LUBRICATED TRACKS (III)

TRACK BUSHING OIL (WET) TURN PROCEDURE MANUAL
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Application of this Guide

This manual, Guidance for Reusable Parts is arranged to the wedge ring type sealed & lubricated track fitted on D475A as a base machine. The same procedure will be applied on D275A and D375A. But please refer to each shop manual for appropriate dimension and P/N of jig for each model.

This Manual was published by the following persons,
1  Structure and Function & General Technical information  Hiroyuki Nakaishi & CETC1 Akira Hashimoto CETC1
2  Bushing turn procedure with photos  Hidetoshi Okuno CS Division
3  Actual bushing turn work coordination  Yasu Iiyama NSK

This manual has been revised in 2004/Mar, based on the investigation result of pin bushing turning job in USA which we conducted in 2003/Dec. The revised page is added a on page number and the revised portion (mostly added more explanation) is highlighted in yellow back ground.
**INTRODUCTION**

**Undercarriage** is the most expensive element among several elements of repair and maintenance (hereafter R&M) cost to run a large size bulldozer. And among undercarriage parts such as track, top(carrier) rollers, bottom(track) rollers, idlers, sprocket segments, roller guards and so on, track parts spend major portion of entire undercarriage cost such as 50% or more of the total cost. In order to manage R&M cost in reasonable one, **WET TURN OF TRACK BUSHING** is the most important issue for large size bulldozer and reduces number of tracks to be replaced with a new one as an example shown in below.

![Bulldozer R&M cost](image)

![Track R&M cost](image)

In 2001, a new D475A is launched with a new undercarriage system, which is explained in details on the next pages. **Wedge rings** fitted on both ends of pin assure holding pins and links in proper position even pins are fitted with less force to prevent scuffing. **K-type bogies** prevent from link shoulder chipping by better following-up capability and **new guards** do not cause inclined wear on pin ends any more. A new **F5** seal is adopted and it extends seal life as well.

All these innovations enable **WET TURN OF TRACK BUSHING** more easily and this manual is issued to introduce the new undercarriage and its WET TURN OF TRACK BUSHING procedure correctly and practically. It would be more effective if this manual is utilized with separate volume of " Guidance for Reusable Parts - Lubricated Track (II)" Form No. SEBG4091" .

We thank very much for all persons of NSK(Australia) who gave us great cooperation on the occasion of taking pictures of actual jobs there for the draft creation.

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**Note:** This publication is intended for guidance only and KOMATSU LTD. hereby expressly denies and excludes any representation, warranty or implied warranty for the reuse of sealed and lubricated track
NEW TRACK STRUCTURE & FEATURE

1) Adoption of **wedge ring** to the pin hold effect: Pin press-fitting force can be reduced, and it reduce scuffing between pin and link bore at bushing turn. As a result, man-hour can be shortened and parts reusable ratio can be increased.

2) **Link guard and link shape** change to avoid interference of pin ends and guards. effect: Pin end face wear can be eliminated, then it result man-hour reduction of pin end face maintenance and pin reusable ratio improvement.

3) Expanding of link and **rollers tread width** effect: Wear life on track link and rollers can be elongated due to surface pressure reduction.

4) Adoption of **K-type bogie** which rollers following-up track link movement. effect: Elimination of track coming off, then rollers flange wear life can be extended. And riding comfort would be improved.

<table>
<thead>
<tr>
<th>NEW TRACK</th>
<th>CURRENT TRACK</th>
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<tbody>
<tr>
<td>Track roller</td>
<td>Link tread</td>
</tr>
<tr>
<td>Link tread</td>
<td></td>
</tr>
<tr>
<td>Guard</td>
<td></td>
</tr>
<tr>
<td>Wedge ring</td>
<td></td>
</tr>
</tbody>
</table>
STRUCTURE OF THE SEALED & LUBRICATED TRACK

TRACK STRUCTURE
Sealed & lubricated track differs greatly from grease sealed track in the following point. Oil is sealed in the area between pin and bushing (link connection), and special seal is used to prevent entry of soil or water. This greatly improves the elongation life of link pitch. Sealed & lubricated track consists of the links, pins, bushings, seals, spacers, large plugs and small plugs.

As for the track that we adopted this time, the following points are changed formerly.
1. The adoption of F5 type seal that improved sealing follow-up ability.
2. The adoption of wedge ring that maintain the pin hold.
SEAL STRUCTURE AND FUNCTION

The structure of the seal is similar to that of seals used in idlers and rollers of undercarriage. It consist of a part which seals oil in and keeps dirt and sand out, and load ring which impose a thrust to the said part. The load ring is set in place in a crushed condition. Its resilience pushes the sealing portion in the direction of thrust, exerting the proper surface pressure on the sliding surface with the bushing. The thrust is also given in the radial direction of the link counterbore, preventing oil from leaking from the bores. The spacer is set inside the seal to protect it from overload and keep the direction of the seal at proper level while the machine is traveling.

1) **F5 seal**
   Adopted on large size bulldozer

2) **F3 seal**
   Adopted on middle size bulldozer

3) **W7 seal**
   Adopted on small size bulldozer
**SEALING MECHANISM**

As for the contact portion of the seal and bushing the wear groove advances with the following mechanism.

![Diagram of sealing mechanism](image)

When parts are new, Shallow sealing groove is formed, Sealing groove is larger, Sealing groove is transferred toward the bore.

The contact portion of the seal and bushing gradually move inside while forming the seal groove as shown in the picture above. The sealing film becomes possible only by the seal part without damage that are formed inside this seal groove with bushing surface finished precisely.

The oil film is only formed during oil is supplied normally. The contact surface of seal and bushing are damage once sealed oil is leaked and it becomes dry internally with some causes, and oil film is not formed even if oil is refilled again.

If dirt, sand etc. enter the sealing areas, the surfaces of seals and bushing will be easily impaired with dirt, sand etc. thereby deteriorating the sealing function.
1) With this method of turning, the pin and bushing are turned and reassembled and the assembly is filled with oil. Be careful to assemble the pin so that the side hole (branch hole) is on the link tread side in the same way as before turning.

2) Not only a bushing but also a seal need to be replaced with new one at the same time when a bushing is replaced with new one. On the other hand, a bushing can be reused if there is no abnormality even if a seal is changed with new one. And bushings and seals are not required to assemble as original set.

3) Pin will not be held enough and it would be come out if it is not assembled properly at bushing turn, and it will cause oil leakage by the sealing mechanism mentioned in the former page. Therefore, it is necessary to control dimensions strictly and assemble in proper steps. All parts must free from damage during assembling time, especially bushing end face.

4) Refer separate volume of shop manual "Guidance for Reusable parts-Lubricated Track (II)" to judge parts resuability.
KEY POINTS ON SEAL PROTECTION

Rebuilding Track

Care is needed when welding the lug material to shoe grouser while the shoe is installed to the link assembly. If the grouser portion is shaped using gas cutting and lug welding is carried out continuously for one shoe, the heat will be concentrated in one place. This will mean that the seal will be subjected to high temperature and may deteriorate, so it is necessary to consider carefully the procedure to follow.

Example of method of dissipating heat

To prevent the heat from concentrating at the seal at one place, divide the processes for rebuilding the lug into several parts, and carry out the work on every 2nd or 3rd shoe. When bolt is forced to cut by gas, keep temperature under 80 °C at seal portion to avoid seal deterioration, and protect spatter entering into the link gaps.
**Caution & warning on track press job** (Additional Page)

1. Protection cover must be equipped on track press for operator's safety
   (Debris of wedge ring may scatter during press out pin)

2. Track press operator and co-workers should have a Helmet, Safety glasses and Ear plug.

3. Side wall of track press jaw must be vertical.
   * Jaw with wear plate (replacable) type side wall is recommended as shown below.

4. Pushing tools for pin and bushing must be protrusion adjusting type.
   * For detail, please refer to page “Press jig” (Page 32-a)
DISASSEMBLY

1. Preparation of shoe removal from track link assembly.

Set the track assembly on a flat floor with the shoe facing up.

★ Remove all dirt from track assembly before start disassembly.

2. Shoe removal

Raise the track assembly with the shoe facing up, then use shoe impact wrench to remove shoe.

★ Do not loosen a bolt by force if it was hard, loosen other bolt.
   It will cause bolt seizure or link hole deformation, and rework will be required.
★ When bolt is forced to cut by gas, keep seal part temperature under 80 degree C to avoid seal deterioration, and protect entering of spatter into the link gap.

3. Shoe bolt & nut

Check damage on the thread of each shoe bolt, then keep in the pallet.

4. Track disassembly

1) Elevate removed shoes and pull link ass'y toward link press by winch if elevating table is available.

Place removed shoe plate on pallet if elevating table is not available, and pull link ass'y toward link press by winch.
2) Set master link on track link press jaw

**Master link disassembly.**

3) Press master link pin out.

   Punch small plug into oil hole of the pin after disassembly. No need to remove large plugs. It can be done before disassembly, but oil will be spreaded out on the floor.

   ★ Do not give any damage on master link connecting surface.

**Regular link disassembly**

4) Check alignment between center of pushing tools and pin and bushing, then push pin and bushing out at the same time. Banging sound will be occurred at breakage of edge ring, which is normal.

   ★ Press fit portion of bushing and pin nor link bore will be damaged if it was misaligned.

<table>
<thead>
<tr>
<th>Required Link Press Capacity</th>
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<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>D475A and up</td>
</tr>
<tr>
<td>D375A and below</td>
</tr>
</tbody>
</table>

5) Take a disassembled link out
6) Removal of pin and bushing from the other side.

★ Be careful of seal assembly falling off from link counterbore not to be damaged when pin is pushing out from the other side.

7) Removal of pin and bushing from the other side.

Wedge ring breakage by shearing

Wedge ring put in the pin groove is sheared off by press force with large banging sound.

★ Be careful to handle sheared ring which may cut finger by sharp edge.

8) A pair of pin and bushing came off from link.

★ Be careful not giving any damage on bushing end face where contact seal lip during disassembly.
9) Check bushing at press fit portion and seal contact surface.

Repeat same steps up to the last set of link.

10) Removal of the last bushing from master link.

★ Do not give any damage on master link mating surface.

same as above.

Arrangement of removed links (example)

Put removed pairs of links on the round table in order.
Preparation of pins, bushings and spacer rings cleaning (exsample)

Put all removed pins, bushing and spacer rings in the net case for parts washing by degreaser.

★ Punch small plug into pin oil hole with tool (R1) before cleaning pins.

Preparation of pin, bushing and spacer rings cleaning (exsample)

Put all removed pins and bushing in the net case for parts washing by degreaser.

Parts cleaning (exsample)

Put the parts in parts washing tank.

Parts cleaning

Fluid is "Multi-Purpose Degreaser" of Castrol and it is heated and stirred by air to remove coated oil on the parts.
Parts cleaning

Finish parts cleaning with Steam high pressed gun.

★ Stand pins as small plug hole lower side to drain cleaning fluid from inside after finish cleaning.

★ Be careful not giving any damage at bushing end face during handling.

Seal cleaning

When seals are reused, wash seal by soft brush to avoid damage of seal lip area with Kerosene.

★ Use only Kerosene. Do not use any other fluid that may damage rubber seal material.

Multi-Purpose Degreaser of Castrol can be used as "oil & grease remover" (example)
Inspection
Check the following items to determine if the parts can be reused as lubricated track or as a grease-filled track. Carry out comprehensive check to determine if the link assembly can be rebuilt as a lubricated track or as a grease-filled track.

★ When making judgements about reuse of parts, see “Guidance for Reusable Parts - Lubricated Tracks (II)”.

Check the parts visually for damage, and carry out a color check or use flaw detector to check parts that are suspected of being damaged. Any parts that is cracked must not be used again, so scrap it.

★ Precautions for storage

1) To prevent rust of the counterbore portion of the link, leave the seal installed to the link and be careful not to damage the seal lip during storage if seal are reused as grease-filled track.

2) Coat the pin and bushing press-fitting portion, shoe mating surface, and master link mating surface of the link with rust prevention oil to prevent rust.

3) Coat the whole circumference of the pins, bushing, and spacer with rust prevention oil to prevent rust, and be particularly careful not to damage the end face of the bushing during storage.
REWORK

1. Link
   1) Wipe oil and dirt off from Links and check damage visually.

   2) Maintain press-fitting bore surface with sand grinder if it is rough or it is dirt remained.

   3) Maintain rough surface of pin and bushing bore if it is necessary with sand grinder.

      Make press-fitting surface smooth.

      ★ Be careful, press-fitting force maybe drop if surface was grind excessively.

   4) Take dirt off from link counter bore with sand grinder.
Remove dirt off from seal ring counter bore with sand grinder.

★ Dirt may enter the edge of counter bore and remain. It must be removed completely.

5) Make master link mating surface smooth with sand grinder.

★ Do not damage the mating surface and thread.

6) Remove dirt and rust on shoe mating surface with sand grinder.

2. Bushing

Make bushing press-fitting portion smooth with sand grinder if it is required.
3. Pin
1) Make pin press-fitting portion smooth with sand grinder if it is required.

Check breakage of pin end. Even there is a breakage, use it again if breakage length is less than 30mm (See below)

2) Remove remaining liquid gasket and dirt from Wedge ring groove on pin with wire brush.

4. Shoe
Make shoe mounting surface smooth with sand grinder.

5. Pushing tool maintenance
Maintain pushing tool deformation if it is required.

Maintenance of pushing tool will cause keeping proper protrusion of pin and bushing at assembly.
**Tool**

Sand grinder for maintaining of link bores and press-fitting portion of pin and bushing.

Wire brush for removing dirt from link bores. (normally sand grinder is recommended)

Wire brush for removing remained liquid gascket and dirt from edge ring groove on pin

Sand grinder for maintaining pin and bushing press-fitting portion and link and shoe mounting surface.
**ASSEMBLY**

Preparation for assembly

1) Adjust the dimension of link press pushing tool to have protrusion of bushing and pin in the specification. (Please refer to "Press jig" page)
   In case pin end face is worn, adjust pushing tool by adding wear amount of the pin end to be specified dimension.

   "Adjusting Procedure" (Refer to sketch in right)
   a) Measure pin length (L) and confirm wear (a)
      \[ a = 367.6 - L, \quad 367.6 \text{ is length of new pin} \]
   b) Adjust the dimension of pushing tool to have a proper protrusion by adding shim.
      \[ \text{Adjusted protrusion} = 4.6 - \frac{a}{2} \quad 4.6: \text{ at New} \]
      Prepare the shim 0.2, 0.4, 0.8, 1.6mm

2) Adjust relief pressure of link press not to exceed press-fitting force (P4) over the specification

3) In case large plug are removed, wash oil hole with tool (R2), and put large plug with tool (R3)

1. Master Link assembly (bushing side)
   1) Align link press push tool center with bushing center properly.
      ★ Bushing center becomes lower after 180 degree turn so re-centerlize with pushing tool is required.
      ★ outer diameter should be measured at disassembly to estimate alignment change.

   2) Set a link and press bushing in the link.
      Target bushing press-fitting force (P2) should be be in the specification shown in the "Parts standard table".

   ★ The symbols in the each discription of works can be referred " PARTS STANDARD VALUE" table and "ASSEMBLY TOOL" table in this last part of manual.

   Example: P4, R2,------
3) Check bushing protrusion (L5) in the specification with depth gauge, which is shown in the "Parts standard table".

4) Set an other side link and align parallels with press fitted one, and press fit it.

★ Link shoe mounting face must be parallel, otherwise it will be difficult to connect master links and install shoe.

5) Check shoe bolt pitch with shoe bolt pitch gauge.

Refer dimension (L9, L10 & L11) in the "Parts standard table".

2. Regular Link assembly
1) Turn master link sub-ass' y 180 degree. Put a bushing(1) on a press jaw, and put a pin(2) in a bushing.

★ Turn bushing 180 degree as worn side comes upper side which is link shoe mating side.

Reverse left and right ends of pin as oil branch hole facing link tread side.
2) Put spacer rings on pin from both side.

3) Apply lubricated oil at the bushing end face, which is filled in the pin.

   ★ Use Gear Oil SAE GO #90

4) Coat bushing end surface with lubricated oil.

   ★ Do not forget to coat bushing end face with oil to keep seal properly.

5) Put seal in the link counter bore with seal installation tool (R6).

   ★ Seal can be installed by hand without using tool, but it maybe come out at link assembly.

   ★ Seal need to be changed with new one at bushing turn.
6) Set a link, and coat link pin press-fitting bore with liquid gasket. *(P/No.198-32-19890)*

★ Do not put liquid gasket on seal lip.

7) Check alignment between pushing tool center and bushing/pin center, then press fit.

8) Set the other side link and check alignment between pushing tool center and bushing/pin center and press fit.

9) Press fit link completely with certain press-fitting force *(P4)*.

★ Do not exceed press-fitting force larger than the target.
10) Check protrusion of bushing and pin from link with depth gauge. (L4, L5)

★ It should be done on both side on the first three(3) set of Links at least.

Protrusion of bushing and pin on the both side should be in the specification. And it should be even on both side. Otherwise, edge ring might not be fit in the groove on the pin properly.

Jig, as shown below, is also very handy to see a protrusion balance between R.H and L.H.

(Usage of Protrusion Jig)

11) Check shoe bolt pitch with shoe bolt pitch gauge. (L6, L7 & L8)
After that check link rotation manually.

It is better check vaccuum (Sealing test) before installing wedge ring
Sealing test: Step 16) and 17)

12) Wedge ring installation
Set wedge ring on ring installation tool. (R7 & R8)

★ The open end of ring should be set at center of three split tool. The ring may not be inserted pin groove properly in case the open end of ring is not at center of tool as shown in the drawing on the left.
13) Align the tool center with plug hole center and push the tool gently until click sound is noticed.

   H A click sound is noticed when wedge ring slides tool off and fit on the pin.
   Size of protruded center of installation tool for large and small plug side are different.

   Note: The open end of ring should be shoe side

14) Do same thing on the other side.

15) Set secondary ring pushing tool (R9) on both side, and push rings in the pin groove completely with maximum press force (P3).

   Note: Opening dimension of wedge ring should be less than 12mm. If it's more than 12mm, reajust protrusion of pushing tool.

16) Check sealing performance
   Remove the air from inside the pin through small plug hole using vacuum pump (R4) at the vacuum of 680 - 710 mmHg (91-95 kPa) for 5 seconds.
17) If the vacuum pressure was dropped, seal did not fit properly. Then reassembling and seal inspection are required.

18) Fill specified lubrication oil in the pin after no air leakage is confirmed.

Fill oil up to 2-3 kg/cm² (196-294 kPa)

19) After completion of filling with oil, install the small plug with pushing tool (R5) to specified depth (L13).

★ Be sure oil comes out from hole when installing plug. Refill oil if oil does not come out.
Coat outside of circumference of the small plug with lubricated oil before.

3. Master Link assembly (pin side)
1) Set and press fit master link.
2) Set the other side link and press-fit it.

3) Check protrusion of pin end from link surface on both side. (L4)

4) Confirm both links are parallel with straight edge.

5) Screw gauge bolts in bolt holes and check shoe bolt pitch with pitch gauge. (L9, L10, L11)
6) Set wedge ring in the pin groove with installation tool. \( \text{(R7)} \)

7) Set wedge ring in the pin groove with installation tool. \( \text{(R8)} \)

8) Push ring in the pin groove completely with pushing tool maximum \( \text{(P3)} \) ton press force.

4. Shoe installation
1) Coat shoe bolt with disulfide molybdenum grease to avoid seizure.
2) Set bolt with nut. Screw bolts several turn in nuts by hand.

3) Tighten the bolts with shoe nut runner to the targeted torque. (S1)

★ Bolts should be tightened with the order mentioned in the picture.

4) Retighten bolts by angle (S1) according to the same tightening order mentioned in the above.

★ Mark bolt head to ease tighten it by angle.
5. Master Link connection and shoe installation (in the field)
   1) Clean shoe mounting surface and keys before shoe and bolt installation.

   2) Apply Anti-seize on neck of master bolts.

   3) Screw master bolts in the links by hand up to mating surface to be completely contacted, and tighten temporally with portable impact wrench and tighten with shoe bolt impact wrench as same manner as regular shoe bolts. Then tighten by angle as well.
   (S2)

6. Pin oil level check (if required)

   In case oil level filled is not sure, put small plug temporally after filling oil, and take the following actions.

   1) Set assembled link ass'y(or track ass'y) on ground and stand it small plug side upward. And keep it over 30 minutes for oil down.
2) Remove small plugs which were plugged temporarily.

3) Measure oil level with gauge. \textbf{(L15)}
And keep oil level record for refill.

   It can be used welding rod or wire as a gauge.

4) Refill oil if it was lower than standard level.

5) Put small plugs in the pin with push tool.\textbf{(R5)}
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>D475A-3</th>
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<tbody>
<tr>
<td>L1</td>
<td>Link pitch</td>
<td>mm 317.5</td>
</tr>
<tr>
<td>L2</td>
<td>Link height (New)</td>
<td>mm 199</td>
</tr>
<tr>
<td></td>
<td>Link height (Wear limit)</td>
<td>mm 181</td>
</tr>
<tr>
<td>L3</td>
<td>Bushing dia. (New)</td>
<td>mm 116</td>
</tr>
<tr>
<td></td>
<td>Bushing dia. (Normal Wear limit)</td>
<td>mm 107.5</td>
</tr>
<tr>
<td></td>
<td>Bushing dia. (Impact Wear limit)</td>
<td>mm 110</td>
</tr>
<tr>
<td>L4</td>
<td>Protrusion of Pin from Link</td>
<td>mm 4.6±0.2</td>
</tr>
<tr>
<td>L5</td>
<td>Protrusion of Bushing from Link</td>
<td>mm 2±0.3</td>
</tr>
<tr>
<td>L6</td>
<td>Bolt pitch (Regular)</td>
<td>mm 222</td>
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<tr>
<td>L7</td>
<td></td>
<td>mm 288</td>
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<tr>
<td>L8</td>
<td></td>
<td>mm 96</td>
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<tr>
<td>L9</td>
<td>Bolt pitch (Master)</td>
<td>mm 226</td>
</tr>
<tr>
<td>L10</td>
<td></td>
<td>mm 276</td>
</tr>
<tr>
<td>L11</td>
<td></td>
<td>mm 84</td>
</tr>
<tr>
<td>L12</td>
<td>Depth of Small plug</td>
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<tr>
<td>L13</td>
<td>Depth of Large plug</td>
<td>mm 10±1</td>
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<tr>
<td>L14</td>
<td>Endplay</td>
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<tr>
<td>L15</td>
<td>Oil level</td>
<td>mm 55±15</td>
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**Dimension**

<table>
<thead>
<tr>
<th>Force</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>P1</td>
<td>Pin press-fitting force ton 40±6</td>
</tr>
<tr>
<td>P2</td>
<td>Bushing press-fitting force ton 32±7</td>
</tr>
<tr>
<td>P3</td>
<td>Ring press force ton 45±5</td>
</tr>
<tr>
<td>P4</td>
<td>Press-fitting force ton 130</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Force</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Bolt size (Regular) mm 33x2</td>
</tr>
<tr>
<td></td>
<td>Initial torque (Regular) kgm 80±8</td>
</tr>
<tr>
<td></td>
<td>Additionaly-tighten angle (Regular) ° 180±10</td>
</tr>
<tr>
<td>S2</td>
<td>Bolt size (Master) mm 33x2</td>
</tr>
<tr>
<td></td>
<td>Initial torque (Master) kgm 100±10</td>
</tr>
<tr>
<td></td>
<td>Additionaly-tighten angle (Master) ° 180±10</td>
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PRESS JIG

Please contact with track press manufacturer for pushing tools
Komatsu doesn't prepare pushing tools as "Special Service Tools"

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<tr>
<td>A</td>
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<td>D</td>
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<td>110</td>
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</tbody>
</table>

Pushing tools must be protrusion (A & B) adjusting type by shim as follows

"Pushing tool for pin"  "Pushing tool for bushing"

Stopper bolt  Protrusion A  Protrusion B

Shim  Shim
## TOOLS

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Parts Number</th>
<th>Q'ty</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Push Tool</td>
<td>D475A-3</td>
<td>1</td>
<td>Small plug removing</td>
</tr>
<tr>
<td>R2</td>
<td>Brush</td>
<td>791-660-7460</td>
<td>1</td>
<td>Pin hole</td>
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<tr>
<td>R3</td>
<td>Push Tool</td>
<td>791-646-7900</td>
<td>1</td>
<td>Large plug installing</td>
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<tr>
<td>R4</td>
<td>Pump</td>
<td>791-601-1000</td>
<td>1</td>
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<td>R5</td>
<td>Push Tool</td>
<td>791-932-1110</td>
<td>1</td>
<td>Small plug installing</td>
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<tr>
<td>R6</td>
<td>Installer</td>
<td>791-632-1010</td>
<td>1</td>
<td>Seal</td>
</tr>
<tr>
<td>R7</td>
<td>Installation tool</td>
<td>791-685-5700</td>
<td>1</td>
<td>Small plug side</td>
</tr>
<tr>
<td>R8</td>
<td>Installation tool</td>
<td>791-685-5600</td>
<td>1</td>
<td>Large plug side</td>
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<tr>
<td>R9</td>
<td>Pushing tool</td>
<td>791-685-5750</td>
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</tbody>
</table>
R6 Seal Installer

791-632-1010

D475A-3

A
4.3

B
8.7

φ C
113.5

φ D
108.9
R7, R8  
Wedge ring installer

R8 is same as R7 except 01.
R7,8-05

\[ \varnothing 5.0 \]

281 (2.3 kg)  
176 (1 kg)  
155 (FCE)

R7,8-06

\[ \frac{3.4}{\frac{2.4}{\frac{1.4}{\frac{0.4}{\frac{0.2}{\frac{0.1}{\frac{0.0}{}}}}}}}} \]

R7,8-07

\[ \varnothing 60 \]

Material: Urethane (HS A90)

R7,8-08

\[ M12 \times 1.75 \]

270  
23  
250
R9 Wedge ring pushuing tool

<table>
<thead>
<tr>
<th></th>
<th>D475A-3</th>
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<tbody>
<tr>
<td>φ A</td>
<td>82</td>
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<tr>
<td>φ B</td>
<td>70.6</td>
</tr>
<tr>
<td>φ C</td>
<td>48</td>
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</table>

Material: Carbon Steel
Track link Rebuilding machine will not be required nowadays.