



**PERFORMANCE IN MOTION**

**REGINA CATENE CALIBRATE**

**HOISTING CHAINS**

**DECEMBER 2009**

**GENERAL INSTRUCTIONS**

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**Rev. a del 01/2014**

**User and Maintenance Manual**

**Summary**

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## 1. INTRODUCTION

This manual is destined for operators of the leaf chains.

This instructions manual should be read carefully in order to use the capacities of the various types of leaf hoisting chains in the best possible way.

Maintenance of the leaf chains is very limited and very easy to carry out. The operator should carry out all of the activities described in this document.

The manufacturer of the leaf hoisting chains has made them with the objective of guaranteeing adequate conditions of safety during their normal use: exclusion of the safety devices may seriously compromise the conditions of safety during operation.

Furthermore, these conditions are also connected with observance of the installation methods. The manufacturer will not be held responsible for breakages, accidents or damages caused by non observance (reduced or inexistent) of the indications included in this manual. The same applies in the case of variations and/or installation of accessories not authorized in advance.

In the case of replacement of parts, **ONLY ORIGINAL SPARE PARTS** should be used.

Even though this document highlights all references and warnings for correct use of the leaf chains, it presumes that all current norms related to safety and hygiene at work are observed.

The drawings and technical data included in this manual are updated as of the date of publication and only apply to the specific hoisting chains indicated.

This User and Maintenance manual should be stored carefully in an area that is known to everybody and easily accessible.



**THE USE OF LEAF HOISTING CHAINS FOR OBJECTIVES OTHER THAN THE ONES INDICATED IN THIS MANUAL IS PROHIBITED**

When choosing a leaf hoisting chain a whole range of factors that affect the maximum weight that the chain will be subject to and its resistance to fatigue should be established.


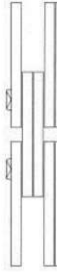
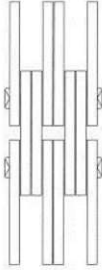

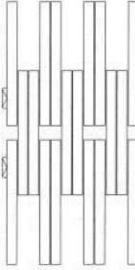
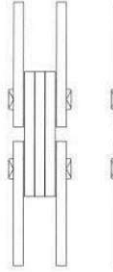
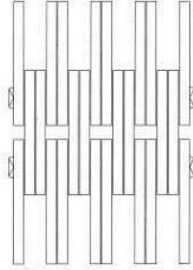
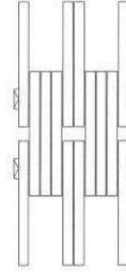


**The most important factors are the speed of the chain, the number of cycles and the static and dynamic loads.**

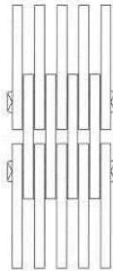

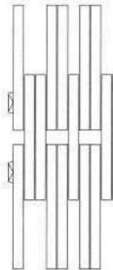
The last static and dynamic loads depend on the structure of the feeder and the operative conditions, for example:

- accidental courses, in terms of routes and uneven flooring, types of wheels etc.
- special environmental factors, for example corrosive environments or the presence of foreign bodies that may affect the life of the chain (breakage due to stress corrosion, premature wear etc..)

The leaf chains may be supplied according to plate combinations and are summarised in the following table:







STANDARD COMPOSITIONS			
2x2	UF LL AL		
4x4	UF LL AL		
6x6	UF LL AL BL		
8x8	UF LL BL		
			10x10
			2x3
			3x4
			4x6
			LL
			BL
			BL
			BL





  

SPECIAL COMPOSITIONS	
5x5	
5x6	
6x5	



## 2. GRAPHIC SYMBOLS

	<b>“B” SIGNAL OF DANGER</b> This indicates the areas in which operations are carried out that require special attention of the operator due to the presence of danger factors
	<b>“C” SIGNAL OF DANGER</b> This indicates the areas in which operations are carried out that require special attention of the operator due to the presence of moving elements
	<b>“E” SIGNAL OF PROHIBITION</b> This prohibits the execution of special operations including cleaning and maintenance, due to the presence of danger factors that must be avoided
	<b>“F” SIGNAL OF PROHIBITION</b> This prohibits the execution of special operations including cleaning and maintenance, due to the presence of danger factors that must be avoided
	<b>“G” INDICATION</b> This indicates the Direction of movement of the mechanical parts that it is applied to
	<b>“I” CE MARKING</b> This indicates compliance of the machine to European Regulations and Norms applicable to development and construction

	<b>It indicates the obligation of wearing a helmet</b>
	<b>It indicates the obligation of wearing accident prevention shoes</b>
	<b>It indicates the obligation of wearing gloves</b>
	<b>It indicates the obligation of wearing overalls</b>



It indicates the Comments and Suggestions in points in which specific attention of the reader is requested

### 3. WARRANTIES

REGINA CATENE CALIBRATE S.P.A. guarantees the absence of faults to the products supplied for a period of 12 (twelve) months from the date of dispatch.

Delayed receipt of a complaint from the Customer will result in no responsibilities borne by Regina.

In the event of a complaint considered to be valid, Regina will, within a reasonable period of time, replace the goods at its own expense, not including any charges for installation of the products replaced. The parts replaced will remain the property of Regina.

The following are excluded from the warranty:

- consumable materials;
- parts supplied free of charge;
- parts supplied for tests;
- parts supplied, for any reason, at special conditions agreed in writing with the customer;
- parts normally subject to wear and consumption (or the parts whose average life is less than the duration of the warranty).

The warranty will automatically no longer be valid in the case of one or more of the following events:

- a) inappropriate use of the parts supplied (or beyond the limits defined in the order confirmation or in its annexes and, in particular the technical specifications);
- b) incorrect maintenance of the Products;
- c) sabotage;
- d) replacement of parts and/or components of the Products without the prior written consent of Regina;
- e) variation to the Products supplied by Regina without the prior written consent of Regina

The warranty does not cover damages caused by one or more of the following causes:

- a) inability or lack of experience of the operators
- b) direct or indirect consequences of malfunctioning of parts not supplied by Regina;
- c) malice of the operators.

For further clarifications refer to the general sales conditions.



## 4. TECHNICAL ASSISTANCE

In this manual it is absolutely impossible to provide complete information regarding all of the conditions of use of the leaf hoisting chains, therefore our technical department is at your complete disposal to provide you with answers regarding all operation problems without time limits and for the entire duration of the life of the chains.

In the case of any problems or for any information please contact our technical department:

**REGINA CATENE SPA – viale Monza, 90 – Cernusco Lombardone (LC) – Italy**

Tel. +39 039-9980210 – Fax +039 9980205

[www.reginacatene.it](http://www.reginacatene.it) - E-mail [sales@regina.it](mailto:sales@regina.it)

### 4.1 Copy of CE Compliance Statement

The undersigned Engineer Carlo Garbagnati, as President of the company

**REGINA CATENE CALIBRATE S.p.A.**

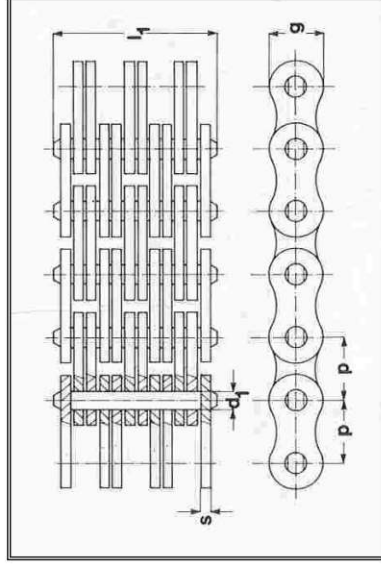
**Via Monza, 9023870 Cernusco Lombardone (LC)**

States that:

**THE CHAIN USED FOR HOISTING:**

**Model: BL634**

**Production batch : WO 281244**



**COMPLIES**

- with all of the regulations related to the REGULATION 2006/42/CE
- ISO 4347: 2004 - Leaf chains, clevises and sheaves – Dimensions, measuring forces and tensile strength
- UNI EN ISO 12100-1: 2009 Machine safety — Vital Concepts, general development principles – Part 1: Basic terms, methods
- UNI EN ISO 12100-2: 2009 Machine safety — Vital Concepts, general development principles — Part 2: Technical principles

The company REGINA CATENE CALIBRATE S.p.A. also declares that the person authorized to create the technical file of the aforementioned hoisting chain is Engineer Carlo Garbagnati and is stored in the Technical Department of REGINA CATENE in Cernusco Lombardone (LC) viale Monza 90

LEAF CHAIN LAYOUT

CONSTRUCTION:		WEIGHT Kg/MT:		
CHAIN DIMENSIONS				
S	D1	P	G	L1
PRODUCTION MATERIALS AND HEAT TREATMENT				
COMPONENT	MATERIAL		HEAT TREATMENT	
PIN				
PLATES				
WORKING LOAD (KN)				
NORMAL USE		MODERATE TEARS		STRONG TEARS
TEST METHOD USED: TRACTION TEST				

This certificate refers exclusively to the hosting chain at the condition in which it was put on the market, excluding the additional components and/or operations carried out at a later stage by the end user.

Cemusco Lombardone, .....

REGINA CATENE SPA  
Garbagnati Carlo  
President

.....



## 5. MARKING

The leaf chain hosting chains, regardless of the type and dimension of the pitch, are identified by point marking etched onto the outer plates during the processing stage or on the card applied at the end of the chain (fig. 1).

In the case of marked plates: they are fitted at a later stage into the chain coil every 20-30 pitches. This marking consists of a W.O. (internal working order) consisting of 6 numbers. This number refers to the Regina production batch and is the number that the “CE” compliance certificate refers to.

**Example: W.O. 281244**

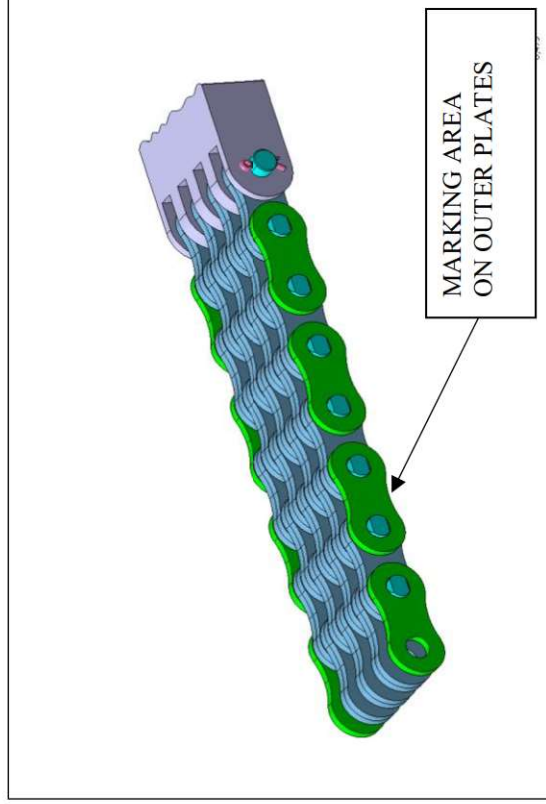
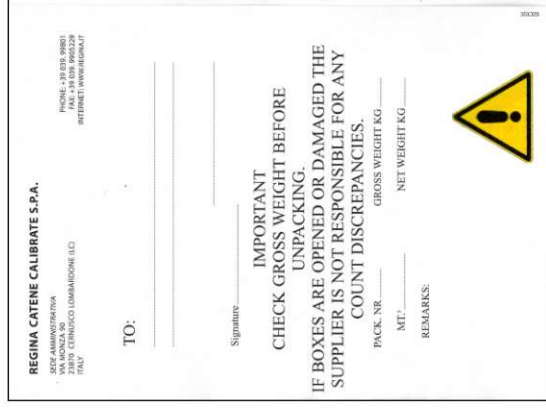


fig.1



REGINA CATENE CALIBRATE S.P.A.  
 30020 PAVANZANO (VI) ITALY  
 PHONE +39 0445 99801  
 FAX +39 0445 998229  
 INTERNET WWW.REGINA.IT

TO: \_\_\_\_\_

Signature \_\_\_\_\_

**IMPORTANT**  
 CHECK GROSS WEIGHT BEFORE  
 UNPACKING.  
 IF BOXES ARE OPENED OR DAMAGED THE  
 SUPPLIER IS NOT RESPONSIBLE FOR ANY  
 COUNT DISCREPANCIES.

PACK. NR. \_\_\_\_\_ MT. \_\_\_\_\_ GROSS WEIGHT KG \_\_\_\_\_ NET WEIGHT KG \_\_\_\_\_

REMARKS: \_\_\_\_\_

! (Warning symbol)

fig.2

The FLEAYER leaf hosting chains are also fitted with a specific label for transportation. This includes identification of the prescriptions and the mass (fig. 2).

## 6. TECHNICAL DESCRIPTION OF THE LEAF CHAINS

### 6.1 LEAF CHAIN

Refer to the last updated version of the REGINA catalogue for technical and dimensional characteristics of the leaf chains (traction chains).

### 6.2 LEAF CHAIN type “AL”

They are normally suitable for applications in which the load can be considered essentially static and where the articulations of the chain on the sheaves do not occur very often and at a low speed. They can also be used on small hydraulic and non-powered fork lift trucks, where dynamic stress due to load is negligible.

**The limitations of use of AL type chains are mainly:**

- Drive speed  $< 30$  m/min (manual)
- Lubrication of an automatic type or high frequency (if manual)
- Frequent control
- Operation load (normal 7, moderate tears 9, strong tears 11)
- Most common combinations: 2x2, 4x4, 6x6.

### 6.3 LEAF CHAIN type “BL”

The “BL” leaf chains are suitable in applications for which a high level of resistance to wear and fatigue is required.

Most common combinations: 2x2, 3x4, 4x6.

**The limitations o fuse of the BL type chains are mainly:**

- Drive speed  $< 30$  m/min (automatic)
- Operation load (normal 7, moderate tears 9, strong tears 11)
- Regular control and lubrication

### 6.4 LEAF CHAIN type “UF/LL”

This range is therefore used when the load applied is essentially static, with very few articulations on the sheaves and at a low speed. The most common combinations supplied are: 2x2, 4x4, 6x6.

**Le limitazioni d’uso delle catene tipo UF/LL sono principalmente:**

- Drive speed  $< 30$  m/min (static, manual)
- Operation load (normal 7, moderate tears 9, strong tears 11)
- Regular control and lubrication

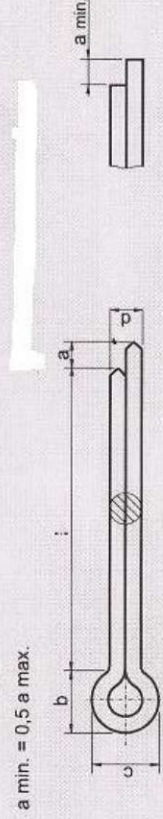


## 6.5 – COTTERS AND ATTACHMENTS

The cotters are characterised by geometric dimensions according to the norm UNI 1336 (see table).

COTTERS  
ABSTRAC **UNI 1336** - (≠ DIN 94)

EDITION 07/1977



**DIMENSIONS IN mm**

[illegible]

The attachments of the leaf chains are substantially of 2 types: external and internal. The dimensions should respect the parameters indicated in fig. 3 provided below. The hoisting accessories and relative components (attachments) should be proportioned by taking into account the stress and ageing phenomenon for a number of working cycles compliant with the life duration expected for the operation conditions specified for the application in question. For dimensions reference should be made to the norm ISO 4347.

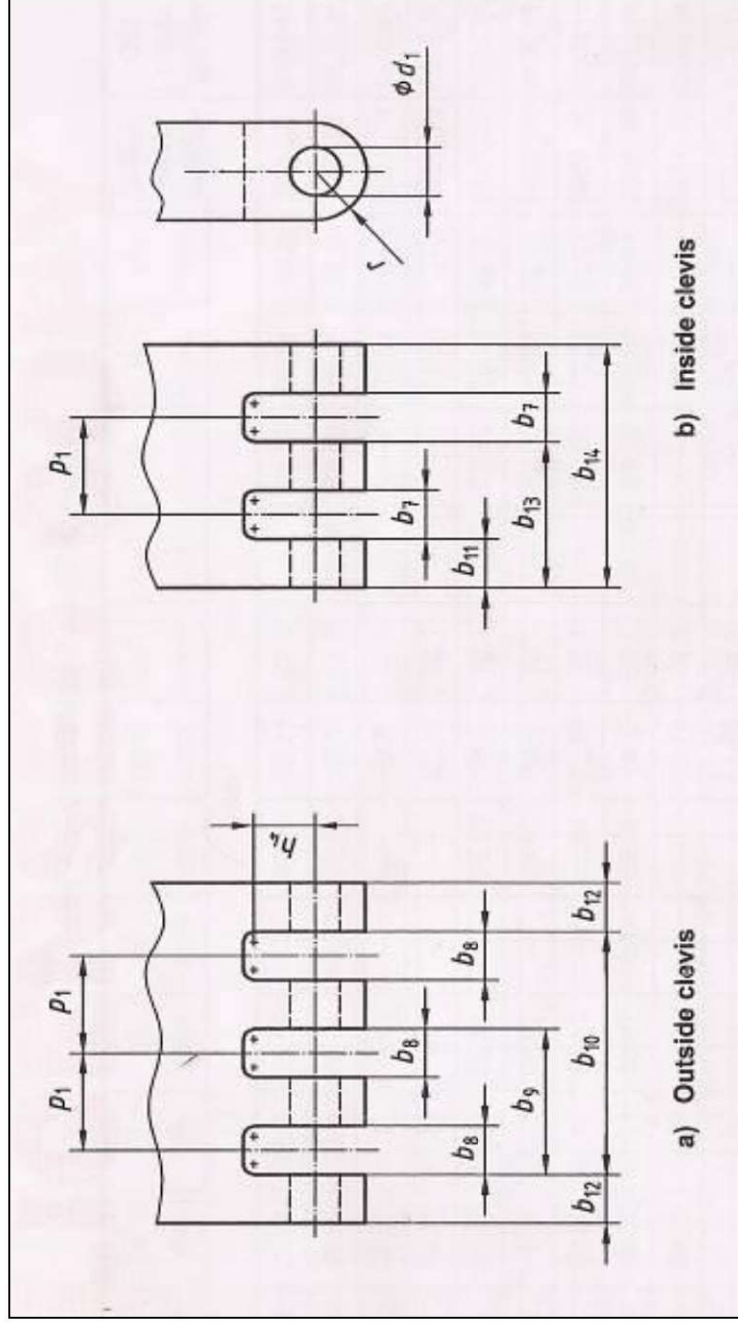


FIG. 3



## 7. TRANSPORT AND INSTALLATION OF THE LEAF CHAIN

### 7.1 – Dispatch, transport and packaging

Unless otherwise specified, transport should be carried out using vehicles of an adequate capacity necessary through to the destination indicated by the customer.

The transportation of hoisting leaf chains should be carried out by qualified transport companies, capable of guaranteeing the correct handling of the material transported.

The company REGINA CATENE SPA will not be held responsible for transportation organised by the customer or for the transport companies chosen by the customer himself.

After final assembly the leaf chains should be rolled onto reels, tied with iron wire and lubricated according to REGINA specifications. Subsequently the chains should be placed onto specific pallets, predisposed for picking up using fork-lifts. The chains are on pallets covered with a plastic film and fixed to the pallet by a strap. This type of packaging guarantees insulation against external atmospheric agents (such as water, dust etc), therefore to avoid compromising the functionality of the chains for the amount of time that they will remain in the warehouse. During transportation the pallets should not be piled on top of one another as they may cause deformations to the chain. The material, duly stored, may be kept in a warehouse for approximately one year in covered areas whose temperature is between -15°C and +60°C with relative humidity not exceeding 80%. In other environmental conditions, specific packaging should be used .



**Personnel in charge of the operations should be trained and authorised to carry out these activities in order to avoid incorrect manoeuvres that may cause situations of danger and/or damage the leaf chains and should understand these handling instructions.**

### 7.2 – Handling, hoisting and unloading

Check the packing list or any transport documents for the location of the documentation related to any possible additional and/or temporary information on the handling, hoisting and unloading stages. The packing list or additional information identify each package through the use of a number and indicate the description, quantity and specify, if necessary, the weight, dimensions and lifting points. Check correspondence with the indications provided in the packing list and the indication of the point weight and/or lifting methods indicated on each single package.

Handling of the chain, with regards to movements within the warehouse, should be carried out exclusively using the pallets on which the chain is provided, while with regards to handling during the installation phase, some of the precautions described below should be undertaken. First of all, if the chain is handled manually its weight should not exceed 30 kg for men and 20 kg for women and the use of gloves is recommended as the chain is lubricated and therefore slippery. However, if the chain is handled using hoisting equipment, connect to it using the grip element using the final pins or the attachments that the customer intends to use. The chain should be lifted in a vertical position without it being subjected to rotation that may cause deformations.



**Carry out a visual control before moving the leaf chain in order to check for any possible breakages or damages**

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## 7.2.1 Weights

With regards to weights per metre of the leaf chains, reference should be made to the CE certificate.



**FOR HOISTING OF PARTS OF THE FLEYER LEAF CHAINS, SPECIFIC INDIVIDUAL PROTECTION DEVICES SHOULD BE WORN**

THE HORIZONTAL LAYOUT OF THE PACKAGES ON PALLETS IS VITAL TO ACQUIRE THE HIGHEST POSSIBLE LEVEL OF STABILITY AND SHOULD BE MAINTAINED DURING ALL HANDLING, TRANSPORTATION AND STORAGE PHASES IN ORDER TO AVOID THE RISK OF OVERTURNING.



THE CAPACITY OF THE HOISTING MEANS SHOULD BE ADEQUATE FOR THE LOAD TO BE HANDLED, CONSIDERING ADEQUATE MARGINS OF SAFETY. DO NOT USE HOISTING MEANS THAT DO NOT COMPLY WITH THE SAFETY NORMS

## 7.2.2 Removal of packaging

Open the packaging consisting of a plastic film strapped using a specific cutter to cut the strap as well as the plastic film.

Proceed as follows:

- **Handle using a telescopic hydraulic lift or a fork-lift:** remove the packaging, organise lifting of the load by inserting the forks of the fork-lift at the points indicated.

Check the integrity of the various parts of the chain and make sure that no vital accessories necessary for installation (final pins and cotters) are missing. Inform the manufacturer of any possible pieces missing.



**For each type of material used in packaging organize disposal according to the indications provided by applicable regional legislative regulations. Do not dispose of packaging materials in the environment.**

## 7.3 – Preparation of the area of installation (by the user)

In order for the user to allow for correct installation of the hoisting leaf chain, he should carry out the following operations in advance, as indicated:

- Check suitability of the connection points that the chain should be fixed to.
- In particular it is important to establish suitability and consistence of the combs or attachments and alignment.
- Check suitability of the manoeuvre areas for installation of the chain.
- Delimitation of the areas of handling and storage of materials and installation in accordance with applicable legislative prescriptions

- Installation of adequate signs in order to highlight the presence of assembly operations using vehicles in movement.

#### 7.4 – Assembly of the hoisting leaf chains

For assembly of the FLEYER hoisting leaf chains inside a hoisting equipment, it is important to make sure that all of the instructions contained in this manual are carefully observed and, in particular, make sure that:

- the characteristics of the leaf chains comply with the use that they are destined for



**Consult this manual**

Therefore the operations should include:

- Hoisting of the chain using equipment to move the end piece close to the point of attachment
- Insertion of the final pin in between the chain and the attachment
- Insert, on both sides of the final pin, the cotters

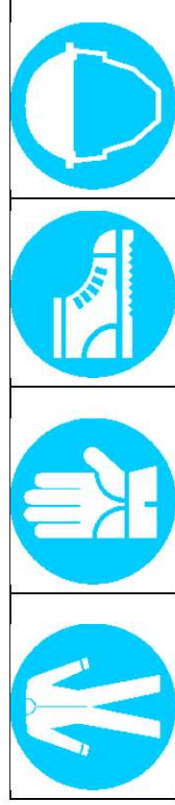


Operations carried out above ground level (height > 2,5 m) should be carried by qualified and trained personnel with:

- Adequate individual protection devices (IPD = shoes, helmet, gloves, safety belts)
- Working equipment (fork lift and scaffolding)

Suitable for the objective following careful assessment of the following parameters:

- type of working area, its environmental characteristics, type of ground
- height of the working area and spaces available
- dimensions and weight of the parts to be installed



**GUARANTEE MINIMUM SPACES FOR CONTROLS AND MAINTENANCE**



**THE USE OF SPECIAL EQUIPMENT OR TOOLS IS INDICATED WHENEVER NECESSARY**



## 8. SET-UP OF THE FLYER LEAF CHAIN

### 8.1 – Preliminary operations

Before set-up of the leaf hoisting chain, the operator should carry out (first installation or after a long period of inactivity) the following operations:

- ☐ **Check suitability of the spaces available:**
  - Check the spaces available that should allow for correct operability of the chain.
- ☐ **Lubrication of the chain:**
  - Make sure that the chain has been correctly lubricated.

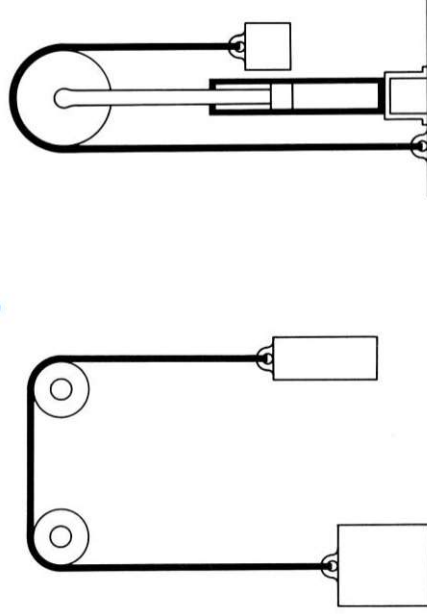
### 8.2 – Set-up

The first set-up of the leaf hoisting chain includes, in coherence with the service limits and conditions (as described in chapter 9), execution of operation tests in order to establish correct installation and functionality.

In particular, it is important to consider that the “hoisting” chains transfer a strength from one point to another, normally working in alternative movement conditions: it is not closed in a ring, it consists of single plates and riveted pins.

Figure 4 illustrates typical situations of chain set-up as hoisting accessories. In both cases choice of the type of chain is made according to the configuration of the general hoisting system (n. of sheaves, moving elements), considerations on resistance to wear and the presence or absence of tear loads and, in any case, whose driving speed is < 30 m/min.

Fig. 4



In the choice of a chain for a fork-lift, a series of factors should be established that affect the maximum load that the chain will be subject to its resistance to fatigue. The most important factors are chain speed, the number of cycles and the static and dynamic loads.



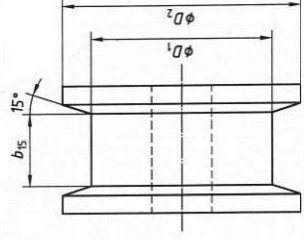
The latter depend on the structure of the fork-lift and the operative conditions, for example:

- Accidental courses, in terms of routes and uneven flooring, types of wheels etc.
- Special environmental factors, for example corrosive environments or the presence of foreign bodies that may affect the life of the chain (breakage due to stress corrosion, premature wear etc..)

The characteristics of correct operation of the chain and sheave set include:

- Observance of the dimension of the diameter of the sheave compared with the nominal pitch of the chain (according to the norm ISO4347) that should be at least 5 times the chain pitch.

Overall dimensions permitting, sheaves should be used whose diameter is equivalent to 8 or 9 times the chain pitch, so as to create a low angle of traction.  
The shape of the sheave is indicated in the figure below.



### 8.3 – Withdrawal from service

#### 8.3.1 Withdrawal from service and conservation

If the leaf chain is to be withdrawn from service for a specific period of time before being set-up, in order to avoid damages or deterioration, check to make sure that:

- There are no damages.
- Before organising storage, protect the surfaces using antioxidant products
- For an extended storage period, lubricate abundantly all parts of the chain so as to create a protective layer across the entire surface.

#### 8.3.2 Recovery and set-up

Before setting-up the leaf chains that have undergone a long period of shut down, the following operations should be carried out:

- Check for any traces of oxidation
- Check articulation of the chain (not blocked)
- Apply lubricant



**FOR ALL OF THE OPERATIONS ALWAYS USE ADEQUATE INDIVIDUAL ACCIDENT PREVENTION DEVICES (IPD = GLOVES)**

## 9. USE OF THE LEAF CHAIN

### 9.1 – General indications for use of the leaf chain

The operations of the leaf chain should be aware of the methods and limits of use indicated for the chain as described below, in order to guarantee their safe use.

The Regina leaf chains have been designed to resist against the most severe conditions of use, in the case of tear loads, dynamic stress deriving from use (for example fork-lifts on ruined routes) and when resistance to fatigue is an important characteristic. Given their construction features, plates fitted intercalated between them and connected by riveted pins, the leaf chains are not suitable for the transmission of power from one rotating shaft to another.

The chains of the leaf chains are destined for hoisting operations and used in hoisting machines. In consideration of the characteristic specifications of the application, the user must comply with the following safety coefficients during use and relative load as defined below.

CHARACTERISTICS OF THE APPLICATION	SAFETY COEFFICIENT
Normal	7
Moderate tears	9
Strong tears	11



**FOR OPERATION LOADS REFER TO THE “CE” CERTIFICATE**



**COMPLIANCE OF THE SAFETY COEFFICIENTS IS VITAL FOR SAFE USE OF THE CHAIN**



**USE, CLEANING AND MAINTENANCE OF THE CHAIN IS ONLY PERMITTED BY QUALIFIED PERSONNEL**



### 9.1.1 – Limits and service conditions

The main limitations of use of the leaf chain are provided below:

#### a) Environmental of use

- The chain should be placed in an environment containing all of the safety indications indicated by current applicable laws so that personnel can operate in the very best conditions.



**THE CHAIN SHOULD ALLOW FOR SUFFICIENT WORKING SPACES TO GUARANTEE OPERABILITY AND INTERVENTION OF THE OPERATOR AND PERSONNEL IN CHARGE OF MAINTENANCE**

#### b) Expected life – operating conditions

The leaf chain has been designed for discontinuous use within the hoisting equipment (with stops for necessary maintenance operations); to maintain a constant safety level, the user should have **complete control carried out by the Manufacturer or by an authorized workshop for every 5 years of service** and, if necessary, complete maintenance should be carried out.



**NEVER ATTEMPT TO RE-USE PARTS OF THE CHAIN THAT APPARENTLY MAY APPEAR TO BE INTACT IF, FOLLOWING REPLACEMENTS MADE BY SPECIALISED AND AUTHORISED PERSONNEL OR BY THE MANUFACTURER HIMSELF, THEY HAVE BEEN DECLARED AS NO LONGER SUITABLE**

### 9.2 – Before starting use of the leaf chain

	<b>COMMANDING OR ACTIVATING THE MACHINE IN WHICH THE FLEYER LEAF CHAIN IS INCORPORATED IS PROHIBITED BY PERSONNEL UNAUTHORISED AND NOT TRAINED</b>
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The suitable operative conditions for correct and safe operation of the hoisting chain are determined by:

#### The operative environment

The operative environment should have the following characteristics:

- temperature : min.: -10 °C; max.:+50 °C; relative humidity. max. 60%



**The chain should not be used in environments and zones:**

- **With vapours, fumes or dust that are highly corrosive and/or abrasive.**



## Dangerous areas and individuals exposed (by the operator)

The dangerous areas are all of the areas in which **individuals exposed** may be subjected to the risks that may arise in the case of an event that may endanger their safety. In particular, it is important to inform potentially exposed individuals that the operators in charge of use of the hoisting chain do not always work in conditions of sufficient visibility in the **dangerous areas** in order to completely prevent or rapidly prevent all risks related to impact and dragging.



**The operator should allow for adequate signalling and warning systems or if necessary he should separate the dangerous areas in order to avoid access by untrained personnel or unauthorized individuals and/or individuals not in charge of the operations in areas in which the hoisting chain works, as indicated in applicable legislative regulations.**

### 9.2.1 Things that ALWAYS should be done

Correct use of the leaf chain allows for maximum use of the performance of the chain itself that it can carry out in total safety.

These potentials are guaranteed only if the indications provided by are strictly respected.

- **ALWAYS** comply with the indications and instructions provided in the user manual and in the relative documentation attached and check the integrity of the chain parts.
- **ALWAYS** respect the instructions and warnings highlighted; the plates provided and in the manoeuvre areas are accident prevention signs and should always be perfectly legible.
- **ALWAYS** check compliance of the performance of the chain with regards to the service that it is destined for (table of use loads)
- **ALWAYS** make sure, before starting any manoeuvre, that the operative area is free from obstructions and there are no exposed individuals in the area.
- **ALWAYS** check the adequacy of the condition of conservation and maintenance of the chain.
- **ALWAYS** operate in the best conditions of illumination and visibility of the working areas.
- **ALWAYS** deactivate energy supplies in the case of inspections or maintenance intervention to the chain.
- **ALWAYS** wear suitable clothing for all operations, or individual protection devices (shoes, gloves etc..) in compliance with the safety norms.
- **ALWAYS** inform the person in charge of any operating anomalies (faulty behaviour, suspicion of breakage, incorrect movements and unusual noises) and turn the chain off.

### 9.2.2 Things that should NEVER be done

Use of the chain for unauthorised manoeuvres, its incorrect use and the absence of maintenance may result in serious situations of danger in terms of personal safety and damage to the working environment as well as compromising functionality and intrinsic safety.

The actions described below, which obviously cannot cover the entire range of potential possibilities of “incorrect use” of the chain and represent the ones that are “reasonably” possible, **should be considered strictly prohibited**.

#### Use not provided for and not permitted

- **NEVER** use the chain for services other than the ones that it is destined for.
- **NEVER** use the chain in environmental conditions that are not provided for.
- **NEVER** modify the functional characteristics/performance of the chain.

#### Foreseeable and unforeseeable incorrect use

- **NEVER** exceed the performance capacities of the chain

#### Counter-indications of use

- **NEVER** use if not equipped with suitable individual protection devices.
- **NEVER** use the chain or carry out maintenance operations on the same in conditions of insufficient illumination and/or visibility.
- **NEVER** carry out temporary repairs or recovery intervention non compliant with the instructions.
- **NEVER** use spare parts that are not original or not recommended by the manufacturer.
- **NEVER** assign maintenance and repair operations to personnel not trained by the manufacturer.
- **NEVER** carry out ordinary maintenance, inspections or repairs without having switched off the machine on which the chain is fitted and after having activated the relative procedure.



## 10. CLEANING AND MAINTENANCE

### 10.1 – General recommendations

The main rules to be observed during maintenance controls and activities are:

- It is good practice that the maintenance activities of the chain are carried out with the hoisting equipment in which the chain is incorporated in conditions out-of-service;
- Use protective clothing such as masks, gloves, shoes and overalls.



**PERSONNEL IN CHARGE OF MAINTENANCE OF THE CHAIN SHOULD BE WELL TRAINED, HAVE READ THIS MANUAL AND HAVE AN IN-DEPTH KNOWLEDGE OF THE ACCIDENT PREVENTION NORMS**



**UNAUTHORISED PERSONNEL SHOULD REMAIN OUTSIDE OF THE WORKING AREA DURING OPERATIONS**

#### 10.1.1

##### Warning notes



Before starting the chain after a fault, it should be carefully checked and the set-up procedure / inspection should be repeated.

#### 10.1.2

##### Danger notes



Always exclude the energy connections from the machine in which the chain is incorporated before carrying out maintenance operations.

Place the sign with the words: **MACHINE UNDERGOING MAINTENANCE – DO NOT TURN ON**



Always make sure, before setting up the chain, that personnel in charge of maintenance is at a safe distance and that the **equipment or material have not been left** in the equipment.



All of the moving parts and transmission elements should be protected against accidental contacts. Therefore **make sure that the protections have been correctly repositioned before setting-up the chain again.**



## 10.2 – Cleaning of the chain

In order to keep the chain in the best operative conditions, it is important to carry out cleaning as follows:

- Eliminate all impurities, dust etc using the following detergent:

<p><b>INTERFLON ECO SOLVE EM100+</b></p> <p>sgrassante</p>	<p>Potente detergente/sgrassante multifunzionale.</p> <p>Catalogato <b>NSF K1</b></p>	<p>Motori - catene - ruote dentate - convogliatori - cuscinetti - scorrimenti - armi - macchinari - ecc.</p>	<ul style="list-style-type: none"> <li>• Ottime proprietà detergenti e sgrassanti.</li> <li>• 100% da fonti rinnovabili.</li> <li>• Catalogato NSF K1 (per ambienti HACCP).</li> <li>• Non contiene composti organici volatili (VOC).</li> <li>• Non evapora.</li> <li>• Alto punto d'inflammabilità (162°C).</li> <li>• Lascia un film protettivo per prevenire l'ossidazione superficiale.</li> <li>• Tra gli sgrassanti più sicuri in assoluto.</li> <li>• <b>Non soggetto alle regolamentazioni ATEX e ADR.</b></li> </ul>
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**NEVER ALLOW MATERIAL RESIDUES TO ACCUMULATE IN THE  
PASSAGE AREAS OF THE CHAIN**

## 10.3 – During Maintenance and Repair activities

In the case of use of specific chemical products, the operator should wear adequate Individual Protection Devices.



**All of the repair activities should be carried out exclusively by  
qualified operators and equipped with the individual Protection  
Devices.**

If repair activities to the chain include the presence of other people, before set-up it is important to warn all personnel involved.

Once the repair activities of the chain have been terminated it can be restarted only after specific authorization given by the safety manager.

## 10.4 – Controls at the end of Repairs

The person in charge of equipment should check to make sure that all of the repair activities have been efficiently completed, that the protection and protective and safety devices are efficient and that only qualified personnel is present.

The chain involved in the repair activities should be subject to an operation test to be carried out by a qualified operator in order to check its efficiency.



**MAINTENANCE OR REPAIR ACTIVITIES: THEY SHOULD BE CARRIED  
OUT EXCLUSIVELY BY QUALIFIED OPERATORS (OR CALL  
TECHNICAL ASSISTANCE PROVIDED BY THE MANUFACTURER)**

### The manufacturer is considered free of any responsibilities in the following cases:

- ☐ The chain is not used correctly or used by personnel unqualified or adequately trained;
- ☐ The chain has not been fitted in accordance with the specific instructions included in this manual;
- ☐ The chain has not undergone ordinary maintenance or necessary extraordinary maintenance;
- ☐ The chain has been modified by the user in any part without the specific and written authorisation of the manufacturer;
- ☐ The chain has undergone maintenance without the use of original spare parts;
- ☐ The user does not respect the instructions contained in this document;

### 10.5 – Qualification of personnel in charge of maintenance

In order to resolve problems in the field of maintenance of the chain, personnel in charge of maintenance should:

- have read and understood this manual;
- know how to use and consult this documentation;
- be interested in operation of the chain;
- establish operation irregularities and when necessary undertake necessary measures;

The professional figures in charge and authorised to carry out intervention on the chain are:

- **Operator in charge of use of the chain;**
- **Mechanic maintenance manager;**

#### 10.5.1 Operator in charge of use of the chain

##### • Typical activities :

- ✓ Use of the chain in its condition of normal operation and recovery of operation after emergency intervention;
- ✓ Undertaking of necessary measures to maintain the quality of the performance;
- ✓ Cleaning of parts of the chain with which it is normally in contact and execution of simple maintenance activities;
- ✓ collaboration with personnel in charge of regular and extraordinary maintenance activities prior to notification of such maintenance in the case of anomalies.

##### • Technical knowledge required :

- knowledge of the functions and limits of use of the chain
- Knowledge of the lubricants used in the chain and dangers connected with their use

##### • Qualification requested :

- Suitability for use with regards to specific operative and environmental characteristics.



## 10.5.2 Mechanical Maintenance Manager

### • Typical maintenance activities:

- Control of the mechanical tolerances and wear of components (pin, plates etc)

### • Technical knowledge requested:

- Good knowledge of mechanical systems with motorised movement confirmed by specific training;
- Knowledge of the methods of control and test in order to establish the effective condition of the chain (control of wear, control of unusual noise etc)
- Logical research methods for non complex faults and assessment of results
- The ability to organise the measures aimed at taking the chain back to its operation/performance
- The ability to prepare a report on maintenance intervention

### • Qualification requested :

- Complete training as an industrial mechanic with specialisation and experience in the field of machine maintenance.

## 10.6 – Maintenance Plan

### 10.6.1 Introduzione

The leaf chains applied to fork-lifts or to hoisting means in general should, as elements that imply safety, be subject to regular controls and maintenance, as indicated below:

REGULAR INTERVENTION		
Maintenance	Controls	
Lubrication	Control on integrity of the components	
Regulations of the tensioning devices and organisation of Alignments	Control of state of wear	

### 10.6.2 Lubrification

For correct operation of the chains and coupled sliding elements, they should always be kept in suitable conditions of lubrication.

#### - Anti-friction action

The lubricant creates a meatus between the surfaces subject to sliding, therefore reducing direct contact between metal and metal and, consequently, friction as well as wear. The absence or the lack of lubricant may make the application noisy (creaks etc) and also deteriorate performance.

#### - Protective action

The lubricant creates a film that isolates the metal surfaces from oxidative phenomenon induced by the environment.

#### - Metodo di applicazione

The lubricant is normally applied using a brush on the surface of the plates, after having loosened the chains to favour penetration inside the articulations. This should penetrate between a thickness of the plate and the other in order to reach the area of wear between the pin and the plate holes.

If the chain is contaminated by abrasive particles (for example sand), before lubrication carry out careful cleaning by washing using an adequate solvent. By



lubricating the dirty chain, the abrasive material is pushed into the articulations, creating a phenomenon of abrasive wear.

#### - **Type of lubricant**

In the case of normal applications a simple mineral oil may be used with an approximate viscosity of ISO VG 46-460. It is important to consider that less viscous oil is best for smaller chains and for lower room temperatures. A very fluid oil penetrates easily into the articulations, but it is less resistant compared with more viscous lubricants.

It is difficult for a very viscous compound to penetrate into the articulations and therefore it may not allow for the lubricating effect desired.

For heavy duty use or for normal use when the objective is to extend the intervals between one lubrication and another, fluid grease pre-diluted with a solvent may be used, with the advantage being that it is very fluid during application, allowing for a good level of penetration and it leaves a very consistent and adhesive layer of film when the solvent has evaporated.

As it is normal for leaf chains to work with a high specific pressure, the possible presence of anti-friction solid pigments (for example molybdenum disulphide, graphite etc) may be considered positive for EP (extreme pressure) characteristics and as it may guarantee a lubricating action even when the liquid vehicle has been consumed completely.

In the case of operation in an aggressive environment (for example a saline environment) or in outdoor applications, it is important to keep the surfaces well protected in order to avoid oxidative phenomenon that are dangerous for the outer plates that may be subject to

cracks due to the phenomenon of stress corrosion. In these cases, in order to provide greater protection to the chain, after having lubricated with a rather light oil, apply a very adhesive grease (with water-repellent characteristics) such as for example, the one used for ropes. In the case of operation in extreme temperatures, less than 0 °C or exceeding 80°C, a suitable lubricant should be applied.

#### - **Regularity of lubrication**

It is not possible to define in advance the specific interval between re-lubrication intervention of the chains. This may vary in a rather consistent manner according to the specific pressure between the pin and the plates, the frequency of use, the type of lubricant and the method of application, the working environment etc.

This interval should be defined by assessing the effective duration of the lubricant in the articulation or, in similar applications.

It can be stated that this interval normally varies between 2 and 12 weeks .

In normal conditions, in the absence of other references, lubrication is recommended at least every 200 hours.

## 10.6.3 Regulation of tensioning devices and alignments



The tensioning systems of the chains should be registered, if necessary, following every lubrication intervention and any possible anomalies in terms of alignment between the chain, the attachment system and the sheaves should be checked. Misalignments are very dangerous as they may result in high levels of excessive stress to the chain.

- **Control of integrity of the components**

The chain should be dismantled on a regular basis, washed completely and analysed in order to identify any possible faults as specified below.

After this control, if it is positive, the chain should be completely re-lubricated, by possibly inserting the chain into the lubricant.

- **Breakages or cracks in the plates**

Unfortunately it is only possible to carry out a visual examination of the outdoor plates as well as the contours of the intermediate plates, therefore cracks cannot be seen around the holes of the intermediate plates, representing the most likely origin of fatigue breakages, and not even on the pins. A control with penetrating liquids would help to highlight further any possible cracks that cannot be seen through a simple visual control.

The components to be checked accurately are the ones close to the attachment devices or in the most stressed areas that can be identified by the clearest state of wear.

Even though anomalies are not registered, this does not exclude the fact that the chain may have reached the limit of duration due to fatigue, because:

- 1) as already indicated, it is not possible to analyse all of the details
- 2) breakages due to fatigue may extend at a speed that, once the crack has started, complete breakage may occur only after a few cycles of operation.

- **Position of the components**

Check correct positioning of the components, especially due to dangers of disengagement of the plates from the pins, and the presence of blocked or hard articulations.

- **Regularity**

At least every 8 months or 1000 hours of operation, choosing the most restrictive condition.

- **Control of the state of wear**

Wear on these chains can be seen:

- 1) on articulations with a consequent elongation to the chain
- 2) on the profile of the plates due to contact with the sheaves and guide rail system
- 3) on the sides of the outer plates and on the headers of the pins due to contact with the flanges of the sheaves or possible side guide rail devices.

### - How to calculate the elongation of a chain

To calculate the elongation of a chain, the length of a section of the chain should be measured, as indicated in figure 1A below:

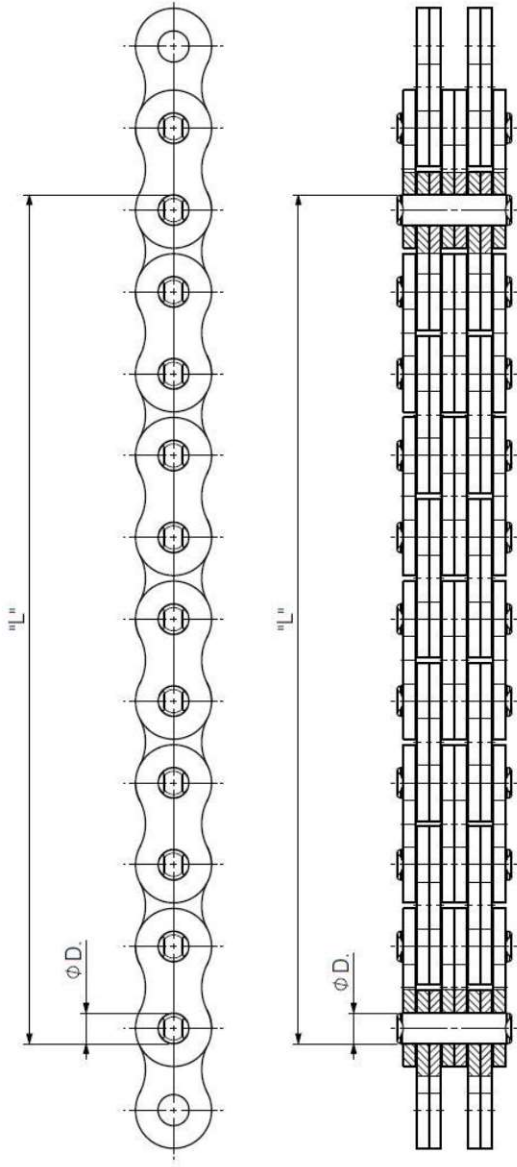


Figura 1A

Each chain is characterised by a nominal pitch (for example 50.8mm). If the pitch is unknown, the measurement of a section of the chain with a minimum elongation (minimum elongation or none at all to be found in the final stretch where the chain does not articulate and where there is no sliding action against the guide rails) is requested as a reference. In order to reduce measuring errors, more than one pitch should be considered. At least 10 pitches should be considered (as shown in fig. 1A).

Measurements to be registered:

- External distance “L” between 10 pins (easy to measure)
- Diameter “ØD” of the pin

Calculation of the pitch:

$$P = \frac{(L-D)}{10} \quad [\text{mm}]$$

Calculation of elongation:

Elongation of the chain should be assessed on the sections where the chain is subject to maximum wear (parts in contact with the sheaves or guide rails), identifying the measurement of 10 pitches, as explained above. The Pr (pitch registered on the worn section) elongation (E) in % of the chain will be:

$$E = \frac{(Pr-P)}{P} \times 100 \quad [\%]$$



### - Control of wear elongation

In order to keep wear elongation under control it is best to prepare a registration form like the one attached.

Probably wear will not be even along the entire length, the measurement should be taken for specific sections (divided the total length into 5 or 15 sections) to be duly identified.

The initial measurement should be identified, used as a reference for the following ones and it is important to point out that all of the subsequent measurements should be taken along the same sections.

After a few measurements identification of the sections subject to the phenomenon of wear is possible and therefore the subsequent measurements may be limited to these sections only.

The measurements may be made using long slide calipers or using a sectional rule. Reference may be the head of the pins or the profile of the plate.

Measuring should be carried out with the chain along the rectilinear section and with a small tensioning load (the weight of the forks may be sufficient).

The maximum elongation limit is fixed at 2% even though the limit of 3% may be reached without any problem for normal applications.

The elongation limit is defined by taking into consideration:

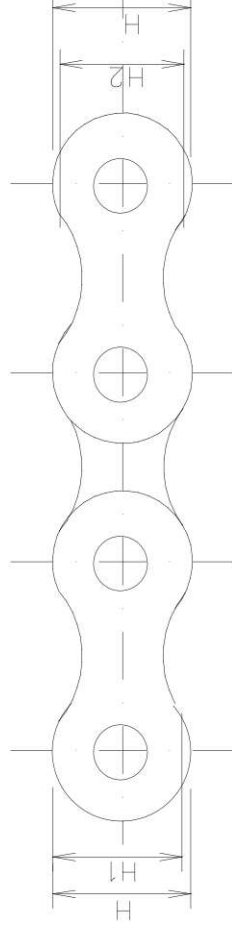
- 1) weakening due to the removal of material from the parts that may affect the resistance characteristics of the chain
- 2) consumption of the hard superficial layers (for casehardened pins)

### - Control of wear of the plate profile

After having visually identified the section of the chain where this phenomenon is the clearest, a caliper should be used to identify the real height of the loops of the plates and compared with the initial one.

These limits of acceptable maximum wear are defined:

Type of wear	Max. % difference between the initial quota and the final measurement	
	Normal applications	Heavy duty applications
Consumption on one side only $\{(H - H1)/H\} \times 100$	3 %	2 %
Consumption on two sides $\{(H - H2)/H\} \times 100$	5 %	3,5 %



The high specific pressure between the plate profile and the sheaves may cause, a part from wear, blow down of material on the corner of the plates that may result in blocked articulations. If blocked articulations occur, the chain should be replaced.

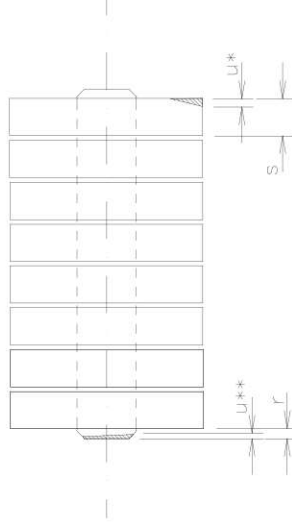
- **Wear on the side of the chain**

This wear is caused by incorrect interaction of the chain with the sheaves or other elements of the side guide rail. Side friction on the sheaves may be induced by off-centred loads or sheaves and/or unaligned fixing devices. This wear is caused by incorrect interaction of the chain with the sheaves or other elements of the side guide rail. Wear on the heads of the pins should not compromise their seal on the plate, in order to avoid them from releasing.

Wear on the edge of the plate causes weakening to the plate itself.

In the case of consumption on the head of the pins of more than 25% of projection of the riveting or on the external side of the plates of more than 20% of the thickness (refer to the drawing provided below), the chain should be replaced and, before applying a new one, the cause of this malfunction should be identified.

For control methods refer to the layout on the following page.



consumption % pin head: **100 x  $u^{**}$  / r**

consumption % plate edge: **100 x  $u^{*}$  / s**

- **Control frequency**

At least every 6 months or 1000 hours of effective operation (choose the most restrictive condition) wear test controls should be carried out, considering that, in the case of abnormalities or wear values close to the limits indicated, such controls should be intensified.

- **Chain disposal**

Steel is an iron based alloy whose main characteristic is that it is completely recyclable. Disposal should be assigned to an authorized company and as far as disposal of the chain is concerned, reference should be made to current national laws or European regulations. As the chains are mainly made of steel, at the end of its life cycle this product can be completely recycled.

The maintenance programme includes ordinary intervention, operations to be carried out on a daily basis before the start of activities, due to shift changes and/or production changes and activities that do not require the use of specific instruments and equipment and of a regular or extraordinary type that may result in the use of equipment and/or the removal of protections and/or partial dismantling.



Ordinary maintenance of the chain may be carried out by an operator in charge of use of the chain itself.  
Regular maintenance operations should only be carried out by qualified and authorized operators.



When maintenance operations are carried out at a dangerous height, compared with the ground, personnel in charge should provide suitable means (scaffolding, platforms, ladders etc) that allow for activities to be carried out in safe conditions.



Personnel should also be provided with adequate individual protection devices (D.P.I.) as indicated by current legislative requirements





### 10.6.4 Maintenance Register

LEGEND

(\*) - ORDINARY  
- EXTRAORDINARY  
(\*\*) - Manufacturer  
- Qualified operator  
(frequent inspection)  
(intervention for five-year control)



## 11. OPERATIVE ANOMALIES




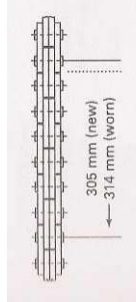
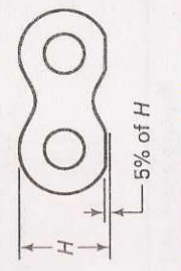
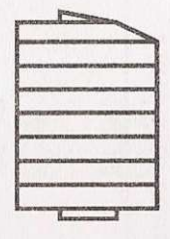
**Any intervention should be carried out after having stopper the chain.**

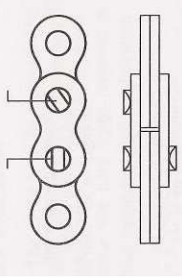
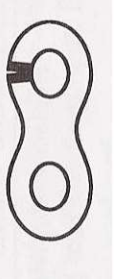
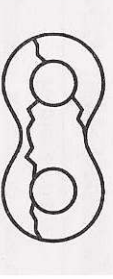
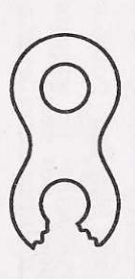
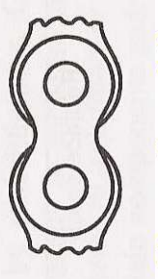
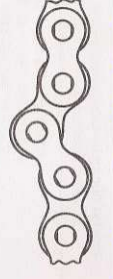
It is important that research into the causes and intervention is carried out using the logical sequence method (from the most likely cause to the least likely one).

**Proceeding using the ladder method:** an initial intervention, then check the result achieved and move onto the next one.

The list provided below may help to identify, in the shortest possible amount of time, the causes and remedies that should be implemented in order to eliminate the anomalies found.

Obviously the list below is indicative and not exhaustive of all of the possible anomalies:

OPERATIVE ANOMALIES		
ANOMALY	CAUSE	REMEDY
 <p><b>Missing elements</b></p>	<ul style="list-style-type: none"> <li>- ASSEMBLY BY THE MANUFACTURER ORIGINALLY FAULTY</li> </ul>	<ul style="list-style-type: none"> <li>- REPLACE THE CHAIN</li> </ul>
 <p><b>Excessive lenght</b></p>	<ul style="list-style-type: none"> <li>- PERMANENT DEFORMATION DUE TO EXCESSIVE LOAD</li> <li>- WEAR BETWEEN THE PIN AND THE PLATES</li> <li>- LACK OF LUBRICATION</li> </ul>	<ul style="list-style-type: none"> <li>- REPLACE THE CHAIN</li> <li>- CHECK LUBRICATION</li> <li>- CHECK THE CONFIGURATION AND LOAD</li> </ul>
 <p><b>Contour of the worn plate</b></p>	<ul style="list-style-type: none"> <li>- NORMAL WEAR AGAINST THE SHEAVE</li> <li>- ABNORMAL WEAR AGAINST THE GUIDE</li> </ul>	<ul style="list-style-type: none"> <li>- REPLACE THE CHAIN WHEN WEAR EXCEEDS 5 % OF THE HEIGHT OF THE PLATE "H"</li> <li>- CORRECT ALIGNMENT</li> <li>- INCREASE TOLERANCE</li> <li>- REPLACE THE CHAIN</li> </ul>
 <p><b>Wear on the side of the chain</b></p>	<ul style="list-style-type: none"> <li>- INCORRECT INTEGRATION OF THE CHAIN WITH THE SHEAVES OR OTHER SIDE GUIDE ELEMENTS</li> </ul>	<ul style="list-style-type: none"> <li>- CORRECT ALIGNMENT</li> <li>- INCREASE TOLERANCE</li> <li>- REPLACE THE CHAIN</li> </ul>

 <p><b>Unusual projection or rotation of the pins</b></p>	<p>- EXCESSIVE FRICTION DUE TO HEAVY LOADS OR INADEQUATE LUBRICATION</p>	<p>- ELIMINATE THE EXCESSIVE LOAD - IMPROVE LUBRICATION</p>
 <p><b>Breakage of the plates (stress)</b></p>	<p>- LOAD EXCEEDED OF THE DYNAMIC CAPACITY OF THE CHAIN</p>	<p>- ELIMINATE THE CAUSE OF THE EXCESSIVE LOAD AND REPLACE THE CHAIN WITH ONE OF A HIGHER DYNAMIC CAPACITY</p>
 <p><b>Cracked plate (stress corrosion)</b></p>	<p>- SERIOUS FORMATION OF RUST AND EXPOSURE TO ACIDS OR ALKALINES + CORROSION UNDER PRESSURE</p>	<p>- REPLACE THE CHAIN AND PROTECT AGAINST HOSTILE ENVIRONMENTS</p>
 <p><b>Breakage of the plates</b></p>	<p>- EXTREME EXCESSIVE LOAD</p>	<p>- ELIMINATE THE CAUSE OF THE EXCESSIVE LOAD AND REPLACE THE CHAIN</p>
 <p><b>Elongation of the plates holes</b></p>	<p>- HIGH EXCESSIVE LOAD</p>	<p>- ELIMINATE THE CAUSE OF THE EXCESSIVE LOAD AND REPLACE THE CHAIN</p>
 <p><b>Hardened articulations</b></p>	<p>- PRESENCE OF DIRT IN THE ARTICULATIONS, - CORRODED PARTS - DEFORMED PINS</p>	<p>- CLEAN AND LUBRICATE - REPLACE THE CHAIN - REPLACE THE CHAIN</p>
<p><b>Pin hole</b></p>	<p>- EXPOSURE TO A CORROSIVE ENVIRONMENT (OFTEN SALT OR CHLORIDE)</p>	<p>- REPLACE THE CHAIN AND PROTECT FROM A HOSTILE ENVIRONMENT</p>
<p><b>Hook bolt or connection pin worn</b></p>	<p>- NORMAL WEAR</p>	<p>- REPLACE ALL OF THE WORN PARTS AND REALIGN DURING THE ORIGINAL INSTALLATION PHASE</p>



## 12. SAFETY DEVICES

### 12.1 – Warning and Signalling Devices




The CHAIN is fitted with the following warning and signalling devices for transport and installation operations.

- Safety signs (packaging).

### 12.2 – Warnings related to Residual Risks

After having carefully considered the dangers that are present in all of the operative phases related to the leaf chain, necessary measures have been adopted to eliminate, in as far as is possible, the risks for operators and/or to limit or reduce risks deriving from the dangers that cannot be completely eliminate from their origin.  
However, despite all of the precautions adopted, **the following residual risks** are still to be found on the chain that can be eliminated or reduced through the relative prevention activities:

RISKS DURING USE		
DANGER / RISK	PROHIBITION / WARNING	OBLIGATION / PREVENTION
<b>Risk of impact / squashing during transportation and assembly of the chain</b>	<b>Warning:</b> only qualified operators. Touching the elements of the chain is <b>prohibited</b>	Assign the operations to qualified personnel.
<b>Risk of squashing during maintenance and dismantling / assembly of the chain</b>	<b>Warning:</b> only qualified operators	Assign the operations to qualified personnel.
<b>Risk of accidental contact of a person with the chain</b>	<b>Warning:</b> only qualified operators Touching the elements of the chain is <b>prohibited</b>	The manufacturer of the machine should allow for protection devices according to the norm UNI EN 12100-1 AND UNI EN 12100-2

RISKS DURING MAINTENANCE		
DANGER / RISK	PROHIBITION / WARNING	OBLIGATION / PREVENTION
 <p><b>Risk of dangers due to entangling / squashing</b> in the case of contact with the moving chain</p>	 <p><b>Intervention on the chain is prohibited</b> when in movement</p> <p><b>Warning:</b> exposure to the moving parts may create situations of danger. Touching the chain is <b>prohibited</b></p>	 <p>Assign the electrical maintenance operations to qualified personnel</p> <p>Assign the mechanical maintenance operations to qualified personnel.</p>
<p><b>Risk of contact from lubricants</b> during maintenance and the dismantling / assembly of the chain</p>	<p><b>Warning:</b> use of low risk products use of IPD's</p>	<p>Assign the operations to qualified personnel.</p>



## 13. SPARE PARTS AND DOCUMENTS

### 13.1 – Spare parts

We recommend the exclusive use of original spare parts and, in any case, a request should be made to the manufacturer for a detailed list of the main spare parts to be kept available.

### 13.2 – Certificates and Manuals

The following documents represent an integral part of this manual:

- EC Chain Compliance Statement (when applicable))



PERFORMANCE IN MOTION

## LEAF HOISTING CHAINS

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ALL BUYERS AND USERS SHOULD CONSULT ALL OF THE APPLICABLE REGULATIONS RELATED TO SAFETY.

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