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**SPEC. F5-3162-AE**

**Date: August, 2000**

# ***SPECIFICATION***

## **“NISSHA”**

**EARTH BOY Series**

### **Hydraulic Earth Drilling Rig**

**Model : ED6200H**

**(Cylindrical type telescopic kelly bar version)**

**Quantity: \_\_\_\_\_ unit**

**August, 2000**

**NIPPON SHARYO, LTD.**

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## **1. GENERAL CONDITIONS**

This specification shall cover the standard specification of NISSHA, Hydraulic earth drilling rig; model ED6200H (here-in-after called "The machine" ) manufactured by NIPPON SHARYO, LTD.

The general arrangement and principal dimensions of the machine are shown in the drawings attached.

### **1) DESIGN AND WORKMANSHIP**

The machine shall be designed to perform the maximum efficiency with the least fuel consumption and the lowest maintenance costs.

The workmanship shall be of the first class in all respects.

The machine shall be built for simple mechanical arrangement and easy in inspection and maintenance.

### **2) MATERIALS**

The materials used in the manufacture of the machine shall be of the highest quality, free from defects and imperfections.

Principal materials such as bolts, nuts, seals and steel plates used in the machine confirm to the Japanese Industrial Standards. (Almost equal to ISO)

### **3) TEST AND INSPECTION**

Routine test and inspection in our factory shall be final.

### **4) PAINTING AND LETTERING**

Under-coating by anti-rust paint and enamel finishing shall be performed in accordance with manufacturer's standard practice.

Main parts of the equipment shall be painted in NISSHA Green and other equipment in manufacturer's standard.

### **5) LANGUAGE AND UNIT OF MEASUREMENT**

All documentation, such as specifications, manuals, etc. shall be written in English and all of equipment shall be designed in metric system.

### **6) SERVICE CONDITIONS**

The equipment shall meet the following service conditions.

Ambient temperature: -10 °C or higher and 40 °C or lower.

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## **7) WARRANTY**

**All the machines specified herein shall be warranted by us for a period of twelve (12) calendar months after the date of being to put into operation, or fourteen (14) months after the date of shipment at a Japanese port, or one thousand engine operation hours according to the service hour meter, whichever is soonest.**

**The warranty shall cover defects in design, materials and workmanship only, shall not applicable to damage sustained mishandling of the machine or normal wear and tear.**

**The warranty shall not be applicable to the parts and materials mentioned below.**

- 1) Linings as brake/clutch bands and disc.**
- 2) Wear plates**
- 3) Wire ropes**
- 4) Rubber made parts**
- 5) Seals as o-rings, seal rings, back-up rings, etc.**
- 6) Gaskets and sheet packings**
- 7) Filter elements**
- 8) Batteries**
- 9) Electric wiring**
- 10) Glasses**
- 11) Other quick moving parts**
- 12) Lubricants**

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## 2. FEATURES

### 1) High performance in deep drilling of 62m

The machine is specially designed for deep bored pile construction work.

Boom length	Kelly bar- No. of stage	Kelly bar length (Retracted)	Drilling depth	
			High position	Low position
24m	4-stage	17.7m	58m	62m

### 2) Powerful drilling performance

	Low torque	High torque
Maximum torque	56kN-m [5.7 ton-m]	105kN-m[10.7 ton-m]
Bucket speed	20 rpm	10rpm

Two speed torque system allows the machine to perform an efficient drilling work into various stratum conditions.

### 3) Hydraulic cylinder supported type kelly drive

A stable positioning of the kelly drive by a hydraulic cylinder eliminates swaying of the kelly bar and gives a high degree of vertical drilling accuracy compared to the conventional rope-suspension type machines.

### 4) Robust suspension rope of 28mm in diameter plus large braking capacity

Adaptation of  $\phi$  28mm suspension rope for the kelly bar prolongs the life time of the suspension rope and minimizes rope maintenance work.

A large brake drum provided with cooling fins is suitable for a heavy duty drilling work.

### 5) High power diesel engine of 184kW [250 PS]

A powerful diesel engine allows the machine to maneuver simultaneous operations and assures it to operate efficiently.

### 6) Long thrusting stroke of 1000mm

### 7) Low winch speed control

Winch rope line speed can be controlled at the desired speed of 100% to 17% of its rating.

### 8) Easy maintenance

Adopting floating ring seals in drive tumblers, take-up tumblers and lower track rollers, and sealed bearings to every sheaves require minimum daily maintenance service. A grease-bath type swing pinion gear prolongs its service interval.

### 9) Low fuel consumption

The machine is powered by a direct fuel injection type diesel engine with a pair of variable displacement type plunger pumps of efficient performance, accordingly economical operation can be assured.

### 10) Lifting crane work as 60 ton class crane

By simply installing with necessary attachments for lifting crane work, the ED6200H can be used as an lifting crawler crane of 60 tons lifting capacity.

### 11) Bell pile application

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**Various sized bell-pile buckets with a computer monitor/recorder can be equipped to ED6200H for constructing belling piles.**

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### 3. SPECIFICATIONS OF EARTH DRILLING RIG

<b>3.1 Model</b>	<b>NISSHA ED6200H (Earth boy)</b>
<b>3.2 Manufacturer</b>	<b>NIPPON SHARYO, LTD.</b>
<b>3.3 Type</b>	
1) Type of bucket	Rotary bucket (Bottom open)
2) Drive system	Fully hydraulic drive
3) Travel system	Self-propelled with crawlers
4) Type of boom	Lattice boom
<b>3.4 Dimensions</b>	
1) Overall height (Working order)	Approximately 25,900mm
2) Overall width (Working order)	4,400mm
3) Overall length (Without bucket)	Approximately 9,054mm
4) Boom length	24,000mm
5) Swing radius (Without bucket)	
a) Front end distance from swing center	4,954~5,778mm
b) Rear end distance from swing center	4,100 mm
6) Crawler length	5,610mm
7) Crawler width	4,400mm(3,200mm-retracted)
8) Crawler center to center distance	3,640mm(2,440mm-retracted)
9) Shoe width	760mm
10) Ground clearance	378mm
11) Transportation dimensions of base machine	
a) Overall height	2,920mm
b) Overall width	3,200mm
c) Overall length	6,950mm
12) Weight	
a) Operating weight	Approximately 83,500 kg
b) Base machine	36,400kg
Counterweight	22,100kg
Boom+ Front-end attachments, without bucket	25,000kg
13) Performance	
a) Travelling speed	*1.4km/hr
b) Swing speed	2.8rpm
c) Gradeability	40%

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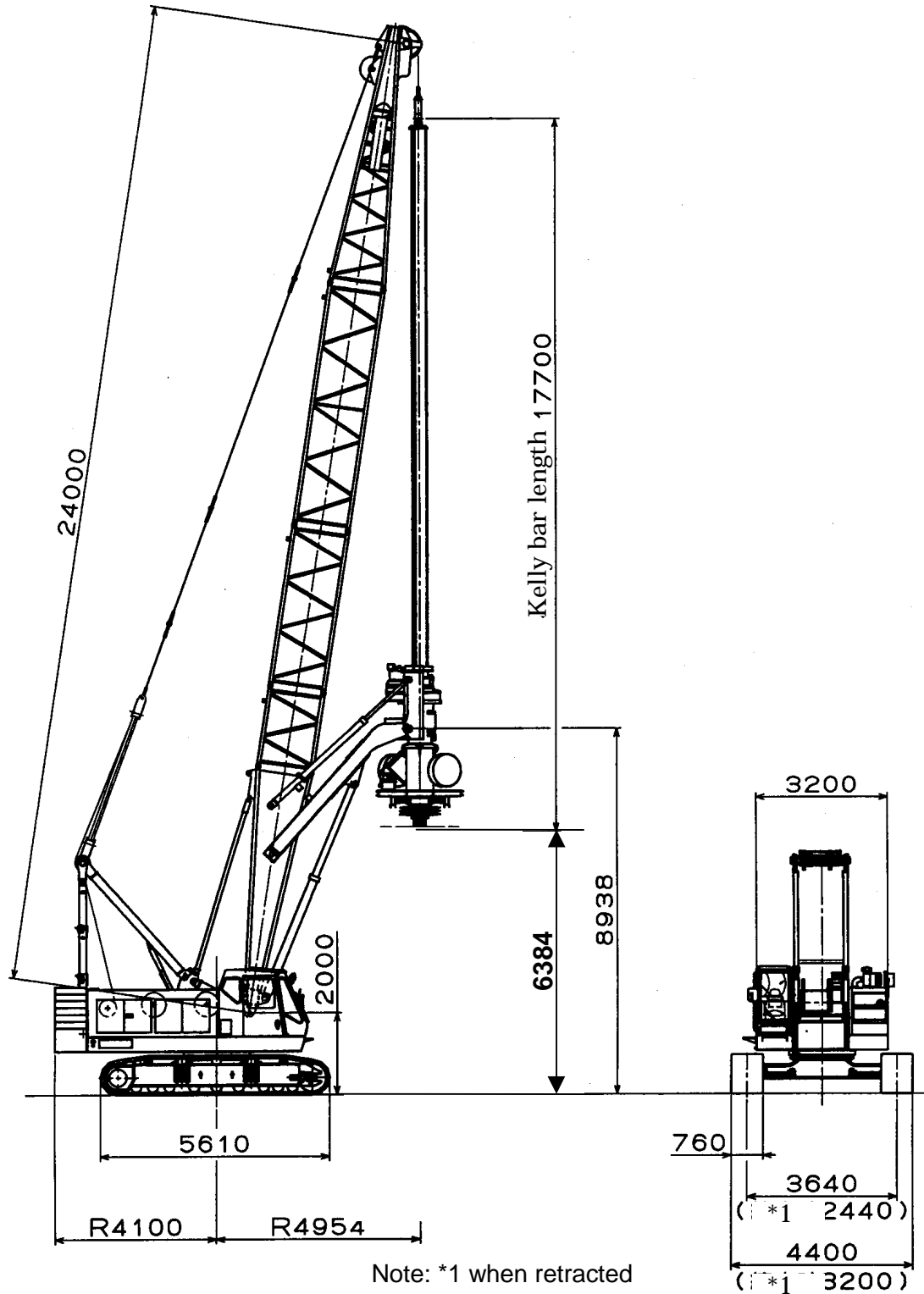
<b>d) Average ground pressure</b>		<b>1.10 kg/cm<sup>2</sup></b>
<b>e) Maximum drilling diameter (bore)</b>		
Regular stratum		φ 3,000mm
<b>f) Maximum drilling depth</b>		<b>62m</b>
<b>g) Kelly bar thrusting stroke</b>		<b>1,000mm</b>
<b>h) Bucket torque(Forward/reverse)</b>		
High torque range		<b>105/108 kN-m[10.7/11.0 t-m]</b>
Low torque range		<b>56kN/56kN [5.7/5.7 t-m]</b>
<b>i) Rotation speed</b>		
(High/Low)		<b>* 20/10 rpm</b>
<b>j) Bucket suspension rope speed/pile pull</b>		
Winding	<b>High/Low</b>	<b>*45/26 m/min. / 263kN[26.8ton]</b>
Rewinding	<b>High/Low</b>	<b>45/26 m/min. / 263kN[26.8ton]</b>
<b>k) Boom hoisting rope</b>	<b>Winding</b>	<b>*61 m/min.</b>
	<b>Rewinding</b>	<b>*61 m/min.</b>
<b>l) Diesel engine</b>		
Manufacturer		<b>HINO MOTOR CO.</b>
Model		<b>P09C-TD diesel engine</b>
Type		<b>4-cycle, water cooled, Direct fuel injection, Turbo-charged</b>
Output		<b>184kW [250PS] /2,100 rpm</b>
Fuel consumption rate		<b>246g/kW-H [181g/PS-H]</b>
Batteries		<b>24V-120AH</b>
Fuel tank		<b>300 liters</b>
<b>n) Hydraulic pump</b>		<b>Variable displacement plunger pump: Full power control</b>
		<b>(*marked : varies depending on load applied.)</b>
<b>14) Structure and functions</b>		
<b>a) Travelling device (Track frame)</b>		
Drive system		<b>Hydraulic drive</b>
Steering system		<b>L.H. and R.L. independent drive motors (Pivot turn / Spin turn)</b>
<b>b) Swing system (Superstructure)</b>		
Swell bearing		<b>Heavy duty ball race bearing with internal gear teeth</b>

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<b>Drive system</b>	<b>Hydraulic drive</b>
<b>Swing lock system</b>	<b>Rod tip insertion</b>
<b>c) Boom</b>	
<b>Type</b>	<b>Lattice</b>
<b>Boom hoisting</b>	<b>Rope suspension</b>
<b>d) Kelly drive</b>	
<b>Type</b>	<b>Direct drive</b>
<b>Drive system</b>	<b>Hydraulic drive</b>
<b>Kelly bar</b>	<b>Cylindrical type, 4-stage telescopic</b>

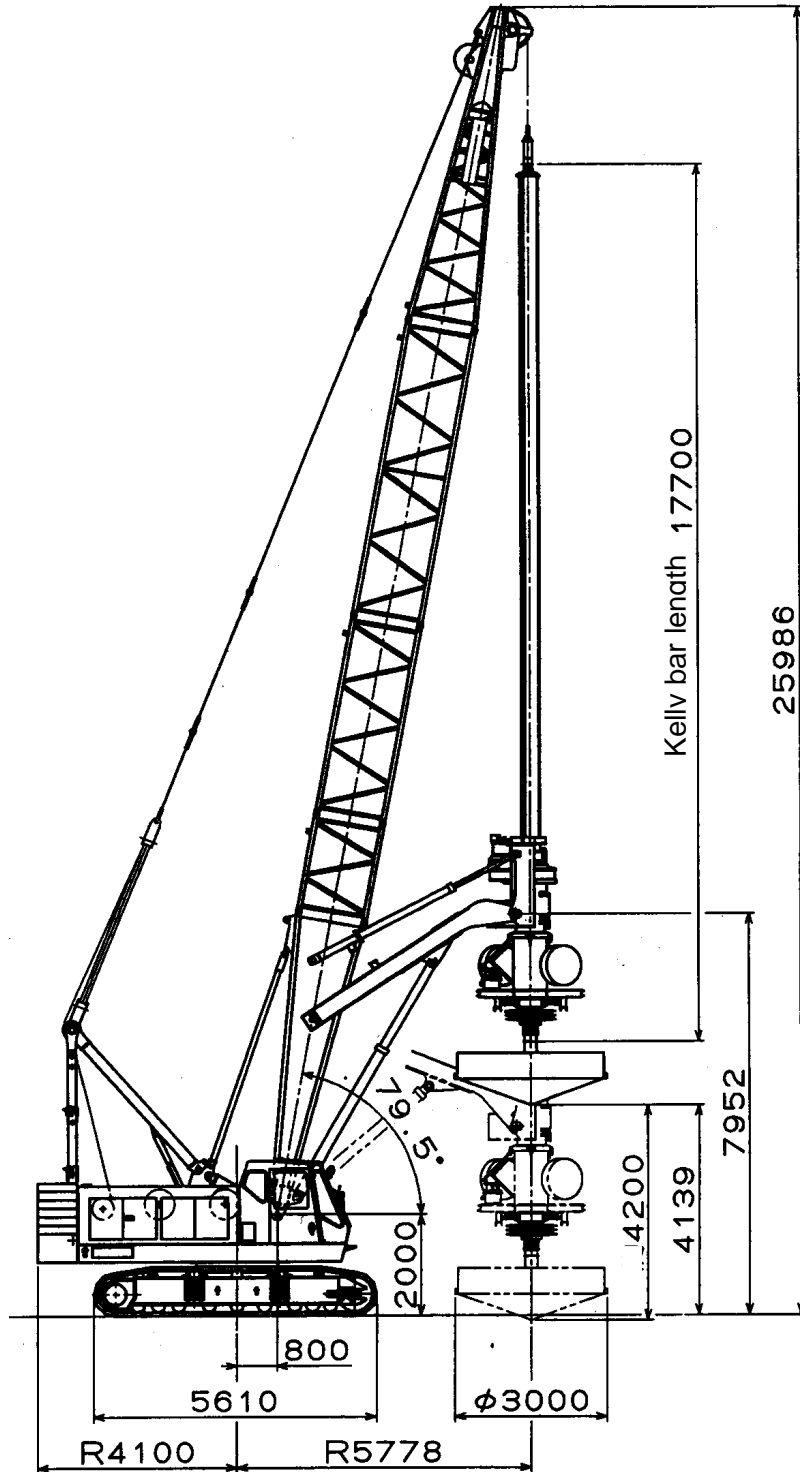
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4. General view of ED6200H earth drilling rig



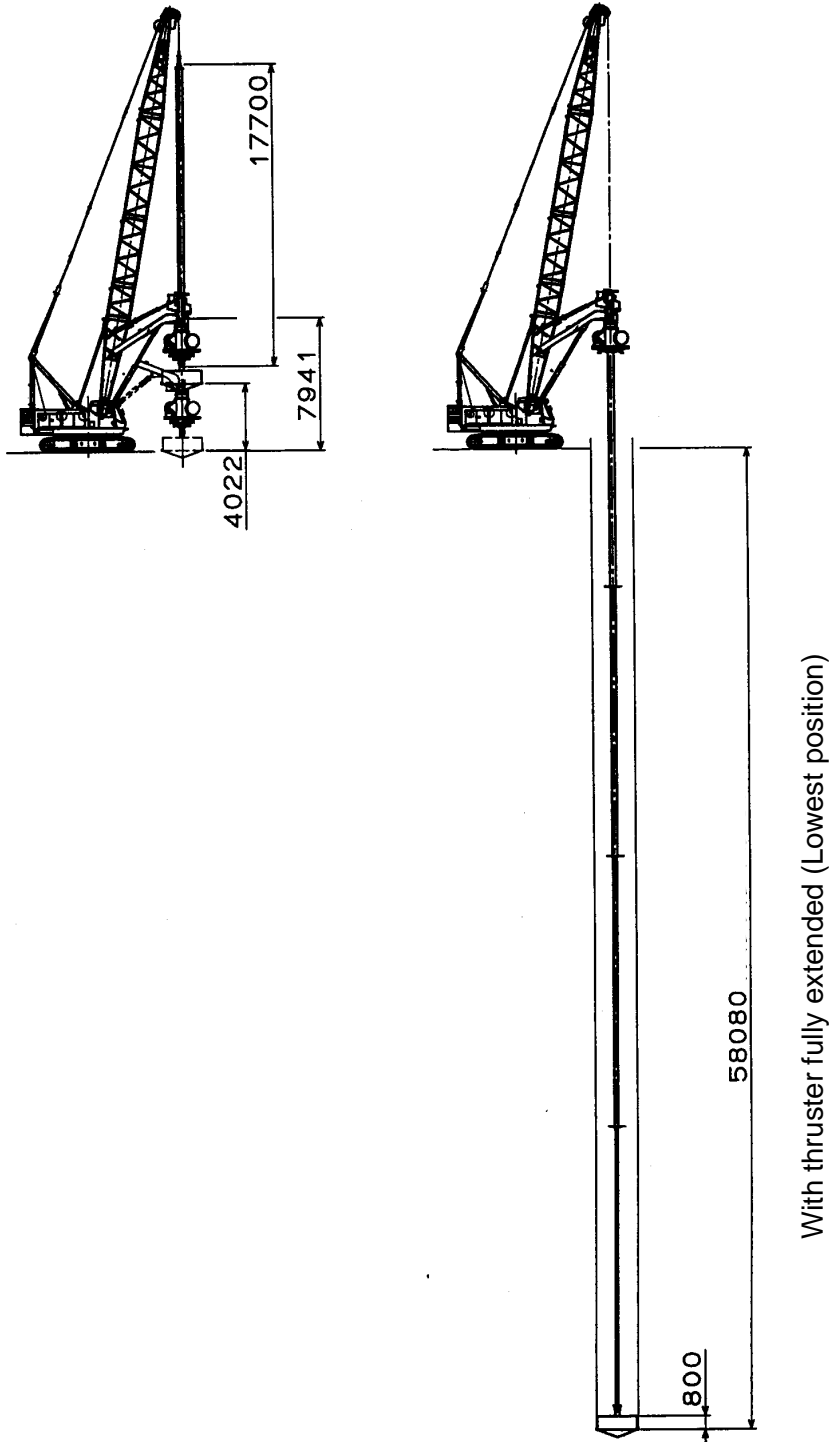
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**5. General view of ED6200H earth drilling rig  
(With  $\phi$  3000 bucket equipped)**



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### 5. Maximum drilling depth of ED6200H



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## **6. STRUCTURE AND FUNCTIONS**

### **6.1 Upper revolving superstructure**

All welded, stress relieved and precision machined unit, specially designed for rigidity and durability.

### **6.2 Winch drums**

- 1) Main, auxiliary and boom winch drums are of special alloy cast iron.
- 2) Grooved boom drum is mounted on a drum shaft and driven independently by a hydraulic motor.
- 3) Main and auxiliary drum are mounted on respective single shafts and independently driven by each hydraulic motor through planetary reduction gear box.
- 4) Drum brake system  
Main and auxiliary drums are equipped with external contracting friction bands powered by treading respective brake pedals.
- 5) Boom hoisting/lowering mechanism  
Completely independent operation from other winch functions.  
Both of hydraulic brake and spring-loaded/hydraulic released band brake offer positive and safe stopping of boom action.
- 7) Drum pawl lock  
Main, auxiliary and leader drums are equipped with drum pawl locks for safe operation.

### **6.3 Swing mechanism**

- 1) Swing motor  
Axial piston motor with built-in planetary reduction gear.
- 2) Swing bearing  
Sealed ball race bearing with a heat-treated internal gear.
- 3) Swing brake  
Spring loaded and hydraulic released negative brake is installed.
- 4) Swing lock  
Manually operated mechanical lock with a rod tip which is engaged in the hole of track frame during transportation and assembling, whenever needed.

### **6.4 Operator room**

Roomy, completely independent operator's room has safety glass windshields giving super blighting and excellent all-round visibility.

- 1) Control levers and instruments are arranged in convenient trouping, reducing unnecessary moves for operator.
- 2) Comfortable reclining seat is adjustable.

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**6.5 Undercarriage**

**1) Track frame**

All welded, stress relieved, precision machined unit, especially designed for rigidity and durability.

**2) Side frame**

Side frame of all-welded construction can be expanded for better stability of the machine during working and retracted for minimizing its transportation dimensions by hydraulic cylinders equipped as standard.

**3) Track shoes**

Shoes are cast, heat-treated steel, flat and tapered surfaces and are connected by heat-treated steel pins.

**4) Rollers**

Life-lubricated lower rollers, upper rollers and drive tumblers.

Lower rollers and upper rollers in each side frame, with double rolling surfaces.

**6.6 Hydraulic system**

A semi-closed circuit hydraulic system with double-plunger pump plus 3-gear pump assures both independent and simultaneous operations of all functions.

**6.6.1 Main pump (Double-plunger pump)**

<b>1) Type</b>	<b>Plunger pump 1</b> Variable displacement Total power control	<b>Plunger pump 2</b> Variable displacement Total power control
<b>2) Setting pressure</b>	<b>320 kgf/cm<sup>2</sup></b> <b>(31.3 MPa)</b>	<b>320 kgf/cm<sup>2</sup></b> <b>(31.3 Mpa)</b>
<b>3) Oil flow</b>	<b>242 lit./min.</b>	<b>242 lit./min.</b>
<b>4) Applications</b>	<b>Travel (L.H.)</b> <b>Boom drum</b> <b>Main/Aux. drum(high)</b>	<b>Travel (R.H.)</b> <b>Main/Aux. drum (low)</b>

**6.6.2 Gear pump**

<b>1) Type</b>	<b>Gear pump 1</b>	<b>Gear pump 2</b>	<b>Gear pump 3-4</b>
<b>2) Setting pressure</b>	<b>210kgf/cm<sup>2</sup></b> <b>(20.6 MPa)</b>	<b>175kgf/cm<sup>2</sup></b> <b>(17.1 MPa)</b>	
<b>3) Oil flow</b>	<b>135 lit./min.</b>	<b>88.9 lit/min.</b>	
<b>4) Applications</b>	<b>Swing</b> <b>Expansion</b> <b>of crawlers</b>	<b>Front-end</b> <b>attachments</b>	<b>Pilot circuit</b> <b>Hose reel</b>

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### 5.6.3 Hydraulic motor

- |                            |  |
|----------------------------|--|
| <b>1) Swing motor</b>      | <b>1-fixed volume axial piston motor with brake.</b>   |
| <b>2) Winch(Main/aux.)</b> | <b>2-fixed volume axial piston motor with counter balance valve</b>  |
| <b>3) Winch (Boom)</b>     | <b>1-fixed volume axial piston motor with counter balance valve</b>  |
| <b>4) Travel</b>           | <b>2-fixed volume axial piston motor with spring loaded/ hydraulic released negative brakes and relief valves.</b> |

### 6.6.4 Hydraulic oil tank capacity : 280 liters

### 6.7 Lattice boom

- 1) Tubular high strength steel chords, lattice construction connected with pins.
- 2) 2 point sheaves on sealed anti-friction ball bearing.

### 6.8 Kelly drive gear and Kelly frame

A hydraulic drive Kelly drive gear is supported by a cylinder through a Kelly frame which eliminates swaying of the Kelly bar and gives a high degree of vertical drilling accuracy compared to the conventional rope-suspension type machines.

Kelly bar is driven by a hydraulic piston motor on the Kelly frame.

The Kelly drive gear can be slid up and down of 600mm in stroke in the Kelly frame for thrusting down the Kelly bar with a friction resistance between the Kelly drive gear and Kelly bar.

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**7 . STANDARD SCOPE OF SUPPLY**

- 1) **Basic machine : model ED6200H ..... 1 unit**  
 equipped with
  - 22.1 ton counter weight
  - Three drums of main, auxiliary and boom
  - Electric fan in operator’s cab
  - Radio
  - Electric fuel pump
  - Ash tray and sight level gauge with a bubble
  - Complete with all necessary controls and instruments for standard shaft-drilling operation
  
- 2) **Earth drill front-end attachments ..... 1 set**
  - 24m lattice boom with back stopper
  - Kelly drive gear + 4-stage telescopic Kelly bar (Cylindrical type)
  - Kelly drive frame + erecting cylinder
  - Kelly rope with swivel (Rotary joint)
  - 15T single hook block and auxiliary drum rope
  
- 3) **Bucket**
  - Drilling bucket ( φ 1000 X 1000H) ..... 1 set
  - Drilling bucket ( φ 1500 X 1000H) ..... 1 set
  - Drilling bucket ( φ 2000 X 600H) ..... 1 set
  - Drilling bucket ( φ 2500 X 500H) ..... 1 set
  
- 4) **Auger**
  - φ 1000 X 1000H ..... 1 set
  - φ 1500 X 1000H ..... 1 set
  - φ 2000 X 800H or more ..... 1 set
  - φ 2500 x 800H or more ..... 1 set

**( OPTIONAL EXTRA DEVICE )**

- Necessary controls, computer controlled monitor/recorder and instruments for various sized bell-pile buckets operation
- Necessary controls and instruments for normal lifting crane operation