SPECIFICATION

“NISSHA”

Crawler Mounted Hydraulic Pile Driving Rig

Model : DHJ60-3, M40D(A)
(Standard version)

Quantity: 1 unit

March, 2005

NIPPON SHARYO, LTD.

Nagoya, Japan
Tel: 81 - (52) -623-3529
Fax: 81 - (52) -623-4349
Due to company policy of continuous development and improvement, the right is reserved to change the specifications without notice.

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</table>
1. GENERAL CONDITIONS
This specification shall cover the standard specification of NISSHA, Hydraulic Pile Driving Rig; model DHJ60-3 (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.
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 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

… concluded
2. FEATURES

1) Rack & pinion elevation system
   The hydraulic drive earth auger; model VA-35 (option) which has no suspension rope but is able to go up and down smoothly by a pair of hydraulically driven pinion gears and racks provided along the leader. This epoch making elevation system allows DHJ-60-3 safe, powerful and facile auger operation compared to the conventional cable suspension type auger drives.

2) High performance with NH-40 hydraulic pile hammer (option) and VA-35 earth auger drive equipped through hydraulic power take-off from the base machine. The machine is specially designed for various heavy duty pile driving works equipped with a hydraulic pile hammer and an earth auger drive + flight auger, or etc.

3) Durable and stable pile driving work
   A durable cylindrical leader with a pair of back stay mechanism provided to specially designed basic machine for pile foundation work purposes gives a high degree of durability and stability of the machine.

4) Excellent maneuverability
   The maximum allowable operating weight of 66,000kgf assures facile maneuverability in the site. R.H. and L.H. independent traveling mechanism with a high traction force enables the machine to make both pivot and spin turns, and to steer the crawlers smoothly and continuously.

5) Smooth swing
   The swing mechanism with NIPPON SHARYO original reaction device makes operator easy to control sensitive swing motion and accurate positioning of the superstructure.

6) Comfortable operator’s room with low sound level
   Well insulated operator room with five (5) wide wind-shields assures bright and quiet operation circumference with minimum fatigue.

7) Easy winch operation
   Hydraulic actuated control levers are easy to operate, and high/low winch speed change and winging-stop/automatic braking-rewinding functions can be done by one control lever with mode indicating lamps.
8) Low speed control
   The elevation and rotation speed of VA-35 auger drive can be controlled at the desired speed of 1/7 to 1/1 times of its rating. Every winch rope line speed can be maintained at the desired constant speed by “Constant speed controller” as optional extra.

9) 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.

10) 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.

11) Easy re-assembling of leader at site
    The leader can be stored over the superstructure for transportation and be erected easily by back stay cylinders that eliminates the required reassembling time at the job site.
3. SPECIFICATIONS OF PILE DRIVING RIG

3.1 Model of basic machine ........................................ NISSHA ; DHJ-60-3

3.2 Nominal dimensions

1) Overall width in transportation ........................................ 3,300mm
   Minimum ........................................ 3,000mm
2) Crawler overall width in working ................................... 3,500mm
3) Crawler overall width in transportation ............................ 3,300mm
   Minimum ........................................ 3,000mm
4) Crawler center to center distance in transportation .............. 2,240mm
5) Crawler center to center distance in working ........................ 2,740mm
6) Crawler shoe width ........................................... 760mm
7) Crawler overall length ........................................... 4,540mm
8) Cab width ................................................. 3,000mm
9) Gantry height (Working) ........................................... 6,050mm
10) Overall height (Transportation) ................................... 3,315mm
11) Rear end radius (Counterweight end ) ............................ 3,825mm
12) Rear end clearance ............................................. 970mm

3.3 Operation speed

1) Main and auxiliary drums, winding/rewinding speed (Low) ....... * 33.5m/min.
2) Main and auxiliary drums, winding/rewinding speed (High) ...... * 67m/min.
3) Third drum, winding/rewinding speed ... (option) ................. * 53m/min.
4) Swing speed .................................................................. 3.5 rpm
5) Travel speed .......................................................... 1.3 km/hr.
6) Gradeability (Basic machine) ........................................... 40%
7) Weight of basic machine ............................................. 25,800kgf
   (253 kN)
9) Counterweight ....................................................... (8,5000 + 4,000 kgf) 12,500kgf
   (122.3 kN)
10) Standard leader length .................................................. 21m
11) Maximum permissible operating weight .......................... 66,000kgf
    (64.7kN)
### 3.4 Diesel engine

1) **Maker** .......................... HINO MOTOR LTD.
2) **Model**  ........................................ J08C-UT diesel engine
3) **Type** .......................... Water cooled, 4-cycle, Overhead valve, in-line
   6-cylinder, direct fuel injection, turbo-charged.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of cylinder x bore x stroke</td>
<td>6 x 114mm x 130mm</td>
</tr>
<tr>
<td>Total displacement</td>
<td>7,961 cc</td>
</tr>
<tr>
<td>Compression ratio</td>
<td>18.0 : 1</td>
</tr>
<tr>
<td>Rated output</td>
<td>200PS/2100rpm (147.1 kW/2100rpm)</td>
</tr>
<tr>
<td>Maximum torque</td>
<td>75kgf-m/1600rpm (733N-m/1600rpm)</td>
</tr>
<tr>
<td>Fuel consumption rate</td>
<td>1712g/ps • hr 234g/kW • hr</td>
</tr>
</tbody>
</table>

### 3.5 Battery

- DC24V-120AH x 2 pc.

### 3.6 Fuel tank capacity

- 250 liters

### 3.7 VA-35 hydraulic auger drive

1) **Model** .......................... VA-35
2) **Auger drive**
   - Speed (Low/high) | 25 / 44 rpm
   - Torque (Low/high) | 3.5 / 2.0 ton-m (34.3 / 19.6 kN-m)
3) **Elevating device**
   - Elevation speed | 16m/min.
   - Maximum driving force(Push down) | 21 ton (205.9kN)
   - Maximum extraction force | 35 ton (343.2 kN)
4) **Operation weight** .......................... 3.5 ton (without screw)
5) **Applicable screw** .......................... 60H
6) **Swivel** .......................... \( \phi 42 \)
4. POWER TRAIN DIAGRAM (DHJ60-3 BASIC MACHINE)
5. STRUCTURE AND FUNCTIONS

5.1 Upper revolving superstructure
   All welded, stress relieved and precision machined unit, specially designed for rigidity and durability.

5.2 Winch drums
   1) Main, auxiliary winch drums are of special alloy cast iron.
   2) Drum clutch system
      Main, auxiliary drums are equipped with internal expanding friction clutch bands powered by respective hydraulic clutch cylinders and ensure both of power controlled lowering and free-fall lowering actions.
   3) Drum brake system
      Main, auxiliary drums are equipped with external contracting friction bands powered by treading respective brake pedals.
   4) Drum pawl lock
      Main, auxiliary, third and leader drums are equipped with electrically operated pawl locks for safe operation.

5.3 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.

5.4 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.
5.5 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 transportation by hydraulic cylinders equipped as standard.

3) Track shoes
Shoes are casting, 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 are provided.
11 lower rollers and 2 upper rollers in each side frame, with double rolling surfaces.

5.6 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.

5.6.1 Main pump (Double-plunger pump)

<table>
<thead>
<tr>
<th>1) Type</th>
<th>Plunger pump 1</th>
<th>Plunger pump 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Variable displacement</td>
<td>Variable displacement</td>
</tr>
<tr>
<td></td>
<td>Total power control</td>
<td>Total power control</td>
</tr>
<tr>
<td>2) Set pressure</td>
<td>280 kgf/cm² (274 bar)</td>
<td>280 kgf/cm² (274 bar)</td>
</tr>
<tr>
<td>3) Oil flow</td>
<td>225 lit./min.</td>
<td>225 lit./min.</td>
</tr>
<tr>
<td>4) Applications</td>
<td>Travel (L.H.)</td>
<td>Travel (R.H.)</td>
</tr>
<tr>
<td></td>
<td>Leader drum</td>
<td>Main drum (low)</td>
</tr>
<tr>
<td></td>
<td>Aux./third drum(low)</td>
<td>Aux./third drum (high)</td>
</tr>
<tr>
<td></td>
<td>Main drum(high)</td>
<td>Fourth drum(Option)</td>
</tr>
</tbody>
</table>

5.6.2 Gear pump

<table>
<thead>
<tr>
<th>1) Type</th>
<th>Gear pump 1</th>
<th>Gear pump 2</th>
<th>Gear pump 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>2) Setting pressure</td>
<td>210kgf/cm² (205.8bar)</td>
<td>175kgf/cm² (171.6 bar)</td>
<td>Pilot circuit</td>
</tr>
<tr>
<td>3) Oil flow</td>
<td>135 lit./min.</td>
<td>76 lit./min.</td>
<td></td>
</tr>
<tr>
<td>4) Applications</td>
<td>Swing Expansion of crawlers</td>
<td>Front-end attachments</td>
<td></td>
</tr>
</tbody>
</table>
5.6.3 Hydraulic motor

1) Swing motor 1-fixed volume axial piston motor with brake.
2) Winch(Main) 1-fixed volume axial piston motor with counter balance valve
(Aux./ third) 1-fixed volume axial piston motor with counter valveance valve
(Fourth) 1-fixed volume axial piston motor with counter valveance valve
3) Winch (Leader) 1-fixed volume axial piston motor with counter balance valve
4) Travel 2-fixed volume axial piston motor with spring loaded/
hydraulic released negative brakes and relief valves.

5.6.4 Hydraulic oil tank capacity: 280 liters
### 6. WORKING CAPACITY TABLE (DHJ60-2 M40D(A))

#### DHJ60-2 M40D(A) working capacity

<table>
<thead>
<tr>
<th>Counter-weight</th>
<th>Hammer</th>
<th>Earth auger</th>
<th>Loader</th>
<th>Pile</th>
<th>Vertical driving stability (with pile)</th>
<th>Backward inclined driving</th>
<th>Total operating weight</th>
<th>Average ground pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class</td>
<td>Weight (t)</td>
<td>Cap weight (t)</td>
<td>Drive unit</td>
<td>Length (m)</td>
<td>Length (m)</td>
<td>Weight (t)</td>
<td>Angle</td>
</tr>
<tr>
<td>8.5</td>
<td>NH40</td>
<td>9.8</td>
<td>0.3</td>
<td>-</td>
<td>-</td>
<td>18</td>
<td>12</td>
<td>3.2</td>
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<tr>
<td></td>
<td>#35</td>
<td>8.5</td>
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<td>-</td>
<td>21</td>
<td>15</td>
<td>3.3</td>
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<tr>
<td></td>
<td>#25</td>
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<td>-</td>
<td>-</td>
<td>21</td>
<td>16</td>
<td>5.0</td>
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<tr>
<td></td>
<td>NH20</td>
<td>5.4</td>
<td>0.2</td>
<td>-</td>
<td>-</td>
<td>21</td>
<td>16</td>
<td>5.0</td>
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<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>VA35</td>
<td>3.5</td>
<td>21</td>
<td>15</td>
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<tr>
<td></td>
<td>#25</td>
<td>5.3</td>
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<td>1.5</td>
<td>-</td>
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<td>21</td>
<td>14</td>
<td>4.2</td>
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<tr>
<td></td>
<td>NH20</td>
<td>5.4</td>
<td>0.2</td>
<td>VA35</td>
<td>3.5</td>
<td>17</td>
<td>21</td>
<td>5.0</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>VA35</td>
<td>3.5</td>
<td>17</td>
<td>21</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**Remarks:**
1. This table shows the working capacity at the standard specifications with crawlers expanded.
2. Use rear jacks in case of loader self-erection.
3. Pile lifting rope carries 5 tons with one-part line and 10 tons with two-part line of both 20 mm in dia. The rope must be used within its permissible lifting loads.
4. Total operating weight does not include a pile weight.
7. GENERAL VIEW OF DHJ60-3, M40D(A)-18M LEADER
8. STANDARD SCOPE OF SUPPLY

1) Basic machine : model DHJ60-3 ........................ 1 unit
   equipped with
   • 12.5 ton counter weight
   • Two drums of main, auxiliary
   • Leader bracket
   • A pair of outrigger jacks
   • Air conditioner in operator’s cab
   • VA-35 earth auger drive
   • Electric fan in operator’s in operator’s cab
   • Radio
   • Electric fuel pump
   • Ash tray and sight level gauge with a bubble

2) Pile driving front-end attachments ................................. 1 set
   • Leader, Revolving type   Model: M40D(A) ............. 21m long
   • Double guide pipe ( 70 x pitch 330 ) ................. 21m long
     Composed of
     2.11m lower leader ....................................... 1pc.
     10.08m revolver ............................................. 1pc.
     3.22m Lower leader ....................................... 1pc.
     2.8 m upper leader ....................................... 1pc.
     2.8 m upper leader ....................................... 1pc.
     Top sheaves assembly ................................... 1set

3) Standard tool set .......................................................... 1 set

9. OPTIONAL EXTRA DEVICE

   • Inclinometer .................................................... 1 set
     (Basic machine and leader )
   • Hydraulic P.T.O for hydraulic pile hammer ...... 1 set
   • Screw............................................................. As desired