SECTION 6 MAINTENANCE STANDARD

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GROUP 1 OPERATIONAL PERFORMANCE TEST

1. PURPOSE

Performance tests are used to check:

1) OPERATIONAL PERFORMANCE OF A NEW MACHINE

Whenever a new machine is delivered in parts and reassembled at a customer's site, it must be tested to confirm that the operational performance of the machine meets Hyundai spec.

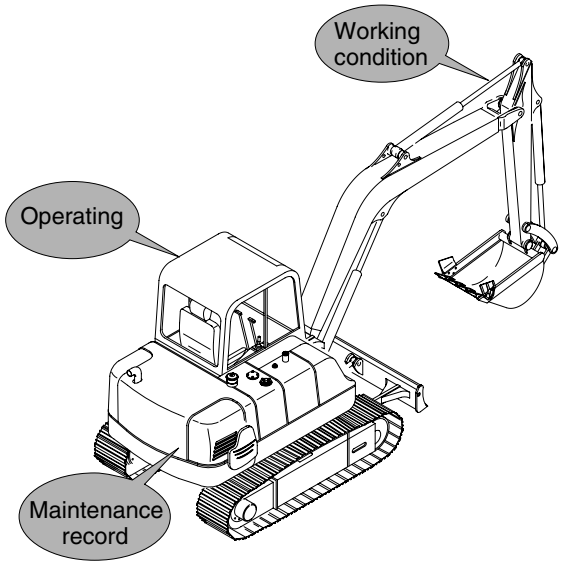
2) OPERATIONAL PERFORMANCE OF A WORKING MACHINE

With the passage of time, the machine's operational performance deteriorates, so that the machine needs to be serviced periodically to restore it to its original performance level.

Before servicing the machine, conduct performance tests to check the extent of deterioration, and to decide what kind of service needs to be done (by referring to the "Service Limits" in this manual).

3) OPERATIONAL PERFORMANCE OF A REPAIRED MACHINE

After the machine is repaired or serviced, it must be tested to confirm that its operational performance was restored by the repair and/or service work done.

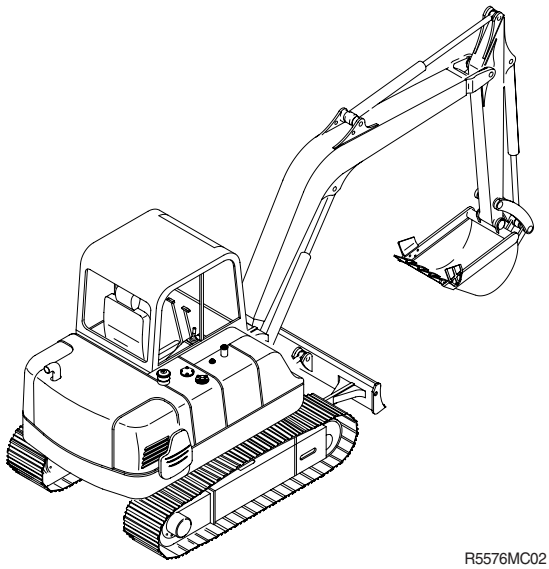


R5576MC01

2. TERMINOLOGY

1) STANDARD

Specifications applied to the brand-new machine, components and parts.



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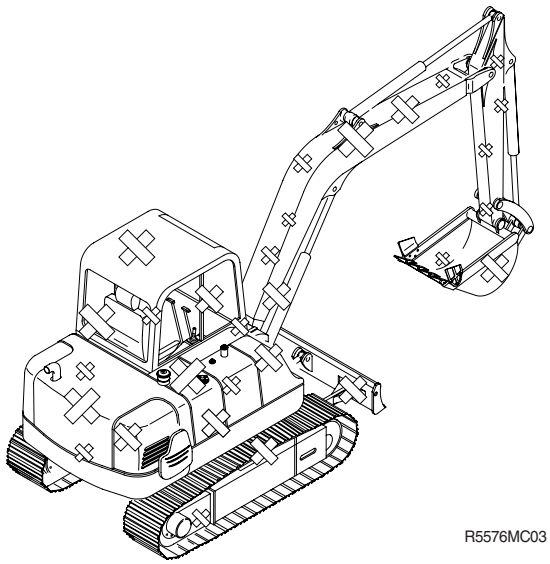
2) SERVICE LIMIT

The lowest acceptable performance level. When the performance level of the machine falls below this level, the machine must be removed from work and repaired. Necessary parts and components must be replaced.



R5576MC03

3. OPERATION FOR PERFORMANCE TESTS

1) Observe the following rules in order to carry out performance tests accurately and safely.

(1) The machine

Repair any defects and damage found, such as oil or water leaks, loose bolts, cracks and so on, before starting to test.

(2) Test area

① Select a hard, flat surface.

② Secure enough space to allow the machine to run straight more than 20m, and to make a full swing with the front attachment extended.

③ If required, rope off the test area and provide signboards to keep unauthorized personnel away.

(3) Precautions

① Before starting to test, agree upon the signals to be employed for communication among coworkers. Once the test is started, be sure to communicate with each other using these signals, and to follow them without fail.

② Operate the machine carefully and always give first priority to safety.

③ While testing, always take care to avoid accidents due to landslides or contact with high voltage power lines. Always confirm that there is sufficient space for full swings.

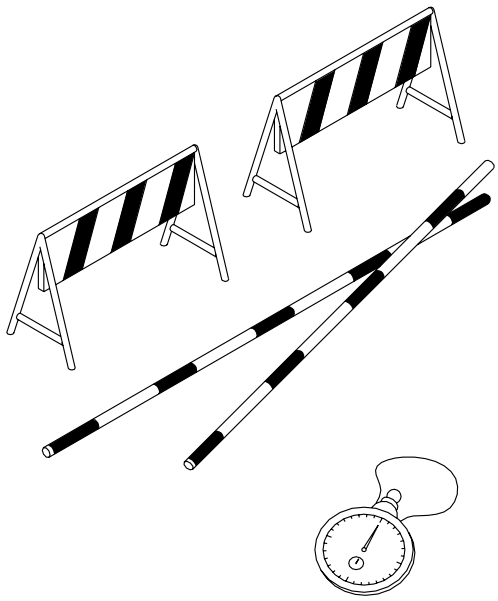
④ Avoid polluting the machine and the ground with leaking oil. Use oil pans to catch escaping oil. Pay special attention to this when removing hydraulic pipings.

(4) Make precise measurements

① Accurately calibrate test instruments in advance to obtain correct data.

② Carry out tests under the exact test conditions prescribed for each test item.

③ Repeat the same test and confirm that the test data obtained can be procured repeatedly. Use mean values of measurements if necessary.



7-3 (140-7)

2) ENGINE SPEED

(1) Measure the engine speed at the maximum RPM.

※ The engine speed must meet standard RPM; if not, all other operational performance data will be unreliable. It is essential to perform this test first.

(2) Preparation and measurement

① Warm up the machine, until the engine coolant temperature reaches 50˚C or more, and the hydraulic oil is 50±5˚C.

② Set the M mode at the cluster

③ Measure the engine RPM.

(3) Evaluation

The measured speeds should meet the following specifications.

Unit : rpm

Model	Engine speed	Standard	Remark
R55-9	Low idle	1000±30	
	High idle	2200±30	M mode

3) TRAVEL SPEED

(1) Measure the time required for the excavator to travel a 20m test track.

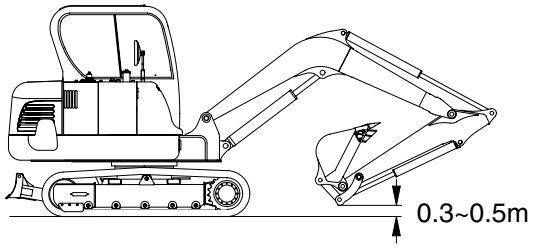
(2) Preparation

① Adjust the tension of both tracks to be equal.

② Prepare a flat and solid test track 20m in length, with extra length of 3 to 5m on both ends for machine acceleration and deceleration.

③ Hold the bucket 0.3 to 0.5m above the ground with the arm and bucket rolled in.

④ Keep the hydraulic oil temperature at 50±5˚C.



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(3) Measurement

① Measure both the low and high speeds of the machine.

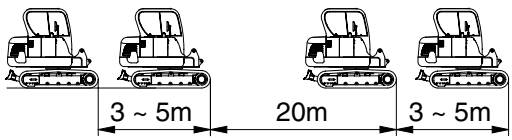
② Before starting either the low or high speed tests, adjust the travel mode switch to the speed to be tested.

③ Start traveling the machine in the acceleration zone with the travel levers at full stroke.

④ Measure the time required to travel 20m.

⑤ After measuring the forward travel speed, turn the upperstructure 180° and measure the reverse travel speed.

⑥ Repeat steps ④ and ⑤ three times in each direction and calculate the average values.



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(4) Evaluation

The average measured time should meet the following specifications.

Unit : Seconds / 20m

Model	Travel speed	Standard	Maximum allowable	Remarks
R55-9	1 Speed	32.7±2.0	41	
	2 Speed	18.0±1.0	23	

4) TRACK REVOLUTION SPEED

(1) Measure the track revolution cycle time with the track raised off ground.

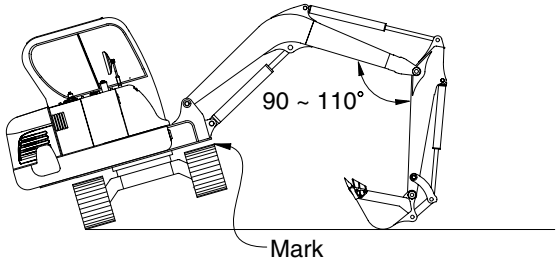
(2) Preparation

① Adjust the tension of both side tracks to be equal.

② On the track to be measured, mark one shoe with chalk.

③ Swing the upperstructure 90˚ and lower the bucket to raise the track off ground. Keep the boom-arm angle between 90 to 110˚ as shown. Place blocks under machine frame.

④ Keep the hydraulic oil temperature at 50±5˚C.



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(3) Measurement

① Select the following switch positions.

· Travel mode switch : 1 or 2 speed

② Operate the travel control lever of the raised track in full forward and reverse.

③ Rotate 1 turn, then measure time taken for next 3 revolutions.

④ Raise the other side of machine and repeat the procedure.

⑤ Repeat steps ③ and ④ three times and calculate the average values.

(4) Evaluation

The revolution cycle time of each track should meet the following specifications.

Unit : Seconds / 3 revolutions

Model	Travel speed	Standard	Maximum allowable
R55-9	1 Speed	26.5±1.5	33.1
	2 Speed	14.6±1.5	18.3

5) TRAVEL DEVIATION

(1) Measure the deviation by the tracks from a 20m straight line.

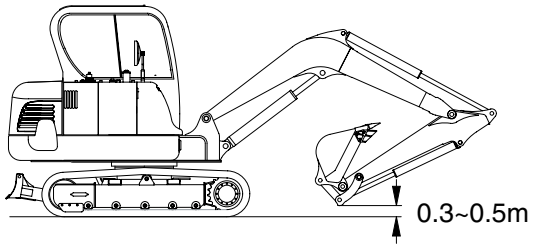
(2) Preparation

① Adjust the tension of both tracks to be equal.

② Provide a flat, solid test yard 20m in length, with extra length of 3 to 5m on both ends for machine acceleration and deceleration.

③ Hold the bucket 0.3 to 0.5m above the ground with the arm and bucket rolled in.

④ Keep the hydraulic oil temperature at 50±5˚C.



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(3) Measurement

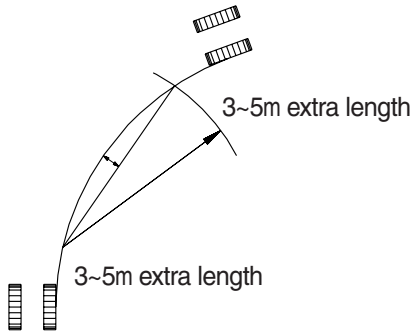
① Measure the amount of mistracking at high and low travel speeds.

② Start traveling the machine in the acceleration zone with the travel levers at full stroke.

③ Measure the distance between a straight 20m line and the track made by the machine. (dimension a)

④ After measuring the tracking in forward travel, turn the upperstructure 180˚ and measure that in reverse travel.

⑤ Repeat steps ③ and ④ three times and calculate the average values.



7-7(2) 140-7

(4) Evaluation

Mistrack should be within the following specifications.

Unit : mm / 20m

Model	Standard	Maximum allowable	Remarks
R55-9	200 below	240	

6) SWING SPEED

(1) Measure the time required to swing three complete turns.

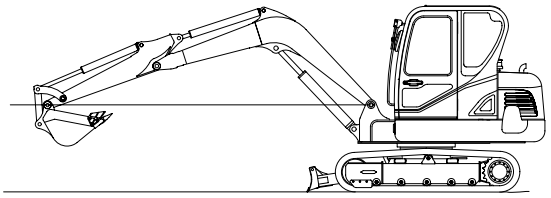
(2) Preparation

① Check the lubrication of the swing gear and swing bearing.

② Place the machine on flat, solid ground with ample space for swinging. Do not conduct this test on slopes.

③ With the arm rolled out and bucket rolled in, hold the bucket so that the height of the bucket pin is the same as the boom foot pin. The bucket must be empty.

④ Keep the hydraulic oil temperature at 50±5˚C.



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(3) Measurement

① Operate swing control lever fully.

② Swing 1 turn and measure time taken to swing next 2 revolutions.

③ Repeat steps ① and ② three time and calculate the average values.

(4) Evaluation

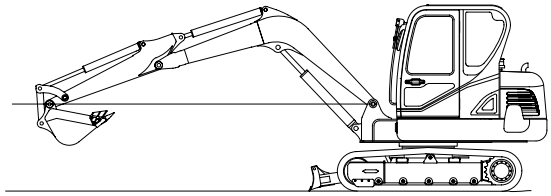
The time required for 2 swings should meet the following specifications.

Unit : Seconds / 2 revolutions

Model	Standard	Maximum allowable	Remarks
R55-9	12.9±1.0	16	

7) SWING FUNCTION DRIFT CHECK

(1) Measure the swing drift on the bearing outer circumference when stopping after a 360˚ full speed swing.



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(2) Preparation

① Check the lubrication of the swing gear and swing bearing.

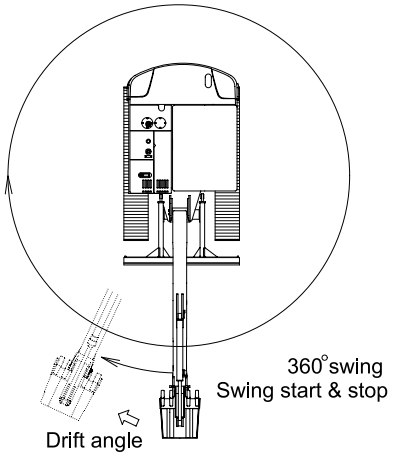
② Place the machine on flat, solid ground with ample space for swinging. Do not conduct this test on slopes.

③ With the arm rolled out and bucket rolled in, hold the bucket so that the height of the bucket pin is the same as the boom foot pin. The bucket must be empty.

④ Make two chalk marks: one on the swing bearing and one directly below it on the track frame.

⑤ Swing the upperstructure 360˚.

⑥ Keep the hydraulic oil temperature at 50±5˚C.



R5576MC08

(3) Measurement

① Operate the swing control lever fully and return it to the neutral position when the mark on the upperstructure aligns with that on track frame after swinging 360˚.

② Measure the distance between the two marks.

③ Align the marks again, swing 360˚, then test the opposite direction.

④ Repeat steps ② and ③ three times each and calculate the average values.

(4) Evaluation

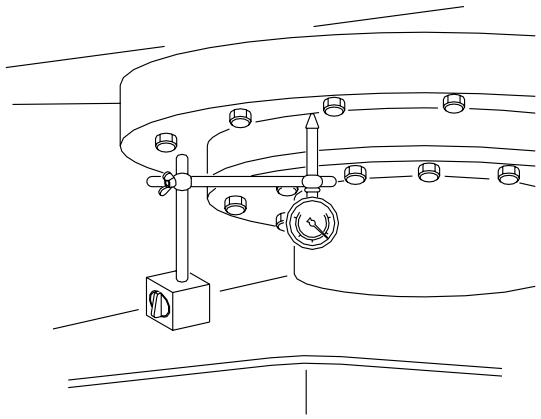
The measured drift angle should be within the following specifications.

Unit : Degree

Model	Standard	Maximum allowable	Remarks
R55-9	40 below	70	

8) SWING BEARING PLAY

(1) Measure the swing bearing play using a dial gauge to check the wear of bearing races and balls.



7-10(1) 140-7

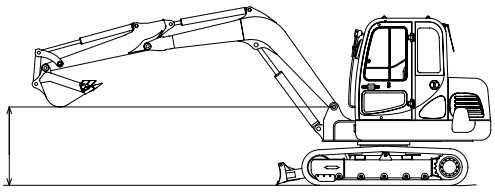
(2) Preparation

① Check swing bearing mounting cap screws for loosening.
② Check the lubrication of the swing bearing. Confirm that bearing rotation is smooth and without noise.
③ Install a dial gauge on the track frame as shown, using a magnetic base.
④ Position the upperstructure so that the boom aligns with the tracks facing towards the front idlers.
⑤ Position the dial gauge so that its needle point comes into contact with the bottom face of the bearing outer race.
⑥ Bucket should be empty.

(3) Measurement

① With the arm rolled out and bucket rolled in, hold the bottom face of the bucket to the same height of the boom foot pin. Record the dial gauge reading (h1).
② Lower the bucket to the ground and use it to raise the front idler 50 ㎝. Record the dial gauge reading (h2).
③ Calculate bearing play (H) from this data (h1 and h2) as follows.
H=h2-h1

Measurement : h1



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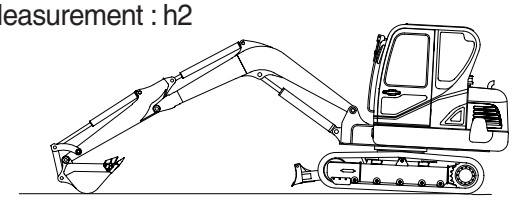
Measurement : h2



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(4) Evaluation

The measured drift should be within the following specifications.

Unit : mm

Model	Standard	Maximum allowable	Remarks
R55-9	0.5 ~ 1.2	2.4	

9) HYDRAULIC CYLINDER CYCLE TIME

(1) Measure the cycle time of the boom, standard arm, and standard bucket cylinders.

(2) Preparation

① To measure the cycle time of the boom cylinders:
With the arm rolled out and the empty bucket rolled out, lower the bucket to the ground, as shown.

② To measure the cycle time of the arm cylinder.
With the empty bucket rolled in, position the arm so that it is vertical to the ground. Lower the boom until the bucket is 0.5m above the ground.

③ To measure the cycle time of the bucket cylinder.
The empty bucket should be positioned at midstroke between roll-in and roll-out, so that the sideplate edges are vertical to the ground.

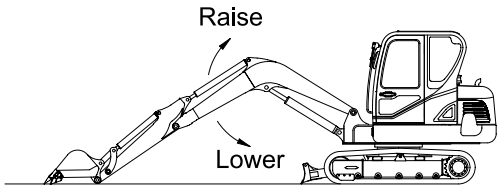
④ Keep the hydraulic oil temperature at 50±5˚C.

(3) Measurement

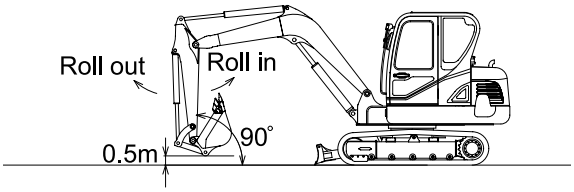
① To measure cylinder cycle times.

- Boom cylinders.
Measure the time it takes to raise the boom, and the time it takes to lower the boom. To do so, position the boom at one stroke end then move the control lever to the other stroke end as quickly as possible.
- Arm cylinder.
Measure the time it takes to roll in the arm, and the time it takes to roll out the arm. To do so, position the bucket at one stroke end, then move the control lever to the other stroke end as quickly as possible.

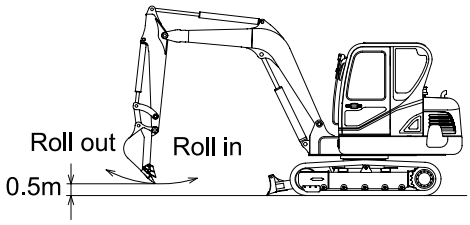
Boom cylinder



Arm cylinder



Bucket cylinder



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- Bucket cylinders

  Measure the time it takes to roll in the bucket, and the time it takes to roll out the bucket. To do so, position the bucket at one stroke end, then move the control lever to the other stroke end as quickly as possible.
- Repeat each measurement 3 times and calculate the average values.

(4) Evaluation

The average measured time should meet the following specifications.

Unit : Seconds

Model	Function	Standard	Maximum allowable	Remarks
R55-9	Boom raise	2.6±0.4	3.2	
	Boom lower	2.3±0.4	2.9	
	Arm in	2.5±0.4	3.1	
	Arm out	2.7±0.3	3.1	
	Bucket load	3.7±0.4	4.3	
	Bucket dump	2.4±0.3	2.8	
	Boom swing (LH)	6.8±0.4	8.2	
	Boom swing (RH)	5.6±0.4	6.8	
	Dozer up (raise)	1.4±0.3	1.7	
	Dozer down (lower)	1.4±0.3	1.7	

10) DIG FUNCTION DRIFT CHECK

(1) Measure dig function drift, which can be caused by oil leakage in the control valve and boom, standard arm, and standard bucket cylinders, with the loaded bucket.
When testing the dig function drift just after cylinder replacement, slowly operate each cylinder to its stroke end to purge air.

(2) Preparation

① Load bucket fully. Instead of loading the bucket, weight (W) of the following specification can be used.

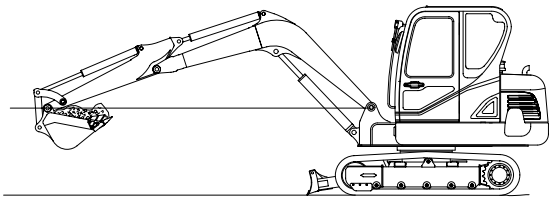
- $W = M^3 \times 1.5$
  Where :
  M^3 = Bucket heaped capacity (m^3)
  1.5 = Soil specific gravity

② Position the arm cylinder with the rod 20 to 30㎜ extended from the fully retracted position.

③ Position the bucket cylinder with the rod 20 to 30㎜ retracted from the fully extended position.

④ With the arm rolled out and bucket rolled in, hold the bucket so that the height of the bucket pin is the same as the boom foot pin.

⑤ Keep the hydraulic oil temperature at 50±5˚C.



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(3) Measurement

① Stop the engine.

② Five minutes after the engine has been stopped, measure the changes in the positions of the boom, arm and bucket cylinders.

③ Repeat step ② three times and calculate the average values.

(4) The measured drift should be within the following specifications.

Unit : mm / 5min

Model	Drift to be measured	Standard	Maximum allowable	Remarks
R55-9	Boom cylinder	10 below	20	
	Arm cylinder	20 below	30	
	Bucket cylinder	20 below	30	

11) CONTROL LEVER OPERATING FORCE

(1) Use a spring scale to measure the maximum resistance of each control lever at the middle of the grip.

(2) Preparation

① Keep the hydraulic oil temperature at 50±5˚C.

(3) Measurement

① Start the engine.
② Operate each boom, arm, bucket and swing lever at full stroke and measure the maximum operating force for each.
③ Lower the bucket to the ground to raise one track off the ground. Operate the travel lever at full stroke and measure the maximum operating force required. When finished, lower the track and then jack-up the other track.
④ Repeat steps ② and ③ three times and calculate the average values.

(4) Evaluation

The measured operating force should be within the following specifications.

Unit : kgf

Model	Kind of lever	Standard	Maximum allowable	Remarks
R55-9	Boom lever	1.4 or below	1.9	
	Arm lever	1.4 or below	1.9	
	Bucket lever	1.4 or below	1.9	
	Swing lever	1.4 or below	1.9	
	Travel lever	2.0 or below	2.5	

12) CONTROL LEVER STROKE

(1) Measure each lever stroke at the lever top using a ruler.

※ When the lever has play, take a half of this value and add it to the measured stroke.

(2) Preparation

Keep the hydraulic oil temperature at 50±5˚C.

(3) Measurement

① Stop the engine.

② Measure each lever stroke at the lever top from neutral to the stroke end using a ruler.

③ Repeat step ② three times and calculate the average values.

(4) Evaluation

The measured drift should be within the following specifications.

Unit : mm

Model	Kind of lever	Standard	Maximum allowable	Remarks
R55-9	Boom lever	87±10	109	
	Arm lever	87±10	109	
	Bucket lever	87±10	109	
	Swing lever	87±10	109	
	Travel lever	86±10	105	

13) PILOT PRIMARY PRESSURE

(1) Preparation

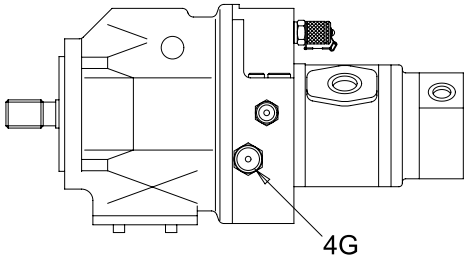
① Stop the engine.

② Push the pressure release button to bleed air.

③ Loosen and remove plug on the pilot pump delivery port (4G) and connect pressure gauge.

④ Start the engine and check for oil leakage from the port.

⑤ Keep the hydraulic oil temperature at 50±5˚C.



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(2) Measurement

① Measure the primary pilot pressure in the M mode.

(3) Evaluation

The average measured pressure should meet the following specifications:

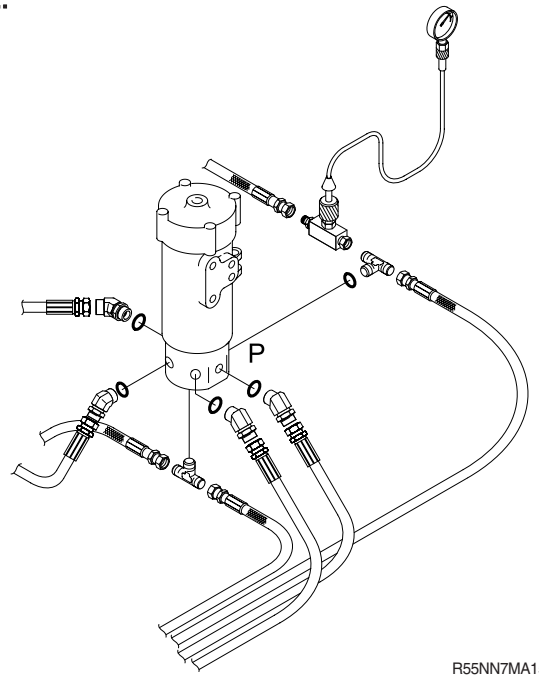
Unit : kgf / cm²

Model	Standard	Remarks
R55-9	30±5	

14) FOR TRAVEL SPEED SELECTING PRESSURE:

(1) Preparation

① Stop the engine.
② Push the pressure release button to bleed air.
③ To measure the speed selecting pressure: Install a connector and pressure gauge
④ assembly to turning joint P port as shown. Start the engine and check for on leakage from the adapter.
⑤ Keep the hydraulic oil temperature at 50±5˚C.



R55NN7MA15

(2) Measurement

① Select the following switch positions.
Travel mode switch : 1 speed
2 speed
② Measure the travel speed selecting pressure in the Hi or Lo mode.
③ Lower the bucket to the ground to raise the track off the ground. Operate the travel lever at full stroke and measure the fast speed pressure.
④ Repeat steps ② and ③ three times and calculate the average values.

(3) Evaluation

The average measured pressure should be within the following specifications.

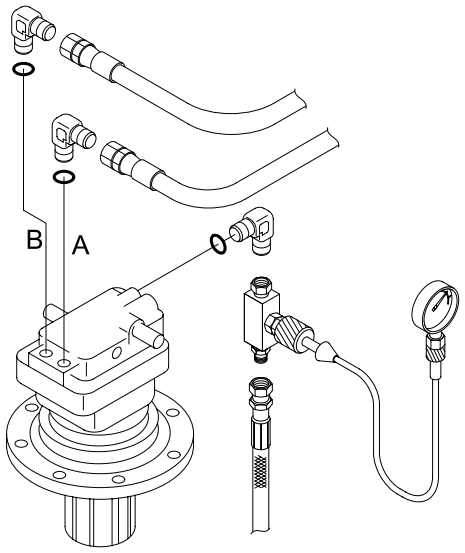
Unit : kgf / cm²

Model	Travel speed mode	Standard	Maximum allowable	Remarks
R55-9	1 Speed	0	-	
	2 Speed	30±5	-	

15) SWING PARKING BRAKE RELEASING PRESSURE

(1) Preparation

① Stop the engine.
② Push the pressure release button to bleed air.
③ Install a connector and pressure gauge assembly to swing motor SH port, as shown.
④ Start the engine and check for oil leakage from the adapter.
⑤ Keep the hydraulic oil temperature at 50±5˚C.



R55NN7MA16

(2) Measurement

① Operate the swing function or arm roll in function and measure the swing brake control pressure with the brake disengaged. Release the control lever to return to neutral and measure the control pressure when the brake is applied.
② Repeat three times and calculate the average values.

(3) Evaluation

The average measured pressure should be within the following specifications.

Unit : kgf / cm²

Model	Description	Standard	Remarks
R55-9	Brake disengaged	30±5	
	Brake applied	0	

16) MAIN PUMP DELIVERY PRESSURE

(1) Preparation

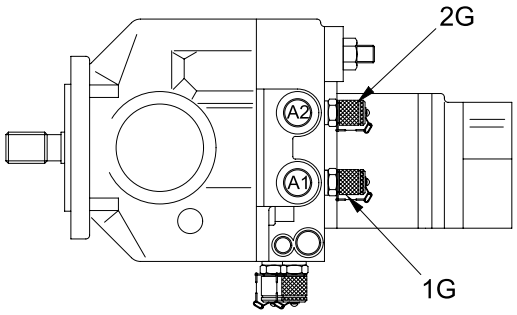
① Stop the engine.

② Push the pressure release button to bleed air.

③ To measure the main pump pressure. Install a connector and pressure gauge assembly main pump gauge port (1G, 2G) as shown.

④ Start the engine and check for oil leakage from the port.

⑤ Keep the hydraulic oil temperature at 50±5˚C.



R55NN7MA17

(2) Measurement

① Measure the main pump delivery pressure at high idle.

(3) Evaluation

The average measured pressure should meet the following specifications.

Unit : kgf / cm²

Model	Engine speed	Standard	Allowable limits	Remarks
R55-9	High idle	20±5	-	

17) SYSTEM PRESSURE REGULATOR RELIEF SETTING

(1) Preparation

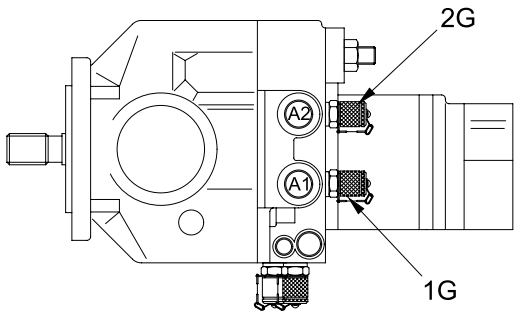
① Stop the engine.

② Push the pressure release button to bleed air.

③ To measure the system relief pressure. Install a connector and pressure gauge assembly main pump gauge port, as shown.

④ Start the engine and check for oil leakage from the port.

⑤ Keep the hydraulic oil temperature at 50±5˚C.



R55NN7MA17

(2) Measurement

① Slowly operate each control lever of boom, arm and bucket functions at full stroke over relief and measure the pressure.

② In the swing function, place bucket against an immovable object and measure the relief pressure.

③ In the travel function, lock undercarriage with an immovable object and measure the relief pressure.

(3) Evaluation

The average measured pressure should be within the following specifications.

Unit : kgf / cm^2

Model	Function to be tested	Standard
R55-9	Boom, Arm, Bucket	220±10
	Travel	220±10
	Swing	200±10

1. MAIN PUMP

Before inspection, wash the parts well and dry them completely.

Inspect the principal parts with care and replace them with new parts when any abnormal wear exceeding the allowable limit or damage considered harmful is found.

Replace the seal also when any remarkable deformation and damage are found.

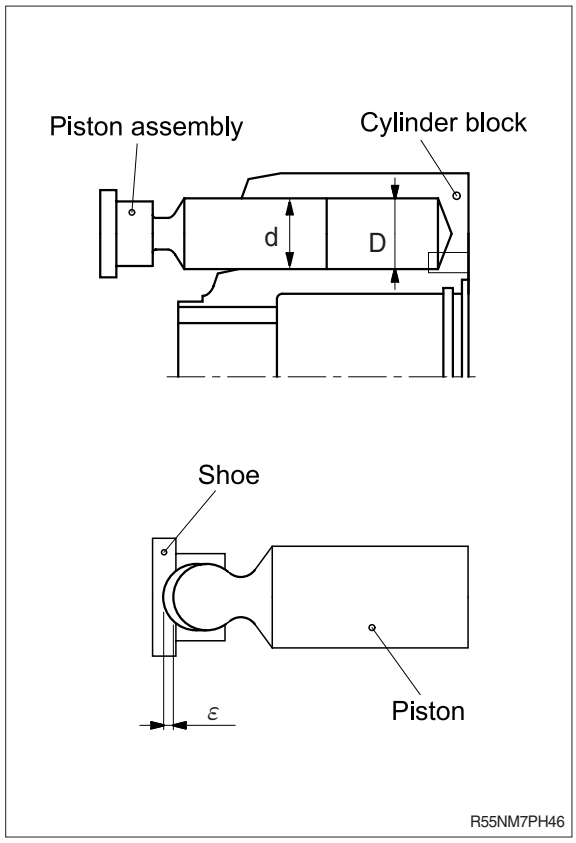
1) PISTON ASSEMBLY AND CYLINDER BLOCK

(1) Check the appearance visually.
No damage, scouring, abnormal wear (particularly, in the slide portion) should be found.

(2) Check the clearance between the piston outside dia and cylinder block inside dia.
D-d $\leq$ 0.050 mm

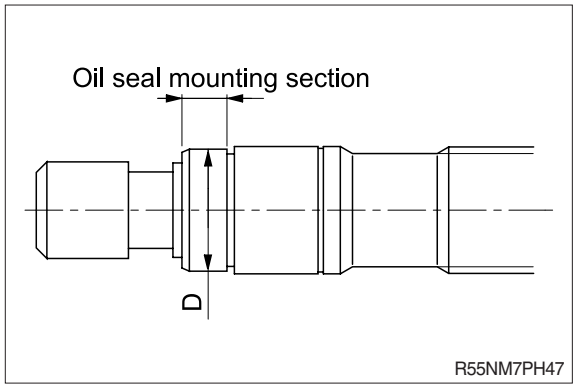
2) PISTON SHOE AND PISTON

(1) Check the axial play of the piston and piston shoe.
$\varepsilon \leq$ 0.2 mm



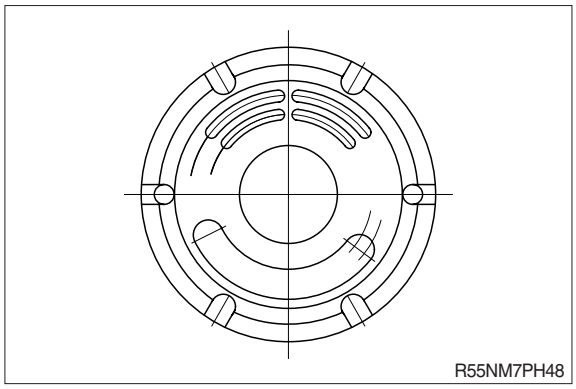
3) SHAFT

(1) Check the wear amount of the oil seal mounting section.
Wear mount $\leq$ 0.025 mm



4) CONTROL PLATE

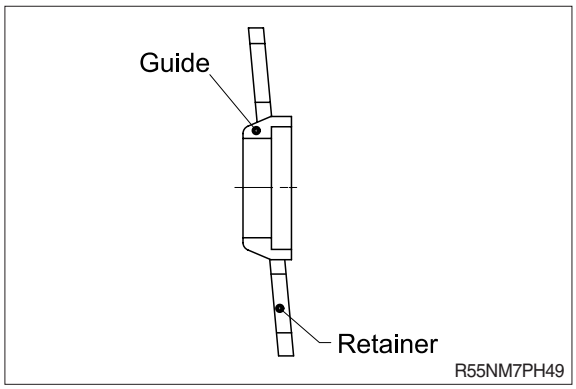
(1) Check the slide surface for any damage. When the damage is large, replace the plate with new one.



5) GUIDE AND RETAINER

(1) Check for scouring or stepped wear. If this can not be corrected, replace the guide and retainer with new full-set.

(2) Fine scouring or damage can be corrected with lapping. Carry out thorough washing after lapping.

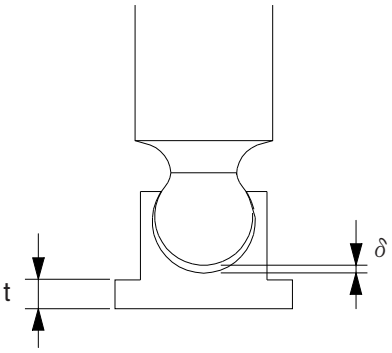
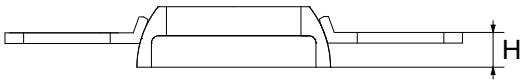


2. MAIN CONTROL VALVE

Part name	Inspection item	Criteria & measure
Block	· Existence of scratch, rusting or corrosion.	· In case of damage in following section, replace part. - Sliding sections of casing fore and spool, especially land sections applied with holded pressure. - Seal pocket section where spool is inserted. - Seal section of port where O-ring contacts. - Seal section of each relief valve for main, travel, and port. - Other damages that may damage normal functions.
Spool	· Existence of scratch, gnawing, rusting or corrosion. · O-ring seal sections at both ends. · Insert spool in casing hole, rotate and reciprocate it.	· Replacement when its outside sliding section has scratch (especially on seals-contacting section). · Replacement when its sliding section has scratch. · Correction or replacement when O-ring is damaged or when spool does not move smoothly.
Poppet	· Damage of poppet or spring · Insert poppet into casing and function it.	· Correction or replacement when sealing is incomplete. · Normal when it can function lightly without being caught.
Around spring	· Rusting, corrosion, deformation or breaking of spring, spring seat, plug or cover.	· Replacement for significant damage.
Around seal for spool	· External oil leakage. · Rusting, corrosion or deformation of seal plate.	· Correction or replacement. · Correction or replacement.
Main relief valve & port relief valve	· External rusting or damage. · Contacting face of valve seat. · Contacting face of poppet. · Abnormal spring. · O-rings, back up rings and seals.	· Replacement. · Replacement when damaged. · Replacement when damaged. · Replacement. · 100% replacement in general.

3. SWING DEVICE

1) WEARING PARTS

Inspection item	Standard dimension	Recommended replacement value	Counter measures
Clearance between piston and cylinder block bore	0.020	0.045	Replace piston or cylinder block
Play between piston and shoe caulking section (δ)	0	0.3	Replace assembly of piston and shoe
Thickness of shoe (t)	4	3.8	Replace assembly of piston and shoe
Combined height of set plate and guide (H)	17.4	17	Replace set of set plate and guide
Thickness of friction plate	3.6	3.2	Replace
			

2) SLIDING PARTS

Part name	Standard roughness	Remark
Shoe	0.8S	
Shoe plate	0.8S	
Cylinder block	6.3S	
Valve plate	0.8S	

5. TRAVEL DEVICE (TYPE 1)

Disassembling and inspection of the motor must be done in strict accordance with the servicing standards described here. During servicing, handle each part very carefully not to damage them, especially for their movable or sliding sections.

1) SEALS

Once the seals (o-rings, oil seals, and floating seals) have been disassembled, they must be replaced with new ones even if no damage is observed.

2) TABLE OF MAINTENANCE STANDARD

(1) Replace all parts having a seriously damaged appearance.

(2) Replace the part if any one of the states (symptoms) listed in the table below is observed.

Item No.	Part name	Situation	Standard dimension	Maximum allowable value (criteria)
2 8 17	**Spindle kit** ·Spindle assembly -Spindle -Coupling gear ·Pin	·Seriously damaged in appearance. ·Galling or other forms of excessive wear are observed.	-	-
3 6 9 14 25 34	**Carrier assembly** Carrier Cluster gear Shaft Thrust collar Needle bearing Dowel pin	·The tooth surface of the cluster gear (6) is nonuniformly worn out and damaged. ·The cluster gear (6) does not move smoothly.	-	-
4	Ring gear A	·The tooth surface is nonuniformly worn out and damaged.	-	-
5	Ring gear B	·The tooth surface is nonuniformly worn out and damaged.	-	-
7	Sun gear	·The tooth surface is nonuniformly worn out and damaged. ·The spline section is worn.	-	-
8	Coupling gear	·Excessive wear or pitching is observed on the tooth surface.	-	-
19	Coupling	·The spline section is worn.	-	-
20	Thrust bearing	·Worn out.	Axial clearance between coupling gear (8) and cover (13) : 0.3 mm±0.1 mm	-

Item No.	Part name	Situation	Standard dimension	Maximum allowable value (criteria)
22	Distance piece	· The sliding surface is damaged. · The sliding surface is excessively worn out.	-	-
24	Ball bearing	· Dents are present. · Flaking develops. · Nonuniform wear is present.	-	-
101	**Rear flange kit** Rear flange	· The movable section contacting the spool (123) is damaged. · The clearance against the spool (123) is too large. · The surface contacting the valve (127) is damaged. · The depth to the surface contacting the valve (127) is too large.	Linear clearance : 10 to 20 μ	Linear clearance : 25 μ
123	Spool	· The outer surface is damaged. · The outer surface is nonuniformly worn out.		
102	Shaft	· The surface contacting the oil seal (132) is worn out. · The spline section is worn out.	-	-
103	Swash plate	· Seizure is observed.	-	-
104	Cylinder block	· The spline section is worn out. · The bore inner surface is worn out too much. · The sliding surface that contacts the timing plate (109) is damaged or nonuniformly worn out.	-	-
105 106	Piston assembly Piston shoe	· An axial clearance is present between the piston (105) and the shoe (106). · The shoe is excessively worn out. · The shoe is nonuniformly worn out.	Clearance : 0.05mm	Clearance : 0.15mm
107	Retainer plate	· The peripheral edge is nonuniformly worn out.	-	-

Item No.	Part name	Situation	Standard dimension	Maximum allowable value (criteria)
108	Thrust ball	· The spherical sliding section that contacts the retainer plate (107) is nonuniformly worn out.	-	-
109	Timing plate	· The sliding surface has the traces of seizure or nonuniformly wear.		
115	Friction plate	· Both edges are nonuniformly worn out.	Braking torque 40.6 kgf · m or more	Braking torque 40.6 kgf · m or less
116	Mating plate	· The required torque cannot be achieved. · The traces of seizure are present.		
118	Valve seat	· The seat surface is damaged.	-	-
119	Valve	· The outer surface is damaged. · The seat surface is damaged.	-	-
136	**Body kit** Body	· The sliding section that contacts the spool (137) is damaged. · The clearance against the spool (137) is too large.	Linear clearance : 7 to 15 μ	Linear clearance : 20 μ
137	Spool	· The outer surface is damaged. · The outer surface is nonuniformly worn out.		
149 150	Roller bearing Ball bearing	· Dents are present. · Flaking develops. · Nonuniform wear is observed.	-	-
163	Valve	· The outer surface is damaged. · The seat surface is damaged.	-	-
164	Stopper	· The seat surface is damaged.		
142	Valve	· The outer surface is damaged. · The seat surface is damaged.		
172	Valve seat	· The seat surface is damaged.	-	-

TRAVEL DEVICE (TYPE 2, MACHINE SERIAL NO. : #3959-)

Disassembling and inspection of the motor must be done in strict accordance with the servicing standards described here. During servicing, handle each part very carefully not to damage them, especially for their movable or sliding sections.

1) PARTS INSPECTION TIPS AND REPLACEMENT STANDARDS

(1) **Sun gear, drive gear, planetary gear, housing.**
Pitting and breaking appear on the tooth surface.
※ **When the size of the groove or cavity in one pitting is Φ 1mm or more or the area ratio is 5% or more for the entire area.**

(2) **Oil seal**
Replace when the surface of the lip is damaged or worn.
When disassembling the oil seal from the motor for inspection.

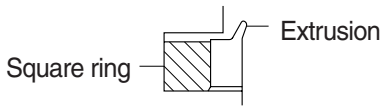
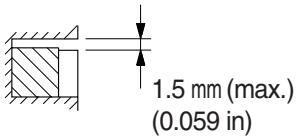
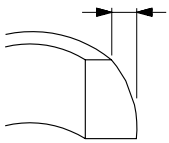
(3) **Planetary gear F of needle bearing part**
As the planetary gear F is assembled, check the boss and circumference direction clearance of the motor casing.
If it is 0.5 mm or more, replace it.

(4) **Do not disassemble in housing and check with the following tips.**
① Check the raceway surface, rollers or balls in the visible range, and make sure there are no pittings or cracks.
② Check for local corrosion and wear on the ball.
③ Please check again with the following tips.
a) Check the gear oil for excessive wear powder.
b) Make sure that there is excessive wear powder between the ball and cage.
c) When turning lightly by hand, check that it rotates smoothly.
After performing the above inspection, replace any problem.
Do not use angular bearing separated from housing again.

(5) **Side plate**
If the drive gear and sliding surfaces are markedly damaged, they must be replaced.

(6) Fitting on rotating surfaces of needle bearing and inner racefor planetary gear R, should be replaced when broken.

5. TURNING JOINT

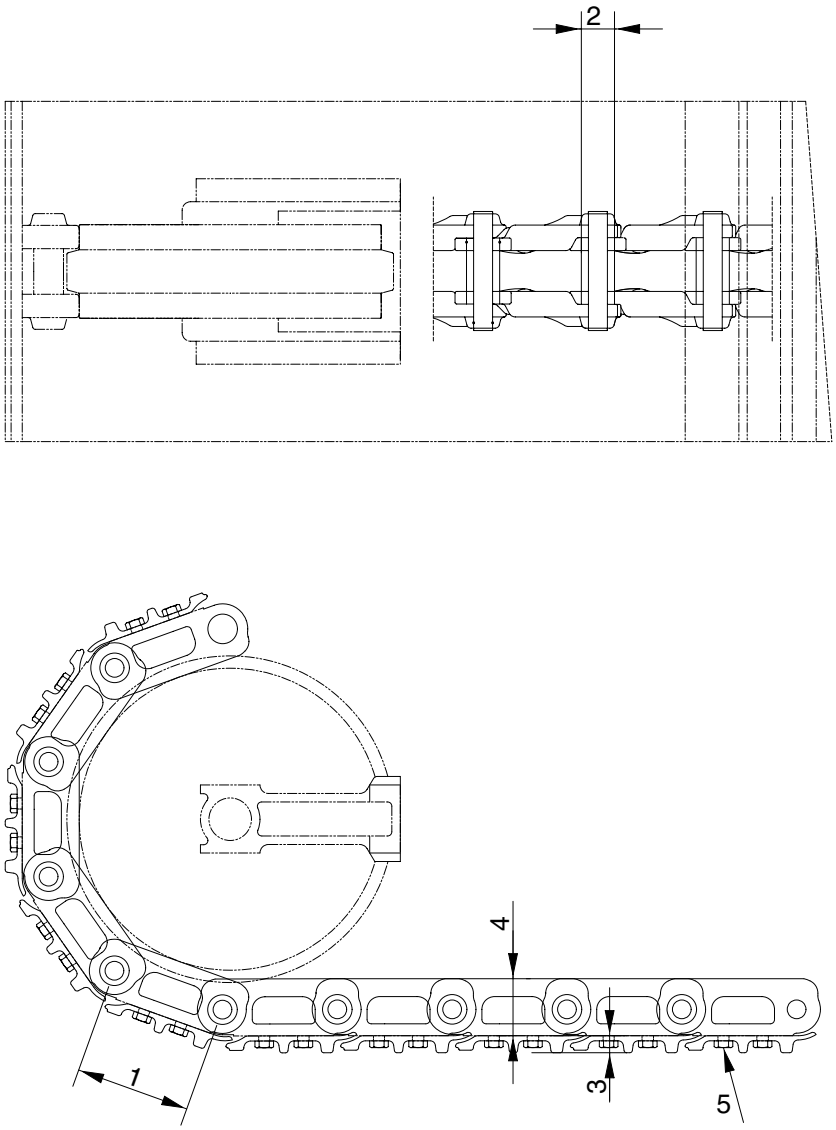
Part name		Maintenance standards	Remedy
Body, Stem	Sliding surface with sealing sections.	Plating worn or peeled due to seizure or contamination.	Replace
	Sliding surface between body and stem other than sealing section.	· Worn abnormality or damaged more than 0.1 mm (0.0039 in) in depth due to seizure contamination.	Replace
		· Damaged more than 0.1 mm (0.0039 in) in depth.	Smooth with oilstone.
	Sliding surface with thrust plate.	· Worn more than 0.5 mm (0.02 in) or abnormality.	Replace
		· Worn less than 0.5 mm (0.02 in).	Smooth
		· Damage due to seizure or contamination remediable within wear limit (0.5 mm) (0.02 in).	Smooth
Cover	Sliding surface with thrust plate.	· Worn more than 0.5 mm (0.02 in) or abnormality.	Replace
		· Worn less than 0.5 mm (0.02 in).	Smooth
		· Damage due to seizure or contamination remediable within wear limit (0.5 mm) (0.02 in).	Replace
Seal set	-	· Extruded excessively from seal groove square ring. 	Replace
	-	· Slipper ring 1.5 mm (0.059 in) narrower than seal groove, or narrower than back ring. 	Replace
	-	· Worn more than 0.5 mm (0.02 in) ~ 1.5 mm (MAX.) (0.059 in) 	Replace

6. CYLINDER

Part name	Inspecting section	Inspection item	Remedy
Piston rod	· Neck of rod pin	· Presence of crack	· Replace
	· Weld on rod hub	· Presence of crack	· Replace
	· Stepped part to which piston is attached.	· Presence of crack	· Replace
	· Threads	· Presence of crack	· Recondition or replace
	· Plated surface	· Plating is not worn off to base metal. · Rust is not present on plating. · Scratches are not present.	· Replace or replate · Replace or replate · Recondition, replate or replace
	· Rod	· Wear of O.D.	· Recondition, replate or replace
	· Bushing at mounting part	· Wear of I.D.	· Replace
Cylinder tube	· Weld on bottom	· Presence of crack	· Replace
	· Weld on head	· Presence of crack	· Replace
	· Weld on hub	· Presence of crack	· Replace
	· Tube interior	· Presence of faults	· Replace if oil leak is seen
	· Bushing at mounting part	· Wear on inner surface	· Replace
Gland	· Bushing	· Flaw on inner surface	· Replace if flaw is deeper than coating

1. TRACK SHOE

1) STEEL SHOE SPEC

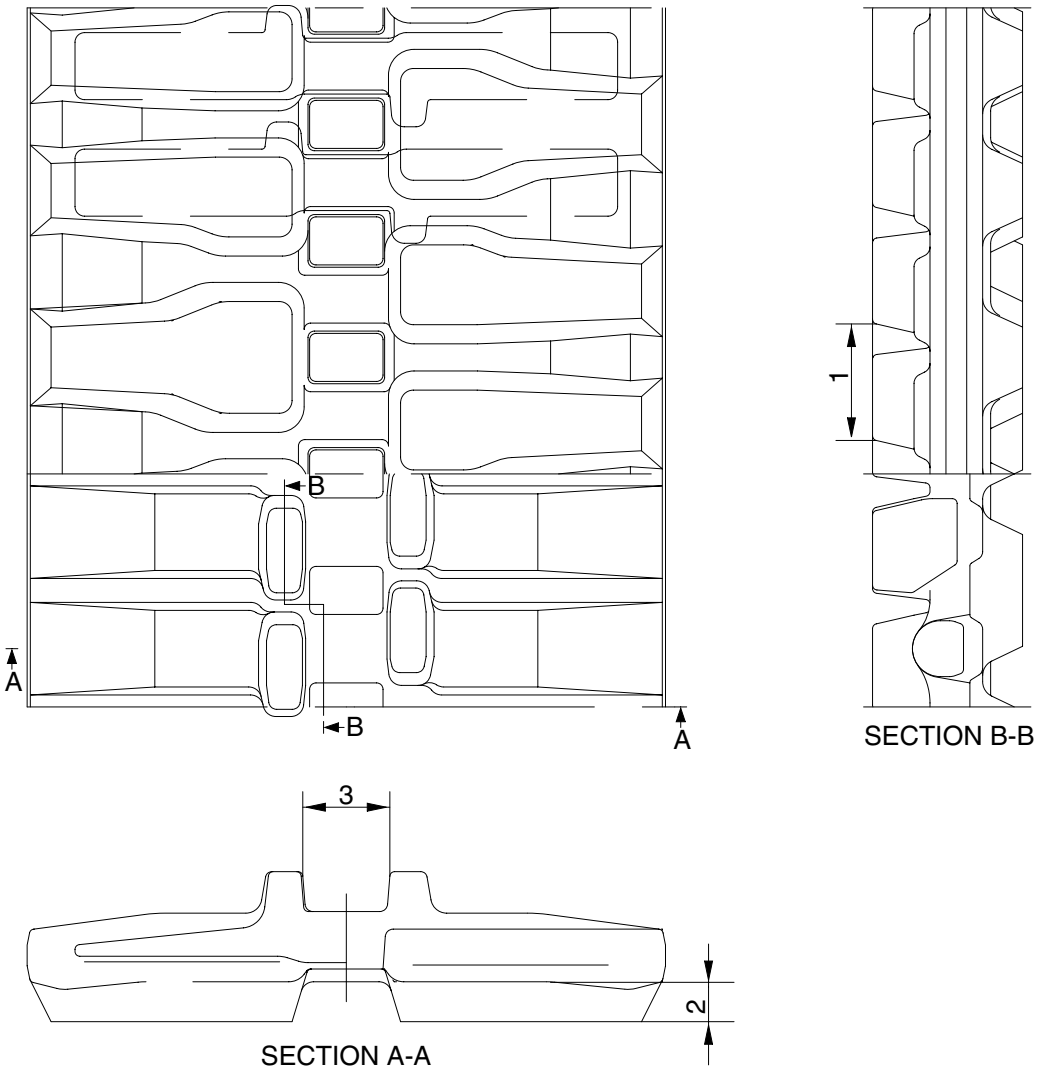


R5576MC16

Unit : mm

No	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Link pitch	135	138.6	Replace bushing and pin and link assembly
2	Outside diameter of bushing	35	31.4	
3	Height of grouser	14	11	Lug welding, rebuild or replace
4	Height of link	67	61.5	
5	Tightening torque	Initial tightening torque : 19±1.0kgf · m		Retighten

2) RUBBER SHOE SPEC

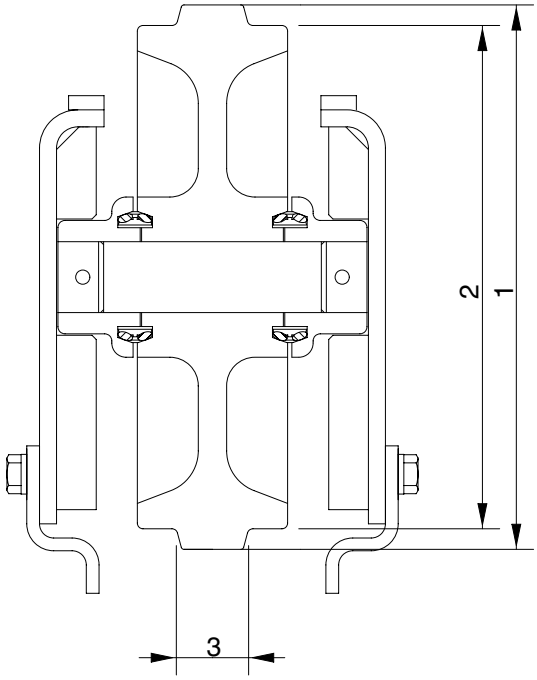


R5576MC17

Unit : mm

No	Check item	Criteria			Remedy
		Standard size	Tolerance	Repair limit	
1	Link pitch	73	±1.0	76	Replace
2	Height of grouser	25	-	5	
5	Width of link	55	-	70	

2. IDLER

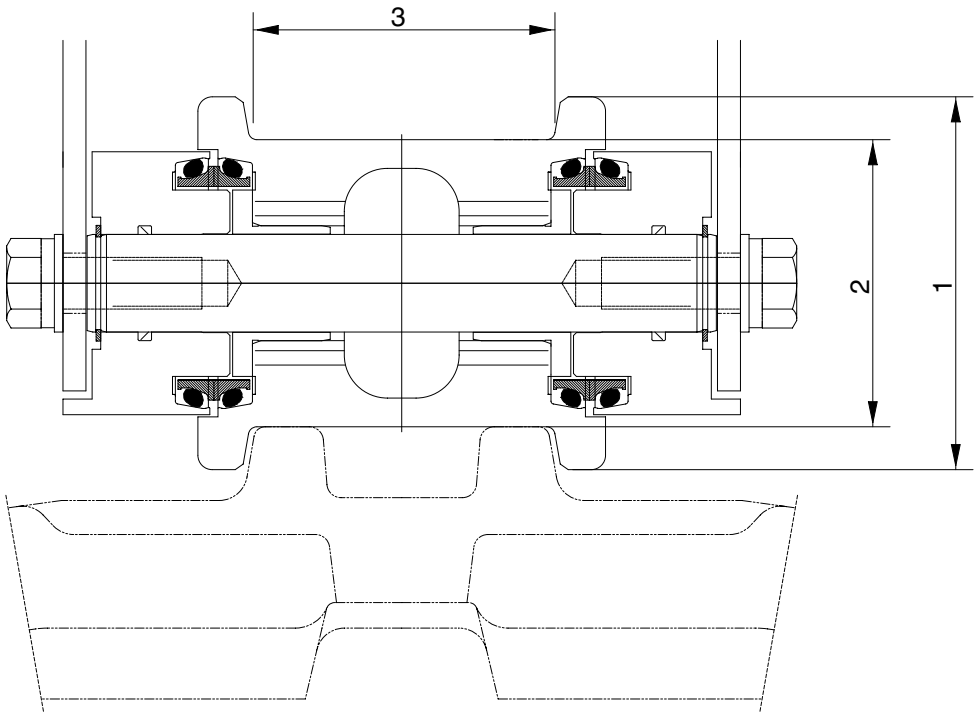


R5576MC18

Unit : mm

No	Check item		Criteria		Remedy
			Standard size	Repair limit	
1	Outside diameter of flange	Steel	384	-	Rebuild or replace
		Rubber	398	-	
2	Outside diameter of thread		355	345	
5	Width of flange		51	-	

3. TRACK/CARRIER ROLLER



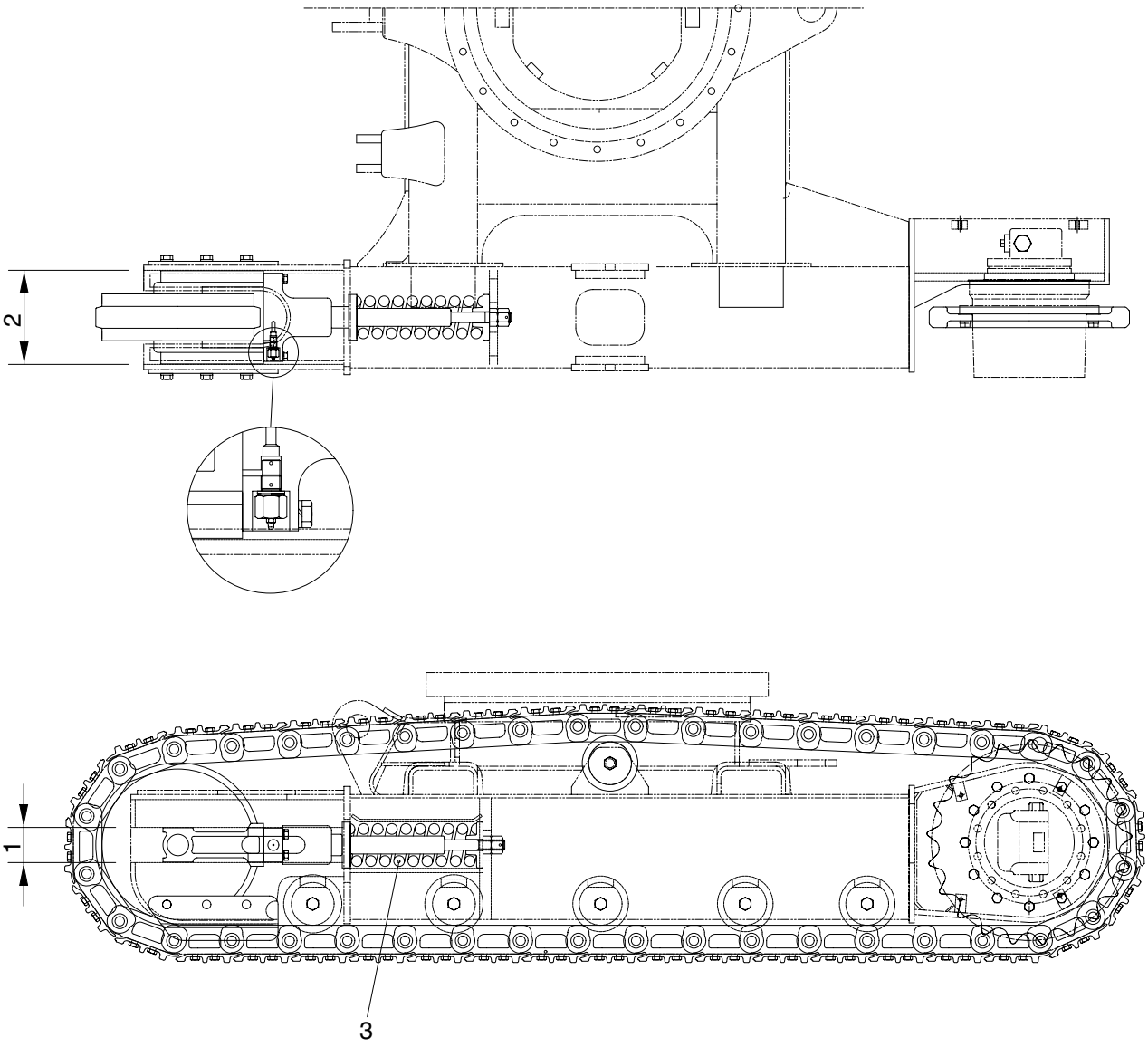
R5576MC15

Unit : mm

No	Check item		Criteria		Remedy
			Standard size	Repair limit	
1	Outside diameter of flange	Steel	130	-	Rebuild or replace
		Rubber	135	-	
2	Outside diameter of thread		105	95	
5	Width of flange		108	114	

4. TENSION CYLINDER

1) STEEL SHOE SPEC



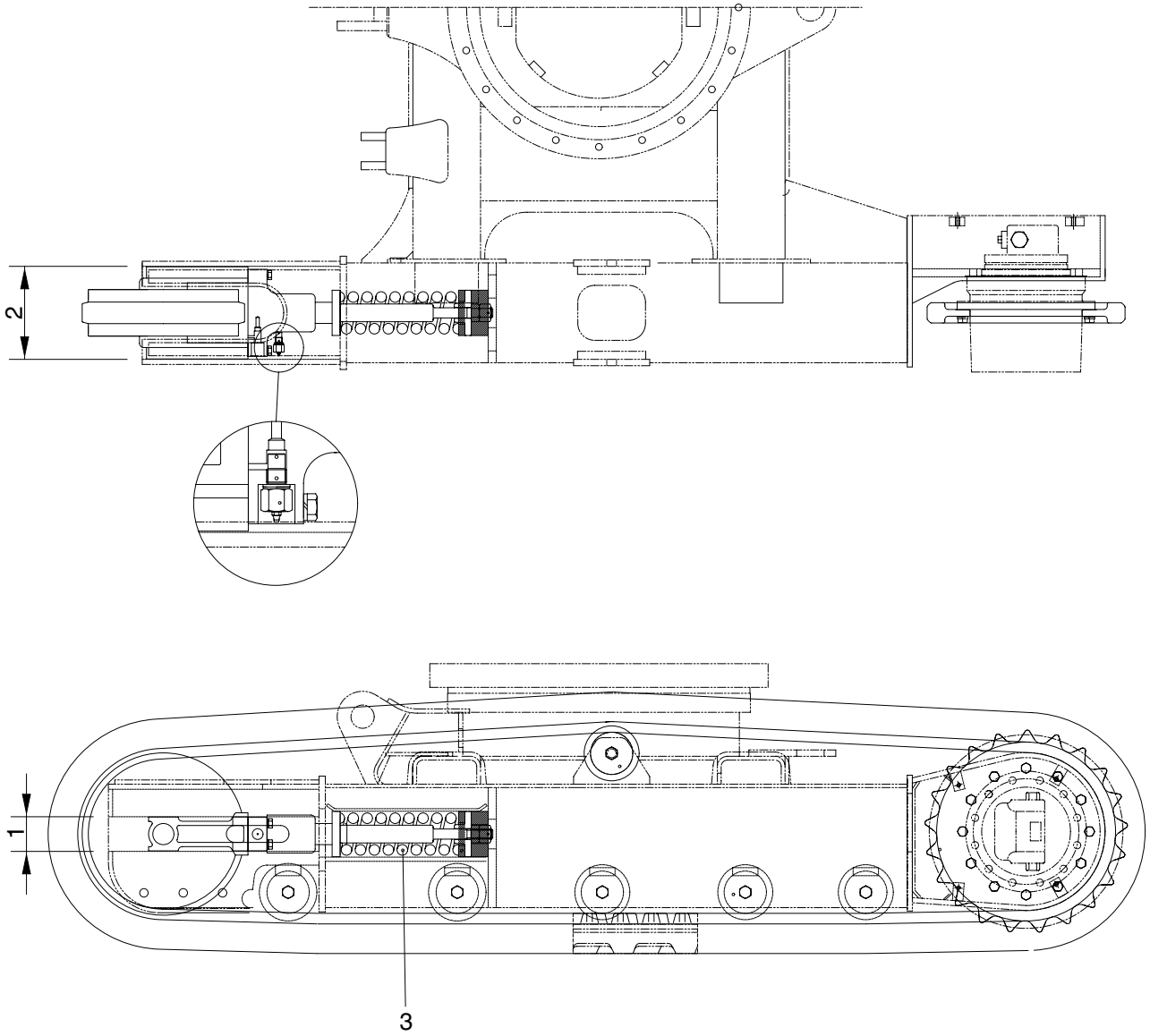
R5576MC19

Unit : mm

No	Check item	Criteria			Remedy
			Standard size	Repair limit	
1	Outside diameter of flange	Track frame	82	86	Rebuild
		Idler support	80	78	Rebuild or replace
2	Outside diameter of thread	Track frame	220	222	Rebuild
		Idler guide	218	214	Rebuild or replace

No	Check item	Standard size			Repair limit		Remedy
		Free length	Installed length	Installed load	Free length	Installed load	
3	Recoil spring	ø100×330	292	3,900 kg	-	3,120 kg	Replace

2) RUBBER SHOE SPEC

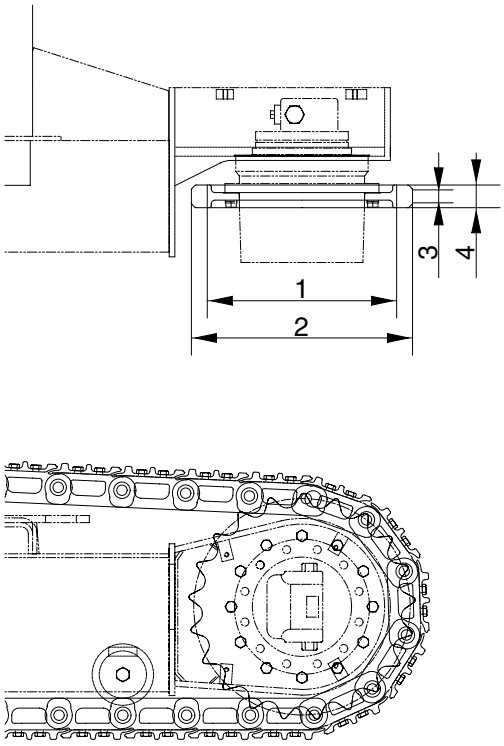


R5576MC20

Unit : mm

No	Check item	Criteria					Remedy
			Standard size		Repair limit		
1	Vertical width of idler guide	Track frame	82		86		Rebuild
		Idler support	80		76		
2	Horizontal width of idler guide	Track frame	220		222		Rebuild or replace
		Idler guide	218		214		Rebuild
3	Recoil spring	Standard size			Repair limit		Rebuild or replace
		Free length	Installed length	Installed load	Free length	Installed load	
		330	280	5,140 kg	-	4,110 kg	Replace

5. SPROCKET

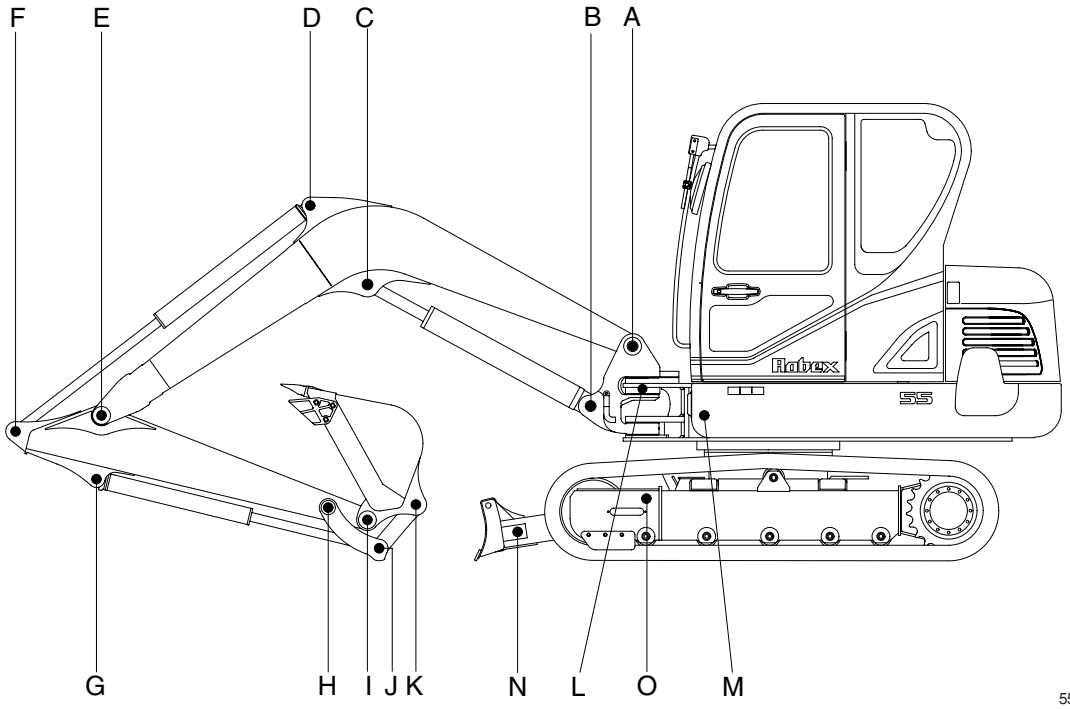


R5576MC21

Unit : mm

No	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Wear out of sprocket tooth lower side diameter	418.6	412	Repair or Replace
2	Wear out of sprocket tooth upper side diameter	476	-	
3	Wear out of sprocket tooth upper side width	33.5	-	
4	Wear out of sprocket tooth lower side width	42.5	36.5	

6. WORK EQUIPMENT



5596MC01

Unit : mm

Mark	Measuring point (pin and bushing)	Normal value	Pin		Bushing		Remedy & Remark
			Recomm. service limit	Limit of use	Recomm. service limit	Limit of use	
A	Boom Rear	50	49	48.5	50.5	51	Replace
B	Boom Cylinder Head	60	59	58.5	60.5	61	〃
C	Boom Cylinder Rod	60	59	58.5	60.5	61	〃
D	Arm Cylinder Head	50	49	48.5	50.5	51	〃
E	Boom Front	50	49	48.5	50.5	51	〃
F	Arm Cylinder Rod	50	49	48.5	50.5	51	〃
G	Bucket Cylinder Head	45	44	43.5	45.5	46	〃
H	Arm Link	45	44	43.5	45.5	46	〃
I	Bucket and Arm Link	45	44	43.5	45.5	46	〃
J	Bucket Cylinder Rod	45	44	43.5	45.5	46	〃
K	Bucket Link	45	44	43.5	45.5	46	〃
L	Boom swing post	110	109	108.5	110.5	111	〃
M	Boom swing cylinder	50	49	48.5	50.5	51	〃
N	Blade cylinder	55	54	53.5	55.5	56	〃
O	Blade and frame link	35	34	33.5	35.5	36	〃