



Issuing Entity:	Bulletin No.: N-011-05092011_00
Vekoma Rides Parts & Services B.V.	Release Date: 05-09-2011
Schaapweg 18	Effective Date: 05-10-2011
6063 BA VLODROP	Supersedes:
The Netherlands	Completion Date: N.A.
CoC Number 12049585	

# Notification

Original Ride Manufacturer: See Table 1	Affected Production Dates: All Rides with chain drive
Ride Name: General chain driven rides	Affected Serial Nos: N.a.
Model No: Various	

<p><b>Abstract of issue:</b></p> <p>This Notification gives general information about the storage, inspection, maintenance, mounting and adjustment of the chains and teeth of the sprocket wheels that are used to move a train upwards a lift.</p>
<p><b>Reason for release:</b></p> <p>General information about chains for rides with a chain driven lift.</p>
<p><b>Action to be taken:</b></p> <p>Add this information to your maintenance manual.</p>

## Revision summary:

Revision	Date	Comment
00	05-09-2011	Initial version

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Details of issue continued:

IB-nr.	Original Ride Manufacturer	Project number
27501	Vekoma International B.V./Vekoma Manufacturing B.V.*	82608
27502	Vekoma International B.V./Vekoma Manufacturing B.V.*	83515
27503	Vekoma International B.V./Vekoma Manufacturing B.V.*	83530
27504	Vekoma International B.V./Vekoma Manufacturing B.V.*	83535
27505	Vekoma International B.V./Vekoma Manufacturing B.V.*	91685
27506	Vekoma International B.V./Vekoma Manufacturing B.V.*	84545
27507	Vekoma International B.V./Vekoma Manufacturing B.V.*	84555
27508	Vekoma International B.V./Vekoma Manufacturing B.V.*	84565
27509	Vekoma International B.V./Vekoma Manufacturing B.V.*	85590
27510	Vekoma International B.V./Vekoma Manufacturing B.V.*	86785
27511	Vekoma International B.V./Vekoma Manufacturing B.V.*	86780
27512	Vekoma International B.V./Vekoma Manufacturing B.V.*	86725
27514	Vekoma International B.V./Vekoma Manufacturing B.V.*	86715
27515	Vekoma International B.V./Vekoma Manufacturing B.V.*	86640
27516	Vekoma International B.V./Vekoma Manufacturing B.V.*	87505
27517	Vekoma International B.V./Vekoma Manufacturing B.V.*	93104
27518	Vekoma International B.V./Vekoma Manufacturing B.V.*	87610
27519	Vekoma International B.V./Vekoma Manufacturing B.V.*	87685
27520	Vekoma International B.V./Vekoma Manufacturing B.V.*	89587
27521	Vekoma International B.V./Vekoma Manufacturing B.V.*	89605
27522	Vekoma International B.V./Vekoma Manufacturing B.V.*	89610
27523	Vekoma International B.V./Vekoma Manufacturing B.V.*	90510
27524	Vekoma International B.V./Vekoma Manufacturing B.V.*	90523
27525	Vekoma International B.V./Vekoma Manufacturing B.V.*	91678
27526	Vekoma International B.V./Vekoma Manufacturing B.V.*	95115
27527	Vekoma International B.V./Vekoma Manufacturing B.V.*	95163

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IB-nr.	Original Ride Manufacturer	Project number
27528	Vekoma International B.V./Vekoma Manufacturing B.V.*	96378
27529	Vekoma International B.V./Vekoma Manufacturing B.V.*	96372
27530	Vekoma International B.V./Vekoma Manufacturing B.V.*	96340
27531	Vekoma International B.V./Vekoma Manufacturing B.V.*	96293
27532	Vekoma International B.V./Vekoma Manufacturing B.V.*	97105
27533	Vekoma International B.V./Vekoma Manufacturing B.V.*	97117
27534	Vekoma International B.V./Vekoma Manufacturing B.V.*	97153
27535	Vekoma International B.V./Vekoma Manufacturing B.V.*	97128
27536	Vekoma International B.V./Vekoma Manufacturing B.V.*	97196
27537	Vekoma International B.V./Vekoma Manufacturing B.V.*	98113
27538	Vekoma International B.V./Vekoma Manufacturing B.V.*	98111
27539	Vekoma International B.V./Vekoma Manufacturing B.V.*	99306
27540	Vekoma International B.V./Vekoma Manufacturing B.V.*	97333
27541	Vekoma International B.V./Vekoma Manufacturing B.V.*	99269
27542	Vekoma International B.V./Vekoma Manufacturing B.V.*	98112
27543	Vekoma International B.V./Vekoma Manufacturing B.V.*	20151
27544	Vekoma Rides Manufacturing B.V.	91008
27545	Vekoma Rides Manufacturing B.V.	91228
27546	Vekoma Rides Manufacturing B.V.	60022
28001	Vekoma International B.V./Vekoma Manufacturing B.V.*	93102
28501	Vekoma International B.V./Vekoma Manufacturing B.V.*	85525
28502	Vekoma International B.V./Vekoma Manufacturing B.V.*	85530
28503	Vekoma International B.V./Vekoma Manufacturing B.V.*	86770
28504	Vekoma International B.V./Vekoma Manufacturing B.V.*	87580
28505	Vekoma International B.V./Vekoma Manufacturing B.V.*	88692
28506	Vekoma International B.V./Vekoma Manufacturing B.V.*	92511
28507	Vekoma International B.V./Vekoma Manufacturing B.V.*	97121
29002	Vekoma International B.V./Vekoma Manufacturing B.V.*	78820
29003	Vekoma International B.V./Vekoma Manufacturing B.V.*	78830

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29005	Vekoma International B.V./Vekoma Manufacturing B.V.*	78850
29006	Vekoma International B.V./Vekoma Manufacturing B.V.*	80860
29008	Vekoma International B.V./Vekoma Manufacturing B.V.*	81500
29501	Vekoma International B.V./Vekoma Manufacturing B.V.*	80880
29502	Vekoma International B.V./Vekoma Manufacturing B.V.*	82550
29503	Vekoma International B.V./Vekoma Manufacturing B.V.*	82560
29504	Vekoma International B.V./Vekoma Manufacturing B.V.*	84535
29505	Vekoma International B.V./Vekoma Manufacturing B.V.*	87695
30001	Vekoma International B.V./Vekoma Manufacturing B.V.*	96584
30003	Vekoma International B.V./Vekoma Manufacturing B.V.*	20139
30004	Vekoma International B.V./Vekoma Manufacturing B.V.*	20140
31001	Vekoma International B.V./Vekoma Manufacturing B.V.*	87690
31002	Vekoma International B.V./Vekoma Manufacturing B.V.*	95116
32001	Vekoma International B.V./Vekoma Manufacturing B.V.*	92604
32002	Vekoma International B.V./Vekoma Manufacturing B.V.*	93144
32003	Vekoma International B.V./Vekoma Manufacturing B.V.*	93137
32004	Vekoma International B.V./Vekoma Manufacturing B.V.*	94103
32005	Vekoma International B.V./Vekoma Manufacturing B.V.*	94117
32007	Vekoma International B.V./Vekoma Manufacturing B.V.*	94119
32008	Vekoma International B.V./Vekoma Manufacturing B.V.*	94124
32009	Vekoma International B.V./Vekoma Manufacturing B.V.*	94133
32010	Vekoma International B.V./Vekoma Manufacturing B.V.*	94136
32011	Vekoma International B.V./Vekoma Manufacturing B.V.*	95107
32012	Vekoma International B.V./Vekoma Manufacturing B.V.*	96398
32013	Vekoma International B.V./Vekoma Manufacturing B.V.*	95164
32014	Vekoma International B.V./Vekoma Manufacturing B.V.*	95170
32015	Vekoma International B.V./Vekoma Manufacturing B.V.*	96350
32016	Vekoma International B.V./Vekoma Manufacturing B.V.*	96362
32017	Vekoma International B.V./Vekoma Manufacturing B.V.*	96344

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32018	Vekoma International B.V./Vekoma Manufacturing B.V.*	96356
32019	Vekoma International B.V./Vekoma Manufacturing B.V.*	96289
32020	Vekoma International B.V./Vekoma Manufacturing B.V.*	97119
32021	Vekoma International B.V./Vekoma Manufacturing B.V.*	97103
32022	Vekoma International B.V./Vekoma Manufacturing B.V.*	97163
32023	Vekoma International B.V./Vekoma Manufacturing B.V.*	97330
32024	Vekoma International B.V./Vekoma Manufacturing B.V.*	97154
32025	Vekoma International B.V./Vekoma Manufacturing B.V.*	97197
32026	Vekoma International B.V./Vekoma Manufacturing B.V.*	97332
32027	Vekoma International B.V./Vekoma Manufacturing B.V.*	97331
32028	Vekoma International B.V./Vekoma Manufacturing B.V.*	97123
32029	Vekoma International B.V./Vekoma Manufacturing B.V.*	98130
32030	Vekoma International B.V./Vekoma Manufacturing B.V.*	99262
32031	Vekoma International B.V./Vekoma Manufacturing B.V.*	98182
32032	Vekoma International B.V./Vekoma Manufacturing B.V.*	99272
32033	Vekoma Rides Manufacturing B.V.	91000
32034	Vekoma Rides Manufacturing B.V.	91015/16
32035	Vekoma Rides Manufacturing B.V.	91084
32036	Vekoma Rides Manufacturing B.V.	91004
32037	Vekoma Rides Manufacturing B.V.	91013
32038	Vekoma Rides Manufacturing B.V.	60007
32039	Vekoma Rides Manufacturing B.V.	60032
32040	Vekoma Rides Manufacturing B.V.	60158
32501	Vekoma Rides Manufacturing B.V.	91050
33001	Vekoma International B.V./Vekoma Manufacturing B.V.*	81511
33002	Vekoma International B.V./Vekoma Manufacturing B.V.*	87640
33003	Vekoma International B.V./Vekoma Manufacturing B.V.*	89561
33501	Vekoma International B.V./Vekoma Manufacturing B.V.*	80710
33502	Vekoma International B.V./Vekoma Manufacturing B.V.*	80720

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33503	Vekoma International B.V./Vekoma Manufacturing B.V.*	80730
33504	Vekoma International B.V./Vekoma Manufacturing B.V.*	80740
33505	Vekoma International B.V./Vekoma Manufacturing B.V.*	80750
33507	Vekoma International B.V./Vekoma Manufacturing B.V.*	81527
34501	Vekoma International B.V./Vekoma Manufacturing B.V.*	86760
34502	Vekoma International B.V./Vekoma Manufacturing B.V.*	86700
34503	Vekoma International B.V./Vekoma Manufacturing B.V.*	93134
35501	Vekoma International B.V./Vekoma Manufacturing B.V.*	87650
35502	Vekoma International B.V./Vekoma Manufacturing B.V.*	88688
35503	Vekoma International B.V./Vekoma Manufacturing B.V.*	91650
35504	Vekoma International B.V./Vekoma Manufacturing B.V.*	93100/101
37001	Vekoma International B.V./Vekoma Manufacturing B.V.*	88700
37509	Vekoma International B.V./Vekoma Manufacturing B.V.*	94129
37510	Vekoma International B.V./Vekoma Manufacturing B.V.*	95176
39501	Vekoma International B.V./Vekoma Manufacturing B.V.*	86690
39502	Vekoma International B.V./Vekoma Manufacturing B.V.*	86710
39503	Vekoma International B.V./Vekoma Manufacturing B.V.*	87560
39504	Vekoma International B.V./Vekoma Manufacturing B.V.*	95129
39505	Vekoma Rides Manufacturing B.V.	91116
39506	Vekoma Rides Manufacturing B.V.	91154
39507	Vekoma Rides Manufacturing B.V.	60098
40001	Vekoma International B.V./Vekoma Manufacturing B.V.*	89545
40002	Vekoma International B.V./Vekoma Manufacturing B.V.*	94127
40003	Vekoma International B.V./Vekoma Manufacturing B.V.*	97129
40004	Vekoma Rides Manufacturing B.V.	91002
40006	Vekoma Rides Manufacturing B.V.	60008
40008	Vekoma Rides Manufacturing B.V.	60114
40009	Vekoma Rides Manufacturing B.V.	60123
40010	Vekoma Rides Manufacturing B.V.	60159

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IB-nr.	Original Ride Manufacturer	Project number
40011	Vekoma Rides Manufacturing B.V.	60237
40501	Vekoma International B.V./Vekoma Manufacturing B.V.*	94116
40502	Vekoma International B.V./Vekoma Manufacturing B.V.*	95174
40503	Vekoma Rides Manufacturing B.V.	98116
42001	Vekoma International B.V./Vekoma Manufacturing B.V.*	99282
42002	Vekoma International B.V./Vekoma Manufacturing B.V.*	99311/20148
42003	Vekoma International B.V./Vekoma Manufacturing B.V.*	20148
45501	Vekoma Rides Manufacturing B.V.	60135

Table 1

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Details of issue continued:

## Table of contents:

Revision summary:.....	1
Table of contents: .....	8
1.1 Chain & sprocket storage .....	9
1.1.1 Chain .....	9
1.1.2 Sprockets .....	9
1.2 Chain and sprocket wheel inspection .....	10
1.2.1 Chain inspection.....	10
1.2.2 Sprocket wheel inspection .....	14
1.3 Maintenance .....	19
1.3.1 Maintenance schedule.....	19
1.3.2 Lubrication .....	22
1.4 Mounting instructions .....	24
1.4.1 Removing a connecting link .....	24
1.4.2 Removing a riveting link.....	25
1.4.3 Riveting solid pins .....	26
1.5 Adjustment.....	27

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Details of issue continued:

## 1.1 Chain & sprocket storage

### 1.1.1 Chain

Before a chain leaves the warehouse it is pre-lubricated with a grease which acts as a corrosion protective and anti-fretting lubricant. For shipment they are either stacked on pallets and then shrink wrapped or packed into wooden boxes. If the chain is to be stored on site for weeks or months before use, it should be left in the packaging for protection. It should not be stored in an open area where dust, dirt and water are present. If chain equipment is to be left idle for long periods, clean the chain and sprockets (i.e. brushing or steam cleaning) and then cover them with oil. If chain is removed from a machine for storage, try to store it in a container filled with old engine oil or similar. If it is not possible to store chains in a lubricated environment, the chain should be lubricated on installation and run unloaded for at least 24 hours.

#### 1.1.1.1 Lubricant application

It is important that lubricant is applied to the correct parts of a chain. To merely brush lubricant over the chain plates will prevent external corrosion but will not necessarily benefit the bearing surfaces. Lubricant should be applied between the inner and outer plates above each pitch point, and between the inner plates and roller if a roller is fitted. This should ensure that the lubricant flows into the bearing surfaces.

Vekoma Rides Parts & Services B.V. recommends using Klüber Structovis BHD as lubricant.

#### 1.1.2 Sprockets

Sprockets usually leave the warehouse shrink wrapped on pallets or in wooden boxes. All surfaces are painted before dispatch except where they have been machined (i.e. cut teeth or bored and key-wayed). If the sprockets are not to be used within a few days of receipt, then all machined surfaces should be protected/ covered with a heavy oil or grease to prevent corrosion. As stated for the chain, do not store in an open area where dust, dirt and water are present.

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6063 BA VLODROP	Supersedes:
The Netherlands	Completion Date: N.A.
CoC Number 12049585	

Details of issue continued:

## 1.2 Chain and sprocket wheel inspection

### 1.2.1 Chain inspection

#### 1.2.1.1 General inspection

The chain needs to be checked on a regular basis throughout its life, to ensure any faults in the machine are detected at an early stage so that rectification work can be carried out to prevent further damage.

General visual inspection of the chain should be carried out with the forgoing to detect broken components, broken or damaged attachments, severe corrosion, seized joints, cracks or any unusual occurrences. The chain should be cleaned in order to be able to do a good inspection. The causes of these should be identified and rectified and damaged chain replaced.

#### 1.2.1.2 Extension of chain pitch

A direct measure of chain wear is the extension in chain pitch due to the wear between bearing pin and bush. This is caused by the chain articulating under tension around the drive sprockets.

This can usually be obtained by direct measurement as follows (figure 1):

The chain must be on a straight section of track and under tension. This measured length "M" can then be applied to the in figure 1 mentioned formula to obtain the percentage extension.

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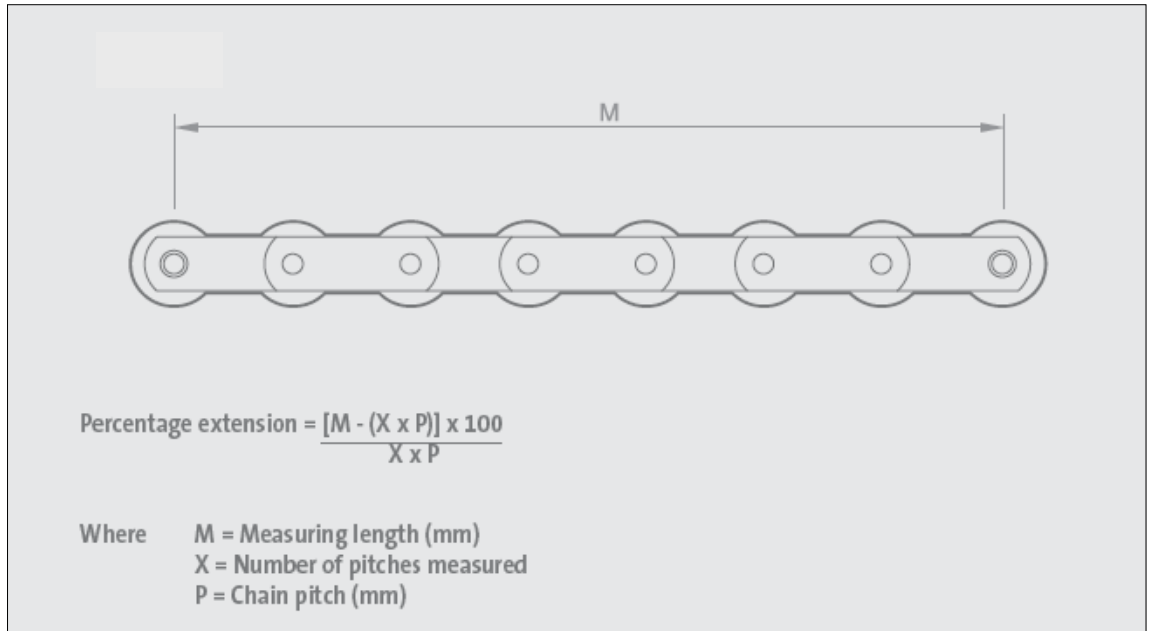


figure 1

The chain must be replaced when the max. elongation, i.e. 3% of the original chain length, is exceeded. The normal tolerance on the chain is +0.32%.(9.6 mm over 3000 mm). Measure the elongation over a length of 20 chain irons. Original size = 20 x 150 mm = 3000.0 mm, i.e. 3% = 90 mm. If the length of the chain measured over 20 chain irons is more than 3090.0 mm. (3000.0 mm + 90 mm) replace the chain.

When the chain extension has reached these numbers, the chain should be replaced. If regular measurements are taken and results recorded, it is possible to predict how long the chain will last and when replacement will be required.

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6063 BA VLODROP	Supersedes:
The Netherlands	Completion Date: N.A.
CoC Number 12049585	

Details of issue continued:

### 1.2.1.3 Link plate wear

Wear on link plates can appear in various ways, due to a number of different causes and in some cases can mean premature chain replacement. In chain troughs the chain runs on its link plate edges, wearing away of the plate edges can occur, which will reduce the plate depth and thus the tensile strength of the chain. (figure 2). This wear should not exceed more than half the original plate depth above the bush, otherwise a chain breakage could occur. When wear has occurred to this extent the chain should be replaced. In some cases, to extend chain life it may be possible to turn the chain over so that the unworn edge of the chain becomes the wearing surface. This will depend on the type of chain, fixtures on the chain and the make-up of the chain. Contact Vekoma Rides Parts & Services B.V. to determine if this is a possible solution. The sprocket and tension/ idler wheel are the best locations to measure the link plate wear, this because of the easy access to the chain.

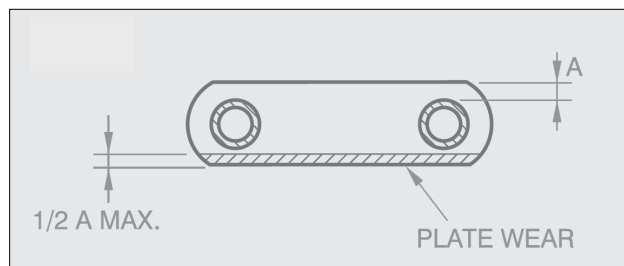


figure 2

The rubbing friction between the roller side face and the inside of the inner links can produce wear on the inner link plate. If this occurs before signs of wear on other components, it is a sign of misalignment in the chain guide. In this case, roller treads should also be checked for signs of tapered wear. (figure 3).

Similar wear may occur between the inner and outer link plates (figure 4) (although this is not common on the BS series of chains, due to the bush projection from the inner link plates which creates a gap between the inner and outer plates). Again, this is usually a sign of mis-alignment. In both cases, if the plate thickness has been reduced by more than 1/3 of its original thickness the chain strength is substantially reduced and the chain should be replaced after first rectifying the misalignments.

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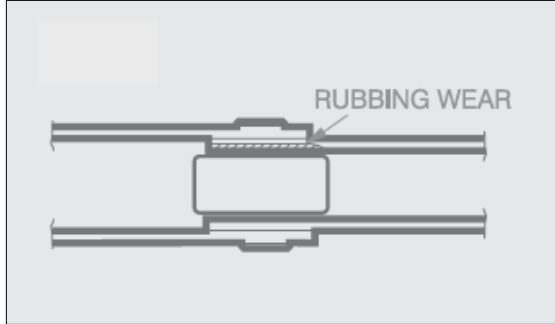


figure 3

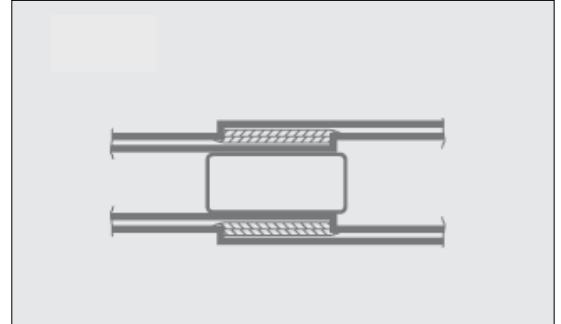


figure 4

**i.e. Check the following:**

- Alignment of head and tail wheels.
- Shaft alignments.
- Level across tracks.

The chain should be checked for marking or damage to the inner plate edges and marking or wear on the inside faces of the inner links. This is due to the sprocket teeth rubbing on the plates as the chain engages with the sprocket. Light marking is usual, due to normal movement of chain. However, if wear is heavy and plate thickness is reducing, sprocket spacing or alignment should be checked and rectified and severely damaged links replaced.

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#### 1.2.1.4 Bush wear

If the bush is worn through so that the bearing pin is exposed, then the chain should be replaced immediately. In certain circumstances it may be possible to turn the chain over and wear the opposite face of the wear of the bush to extend the chain life. (In this case, advice from Vekoma Rides Parts & Services B.V. should be sought). Should any cracked or broken bushes be found, then depending on the extent of the damage, either links or the complete chain should be replaced.

#### 1.2.1.5 Welded chain

In case of a welded chain the weld should be inspected regularly.



**Should cracks be found or if you have any doubts contact Vekoma Rides Parts & Services B.V.**

#### 1.2.2 Sprocket wheel inspection

##### 1.2.2.1 Sprocket wheel tooth wear

Normal wear takes place due to the engagement of the chain with the sprocket wheel teeth and shows up as a polished or worn strip on the face of the tooth gap near the root (i.e. about the PCD). Wear generally occurs faster on sprockets driving bush chains rather than roller chains. This is due to the sliding engagement of the bush on the tooth as opposed to the rolling engagement of the roller. Usually as the sprocket wheel wears, this shows up as a concavity or hooking of the tooth flank. If this is allowed to continue it will start to impede chain engagement/disengagement and on short pitch chains weaken the tooth. (figure 5).

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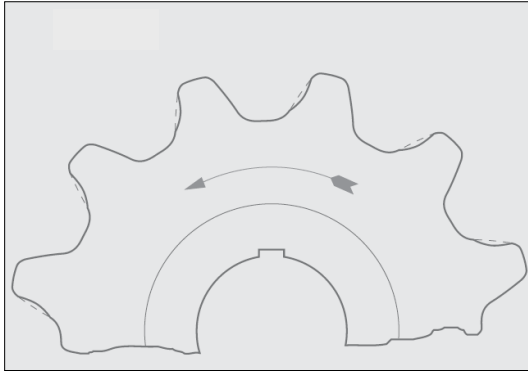


figure 5

If the chain has not been kept in correct adjustment and runs slack it may tend to resonate and jump the teeth, causing the wear pattern shown in figure 6. This can be rectified by correcting the chain adjustment and if necessary replacing the sprocket wheel. Given adequate lubrication and chain maintenance, the sprocket wheels should last the life of the chain.

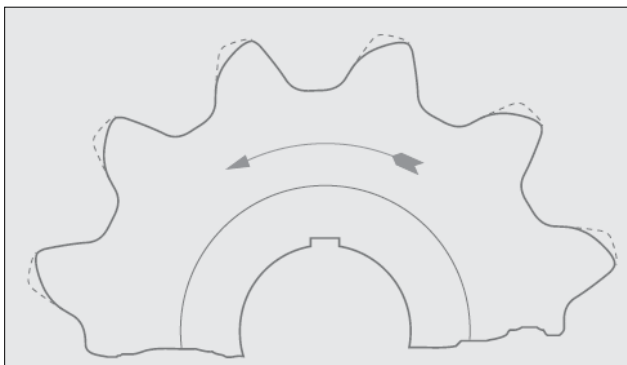


figure 6

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CoC Number 12049585	

Details of issue continued:

### 1.2.2.2 Measurement of tooth wear

Quite often it is only possible to make visual inspection of the tooth gap. However, if the sprockets are accessible during routine maintenance, then one of the following methods should be used to measure for wear.

- Clean the tooth gap of oil, grease or any other matter and apply to the tooth gap an "as new" template. (figure 7).

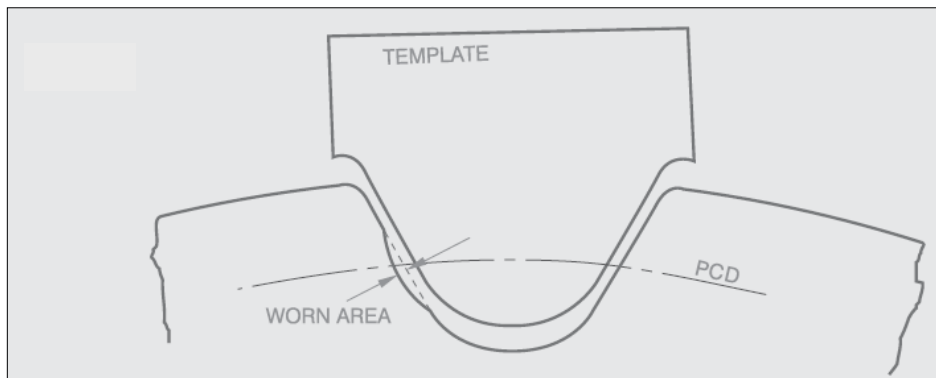


figure 7

- Clean the tooth gap as above and apply a smear of grease around the face of the tooth gap. Hold a piece of stiff paper or card against the wheel and apply finger pressure all the way around the tooth gap to form an impression on the paper/card. This can then be compared to the original tooth gap profile. (figure 8).
- On larger sprockets, wear can be measured by holding a straight edge against the tooth flank and measuring the worn gap. (figure 9).

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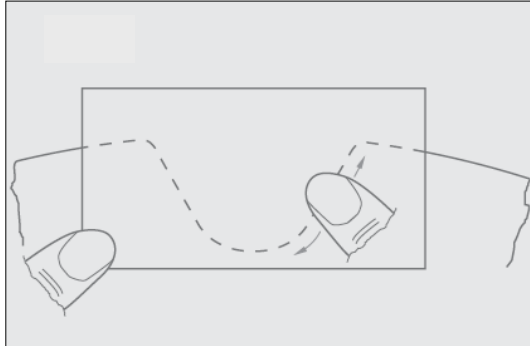


figure 8

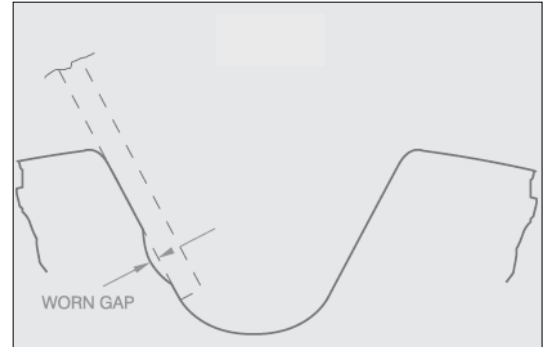


figure 9

### Wear limit

The hardening depth of the teeth of the sprocket wheel is between 1.5 and 2 mm.

The sprocket wheel has worn:

- Up to 1.5 mm                      No action
- Between 1.5 and 2 mm        Additional inspection
- Above 2 mm                        Replace sprocket wheel

It is recommended that the sprocket wheel is replaced as soon as the wear limit has been reached.

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CoC Number 12049585	

Details of issue continued:

### 1.2.2.3 General

As a result of wear between the chain pin and bush, the distance between adjacent rollers increases more at the outer links than at the inner. In terms of sprocket wheel engagement, this causes a greater proportion of the chain pull to be carried by the most highly loaded tooth. In the most extreme situation the full chain pull would be carried by one tooth, which results in accelerated tooth wear. For this reason it is bad practice to run worn chain on new sprockets or vice versa.

As well as sprocket tooth gap, checks should be made for signs of unusual wear patterns, i.e. heavy wear or scoring on one side of the sprocket, tapered wear in the tooth gap, etc.

These will indicate chain track, shaft or sprocket misalignments. The causes should be identified and adjusted.

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CoC Number 12049585	

Details of issue continued:

## 1.3 Maintenance

### 1.3.1 Maintenance schedule

A typical maintenance schedule is laid out below. This should be adapted to suit each specific application, based on the local conditions and duty cycle.

Typical Maintenance Schedule:

#### 1.3.1.1 Every week

- 1 Check lubrication and lubricate if necessary.

#### 1.3.1.2 First month's running

- 1 Check the chain tension and adjust if necessary.
- 2 Check for unusual wear and identify cause and adjust.

#### 1.3.1.3 After three (3) months

- 1 Check chain adjustment and adjust if necessary. See section 1.3.1.2.
- 2 Change oil, oil filter and clear the sump, if a lubrication system used.

#### 1.3.1.4 Every three (3) months

- 1 Check chain tension and adjust if necessary. See section 1.3.1.2.
- 2 Check unusual wear and identify cause and rectify.
- 3 Visual the welds for cracks in case of a welded chain.

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### 1.3.1.5 Annually

- 1 Carry out the above checks.
- 2 Check for wear on side plates, pins and bushes.
- 3 Check for chain elongation.
- 4 Check all teeth of the sprocket wheels for cracks by. penetrant testing or magnetic testing according to Table 2 and Table 3.

Code	Section/ Article	Acceptance level
EN 10228-1	Magnetic particle inspection	Class 4
EN 10228-2	Penetrant testing	Class 4

Table 2: NDT testing machined parts

NDT method	Codes (Examination)	Codes (Acceptance level)	Acceptance level
PT (Penetrant Testing)	ISO 3452-1 or EN 571-1	EN 1289	1
MT (Magnetic Particle Testing)	ISO 17638 or EN 1290	EN 1291	1

Table 3: NDT testing welded parts



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Details of issue continued:

- 5 Check cleanliness of components.
- 6 Remove any accumulation of dirt or foreign materials.
- 7 Check for shaft and sprocket alignment.
- 8 Check for wear on sprockets.
- 9 Check the condition of the lubricant.
- 10 Check the lubrication system (if applicable).

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Details of issue continued:

### 1.3.2 Lubrication

Effective lubrication of the chain bearing surfaces is essential to obtain optimum performance in addition to minimizing power absorption, rate of wear, probability of corrosion and noise.

#### 1.3.2.1 Lubricant application

It is important that lubricant is applied to the correct parts of a chain. To merely brush lubricant over the chain plates will prevent external corrosion but will not necessarily benefit the bearing surfaces. Lubricant should be applied between the inner and outer plates above each pitch point, and between the inner plates and roller if a roller is fitted. This should ensure that the lubricant flows into the bearing surfaces (figure 11).

Vekoma Rides Parts & Services B.V. recommends using Klüber Structovis BHD as lubricant.

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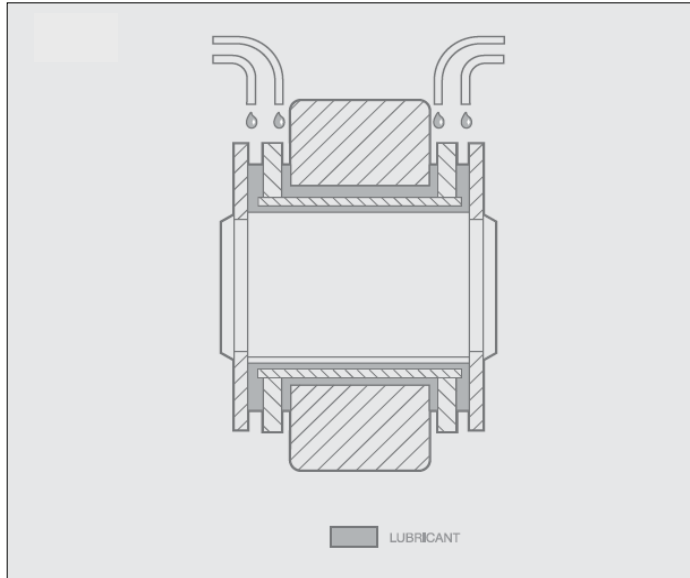


Figure 11

Special care should be taken that the correct amount of lubricant is applied. Too much lubricant can lead to roller treads and tracks being contaminated, with subsequent loss of roller traction. At slow speeds and with light loads this can lead to uneven motion i.e. “stick slip”. A further problem can be flats appearing on the roller treads which eventually prevent the rollers turning and thus increase the power required to drive the lift.

**Lubricant is usually applied to the chain by the following method:**

Manually applying lubricant by means of oil can, brush or aerosol. The frequency of lubrication will vary depending on environmental conditions. In some cases once per day may be necessary, in others once per week. Lubricant should ideally be applied to the chain as it leaves the drive sprocket, i.e. at point of minimum tension. This will allow the lubricant to penetrate into the bearing surfaces. When a new set of chains has been installed, or if the lift has been standing for a long time, it should be allowed to run unloaded for a few hours after the lubricant has been applied to allow it to work into the chain effectively.

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## 1.4 Mounting instructions

### 1.4.1 Removing a connecting link

Connecting links are usually of two types.

- Links with split pins on one side.
- Riveting links.

To remove a connecting link, the chain should be solidly supported on the chain trough or on a bench and the fasteners removed from the bearing pins. In the case of split pins, it may be necessary to cut them off flush with the O.D. of the pin.

A sharp blow with a hammer and punch against the end of each bearing pin in turn will release the pins from the link plate and allow the other plate, complete with pins, to be removed (figure 12 and 13).

**NOTE:**

*If the chain is on a bench or lying on the floor, the plates should be supported.*

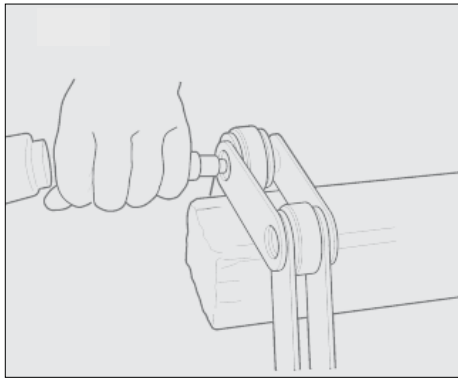


figure 12

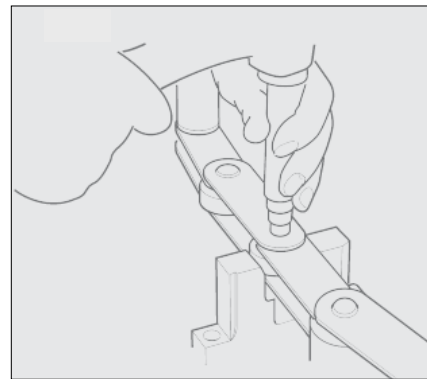


figure 13

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### 1.4.2 Removing a riveting link

Support the chain as stated for connecting links and grind the pin heads on one side of the link, flush with the link plate. (figure 14). To release the pins from the side plate either use a punch and hammer as previously stated, or alternatively, wedge or prise the link plate free of the pin ends. The other plate, complete with pins, can then be removed from the chain.

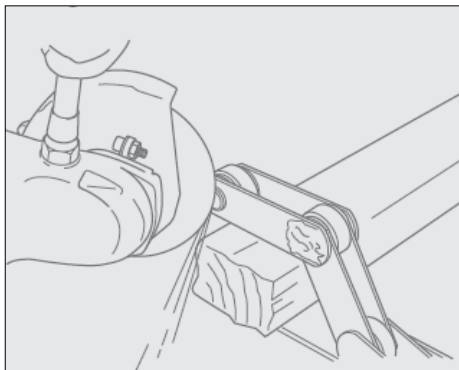


figure 14

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### 1.4.3 Riveting solid pins

To rivet a solid bearing pin, the chain should be supported on the opposite end of the bearing pin against the riveting force. On very small bearing pins, a couple of sharp taps with a hammer on the end of the pin will be enough to spread the rivet end. However, on larger bearing pins (i.e. 7500lb (33kN) breaking load and above) this will not be satisfactory. The outside edge of the pin needs to be peened over to form a satisfactory rivet. (figure 15). A hammer blow directly on the end of these larger pins will not be enough to accomplish this.

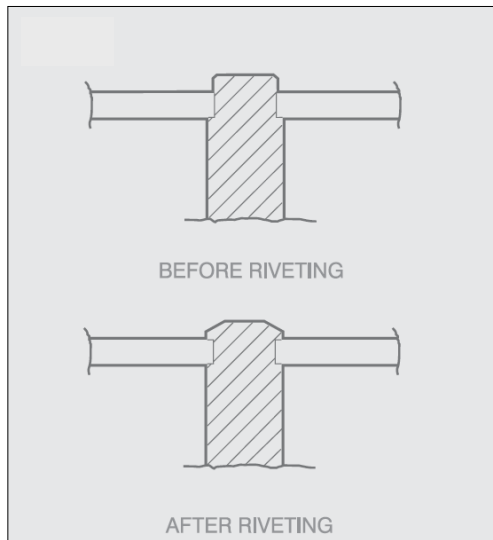


figure 15

#### Riveting can be done with:

- A hammer, working around the pin head. (Care should be taken to hit the bearing pin edge and avoid damaging the link plate).
- Work around the pin head with a pneumatic hammer. (Again avoid damaging the link plate).
- A riveting punch and hammer, progressively turning the punch after each blow of the hammer to peen completely around the bearing pin head. Use the factory riveted pins as a guide to rivet spread.

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## 1.5 Adjustment

Once the chain has been installed and all the fixtures are in place, adjustment of the chain will be necessary before the chain is run. Care must be taken that the chain pre-tension will not become too high (for criteria see chapter 1.3), as this will reduce the chain's life. The main requirement of chain adjustment is to remove slack from the chain (i.e. to take up the clearances between the pins and bushes in each link).

**The following is a general guide to adjustment procedure:**

- 1 Check that the tail shaft is in line.
- 2 Add pressure to the hydraulic system in order to remove slack.
- 3 Run the lift for at least one complete circuit to allow the chain to settle and recheck the chain adjustment.
- 4 Re-adjust if necessary.

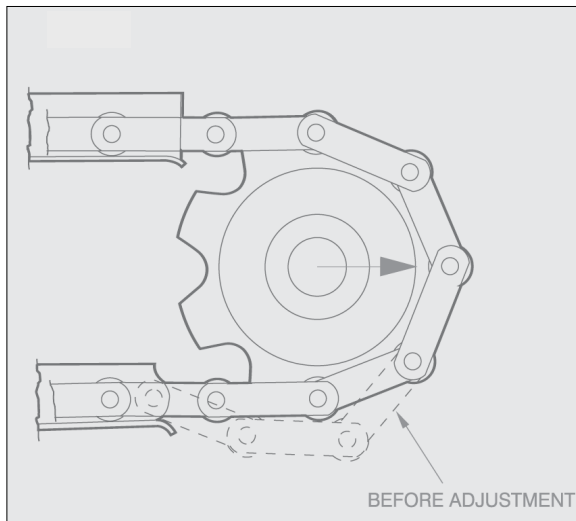


figure 16

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Supplemental bulletins delivered by the manufacturer to the owner / operator that were not provided at the time of hand over of the attraction and contain new information or newly recommended inspections or testing, or both, will be released as a Safety Alert, Service Bulletin or an Notification, with the following criteria in order to carry the force and effect of this practice:

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- “Service Bulletin”      For notifications that do not recommend immediate action but do recommend future action.
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