Operation Manual
Drop Tester for Packaged Freights
Model DTS-50

SHINYEI TESTING MACHINERY CO., LTD
Introduction
Please understand the following items, and then, read this instruction manual carefully for preventing the danger to workers and surrounding persons and using this tester safely. Keep this operation manual near the tester for reading it whenever necessary.

Brands

- Product names and other proper nouns being described in this operation manual are registered brands or brands of each company.

General cautions

- A part or all of this operation manual are inhibited to be reproduced or copied without permission.
- The contents of this operation manual may be changed without any notice for improvement.
- This operation manual has been prepared while making it doubly sure. We are not responsible for any damage that should have occurred about its contents. If you have noticed unclear descriptions, errors, skipped descriptions, or other defects, please inform us of them.

Foreign Exchange and Foreign Trade Control Act
Take necessary procedures such as the export license application, etc. according to the provisions of the Foreign Trade Control Act, if you export this system.
Cautions on safety

Please understand the following items and then, read this instruction manual (text) carefully for preventing the danger to workers and surrounding persons and also using this tester safely before using the tester. Keep this instruction manual near the tester for reading it whenever necessary.

Indications of tester

![WARNING]
Negligence of this display during work may cause personnel death or serious injuries. Observe the instruction contents.

![NEVER DISASSEMBLE]
Negligence of this display during work may cause a fire, an electric shock accident, or other accidents that may result in workers’ injuries. Observe the instruction contents.

![ELECTRIC SHOCK]
Negligence of this display during work may cause an electric shock accident. Observe the instruction contents.
1. Set the rotary table by the [SET] pushbutton switch of the control unit without fail. Don't set it by
   pulling its rotating arm manually, otherwise it may cause injuries or dangerous results.

2. The rotary table moves at high speed. Never approach its operation range, otherwise an accident
   may occur.

3. A specimen may tilt down in an unexpected direction due to its drop collision. Particularly be careful
   since certain specimens may be broken to scatter.

4. Make sure at all times that none of any other worker, packaged freight or other tools exists around the
   dropping face of the tester.

5. If another tester exists nearby, communicate with its operator so as not to cause any trouble during
   the work.

6. Set the specimens within the specified position of the rotary table and use it within the rated weight
   range.

7. Never handle any injurious chemicals around the tester, otherwise they may cause a color change of
   paint or troubles.

8. If an abnormal symptom such as smoke, odor, or the like should have happened during use, or if water
   should have introduced into the tester or control unit, turn off the power switch at once. If you should
   continue operating the tester as it is, a fire or an electric shock accident may occur.

9. Don't remove any part from the tester main body or don't remove the control unit from the case during
   test, otherwise foreign substances may enter to cause a trouble. Parts may be replaced or checked
   due to unavoidable circumstances during repair.

   In such a case, never carry out any work other than instructed by our company.

   If foreign substances should have entered the tester, turn off the power supply and contact us. If
   you should continue the work as it is, they may cause a trouble or an electric shock accident.

10. Don't modify the tester, otherwise it causes a fire, an electric shock accident, or a trouble.

11. Don't put any heavy load on the power cable of the controller. Don't pull, forcibly bend or scratch it,
    otherwise a fire or an electric shock accident may happen.
12. If the tester is relocated, contact us and observe our instructions.

Wrong hoisting position or wrong working procedures may cause the damage of the tester and control unit. Don’t ride on the tester or control unit nor put a heavy load on them. Negligence of this caution may cause injuries or breakage.

If the tester or controller should have been damaged, please contact us.

13. Annual periodical maintenance check (inspection and repair) is recommended. Please ask us for it.
Cautions on operation

1. Check if screws of each part are securely fastened or the tester is free of abnormal symptoms before starting a test.

2. Check if the tester base within the operation range of the specimen table is kept free of obstacles.

3. Don't test any specimen exceeding the specified range (maximum dimensions and maximum weight).

4. For the plane drop test, put a specimen at the center of the specimen table at all times.

5. Never drop any specimen on the rotary table, but put it slowly after setting it when putting it on the rotary table.

6. The specimen table is separated at high speed by the vertical/rotating operation during the drop operation. Don't approach the operation range of the specimen table.

7. Set the specimen table to the drop end condition without fail after a test.

8. If the rotary base cover is removed due to unavoidable circumstances, turn off the power source so as not to cause any electric shock accident.

9. Set the specimen table by the [SET] pushbutton switch of the control unit without fail. Don't set it by pulling its rotating arm manually, otherwise it may cause injuries or dangerous results.

10. Since an air is always supplied to the [contraction] side of the pneumatic cylinder, the middle frame of the equipment lifts when the air pressure is started feeding. Make sure that neither person nor substance exists around so as not to caught by the air cylinder.

11. If the specimen table is left under the protruded condition, it may start the drop operation due to an air leak or other failures. Pull back the specimen table without fail. However, when the air pressure is supplied normally even during power interruption, it is fed to the [contraction] side of the air cylinder so that the specimen table don't drop.
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§1 SUMMARY OF EQUIPMENT

This tester is used for the free drop test of packaged freights. It conforms to JIS Z 0200, 0202 and ISO 2248 which specify the free drop testing methods for packaged freights. It is fully operated by the automatic control system and characterized with easy work, improved safety, and stable vertical drop. It can execute basic tests of packaging specifications accurately and efficiently, such as the damping packaging design, selection of packaging materials, shock resistance of packaged contents, etc.

1-1 High-speed Operation of Specimen Table
This specimen table freely drops a specimen from an optional height, while supporting the specimen. By the combination of its vertical air cylinder and tensile spring, this specimen table operates at a vertical acceleration exceeding 1G and freely drops a specimen vertically up to the maximum size.

1-2 Automated Operation of Specimen Table
The drop operation of a specimen or, the specimen table operation is done by the [DROP] pushbutton switch of the remote box.
Each specimen is set onto the specimen table automatically by the [SET] switch. Don’t set any specimen by hand (by pulling the rotation arm manually), otherwise it may cause an injury to be dangerous.

1-3 Automatic Setting of Drop Height
The drop height can be set accurately by setting the height setting pointer at an optional position on the scale and then, moving the rotation base by means of the lifting motor.

1-4 Safety Measures of Operation
The control system is designed by taking a serious view of safety.

1) If the specimen table is not set completely, the [DROP] pushbutton switch indicator lamp does not light, but it continues flickering, and the specimen table cannot drop even if the [DROP] pushbutton switch is operated.

2) If the rotary base does not lift up to the drop height setting position, the drop operation cannot be done even if the [DROP] pushbutton switch is operated. The [DROP] pushbutton switch indicator lamp does not light.
3) A specimen is dropped by [DROP] pushbutton switch. By pressing this switch, an alarm buzzer sounds, and the specimen does not drop until the switch is released.

4) If the [RAISE] pushbutton switch is pressed while keeping the height setting switch removed by mistake or the rotary base lifts due to a trouble of the height setting pointer (or switch), the rotary base is stopped at the top by the lifting limit switch.

5) Even if the [LOWER] pushbutton switch is pressed when the rotary base is set to the bottom, the rotary base is kept stopping by the lowering limit switch.

6) If the wire is loosened due to a contact with an obstacle or a specimen below the specimen table when the rotary base is lowering, the “looseness detection switch” mounted near the motor pulley operates to stop lowering the rotary base to prevent the wire from its reverse rotation hoisting or from being slipped out of the pulley.

7) If the rotary table or other component was found to be defective when the [DROP] pushbutton switch was pressed and the buzzer is sounding, turn off [POWER] switch or press the emergency stop without releasing the [DROP] pushbutton switch, and the rotary table does not drop.

8) If the pneumatic pressure is not fed or if it is low, the drop operation cannot be done by the pressure switch.
§2 EXTERNAL VIEW

Figure 1 Plane drop

- Main column
- Angular/edge drop jig
- Vertical pneumatic cylinder
- Height setting device
- Lifting geared motor
- Base
- Specimen table
Figure 2 Angular/edge drop
§3 STRUCTURE OF COMPONENTS

3-1 Base
The base is made of smooth steel to which a specimen touches horizontally. A main column, a lifting motor, and a control device are mounted on its upper face. Holes are prepared at the corners of the base so that the base can be fixed by using grip anchors (or anchor bolts).

3-2 Main Column
The main column is made of a rectangular steel pipe to enable the rotary base to slide vertically and the slide face is made of stainless steel. The main column is fixed to the base vertically, and the drop height setting scale is mounted at the front center, while the lifting limit switch is mounted on the side face of the upper and lower parts.

3-3 Rotary Base
This is provided to support and drop a specimen vertically from an optional height. It is composed of a coil spring for forcibly pulling the specimen table, a shock absorber for reducing a shock which is produced when the specimen table is separated, a pneumatic cylinder for pushing out the specimen table, a latch for holding the drop operation position of the specimen table, a vertical pneumatic cylinder for moving the specimen table vertically, an electromagnetic solenoid valve for feeding a pneumatic pressure to the pneumatic cylinder, a brake for holding the rotary base during the drop operation, and each sensor.

3-4 Height Setting Pointer
A no-contact proximity sensor is used for detecting the drop height. When the rotary base has reached the set drop height, the setting pointer is detected by a proximity sensor to stop lifting the rotary base. Its setting range is 20cm ~ 150cm.

3-5 Lifting Motor
The geared motor having a brake for lifting or lowering the rotary base is provided with a 3-phase AC power supply and its output is 0.2kW. Its 1/100 reduction gear and a brake are assembled to rotate the rotary base in an optional direction and stop rotating it momentarily to hold its position by the control unit.

3-6 Lifting Limit Switch
The limit switch mounted on the side face at the top of the main column touches the upper part of the rotary base to stop the lifting operation of the lifting motor.
3-7 Lowering Limit Switch
This limit switch is mounted on the side face at the lower part of the main column. By pressing the [LOWER] pushbutton switch of the remote box continuously, the rotary base continues lowering until it is detected by the lowering limit switch. When it is detected by the lowering limit switch, the lowering operation of the lifting motor is stopped.

3-8 Looseness Detection Switch
This switch is mounted at the lower part of the main column, and it is composed of a limit switch and a roller for pushing the switch. If the rotary base touches an obstacle or a specimen on its lower side in the course of its lowering operation, the wire is loosened and the limit switch is operated by the weight of the roller to stop running the motor in the same way as in the lowering limit switch.

3-9 Forward Position Detection Switch
By operating the [SET] switch, the specimen table is pushed forward by means of the pneumatic cylinder. When the specimen table becomes flush with the base, it is detected by this sensor to make sure that the specimen table is held by the latch. The forward end stroke position of the pneumatic cylinder is assembled with the cylinder unit. If the specimen table is not held by the latch, the operation is not transferred to the drop operation. In such a case, operate the [SET] switch again.

3-10 Backward Position Detection Sensor
When the specimen table is held by the latch and the sensor at the backward stroke end of the pneumatic cylinder is detected, the coil spring is judged to have been pulled up to the specified position to be set to be ready for the drop operation.

3-11 Pressure switch
This switch detects the air pressure being supplied to this equipment after turning on the power supply. If this air pressure is lower than its preset value, the controller cannot be operated.

3-12 SET switch
This switch detects the shrink side stroke end of the vertical cylinder. The air cylinder for spring moves forward at the shrink side stroke end position to fix the rotary base to the latch. If not detected, the operation is not transferred to the drop operation.
Angular/Edge Drop Pressing Jigs

These jigs are fixed at the upper part of the rotary base by two M8 hexagonal socket head bolts. They are removable. The fixing jigs of the corners and edges of a specimen are mounted at the lower part of the slide shaft. Their vertically movable stroke is about 900mm in total. The slide shaft is fixed by fastening 2 butterfly screws while supporting the specimen by the edge or angular drop jig.

If the pressing jigs are not used, face the supporting arm toward 90° rear face so as not to disturb any normal tests or remove it from the shaft.
Figure 5

Figure 6
Figure 7 Internal structure
§4 PREPARATION

4-1  Preparation to be Executed First after Installation
When this tester is used for the first time after mounting (or relocating) it, perform the following preliminary operation and confirm its operation according to the following procedure.

1) 3-phase power supply connection
Be careful since the lifting and lowering operation are reversed if the power cord of the control unit and the power supply are not connected normally.
One-conductor of the attached 4-conductor power cord is an earth wire. The plug of the power cord is connected as shown in Fig.4-1 as viewed from the front. (R, S, T: Power wires E: Earth wire) Connect the central (S) power wire to the grounded wire out of three power wires without fail. (E) serves as the earth wire of the tester and control unit. Ground it to a near place without fail.
Connect power wires (R) and (T) to the primary optionally.

![Figure 8](image)

Check if the lifting operation is done by pressing [RAISE] pushbutton switch.
If the lowering operation should be done, stop the operation at once, turn off the power supply by turning the [POWER] switch, turn off the primary power supply, and then, exchange (R) and (T) power wires with each other.
When (R) and (T) of the 3-phase power supply are connected correctly, the lifting motor functions normally and the rotary base lifts up to the height setting switch. By pressing [LOWER] pushbutton switch, the rotary base lowers.
2) Air feed
A pneumatic cylinder is mounted in the drive source of this tester. Feed the pneumatic pressure from the compressor (option) of higher than 0.5MPa and more than 70L/min through the indoor piping of the building. The pneumatic pressure supplied to the tester body is regulated by a regulator. The regulated pneumatic pressure operates the pneumatic cylinders through the solenoid valves.

The pneumatic pressure system is operated by feeding a current. If the pneumatic pressure is being fed when turning off the power supply, each pneumatic cylinder is controlled toward the [contraction] direction.

Caution 1 If the compressor (option) is provided with a start/stop (ON/OFF) switch, turn on the switch before starting the test.

Caution 2 Remove drain from the compressor frequently, otherwise it may cause a trouble of pneumatic devices.

![Figure 9 Regulator](image-url)
4-2 Preparation for Test

1) Shape and size of specimens
   The maximum weight and the maximum size of a specimen in case of the facial drop should be within the rated ranges.

2) Check of each section
   A big force acts to the tester due to a shock. Check if each component is normal before starting the test.

3) In case of the plane drop of a specimen
   Put a specimen in such a way as the specimen center meets the center of the specimen table, otherwise the specimen does not always drop horizontally.

4) In case of the angular/edge drop of a specimen (Option)
   Mount the shaft mounting plate by using two bolts (M8). Mount the slide rod being equipped with the angular/edge pressing jigs to the tip of the supporting arm, and put it into the shaft. Set a specimen to meet the groove provided about 80mm ahead from the table center. Set the supporting arm and slide rod from the upper part of the specimen while moving them vertically according to the specimen. Fix the supporting arm by its fastening knob so that it is not deviated downward.
   
   If the pressing jigs are not used, face the supporting arm toward the 90° rear face so that it does not cause any obstacle during normal tests or remove it from the shaft.

5) Drop height setting
   The slide system height setting pointer can be fixed to the scale at an optional position. Set the red edge on the upper face to meet an optional scale division.

6) Cautions on safe clothes and operation
   Wear suitable working clothes and use safety protectors suitable for work during the work. Don't wear such clothes as may be caught by operation switches and/or other protrusions. Don't operate the equipment when your physical condition is poor due to overwork, lack of sleep, when you have drunk or when you have taken medicine.
§5  OPERATION METHOD

5-1  Control Unit and Remote Box Operation
The tester operation is entirely controlled by the control unit and remote box. This paragraph describes the functions of the pushbutton switches of the control unit and remote box.

1)  Earth Leakage breaker
   A no-fuse earth leakage breaker (rated current 3A) is used as an electric circuit barrier to shut off the corresponding circuit if an abnormal current flows to each part.

2)  [POWER] push-button switch
   By pressing this switch, its red indicator lamp lights and all operations are set to be standing by.
3) [RAISE] pushbutton switch
By pressing this pushbutton switch, the lifting motor operates to lift the rotary base and stops at the drop height setting position. Even if the height setting pointer (or switch) is defective or if the height setting pointer is not set to the scale, the rotary base is stopped by the detection of the lifting control switch mounted at the upper part of the main column.

![Figure 11 Remote box]

4) [LOWER] pushbutton switch
The rotary base lowers when pressing this switch. When the lowering limit switch detects the limit, the lifting motor stops running. (If the lowering limit switch becomes defective, the rotary base touches the limit plate or the looseness of the wire is detected by the looseness detection switch to stop running the lifting motor.)
If the drop height is set to be the lowest, press this pushbutton switch to lower the rotary base down to the stop position by the lowering limit switch, and then, set the height setting switch to the scale.
Since the [LOWER] pushbutton and [RAISE] pushbutton switch use the relay switch being operated by these switches as a chain circuit, the operation is not switched even if the reverse operation is pressed in the course of the lifting or lowering operation.
5) [SET] switch
By turning the switch clockwise, the specimen table is pushed out forward by the pneumatic cylinder. When the specimen table has become horizontal, it is fixed by the latch mounted at the front end of the rotary base, and the spring for operating the specimen table is pulled up to the specified position to be ready for starting the drop operation. When the rotary base is positioned at the set drop height, the indicator lamp of the [DROP] pushbutton switch changes from flickering to lighting.

6) [DROP] pushbutton switch
The vertical pneumatic cylinder is operated by this switch and the specimen table moves vertically at high speed. The fixed latch is unlatched as a result of the vertical move, and the specimen table starts its rotary move by means of the spring.

The drop operation is done on condition that the specimen table is positioned at the set drop height with the [DROP] indicator lamp lit. If the rotary base is not positioned at the set drop height, the separation is not done even if this switch is operated. Unlike the other switches, this switch becomes flat form and prevent it from being pressed carelessly.

By pressing this switch, the buzzer sounds to give warning. By releasing the switch, the operation is transferred to the drop operation instantaneously.

7) [Emergency stop] pushbutton switch
Press this pushbutton switch for avoiding danger to persons and articles when a specimen dropped or other troublesome failures occurred. By pressing this switch, all controller switches become ineffective. This switch is reset by turning it clockwise. However, eliminate danger or a troublesome failure before resetting this switch.

If this [Emergency stop] switch is pressed when the [DROP] pushbutton switch remains pressed, the equipment is not transferred to the drop operation.
If the [DROP] pushbutton switch is lighting when the [Emergency stop] pushbutton switch has been reset, the drop operation can be continued.
This switch lights when it is pressed.

8) [Total counter] (inside the control unit)
The counter mounted inside the control unit indicates the total number of test times starting with the first use of this tester. It cannot be reset to 0 halfway.
5-2 Operation flow of control unit and controller

- Carry out daily check
- Turn on the main power supply
- **[Control unit]**
  - Turn on the earth leakage breaker and press [POWER] switch
  - (Make sure that the built-in red lamp lights)
  - Set the drop height
  - **[Lift the rotary base to the preset drop height]**
  - Press [RAISE] switch of the controller.
  - **[Set the specimen table]**
  - Turn the [SET] switch of the controller clockwise.
  - Put a specimen on the specimen table.
  - Check if the surrounding is safe.
  - **[Drop operation]**
  - Press the [DROP] switch of the controller, and then, release it.
  - **[Drop operation]**
  - **[Continued]/[Finish]**
  - Check the [finish] condition
- **[Control unit]**
  - Turn off [POWER] switch.
  - Turn off earth leakage breaker.
  - Turn off main power supply.
§6 TROUBLESHOOTING

6-1 Dead condition of tester
   1) Check the primary power source.
   2) Check if power plug socket and power cord are connected securely without any breakage.
   3) Check if the switch of “the no-fuse breaker” mounted on the control unit base is turned on.
   4) Check if air is fed and also check the pneumatic pressure.

6-2 [POWER] indicator lamp lights, but the lifting motor does not run
   1) In case of 3-phase power supply, one wire may be broken sometimes. Check if screws are securely fastened in the lifting motor switch case and the terminal board inside the rotary base.
   2) In case of 3-phase power supply, the reverse phase detection circuit mounted in the control unit may be functioning due to the reverse phase. In such a case, turn off the power supply once, and then, exchange the connection of (R) and (T) with each other
   3) Check if the lifting limit or lowering limit switch is functioning. Check the metal connector Co6 connection.

6-3 Rotary base does not stop at the height setting position
   1) The distance between height setting sensor and height setting pointer may be separated from each other much. Adjust it by relocating the height setting sensor (proximity sensor) mounting bracket toward the height setting pointer side.
   2) Height setting sensor (proximity sensor) contacts may be defective. Replace the sensor.

6-4 Lifting motor does not stop even if the lifting wire is loosened due to a contact of the rotary table with an obstacle or a specimen in the course of the lowering of the rotary base.
   1) Roller does not lower downward due to a trouble to cause the looseness detection switch to be not operable. Check the roller.
   2) Looseness detection switch is defective. Replace the switch.
6-5  [DROP] pushbutton switch indicator lamp does not light
     1)  Check if the rotary base lifts up to the drop height setting position.
     2)  When the specimen table is pushed forward to be flush with the base by the pneumatic cylinder, it does not react on the forward position sensor.  A trouble may occur halfway in the course of the forward move position sensor operation and the motor has stopped running.  Check the above symptom.
     3)  After the specimen table has become horizontal, the air cylinder shaft moves backward to stretch the coil spring, and this condition is detected by the backward move stop sensor to cause the specimen table to be standing by.  Backward move stop sensor may be stopped halfway due to a trouble.  Check it.

6-6  [DROP] indicator lamp lights, but not separated
     1)  Cord (wiring), pushbutton switch contact, vertical pneumatic cylinder, or latch may be defective.

So long as the drop tester is used normally, a trouble scarcely occurs.  However, the operation may change due to dust in the course of a long-time use.  Check the conditions of each component (looseness of bolts, etc., in particular) once every 500 times drop tests.

The warranty period of this drop tester is one year or 10,000 times of use.
§7 DAILY CHECK

The operation may change due to dust, etc. in the course of a long-time use. Carry out the following check, each time the drop test is done 500 times.

1. If the specimen table is left under the put out condition before and after using the tester, it may start the drop operation due to the leakage of air or other failures. Reset the specimen table without fail.

2. If the exclusive compressor is used as the air pressure feed source, remove drain before starting the daily work.

3. Check if the specimen table is kept free of being deformed.

4. Check the mounting screw of the spring mounted in the specimen table for looseness, check the spring for its getting on the both end metals, and also check the spring for its loose condition.

5. Check the screw connections of air pipe for their looseness. If loosen, fasten them with the rated torque.

6. If the equipment was stored or not used for a long time, wipe off dirt from the column guide, and then, lubricate the column guide with grease. (Recommended grease: Alvania EP grease produced by Showa Shell Oil Co.)

7. Check if the pressure gauge of the air regulator is set to 0.5MPa correctly. Check if air is supplied.

8. Check the rubber damper at the rear end of the specimen table for its permanent set in fatigue.

9. Check bolts, nuts, and screws for looseness.
§8 SCREW TIGHTENING TORQUE

8-1 Tightening torque of bolts and nuts
Appropriate tightening torque is specified for bolts and nuts.
If this torque is too small, screws may be loosened. If this torque is too large, screws may be broken.

<table>
<thead>
<tr>
<th>Strength divisions of bolts and nuts &amp; reference tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal diameter</td>
</tr>
<tr>
<td>(mm) (S45C)</td>
</tr>
<tr>
<td>M5</td>
</tr>
<tr>
<td>M6</td>
</tr>
<tr>
<td>M8</td>
</tr>
<tr>
<td>M10</td>
</tr>
<tr>
<td>M12</td>
</tr>
<tr>
<td>M14</td>
</tr>
<tr>
<td>M16</td>
</tr>
<tr>
<td>M20</td>
</tr>
<tr>
<td>M24</td>
</tr>
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</table>

〈unit: N·m〉

8-2 Pipe screws tightening torque

<table>
<thead>
<tr>
<th>Sizes for pipes</th>
<th>1/4</th>
<th>3/8</th>
<th>1/2</th>
<th>3/4</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Torque (N/m)</td>
<td>24.5</td>
<td>49</td>
<td>58.8</td>
<td>117.6</td>
<td>137.2</td>
</tr>
</tbody>
</table>
PERFORMANCE AND SPECIFICATIONS

9-1  Model  DTS-50
9-2  Specified performance
   1)  Maximum size of specimen (in case of plane drop)
       510(W) x 900(D) x 900(H) mm
   2)  Maximum weight of specimen  50kg
   3)  Drop height range  200 ~ 1200mm
   4)  Height of tester  1975mm
       During the use of edge drop jig  2440mm
   5)  Operation system  Electric and pneumatic drive system by electronic control
   6)  Installation floor area  920 x 1480mm
   7)  Weight of tester  Approx. 330kg
   8)  Control voltage  3φ 200V AC
   9)  Power requirement  3φ 200V AC  400W
  10)  Air source  0.6 MPa or higher, 15L/min
  11)  Ambient temperature range  5 ~ 35°C
       (Standard temperature condition at JIS test places Class 4)

9-3  Attachments
   1)  Base fixing bolt or anchor bolt  M12 grip anchor bolt  6 pcs.
       1/2” x 150mm long  6 pcs.
   2)  Test data  1 copy
   3)  Instruction manual  1 copy
§10 WIRING AND CIRCUIT DIAGRAM

10-1 Electric wiring
§11 CONSUMABLES LIST

Maintenance of the test equipment is classified into the repair after the machinery has broken (after it has reached its working limit) and the periodical check and maintenance for exchange by estimating its life before it is broken. Component parts of the tester have their approximate lives.

Possibility of the occurrence of troubles can be reduced by maintaining the machinery conditions while checking and replacing parts according to its planning. The following table shows references.

<table>
<thead>
<tr>
<th>Items</th>
<th>Checker’s judgment</th>
<th>Replacement or Exchange Object</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Specimen table</td>
<td>periodical check by maker</td>
<td>Tester mounting face shall be flat.</td>
</tr>
<tr>
<td>2 Lifting geared motor</td>
<td></td>
<td>Replace if a lifting trouble occurred due to seizure.</td>
</tr>
<tr>
<td>3 Latch</td>
<td></td>
<td>Check for wear once every 40,000 times.</td>
</tr>
<tr>
<td>4 Lifting wire</td>
<td></td>
<td>Replace if shank, looseness, and/or breakage of wires are detected.</td>
</tr>
<tr>
<td>5 Air brake</td>
<td></td>
<td>This is used for holding the rotary base. Check the lining for wear.</td>
</tr>
<tr>
<td>6 Air regulator</td>
<td>Check once every 10,000 times</td>
<td>Replace if the set pressure is not obtained or if air leaks.</td>
</tr>
<tr>
<td>7 Air hose and joint</td>
<td>5 years after delivery</td>
<td>Replace if air leaks or a crack is detected.</td>
</tr>
<tr>
<td>8 Rubber damper</td>
<td>Check once every 40,000 times</td>
<td>Replace if cracked or deformed.</td>
</tr>
<tr>
<td>9 Shock absorber</td>
<td>Check once every 40,000 times</td>
<td>Replace if deformed such as the opening of coil, etc. after 40,000 times use as a reference.</td>
</tr>
<tr>
<td>10 Coil spring</td>
<td>Checker’s judgment in the periodical check by maker</td>
<td></td>
</tr>
<tr>
<td>11 Controller</td>
<td>Check during use</td>
<td>Check for a pushbutton operation failure, poor contact, or other abnormal symptoms.</td>
</tr>
<tr>
<td>12 Inside the control unit</td>
<td>Checker’s judgment in the periodical check by maker</td>
<td>Poor contact of relay switch and power switch.</td>
</tr>
</tbody>
</table>

※In case of carrying out the continuous test under fixed test conditions

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§12 PRODUCT WARRANTY

DTS-50 is guaranteed as specified below.

① Shinyei Testing Machinery provide free repair for the malefaction by normal usage in 1 year or total count is less than 3,000 times after delivery. However, the malefaction by the hit of specimen is out of warranty.

② Our drop tester is passed strict inspection. If any malefaction occurs, please contact us or distributor.

③ Even if it is in the term of warranty, the following malefaction is non-free repair.
   a) By abnormal usage from designed specification.
   b) By misoperation, unjust repair and modification.
   c) By the conflagration or natural disaster

④ Warranty shall be limited only to the recovery of a malefaction that have caused by design or manufacturing failure of our company. We are not responsible for any other cases. Also, any secondary loss caused by those malefaction is out of warranty.