads must be balanced and supported evenly. Use taglines to keep the load steady if wind conditions and large surface area are a problem. Work crew hand signals, individual tasks and safe procedures should all be universally understood before the lift is made.

# Locations of Safety Labels

Always keep these labels clean. If they are lost or damaged, attach them again or replace them with a new label.

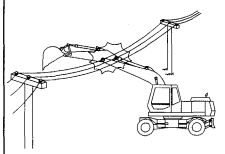
There are other labels in addition to the safety labels that follow so handle them in the same way. Safety labels may be available in languages other than English. To find out what labels are available, contact your Daewoo distributor.




1. **Warning for operation, inspection and maintenance (2190 - 2530).**
2. **Warnings for high voltage (2190 - 2532).**

**⚠ CAUTION**

- Read manual and labels before operation and maintenance. Follow instructions and warnings in manual and on labels on the machine.
- Never get in under the machine while it is being jacked up with boom and arm.
- For transporting the machine, the swing lock must be hung on.
- Turn Auto-Idle switch OFF, when loading the machine.
- Sound the horn to alert the people nearby before operating, and make sure all persons are clear of area.
- Always make sure when leaving operator's seat to:
  - Lower bucket or other working tools to the ground.
  - Move SAFETY LOCK DEVICE (located near seat) to LOCK position.
  - Turn key switch OFF. Remove key from switch.
- If hydraulic components and units are ABNORMAL, consult nearest DAEWOO dealer or authorized service shop. Do not attempt to make an overhaul.


0125

**⚠ DANGER**

Serious injury or death can occur if machine or attachments contact with electric lines. Never move any part of unit or load closer to electric lines than 3 m (10') plus twice the line insulator length.

3. **Warning when opening front window (2190 - 2526).**

**WARNING**

When raising window,
lock it in place with lock
pins on both sides.

Falling window can cause
injury.

4. **Warnings when opening engine hood (2190 - 2525).**

**WARNING**

Before opening bonnet stop engine.

5. **Warning for batteries maintenance (2190 - 2533).**

**DANGER**

- Battery fumes can explode. Keep sparks and flames away from batteries.
- Always avoid storing metals like tools or inflammable materials around or on the batteries.
  Explosion or fire can be caused by short circuiting batteries.
- Sulfuric acid in battery is poisonous. It is strong enough to burn skin, eat holes in clothing, and cause blindness if splashed in eyes.

  If you spill acid on yourself:

  1. Flush your skin with water.
  2. Apply baking soda or lime to help neutralize the acid.
  3. Flush your eyes with water for 10-15 minutes.
     Get medical attention immediately.

6. **Keep out of the swing area (2190 - 2534).**

**DANGER**

**KEEP OFF SWING AREA**

7. **Warning for high temperature hydraulic oil (2190 - 2529).**

**WARNING**

**HYDRAULIC OIL**

To prevent hot oil from spurting out:

- Turn engine off.
- Allow oil to cool.
- Slowly loosen cap to relieve pressure before removing.

8. **Warning for high temperature coolant (2190 - 2531).**

**WARNING**

To prevent hot water from spurting out:

- Turn engine off.
- Allow water to cool.
- Slowly loosen cap to relieve pressure before removing.

**9. Warning for handling accumulator (2190 - 2528).**

**⚠ WARNING**

Explosion hazard

- Keep away from flame.
- Do not weld or drill.

**Accumulator**

The Solar 220LC-III Pilot Control system is equipped with an accumulator. The accumulator will store a pressure charge that may enable the hydraulic controls to be activated for a brief period of time after the engine has been shut down. Activation of any of the controls may enable the selected function to operate under the force of gravity.

**⚠ CAUTION!!!**

**Any raised attachment will lower to the ground if the accumulator holds a charge.**

When shutting the machine down, lower the front attachment to the ground. After the engine has been shut down, move the joystick controls to release the pressure in the accumulator.

**IMPORTANT**

**Refer to the Shop Manual for service procedures. Do not release any of the pilot lines until the pressure within the accumulator has been released.**

**10. Warning when inspecting hydraulic (2190 - 2549).**


**11. Warning when adjusting tension (2190 - 2527).**

**⚠ WARNING**

The track adjuster adjustment and handling:

- The spring in the track adjuster is loaded with great force and the pressure in the cylinder is very high. For this reason there is a possibility of accident which may involve injury to personnel. It is very dangerous to make mistakes in handling such an adjustment or disassembly.
- Be sure to read the procedures described in the Operation and Maintenance Manual carefully before adjusting the track tension.

# Summary of Safe "Lifting Mode" Precautions

## ⚠ DANGER!!!

**Unsafe use of the excavator in lifting mode could cause serious, potentially fatal injuries or extensive damage to the machine or nearby property. Do not let anyone operate the machine unless they've been properly trained and understand the information in the Operation and Maintenance Manual.**

To operate safely in lifting mode:

- Condition of ground support
- Excavator configuration and attachments
- Weight, lifting height and lifting radius
- Safe rigging of the load
- Proper handling of the suspended load

All should be taken into consideration by the operator and worksite crew.

Taglines on opposite sides of the load can be very helpful in keeping a suspended load secure, if they are anchored safely to control points on the ground.

## ⚠ WARNING!!!

1. **NEVER wrap a tagline around your hands or body.**
2. **NEVER rely on taglines or use the excavator in lifting mode when wind gusts are in excess of 48.3 km/h (30 mi/h). Be prepared for any type of wind gust when working with loads that have a large surface area.**

Engage the **"Lifting Mode"** control on the Instrument Panel before using the excavator for lifting work.

## IMPORTANT

**If you need more information or have any questions or concerns about safe operating procedures or working the excavator correctly in a particular application or in the specific conditions of your individual operating environment, please consult your local Daewoo representative.**

### Unauthorized Modifications

Any modification made without authorization or written approval from Daewoo can create a safety hazard, for which the machine owner must be held responsible.

For safety's sake, replace all OEM parts with the correct authorized or genuine Daewoo part. For example, not taking the time to replace fasteners, bolts or nuts with the correct replacement parts could lead to a condition in which the safety of critical assemblies is dangerously compromised.

### Attachment Precautions

Options kits are available through your dealer. Contact Daewoo for information on available one-way (single-acting) and two-way (double-acting) piping/valving/ auxiliary control kits. Because Daewoo cannot anticipate, identify or test all of the attachments that owners may wish to install on their machines, please contact Daewoo for authorization and approval of attachments, and their compatibility with options kits.

### Avoid High-voltage Cables

Serious injury or death can result from contact or *proximity* to high-voltage electric lines. *The bucket does not have to make physical contact with power lines for current to be transmitted.*

Use a spotter and hand signals to stay away from power lines not clearly visible to the operator.

Depending upon the voltage in the line and atmospheric conditions, strong current shocks can occur with the boom or bucket as far away as 4 m – 6 m (13' 0" – 20' 0") from the power line. Very high voltage and rainy weather could further decrease that safety margin.

**Before starting any type of operation near power lines *(either above ground or buried cable-type),* you should always contact the power utility directly and work out a safety plan with them.**

### Before Starting to Dig, Contact Authorities

Below ground hazards also include natural gas lines, water mains, tunnels and buried foundations. Know what's underneath the work site before starting to dig.

### Be Aware of Height Obstacles

Any type of object in the vicinity of the boom could represent a potential hazard, or cause the operator to react suddenly and cause an accident. Use a spotter or signal person working near bridges, phone lines, work site scaffolds, or other obstructions.

### Use Care on Loose Support

Working heavy loads over loose, soft ground or uneven, broken terrain can cause dangerous side load conditions and possible tipover and injury. Travel without a load or balanced load may also be hazardous.

If temperatures are changing, be cautious of dark and wet patches when working or traveling over frozen ground. Stay away from ditches, overhangs and all other weak support surfaces. Halt work and install support mats or blocking if work is required in an area of poor track support.

### Use Solid Support Blocking

Never rely on lift jacks or other inadequate supports when work is being done. Block tracks fore and aft to prevent any movement.

### Overhangs Are Dangerous

Digging the workface under an overhang – the work area beneath a cliff or under the edge of a ditch – is dangerous. Know the height and reach limits of the excavator and plan ahead while working. Avoid creating dangerous situations by moving around the work site while making excavations. Go on to another digging area before steep overhangs are formed. Working around deep pits or along high walls or trenching may require support blocks, especially after heavy rainfalls or during spring thaws. Park the excavator away from overhangs before work shutdown.

### Sloping Terrain Requires Caution

Dig evenly around the work site whenever possible, trying to gradually level any existing slope. If it's not possible to level the area or avoid working on a slope, reducing the size and cycling rate of the workload is recommended.

On sloping surfaces, use caution when positioning the excavator prior to starting a work cycle. Stay alert for instability situations in order to avoid getting into them. For example, you should always avoid working the bucket over downhill crawler tracks when parked perpendicular to the slope. Slow all downhill swing movements and avoid full extensions of the bucket in a downhill direction. Lifting the bucket too high, too close to the machine, while the excavator is turned uphill can also be hazardous.

### Stay Alert for People Moving through the Work Area

- When loading a truck you should always know where the driver is.
- Avoid loading over the cab of a truck even if the driver is in a safe spot. Someone else could have gone inside, for any number of reasons. Avoid working where unseen passersby might be.
- Slow down the work cycle and use slower travel speeds in congested or populated areas. Use a commonly understood signal so that other members of the work crew can warn the operator to slow or halt work in an impending hazardous situation.

# Operation

### Be Prepared – Get to Know All Operating and Safety Instructions

This is the Safety Alert Symbol. Wherever it appears – in this manual or on safety signs on the machine – you should be alert to the potential for personal injury or accidents. Always observe safety precautions and follow recommended procedures.

### Operate While Seated at the Operator's Station ONLY

Never reach in through a window to work a control. Do not try to operate the excavator unless you're in the command position – seated at the controls. You should stay alert and focused on your work at all times but DO NOT twist out of the seat if job activity behind you (or to the side) requires your attention.

Use a spotter or signal person if you can't see clearly and something is happening behind you.

Replace damaged safety labels and lost or damaged owner's manuals.

Do not let anyone operate the machine unless they've been fully and completely trained, in safety and in operation of the machine.

### Learn the Signal Words Used with the Safety Alert Symbol

The words **"CAUTION," "WARNING,"** and **"DANGER"** used throughout this manual and on decals on the machine indicate degree of risk of hazards or unsafe practices. All three degrees of risk indicate that safety is involved. Observe precautions indicated whenever you see the Safety Alert "Triangle," no matter which signal word appears next to the "Exclamation Point" symbol.

**⚠CAUTION!!!**

**Indicates potential of a hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against a generally unsafe practice.**

**⚠WARNING!!!**

**Indicates potential of a hazardous situation that, if not avoided, could result in serious injury or death. It may also be used to alert against a highly unsafe practice.**

**⚠DANGER!!!**

**Indicates imminent hazard of a situation that, if not avoided, is very likely to cause death or extremely serious injury. It may also be used to alert against equipment that may explode or detonate if handled or treated carelessly.**

### Before Starting the Engine

Do a "prestart" safety check:

- Walk around your machine before getting in the operator's cab. Look for evidence of leaking fluid, loose fasteners, mis-aligned assemblies or any other indications of possible equipment hazard.
- All equipment covers and machinery safety guards must be in place, to protect against injury while the machine is being operated.
- Look around the work site area for potential hazards, or people or property that could be at risk while operation is in progress.
- NEVER start the engine if there is any indication that maintenance or service work is in progress, or if a warning tag is attached to controls in the cab.
- A machine that has not been used recently, or is being operated in extremely cold temperatures, could require a warm-up or maintenance service prior to start-up.
- Check gauges and monitor displays for normal operation prior to starting the engine. Listen for unusual noises and remain alert for other potentially hazardous conditions at the start of the work cycle.

### Never Use Ether Starting Aids

An electric-grid type manifold heater is used for cold starting. The glowing heater element can cause ether or other starting fluid to detonate, causing injury.

### Mounting and Dismounting

- NEVER get on or off a moving machine. Do not jump on/off.The entry/egress path should be clear of mud, oil and spills and mounting hardware must be kept tight and secure.
- Always use handholds, steps or track shoes and maintain at least 3-point contact of hands and feet. Never use controls as handholds.
- NEVER get up from the operator's seat or leave the operator's station and dismount the machine if the engine is running.

### Observe General Safety Rules

Only trained and authorized personnel, with a good knowledge and awareness of safe procedures, may be allowed to operate or perform maintenance or service on the excavator.

All personnel at the work site should be aware of assigned individual responsibilities and tasks. Communication and hand signals used should be understood by everyone.

Terrain and soil conditions at the job site, approaching traffic, weather-related hazards and any above or below ground obstacles or hazards should be observed and monitored by all work crew members.

### Engine Ventilation

Engine exhaust gases can cause fatal accidents, as well as unconsciousness; loss of alertness, judgement and motor control and serious injury.

Make sure of adequate ventilation before starting the engine in any enclosed area.

You should also be aware of open windows, doors or ductwork into which exhaust may be carried, or blown by the wind, exposing others to danger.

### Take Time to Provide Good Visibility

Halt work if visibility is poor. Strong rains, snow, fog and extremely dusty conditions can all obscure visibility so badly that it is best to wait for weather to change or dust to settle before continuing operation.

Night work in areas of limited visibility should be halted if installation of extra work lights on the machine (or work area) is necessary.

Keep dirt and dust off of windows and off the lens surfaces of work lights. Stop working if lights, windows or mirrors need cleaning or adjustment.

### Fuel, Oil and Hydraulic Fluid Fire Hazards

Add fuel, oil, antifreeze and hydraulic fluid to the machine only in a well ventilated area. The machine must be parked with controls, lights and switches turned off. The engine must be off and any flames, glowing embers, auxiliary heating units or spark-causing equipment must be doused, turned off and/or kept well clear of the machine.

Static electricity can produce dangerous sparks at the fuel filling nozzle. In very cold, dry weather or other conditions that could produce static discharge, keep the tip of the fuel nozzle in constant contact with the neck of the fuel filling nozzle, to provide a ground.

Keep fuel and other fluid reservoir caps tight and do not start the engine until caps have been secured.

### Boost Starting or Charging Engine Batteries

Turn off all electrical equipment before connecting leads to the battery. This includes electrical switches on the battery charger or boost starting equipment.

When boost-starting from another machine or vehicle do not allow the two machines to touch. Wear safety glasses or goggles while required parallel battery connections – positive to positive and negative to negative – are made.

(24 volt battery units consisting of two series-connected twelve volt batteries have a cable connecting one positive terminal on one of the 12 volt batteries to a negative terminal on the other battery. Booster or charger cable connections must be made between the non-series-connected positive terminals and between the negative terminal of the booster battery and the metal frame of the machine being boosted or charged.) Refer to the procedure and illustration in the "Operating Instructions" section of this book.

Connect positive cable first when installing cables and disconnect the negative cable first when removing them. The final cable connection, at the metal frame of the machine being charged or boost-started, should be as far away from the batteries as possible.

### Travel Controls May Produce Reversed Operations

Before starting the machine you should always check to see which end of the track frame is under the operator's cab. In the normal travel configuration, track frame travel motors are at the rear of the machine, under the engine and counterweight. If the operator swings the cab 180°, travel motors will be underneath the operator's cab, toward the front of the track frame and operating travel will be reversed.

When traveling the excavator, always keep lights on; make sure that you are in compliance with all state and local regulations concerning warning flags and signs and keep the operator's cab positioned over the idler end of the track frame. That will keep travel controls in their intended configuration and at the same time, maintain the proper orientation of lights on the machine and posted flags and signs.

### Keep "Pinch Point" Areas Clear – Use Caution in Reverse & Swing

Use a signal person in high traffic areas and whenever the operator's view is not clear, such as when traveling in reverse. Make sure that no one comes inside the swing radius of the machine.

Anyone standing near the track frames, or working assemblies of the attachment, is at risk of being caught between moving parts of the machine.

Never allow anyone to ride on any part of the machine or attachment, including any part of the turntable or operator's cab.

### Travel Precautions

Attachment control levers should not be operated while traveling.

Do not change selected travel mode (FAST/SLOW) while traveling.

Fold in work equipment so that the outer end of the boom is as close to the machine as possible, and is low – 203 mm – 304 mm (8" – 12") above ground.

Never travel over obstacles or slopes that will cause the machine to tilt severely. Travel around any slope or obstacle that causes 10 degrees tilt, or more.

### Operate Carefully on Snow and Ice and in Very Cold Temperatures

In icy cold weather avoid sudden travel movements and stay away from even very slight slopes. The machine could skid off to one side very easily.

Snow accumulation could hide or obscure potential hazards. Use care while operating or while using the machine to clear snow.

Warming up the engine for a short period may be necessary, to avoid operating with sluggish or reduced working capacity. The jolting shocks and impact loads caused by bumping or bottoming the boom or attachment are more likely to cause severe stress in very cold temperatures. Reducing work cycle rate and work load may be necessary.

### Parking the Machine

Avoid making sudden stops, or parking the machine wherever it happens to be at the end of the work day. Plan ahead so that the excavator will be on a firm, level surface away from traffic and away from high walls, cliff edges and any area of potential water accumulation or runoff. If parking on inclines is unavoidable, block the crawler tracks to prevent movement. Lower the bucket or other working attachment completely to the ground, or to an overnight support saddle. There should be no possibility of unintended or accidental movement.

### Shutdown Control Functions

After the machine has been lowered to the overnight storage position and all switches and operating controls are in the OFF position, the control stand lock lever must be engaged. Release the left console to disable all pilot circuit control functions.

Insert the swing lock pin and engage all brakes and lock-down security equipment that may have been installed on the machine.

**IMPORTANT**

**When hydraulic system maintenance or service work must be performed, you should be aware that an accumulator in the system stores fluid under pressure after system lock down, even after the control stand is raised. Release this energy by working controls with the engine off, until pressure in the pilot circuit has been completely bled away.**

# Equipment

### Rough Operation May Require Use of Certified Safety Equipment

Work in mines, tunnels, deep pits or on loose or wet surfaces could produce danger of falling rock, roll over or hazardous flying objects. Additional protection for the operator's cab could be required in the form of a FOPS/ Falling Object Protective Structure, ROPS/Roll Over Protective Structure and/or OPS/Operator Protective Structure reinforcement system.

Any reinforcement system that is installed on the machine must pass safety and certification standards and carry appropriate labeling and rating information. For example, the most often added type of reinforcement system, FOPS, must meet or exceed Society of Automotive Engineers standard SAE J1356, "Performance Criteria for Falling Object Guards for Excavators."

Never attempt to alter or modify any type of protective structure reinforcement system, by drilling holes, welding or remounting or relocating fasteners. Any serious impact or damage to the system requires a complete integrity reevaluation. Reinstallation, recertification and/or replacement of the system may be necessary.

### Install Additional Safety Equipment If Conditions Require

When working with a breaker or in some shear work applications, a front guard over the windshield may be required. The windshield guard may or may not be OPS/certified, depending upon the specific application and working situation.

Laminate glass protection for the front, side or rear windows may also be recommended depending upon particular site conditions.

Contact your Daewoo distributor for available safety guards and/or recommendations if there is any danger of getting hit by objects that could strike the operator's cab. Make sure that all other work site crew members are kept well away from the excavator and safe from potential hazards.

### Movement Alarms

If the excavator is equipped with an audible travel movement alarm or visible swing movement alarm (strobe light), test the alarm on a daily basis. The audible alarm should sound as soon as the travel system is engaged. The strobe light should begin to flash as soon as the swing system is engaged.

### Seat Belts Should Be Used at All Times

Whenever the engine is running, the operator should be seated at the control station with the seat belt properly engaged.

### Keep a Fire Extinguisher at Hand

It is recommended that an appropriately sized (2.27 kg [5 lb] or larger) multi-purpose "A/B/C" fire extinguisher be mounted in the cab. Check and service the fire extinguisher at regular intervals and make sure that all work site crew members are adequately trained in its use.

### Maintain Standard Safety Equipment in Good Condition

Machinery guards and body panel covers must be in place at all times. Keep well clear of rotating parts. Pinch point hazards such as cooling fan and alternator drive belts could catch hair, jewelry or oversize or very loose clothing.

Safety decals must be replaced if they are damaged or become unreadable. The information on decals gives work crew members an important safety reminder exactly where it will do the most good. Part numbers for each decal and required mounting locations are shown on Pages 1-2 through 1-4 of this section.

### Safety-Critical Parts Must Be Replaced Periodically

Replace the following fire-related components as soon as they begin to show any sign of wear, or at regular periodic intervals, whether or not deterioration is visible:

- Fuel system flexible hoses, the tank overflow drain hose and the fuel filler cap.
- Hydraulic system hoses, especially the pump outlet lines and front and rear pump branch hoses.
- Keep mounting brackets and hose and cable routing straps tight. Hose routing should have gradual bends.

### Hydraulic Cylinder Seals Require Periodic Replacement

Check cylinder drift rate at regular intervals. Maximum allowable rates are included at the end of the Hydraulic section in the Excavator Shop Manual. Overhaul seal kits are available through Daewoo.

### High Pressure Hydraulic Lines Can Store a Great Deal of Energy

Exposed hydraulic hoses on the arm or boom could react with explosive force if struck by a falling rock, overhead obstacle or other jobsite hazard. *Extra safety guards may be required.* NEVER allow hoses to be hit, bent or interfered with during operation.

### The Operator's Cab and Turntable Deck Should Be Kept Clean

Cleaning off accumulations of grease and dirt helps extend equipment service life. Cleaning also provides an opportunity to inspect equipment. Minor damage can be repaired or corrected before major problems result.

Keep the cab floor and consoles free of tools and personal items.

### Wear Eye Protection and Safety Clothing – Use Proper Tools

Full eye protection, a hard hat, safety shoes and gloves may be required at the job site.

While working on the machine, never use inadequate tools. They could break or slip, causing injury, or they may not adequately perform intended functions.

### Breathing Masks, Ear Protection May Be Required

Do not forget that some risks to your health may not be immediately apparent. Exhaust gases and noise pollution may not be visible, but these hazards can cause disabling or permanent injuries.

**NOTE**

*The sound level in the closed operator's cab is 75 dB(A). Additional information on the machine sound and vibration levels can be found in the Shop Manual.*

### Battery Electrolyte and Explosive Gases Can Be Lethal

Flush eyes with water for 10-15 minutes if acid is splashed in the face. Anyone who swallows acid must have **immediate** medical aid. *Call the Poison Control listing in the front cover of the telephone directory.* Water, a popsicle or ice cream are likely better than old remedies that try to induce vomiting (which would expose tissue to damage twice).

Explosive battery gas can be set off by sparks from incidental contact or static discharge. Turn off all switches and the engine when working on batteries. Keep battery terminals tight. Contact between a loose terminal and post can create an explosive spark.

### Disconnect Batteries for Electrical Service/Before Electrical Welding

Remove cable to negative terminal first when disconnecting cable. Connect positive terminal cables first when installing a battery.

### Use Low Heat Portable Lighting

Hot surfaces on trouble lights or portable work lights can set off fuel or battery explosive gases.

## Maintenance

### Use Warning Tag Control Lockout Procedures During Service

Alert others that service or maintenance is being performed and tag operator's cab controls – and other machine areas if required – with a warning notice. OSHA-mandated control lever lockout can be made with any OSHA certified lockout device and a length of chain or cable to keep the left-hand control console in the fully raised, non-active position.

Warning tags for controls are available from Daewoo distributors; see Page 1-1 for more information.

### Do Not Run the Engine If Repairs or Work Is Being Performed Alone

You should always have at least two people working together if the engine must be run during service. One person needs to remain in the operator's seat, ready to work the controls or stop the machine and shut off the engine.

**Always Use Adequate Equipment Supports and Blocking**

Do not allow weight or equipment loads to remain suspended. Lower everything to the ground before leaving the operator's seat. Do not use hollow, cracked or unsteady, wobbling weight supports. Do not work under any equipment supported solely by a lift jack.

**Do Not Work on Hot Engines or Hot Cooling or Hydraulic Systems**

Wait for the engine to cool off after normal operation. Park the excavator on a firm, level surface and lower all equipment before shutting down and switching off controls. When engine lube oil, gearbox lubricant or other fluids require change, wait for fluid temperatures to decrease to a moderate level before removing drain plugs.

**NOTE**

*Oil will drain more quickly and completely if it is warm. Do not drain fluids at temperatures exceeding 95°C (203°F), however do not allow full cool-down.*

**Cool-down Is Required Prior to Radiator or Reservoir Checks**

Stop the engine and allow heat to dissipate before performing service on the engine radiator or hydraulic fluid reservoir. Both assemblies have air vent levers at or near the filler cap for venting built-up air pressure. Release the levers before trying to take off filler caps and LOOSEN CAPS SLOWLY, prior to removal.

**Pressurized Hydraulic Oil Fluid Leaks Can Be Dangerous**

Fluid leaks from hydraulic hoses or pressurized components can be difficult to see but pressurized oil has enough force to pierce the skin and cause serious injury.

Always use a piece of wood or cardboard to check for suspected hydraulic leaks. Never use your hands or expose your fingers.

**Obtain immediate medical attention if pressurized oil pierces the skin.**

| IMPORTANT |
| --- |
| **Failure to obtain prompt medical assistance could result in gangrene or other serious damage to tissue.** |

**Use Correct Replacement Fasteners Tightened to Proper Torque**

Refer to the "General Maintenance" section of the Shop Manual for information on tightening torques and recommended assembly compounds and always use the correct part.

Poor or incorrect fastener connections can dangerously weaken assemblies.

**Dispose of All Petroleum-based Oils and Fluids Properly**

Physical contact with used motor oil may pose a health risk. Wipe oil from your hands promptly and wash off any remaining residue.

Used motor oil is an environmental contaminant and may only be disposed of at approved collection facilities. Never drain any petroleum-based product on the ground or dispose of old oil in municipal waste collection containers, or in metropolitan sewer systems or rural landfills.

Check state and local regulations for other requirements.

**Track Tension Adjustments Require Caution**

NEVER turn out the track tension grease fitting nut. To release pressure from the crawler frame track tension assembly, you should NEVER attempt to disassemble the track adjuster or attempt to remove the grease fitting or valve assembly.

Keep your face and body away from the valve. Refer to the track adjustment procedure in the Operation and Maintenance Manual or Shop Manual.

# Shipping and Transportation

**Obey State and Local Over-the-Road Regulations**

Check state and local restrictions regarding weight, width and length of a load prior to making any other preparation for transport.

The hauling vehicle, trailer and load must all be in compliance with local regulations governing the intended shipping route.

Partial disassembly or tear-down of the excavator may be necessary to meet travel restrictions or particular conditions at the job site.

Refer to the Transportation and Shipping section of this Operation and Maintenance and Maintenance Manual. Information on partial machine disassembly, loading and unloading, lifting and towing is included in the last section of the manual.

# Solar 220LC-III Excavator Rated Lift Capacity Tables

**Rated Lift Capacities with Standard and Optional Configurations**

| Boom Length | Arm Length | Shoe Width | Counterweight | Bucket Size |
|---|---|---|---|---|
| 6,245 mm (20' 6")<br>1,975 kg (4,355 lb)<br>(Used with all configurations) | 3,100 mm (10' 2")<br>2, 400 mm (7' 10")<br>3,750 mm (12' 4")<br>5,000 mm (16' 5") | 600 mm (23' 6")<br><br>810 mm (32.0") | 4,500 kg (9,920 lb)<br><br>(Used with all configurations) | 1.1$m^3$ (CECE)<br>0.8 $m^3$<br>1.0 $m^3$<br>1.3$m^3$ |

**⚠WARNING!!!**

**All rated lift capacities are based on the machine and the load both remaining level at all times. DO NOT EXCEED THE RATED LIFT CAPACITY. Lifting loads greater than those shown in the rated capacity tables can cause catastrophic equipment failure and/or structural collapse of the machine.**

To operate safely the excavator should be on a firm, level and uniformly supporting surface. The operator is expected to make due allowance for all specific work site and lift-related conditions, and respond to changes in those conditions that could pose a hazard. The following could all cause hazardous conditions and accidents or injuries:

- Soft or uneven ground
- Off-level terrain
- Side loads
- Modifications or poor maintenance of the excavator
- Failure to lift squarely over the end or over the side of the machine

When a load is in the air, the operator must remain alert.

- Avoid side loads that may be caused by uneven slings, traveling with the load or swinging too quickly.
- The load can become unbalanced if the hook-line is twisted and starts to rotate. If the surface area of the load is large enough, wind gusts can create side loads.
- Keep the bucket hook point directly over the load. Taglines on opposite sides of the load can help maintain greater stability against side loads and wind gusts.

Avoid traveling with a suspended load. Before swinging (or if required, traveling), bring the load in to an arm position (radius and height) that has a safer weight capacity rating **and adequate movement clearance.** The operator and all worksite personnel should be thoroughly familiar with safety instructions and procedures within this Operation and Maintenance Manual.

# Solar 220LC-III Excavator Rated Lift Capacity Tables (Continued)

**Lift Ratings for Standard Configuration, Over FRONT (  ) in Kg (Lb)**

| Boom Length | Arm Length | Shoe Width | Counterweight | Bucket Size |
|---|---|---|---|---|
| 5.7 m<br>(18' 9") | 2.9 m<br>(9' 6") | 600 mm<br>(23.6") | 3,500 kg<br>(7,700 lb) | 0.8 $m^3$ (1.0 $yd^3$)<br>Std. Size |

| Lift Height | 3.0 m Radius (10') | 4.5 m Radius (15') | 6.0 m Radius (20') | 7.5 m Radius (25') | Maximum Reach |
|---|---|---|---|---|---|
| 6.0 m (20') | | | * 3,921 kg<br>(8,644 lb) | | *2,204 kg (4.859 lb)<br>@ 8.50 m (27' 11") |
| 4.5 m (15') | | | * 4,452 kg<br>(9,815 lb) | * 4,293 kg<br>(9,464 lb) | *2,091 kg (4,610 lb)<br>@ 9.11 m (29' 11") |
| 3.0 m (10') | | * 7,031 kg<br>(15,500 lb) | * 5,361 kg<br>(11,819 lb) | 4,311 kg<br>(9,504 lb) | *2,080 kg (4,586 lb)<br>@ 9.41 m (30' 10") |
| 1.5 m (5') | | * 8,957 kg<br>(19,746 lb) | 6,134 kg<br>(13,523 lb) | 4,214 kg<br>(9,290 lb) | *2,169 kg (4,782 lb)<br>@ 9.39 m (30' 10") |
| Ground Line | | 9,710 kg<br>(21,407 lb) | 6,004 kg<br>(13,236 lb) | 4,131 kg<br>(9,107 lb) | *2,323 kg (5,121 lb)<br>@ 9.17 m (30' 1") |
| –1.5 m (–5') | * 9,252 kg<br>(20,397 lb) | 9,817 kg<br>(21,642 lb) | 5,930 kg<br>(13,073 lb) | 4,120 kg<br>(9,083 lb) | *2,727 kg (6,012 lb)<br>@ 8.52 m (27' 11") |
| –3.0 m (–10') | * 14,340 kg<br>(31,614 lb) | * 9,727 kg<br>(21,444 lb) | 5,922 kg<br>(13,056 lb) | | *3,466 kg (7,641 lb)<br>@ 7.51 m (24' 8") |
| –4.5 m (–15') | * 11,588 kg<br>(25,547 lb) | * 7,937 kg<br>(17,498 lb) | | | *4,998 kg (11,019 lb)<br>@ 5.90 m (19' 4") |

The preceding weight loads are in compliance with SAE (J1097) and ISO applicable, recommended standards for hydraulic excavators performing lifting operation on a firm supporting surface. An asterisk (*) next to the lift rating indicates rated load does not exceed 87% of hydraulic capacity. All other ratings have been determined not to exceed 75% of tipping capacity.

Do NOT attempt to lift or hold any load that exceeds rated load capacity at the specified distances (from the machine's rotation centerline and height – see "lift radius" and "lift height" in the reference drawing).

The weight of slings and any auxiliary lifting device (and/or the weight difference of any attachment heavier than standard configuration) must be deducted from the rated lift capacity to determine allowable net lifting load. The lift point should be located on the back of the bucket, as shown in the reference drawing on the facing page.

## IMPORTANT

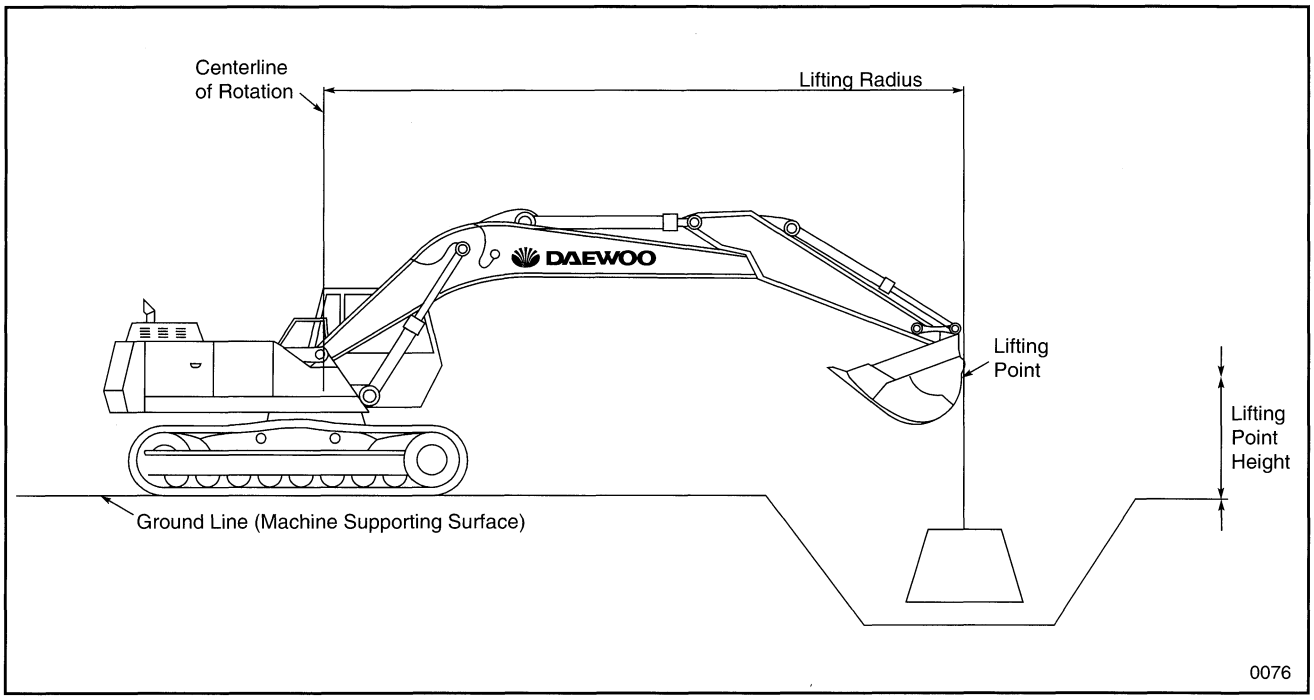
**Engage the "Lifting Mode" control on the Instrument Panel before using the excavator for lifting work. Engine and hydraulic oil should both be fully warmed up to operating temperature before starting a lift.**

# Solar 220LC-III Excavator Rated Lift Capacity Tables (Continued)

**Lift Ratings for Standard Configuration, Over SIDE ( ) in Kg (Lb)**

| Boom Length | Arm Length | Shoe Width | Counterweight | Bucket Size |
|---|---|---|---|---|
| 5.7 m<br>(18' 9") | 2.9 m<br>(9' 6") | 600 mm<br>(23.6") | 3,500 kg<br>(7,700 lb) | 0.8 $m^3$ (1.0 $yd^3$)<br>Std. Size |

| Lift Height | 3.0 m Radius (10') | 4.5 m Radius (15') | 6.0 m Radius (20') | 7.5 m Radius (25') | Maximum Reach |
|---|---|---|---|---|---|
| 6.0 m (20') | | | * 3,921 kg<br>(8,644 lb) | | *2,204 kg (4,859 lb)<br>@ 8.50 m (27' 11") |
| 4.5 m (15') | | | * 4,452 kg<br>(9,815 lb) | 3,207 kg<br>(7,070 lb) | *2,091 kg (4,610 lb)<br>@ 9.11 m (29' 11") |
| 3.0 m (10') | | * 7,031 kg<br>(15,500 lb) | 4,580 kg<br>(10,097 lb) | 3,132 kg<br>(6,905 lb) | *2,080 kg (4,586 lb)<br>@ 9.41 m (30' 10") |
| 1.5 m (5') | | 7,059 kg<br>(15,562 lb) | 4,422 kg<br>(9,749 lb) | 3,041 kg<br>(6,704 lb) | *2,128 kg (4,691 lb)<br>@ 9.39 m (30' 10") |
| Ground Line | | 6,752 kg<br>(14,885 lb) | 4,297 kg<br>(9,473 lb) | 2,966 kg<br>(6,539 lb) | 2,192 kg (4,832 lb)<br>@ 9.17 m (30' 1") |
| –1.5 m (–5') | * 9,252 kg<br>(20,397 lb) | 6,804 kg<br>(15,000 lb) | 4,232 kg<br>(9,330 lb) | 2,954 kg<br>(6,512 lb) | 2,463 kg (5,430 lb)<br>@ 8.52 m (27' 11") |
| –3.0 m (–10') | * 14,340 kg<br>(31,614 lb) | 6,866 kg<br>(15,137 lb) | 4258 kg<br>(9,387 lb) | | 3,051 kg (6,726 lb)<br>@ 7.51 m (24' 8") |
| –4.5 m (–15') | * 11,588 kg<br>(25,547 lb) | 7,082 kg<br>(15,613 lb) | | | 4,574 kg (10,084 lb)<br>@ 5.90 m (19' 4") |



# Solar 220LC-III Excavator Rated Lift Capacity Tables (Continued)

**Lift Ratings, Optional 810 mm (32") Crawler Shoes, Over FRONT (  ) in Kg (Lb)**

| Boom Length | Arm Length | Shoe Width | Counterweight | Bucket Size |
|---|---|---|---|---|
| 5.7 m<br>(18' 9") | 2.9 m<br>(9' 6") | 810 mm<br>(32") | 3,500 kg<br>(7,700 lb) | 0.8 $m^3$ (1.0 $yd^3$)<br>Std. Size |

| Lift Height | 3.0 m Radius (10') | 4.5 m Radius (15') | 6.0 m Radius (20') | 7.5 m Radius (25') | Maximum Reach |
|---|---|---|---|---|---|
| 6.0 m (20') | | | * 3,921 kg<br>(8,644 lb) | | *2,204 kg (4,859 lb)<br>@ 8.50 m (27' 11") |
| 4.5 m (15') | | | * 4,452 kg<br>(9,815 lb) | * 4,293 kg<br>(9,464 lb) | *2,091 kg (4,610 lb)<br>@ 9.11 m (29' 11") |
| 3.0 m (10') | | * 7,031 kg<br>(15,500 lb) | * 5,361 kg<br>(11,819 lb) | 4,456 kg<br>(9,824 lb) | *2,080 kg (4,586 lb)<br>@ 9.41 m (30' 10") |
| 1.5 m (5') | | * 8,957 kg<br>(19,746 lb) | 6,331 kg<br>(13,957 lb) | 4,360 kg<br>(9,612 lb) | *2,169 kg (4,782 lb)<br>@ 9.39 m (30' 10") |
| Ground Line | | * 9,906 kg<br>(21,839 lb) | 6202 kg<br>(13,673 lb) | 4,277 kg<br>(9,429 lb) | *2,323 kg (5,121 lb)<br>@ 9.17 m (30' 1") |
| –1.5 m (–5') | * 9,252 kg<br>(20,397 lb) | 10,127 kg<br>(22,326 lb) | 6,128 kg<br>(13,510 lb) | 4,266 kg<br>(9,405 lb) | *2,727 kg (6,012 lb)<br>@ 8.52 m (27' 11") |
| –3.0 m (–10') | * 14,340 kg<br>(31,614 lb) | * 9,727 kg<br>(21,444 lb) | 6,056 kg<br>(13,351 lb) | | *3,466 kg (7,641 lb)<br>@ 7.51 m (24' 8") |
| –4.5 m (–15') | * 11,588 kg<br>(25,547 lb) | * 7,937 kg<br>(17,498 lb) | | | *4,998 kg (11,019 lb)<br>@ 5.90 m (19' 4") |

The preceding weight loads are in compliance with SAE (J1097) and ISO applicable, recommended standards for hydraulic excavators performing lifting operation on a firm supporting surface. An asterisk (*) next to the lift rating indicates rated load does not exceed 87% of hydraulic capacity. All other ratings have been determined not to exceed 75% of tipping capacity.

Do NOT attempt to lift or hold any load that exceeds rated load capacity at the specified distances (from the machine's rotation centerline and height – see "lift radius" and "lift height" in the reference drawing).

The weight of slings and any auxiliary lifting device (and/or the weight difference of any attachment heavier than standard configuration) must be deducted from the rated lift capacity to determine allowable net lifting load. The lift point should be located on the back of the bucket, as shown in the reference drawing on the facing page.

## IMPORTANT

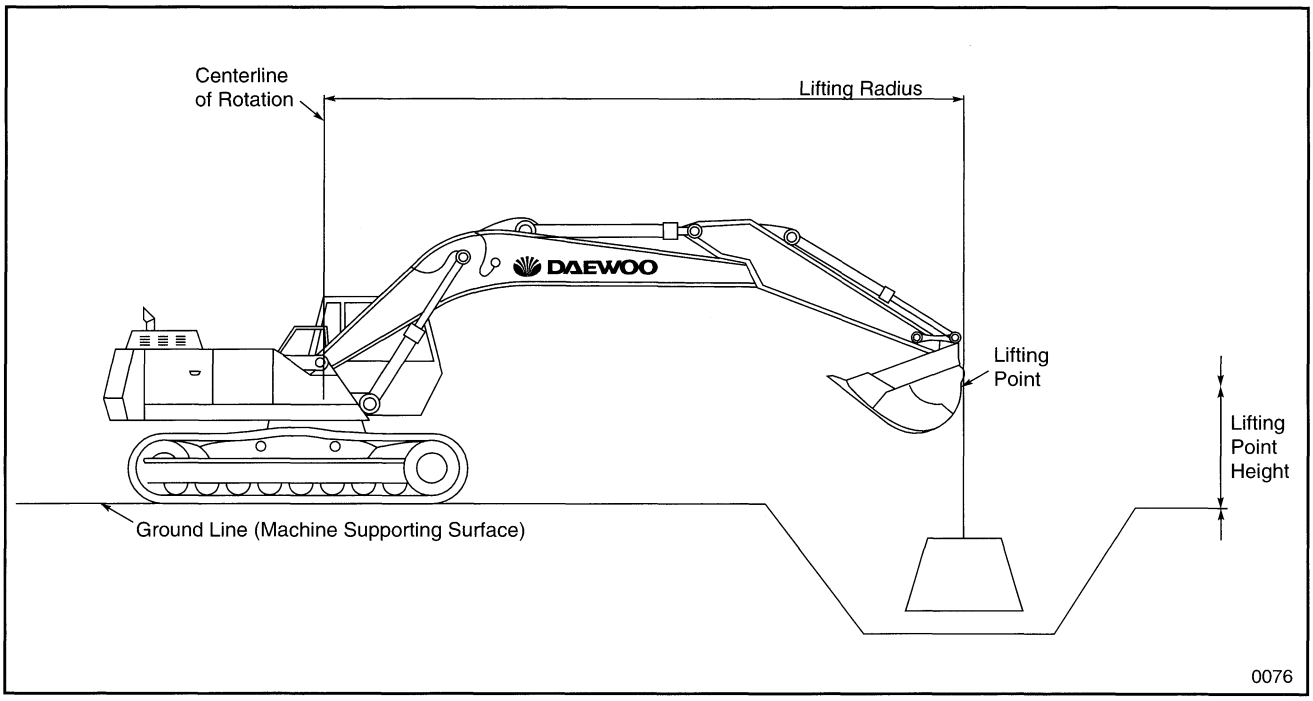
***Engage the "Lifting Mode" control on the Instrument Panel before using the excavator for lifting work. Engine and hydraulic oil should both be fully warmed up to operating temperature before starting a lift.**

# Solar 220LC-III Excavator Rated Lift Capacity Tables (Continued)

**Lift Ratings, Optional 810 mm (32") Crawler Shoes, Over SIDE ( ) in Kg (Lb)**

| Boom Length | Arm Length | Shoe Width | Counterweight | Bucket Size |
|---|---|---|---|---|
| 5.7 m<br>(18' 9") | 2.9 m<br>(9' 6") | 810 mm<br>(32") | 3,500 kg<br>(7,700 lb) | 0.8 $m^3$ (1.0 $yd^3$)<br>Std. Size |

| Lift Height | 3.0 m Radius (10') | 4.5 m Radius (15') | 6.0 m Radius (20') | 7.5 m Radius (25') | Maximum Reach |
|---|---|---|---|---|---|
| 6.0 m (20') | | | *1 3,921 kg<br>(8,644 lb) | | *2,204 kg (4,859 lb)<br>@ 8.50 m (27' 11") |
| 4.5 m (15') | | | * 4,452 kg<br>(9,815 lb) | 3,316 kg<br>(7,310 lb) | *2,091 kg (4,610 lb)<br>@ 9.11 m (29' 11") |
| 3.0 m (10') | | * 7,031 kg<br>(15,500 lb) | 4,689 kg<br>(10,337 lb) | 3,241 kg<br>(7,145 lb) | *2,080 kg (4,586 lb)<br>@ 9.41 m (30' 10') |
| 1.5 m (5') | | 7,275 kg<br>(16,038 lb) | 4,567 kg<br>(10,068 lb) | 3,150 kg<br>(6,944 lb) | *2,169 kg (4,782 lb)<br>@ 9.39 m (30' 10') |
| Ground Line | | 6,966 kg<br>(15,357 lb ) | 4,442 kg<br>(9,793 lb) | 3,074 kg<br>(6,777 lb) | 2,277 kg (5,020 lb)<br>@ 9.17 m (30' 1") |
| –1.5 m (–5') | * 9,252 kg<br>(20,397 lb) | 7,021 kg<br>(15,478 lb) | 4,377 kg<br>(9,649 lb) | 3,063 kg<br>(6,753 lb) | 2,555 kg (5,633 lb)<br>@ 8.52 m (27' 11") |
| –3.0 m (–10') | * 14,340 kg<br>(31,614 lb) | 7,083 kg<br>(15,615 lb) | 4,403 kg<br>(9,707 lb) | | 3,159 kg (6,964 lb)<br>@ 7.51 m (24' 8") |
| –4.5 m (–15') | * 11,588 kg<br>(25,547 lb) | 7,298 kg<br>(16,098 lb) | | | 4,719 kg (10,413 lb)<br>@ 5.90 m (19' 4") |



# SPECIFICATIONS

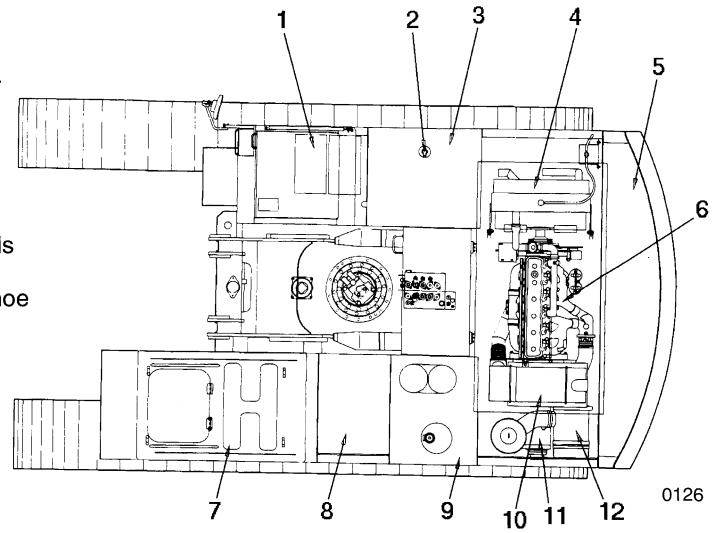
## Excavator Machinery Plan

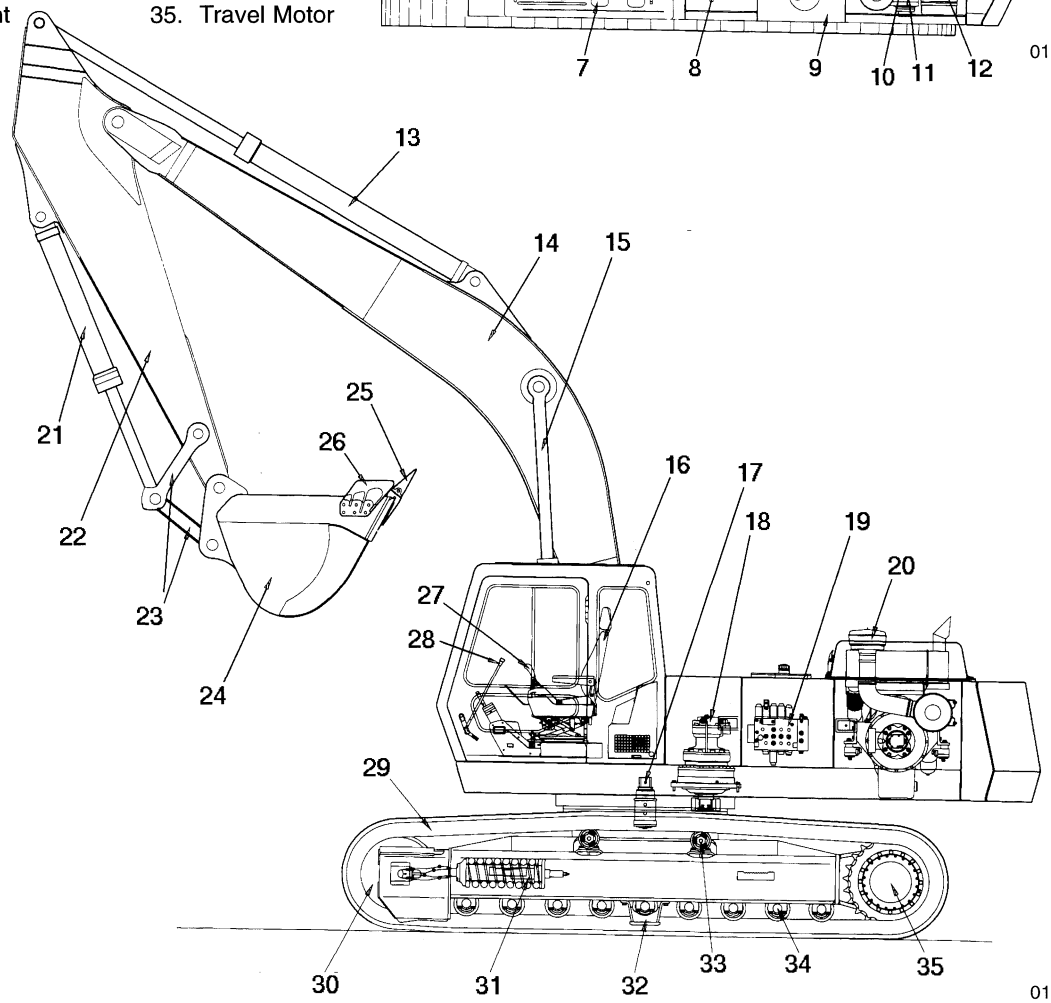
The Solar 220LC-III Excavator has 3 main component sections:

- The Upper Turntable
- The Lower Undercarriage and Track Frames
- The Excavator Front-end Attachment

The drawings identify main components and their locations (Figure 2-1).

1. Battery
2. Fuel Filler
3. Fuel Tank
4. Radiator & Oil Cooler
5. Counterweight
6. Engine
7. Cab
8. Storage
9. Hyd. Oil Tank
10. Muffler
11. Pumps
12. Air Cleaner
13. Arm Cylinder
14. Boom
15. Boom Cylinder
16. Seat
17. Center Joint
18. Swing Motor
19. Control Valves
20. Precleaner
21. Bucket Cylinder
22. Arm
23. Link
24. Bucket
25. Tooth Point
26. Side Cutter
27. Joystick Controls
28. Travel Lever
29. Track Link & Shoe
30. Idler
31. Track Adjuster
32. Track Guide
33. Upper Roller
34. Lower Roller
35. Travel Motor

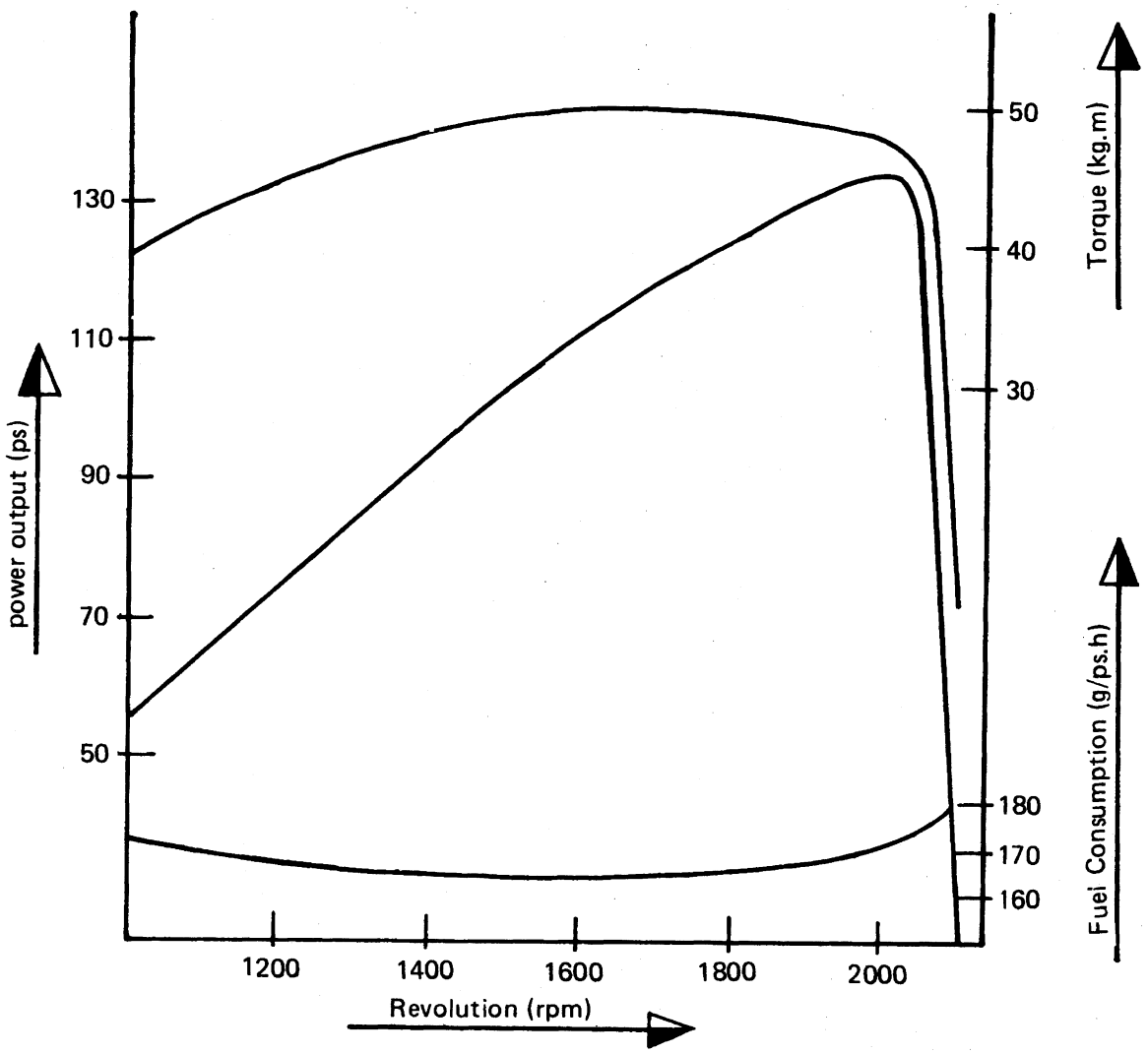


# Solar 220LC-III Excavator Engine Specifications

| Model | Daewoo D2366 |
|---|---|
| Type | 4 Cycle In-line 6 Cylinder Diesel, Naturally Aspirated, Water-cooled |
| Combustion Chamber | AVL Toroidal |
| Combustion System | Direct Injection |
| Cylinder Bore and Stroke | 111 mm x 139 mm<br>(4.37" x 5.47") |
| Engine Displacement | 8,071 $cm^3$ (492 $in^3$) |
| Direction of Rotation | Counterclockwise (viewed facing flywheel) |
| Compression Ratio | 17.6 : 1 |
| Rated Flywheel Horsepower | 138 PS, per KS R1004;<br>100 kW (135 hp) @ 2,000 RPM,<br>per SAE J1349 net rating and<br>99 kW (135 PS) @ 2,000 RPM,<br>per DIN 6271 net rating |
| Torque Output | 554 Nm, or 56.5 kg/m @ 1,600 RPM<br>409 ft lb @ 1,600 RPM |
| Fuel Consumption | 170 g per hp/hr (6 oz per hp/hr) @ 2,000 RPM, per DIN 6271B |
| Fuel Filter (two-stage) | Felt Primary Element<br>Paper Secondary Element |
| Cylinder Firing Order | 1-5-3-6-2-4 |
| Minimum No-Load RPM | 750 plus or minus 50 RPM |
| Mass (Dry) | 700 kg (1,543 lb) |
| Engine Oil | American Petroleum Institute/SAE Class CC/CD or better<br>(Class CD-II, CE, CF-4, CG-4) |
| Injector Nozzle Type | Multi-hole |
| Fuel Injection Timing | 15° BTDC |
| Valve Timing | Intake Open @ 16° BTDC<br>Intake Close @ 36° ABDC<br>Exhaust Open @ 46° BTDC<br>Exhaust Close @ 14° ABDC |
| Fuel Injection Pump | NP-PE6AD95B41ZRSZ |
| Governor | NP-EP/RFD200/1650AF9CHL |
| Fuel Injection Type | NP-FP/KE-ADS |
| Batteries | 2 x 12 V, 200 Ah |
| Charging System Regulator | IC Type (Integrated Circuit) |
| Alternator | 60 amp, 24 V (IC Type) |
| Starter | 6 kW, 24 V, Magnet Type |
| Fuel Injection Pressure | 214 $kg/cm^2$ (3,044 psi) |
| Engine Valve Cold Lash Adjustment | 0.3 mm (0.0118 in), intake & exhaust |
| Compression Pressure (Engine Cylinder No-Load Test Pressure) | 28 kg/cm (Over 398 psi) @ 200 RPM |
| Engine Oil Capacity | 19 l (20 qt)<br>21 l max/17 l min<br>(22 qt max/18 qt min) |
| Engine Oil Pressure Ranges | 0.8-1.4 bar @ idle (12-20 psi)<br>3.0-4.8 bar @ speed (44-70 psi) |
| Coolant Temperature Range | 81°- 95°C (181°- 203°F) |
| Coolant Capacity (Engine only) | 11 l (12 qt) |
| Engine Coolant Thermostat | Wax-Pellet Type |
| Gradability<br>Machine Maximum Horizontal Operating Tilt Angle | 35 degrees (Fore/Aft and Rt/Left)<br>(70 percent) |

# Engine Performance Curves (per KS-R1004 Standard)




| | |
|---|---|
| **Maximum Output** | **138 PS/2,000 RPM (136.1 Hp) 100 kW (2,000 RPM)** |
| **Maximum Torque** | **52 KG/1,600 RPM** |
| **Fuel Use** | **170 G/PS-HR** |

**FIGURE 2-2**

0579

**NOTES**

Barometric Pressure . . . . . .760 mm Mercury
Temperature . . . . . .20°C (68°F)
Cooling Fan . . . . . .625 mm sucker fan
Alternator . . . . . .24 V, 60 amp
Exhaust System . . . . . .Complete, attached

# Hydraulic System Component Specifications

| | | |
|---|---|---|
| Main Pump | | |
| | Quantity: | 2 |
| | Displacement:<br>(each) | 110.5 $cm^3$/rev<br>(6.74 $in^3$/rev) |
| | Max Flow Rate:<br>(each) | 23.3 l/min<br>(1.10 gal/s) |
| | Flow Regulator Type: | Negative Control |
| | Pressurization: | Air Breather |
| | Weight: | 124 kg (273 lb) |
| Pilot Pump | | |
| | Displacement: | 10 $cm^3$/rev (0.6 $in^3$/rev) |
| | Max Flow Rate: | 20 l/min (0.084 gal/s) |
| | Relief Valve: | 40 kg/$cm^2$ (569 lb/$in^2$) |
| Control Valve | | |
| | Relief Valves (Main): | 320 kg/$cm^2$ (4,550 psi) – travel, pressure-up<br>300 kg/$cm^2$ (4,266 psi) – standard operations<br>340 kg/$cm^2$ (4,835 psi) – port relief |
| | Left Side Spools:<br>(28 mm [1.1"] spool diameter) | Travel<br>Swing<br>Boom<br>Arm |
| | Right Side Spools:<br>(28 mm [1.1"] spool diameter) | Travel, right<br>Option – open<br>Boom 1<br>Bucket<br>Arm 2 |
| | Overload Relief Pressure: | 340 kg/$cm^2$ (4835 psi) |
| Travel Control Valve | | |
| | Type: | Pilot Control |
| | Pressure/Stroke: | 22 kg/$cm^2$ (313 psi) at 5.5 mm stroke |
| | Weight: | 16 kg (35.3 lb) |
| Implement Control Valve | | |
| | Type: | Pilot Control |
| | Pressure/Stroke: | 40 kg/$cm^2$ (569 psi) at 7 mm (0.28") stroke |
| | Weight: | 4.8 kg (10.6 lb) |
| Accumulator | | |
| | Working Pressure: | 40 kg/$cm^2$ (569 psi) |
| | Volume: | 320 $cm^3$ (19.5 $in^3$) |

# Hydraulic Pump Performance Characteristics

**Main Pump Pressure/Flow Output**

Engine Speed . . . . . .2,000 RPM

Engine Horsepower . . . . . .100 kW (138 PS), 136.1 Hp

Main Pump Total Displacement . . . . . .110.5 $c^3$/rev (6.74 $in^3$/rev) x 2 pumps

Main Pump Pressure . . . . . .300/320 kg/$cm^2$ (4,266 psi) (work/travel)

Pilot Pump Displacement . . . . . .10 $c^3$/rev (10.6 $in^3$/rev)

Pilot Pump Pressure . . . . . .40 kg/$cm^2$ (569 psi)

**NOTE:** Values in the graph marked "k" are pressure, in kg/$cm^2$
Values in the graph marked "L" are flow, in Liters/minute

**INPUT SPEED : 2,000 RPM**
**INPUT POWER (EXCLUDING GEAR PUMP)**

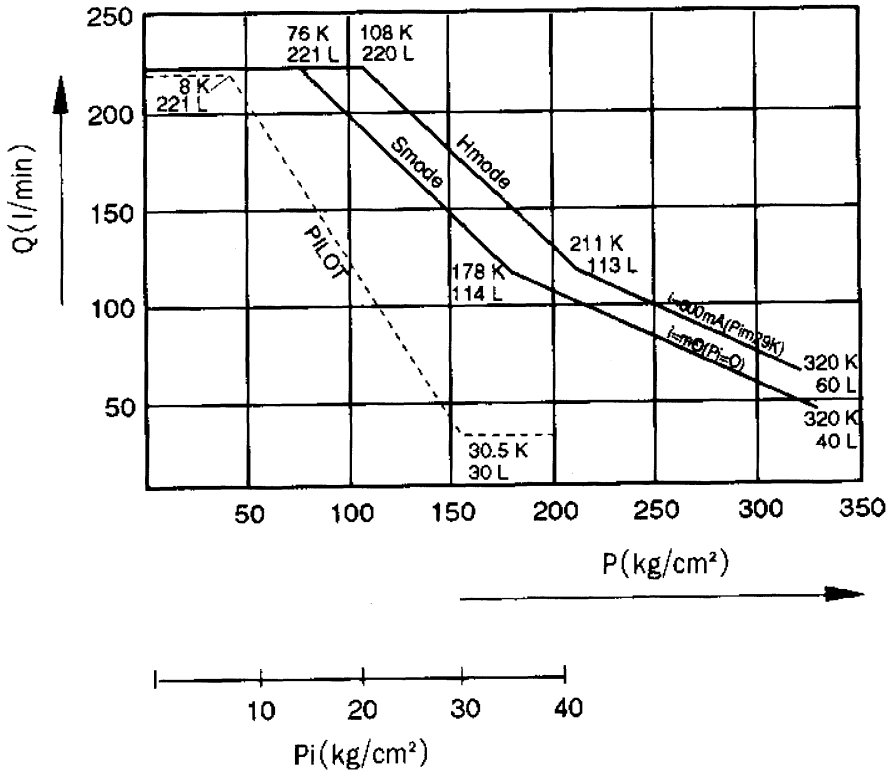



**FIGURE 2-3**

0809

# General Dimensions

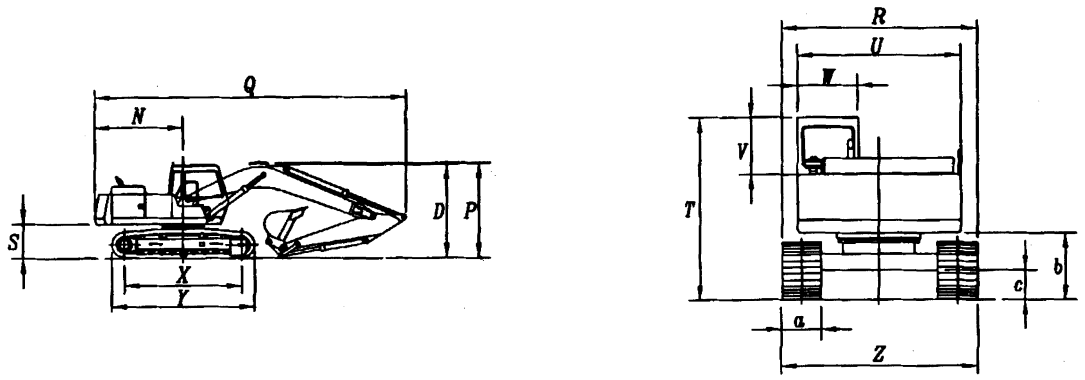



**FIGURE 2-4**

0810

| | Boom Type (One Piece) | 5,700 mm (18' 8") | | 8,500 mm (27' 11") |
|---|---|---|---|---|
| | Arm Type | 2,915 mm (9' 6") | 2,200 mm (7' 3") | 6,200 mm (20' 4") |
| | Bucket Type | 0.8 m³ (1.0 yd³) | 0.8 m³ (1.0 yd³) | 0.35 m³ (0.39 yd³) |
| N | Tail Swing Radius | 2,750 mm (9' 0") | | |
| D | Shipping Height (Boom) | 2,872 mm (9' 5") | 3,023 mm (9' 11") | 3,283 mm (10' 9") |
| P | Shipping Height (Hose) | 2,990 mm (9' 10") | 3,106 mm (10' 2") | 3,283 mm (10' 9") |
| Q | Shipping Length | 9,630 mm (31' 7") | 9,662 mm (31' 8") | 12,258 mm (40' 3") |
| R | Shipping Width | 2,980 mm (9' 9") | | |
| S | Counterweight Clearance | 1,064 mm (3' 6") | | |
| T | Height Over Cab | 2,900 mm (9' 6") | | |
| U | House Width (Serial No. 1-240) | 2,490 mm (8' 2") | | |
| U | House Width (Serial No. 241- ) | 2,640 mm (8' 8") | | |
| V | Cab Height Above House | 906 mm (3' 0") | | |
| W | Cab Width | 940 mm (3' 1") | | |
| X | Tumbler Distance | 3,642 mm (11' 11") | | |
| Y | Track Length | 4,460 mm (14' 8") | | |
| Z | Undercarriage Width | 2,980 mm (9' 9") | | |
| a | Shoe Width | 600 mm (23-1/2") | | |
| b | Track Height | 916 mm (3' 0") | | |
| c | Car Body Clearance | 465 mm (1' 6") | | |

# Solar 220LC-III Specifications

| | |
|---|---|
| Shipping Weight | 20.1 metric tons (44,320 lb), includes 10% fuel,<br>2,915 mm (9' 7") arm, 5,700 mm (18' 8") boom,<br>0.8 $m^3$ (0.91 $yd^3$) backhoe bucket and standard shoes |
| Operating Weight | Add weight of full fuel tank and operator. |
| Shipping Weights<br>with Optional<br>Track Shoes | Add 600 kg (1,320 lb) for 700 mm (27.6")<br>Add 800 kg (1,764 lb) for 800 mm (31.5") shoes<br>Add 1,900 kg (4,190 lb) for 900 mm (35.4") shoes |
| Major Component Weights | 1,174 kg (2,589 lb) Standard Boom; 5,700 mm (18' 18")<br>598 kg (1,319 lb) Standard Arm; 2,900 mm (9' 6")<br>680 kg (1,499 lb) Standard Bucket; 0.8 $m^3$ (0.91 $yd^3$)<br>1,385 kg (3,054 lb) Heavy Duty Opt. Boom; 5,700 mm (18' 8")<br>1,950 kg (4,300 lb) Super Long Opt. Boom; 8,500 mm (27' 11")<br>463 kg (1,021 lb) Opt. Short Arm; 2,200 mm (7' 3")<br>955 kg (2,106 lb) Super Long Opt. Arm; 6,200 mm (20' 4")<br>510 kg (1,125 lb) Opt. 0.45 $m^3$ (0.51 $yd^3$) Bucket<br>640 kg (1,411 lb) Opt. 0.70 $m^3$ (0.8 $yd^3$) Bucket<br>670 kg (1,477 lb) Opt. 0.75 $m^3$ (0.86 $yd^3$) Bucket<br>740 kg (1,632 lb) Opt. 0.9 $m^3$ (1.04 $yd^3$) Bucket<br>750 kg (1,654 lb) Opt. 1.0 $m^3$ (1.2 $yd^3$) Bucket<br>850 kg (1,874 lb) Opt. 1.15 $m^3$ (1.41 $yd^3$) Bucket<br>430 kg (948 lb) Opt. 0.35 $m^3$ (0.39 $yd^3$) Bucket (S.L. Boom)<br>Boom Cylinders 185 kg (408 lb) each<br>Arm Cylinder 270 kg (595 lb)<br>Bucket Cylinder 166 kg (366 lb)<br>Counterweight 3,500 kg (7,718 lb) and 5,000 kg (11,025 lb)<br>Upper Turntable 5,045 kg (11,124 lb)<br>Lower – below Swing Bearing 7,845 kg (17,298 lb) |
| Digging Forces:<br>Bucket Cylinder | 125 KN or 12,800 kg (28,200 ft lb)<br>(with either 2,200 mm [7' 3"] or 2,900 mm [9' 6"] arm) |
| Arm Cylinder | 96 KN or 9,800 kg (21,600 ft lb) with 2,900 mm (9' 6") optional short arm and 115 KN or 11,700 kg (25,800 ft lb) with 2,200 mm (7' 3") standard arm |
| Fuel Tank Capacity<br>Hydraulic System Capacity<br>Hydraulic Reservoir Capacity | 318 l (83.9 gal)<br>220 l (58.1 gal)<br>126 l (33.3 gal) |
| Bucket Heaped Capacity Range | CECE 0.35 $m^3$ – 1.15 $m^3$ (0.393 $yd^3$ – 1.41 $yd^3$) |
| | **IMPORTANT:** Refer to the Load Weight, Bucket and Arm Length Compatibility Table for information on which bucket sizes may be used safely with which arm length, for load material weights. |
| Shoe Type | Triple Grouser |
| Shoe Width and Optional Sizes | 600 mm (23-1/2") – standard<br>710 mm (28") – optional<br>810 mm (32") – optional<br>860 mm (34") – optional<br>910 mm (36") – special option (triangular) |
| Ground Pressure Ratings:<br>standard 600 mm (23.6") shoe –<br>optional 700 mm (27' 6") shoe –<br>optional 800 mm (31' 5") shoe –<br>optional 900 mm (35' 4") shoe – | <br>0.4265 bar (6.06 psi)<br>0.3707 bar (5.27 psi)<br>0.3288 bar (4.68 psi)<br>0.2962 bar (4.21 psi) |

# Solar 220LC-III Specifications (Continued)

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|---|---|
| Transport Dimensions:<br>Overall Shipping Length<br>(standard boom and arm)<br>Overall Shipping Width<br>(standard shoes)<br>Overall Shipping Height<br>(to top of cylinder hose)<br>Track Shipping Length | <br><br>9,630 mm (31' 7")<br><br>2,980 mm (9' 9")<br><br>2,990 mm (9' 10")<br>4,460 mm (14' 8") |
| Transport Trailer Capacity | 25 tons minimum load capacity |
| Transport Loading Ramp Allowable Slope | 15° angle **CAUTION:** Refer to Transport Procedure for Safe Shipping Instructions |