Maintenance and Use Manual

Chain Drawing: **W4975BL032 - W4975CL032**

Chain Description: **Pitch 250mm, Inner width 60mm, Bush diameter 42mm, with Outboard Bearing Wheels diameter 98, Special Carrier attachment every 4000mm**

Year of production : 2020

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1 - Introduction

- This manual is divided into parts to more easily point out to the section of interest.
- The scope of this manual is to serve for the installation and maintenance of the chain.
- **Warning** : Reading this manual is meant for installers, operators, technicians responsible for maintenance, as well as to the purchaser who must inform the operators in order to prevent damage and accidents.

1.1 - References specifications

Issue	Title
European Parliament	*Machinery Directive 2006/42/EC*
BS 4116	*Conveyor chains, their attachments and associated chain wheels*
DIN 8165	*Solid Bearing pin type FV conveyor chain*
DIN 8167	*ISO-type M conveyor chains with solid pins*
DIN 8168	*ISO-type MC conveyor chains with hollow pins*
DIN 8169	*Rollers for types M, MT, MC, and MCT solid and hollow bearing pin conveyor chains*
ASME B29.10M	*Heavy duty offset sidebar power transmission roller chains and sprocket teeth*
ASME B29.12M	*Steel bushed rollerless chains, attachments, and sprocket teeth*
ASME B29.15M	*Steel roller type conveyor chains, attachments, and sprocket teeth*
UNI 10932	*Trattamenti termici dei materiali metallici Heat Treatment of Metallic materials*
ISO 1977	*Conveyor chains, attachments and sprockets*
ISO 15614-1	*Specificazione e qualificazione delle procedure di saldatura per materiali metallici Specification and qualification of the welding procedures for metallic materials*

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1.2 - Warning Statement

Use care. To prevent injury comply with the following to avoid serious personal injury:

1. Guards must be provided on all chain and sprocket installations in accordance with provisions of "Machinery Directive 2006/42/EC" or other applicable safety standards. When revisions of these standards are published, the updated edition shall apply.
2. Always lock out the power switch before installing, removing, manually lubricating or servicing a chain system.
3. When connecting or disconnecting chain:
   - **a** Eye protection is required. Wear safety glasses, protective clothing, gloves and safety shoes.
   - **b** Support the chain to prevent uncontrolled movement of the chain and its parts.
   - **c** The use of hydraulic equipment (cylinders, pumps) is suggested. Tools must be in good condition and properly used.
   - **d** Do not attempt to connect or disconnect the chain without first reading and understanding the instructions, including the proper placement of pins and bushings, and the procedures for removal or insertion.
   - **e** Do not attempt to reuse a damaged chain by replacing only the parts that show the fault. The entire chain may be compromised through damage occurred and thus may need to be replaced
4. Other cautions:
   - **a** **Alterations and Repairs** of the chains should be made only by qualified personnel with parts and components authorized by ZMC Italia Sr.l.
   - **b** **Inspect Chains** for shipment damage before installation. During operation, all chain systems should be inspected on a regular schedule. Visually check for worn, damaged and broken parts caused by improper installation or maintenance, abnormal stress, temperature, humidity, abrasion or corrosion, possible interference with other system components and improper lubrication.
   - **c** **Heating Chain** with a cutting torch is not suggested unless absolutely necessary for removal. The heating caused by the cutting can damage the chain.
   - **d** **Welding** should not be performed on any chain or component.
   - **e** **Breaking Load** of a chain means the average load at which it will break when subjected to a destructive tensile test. *It does not mean working load.* For complete information, contact ZMC Italia S.r.l.

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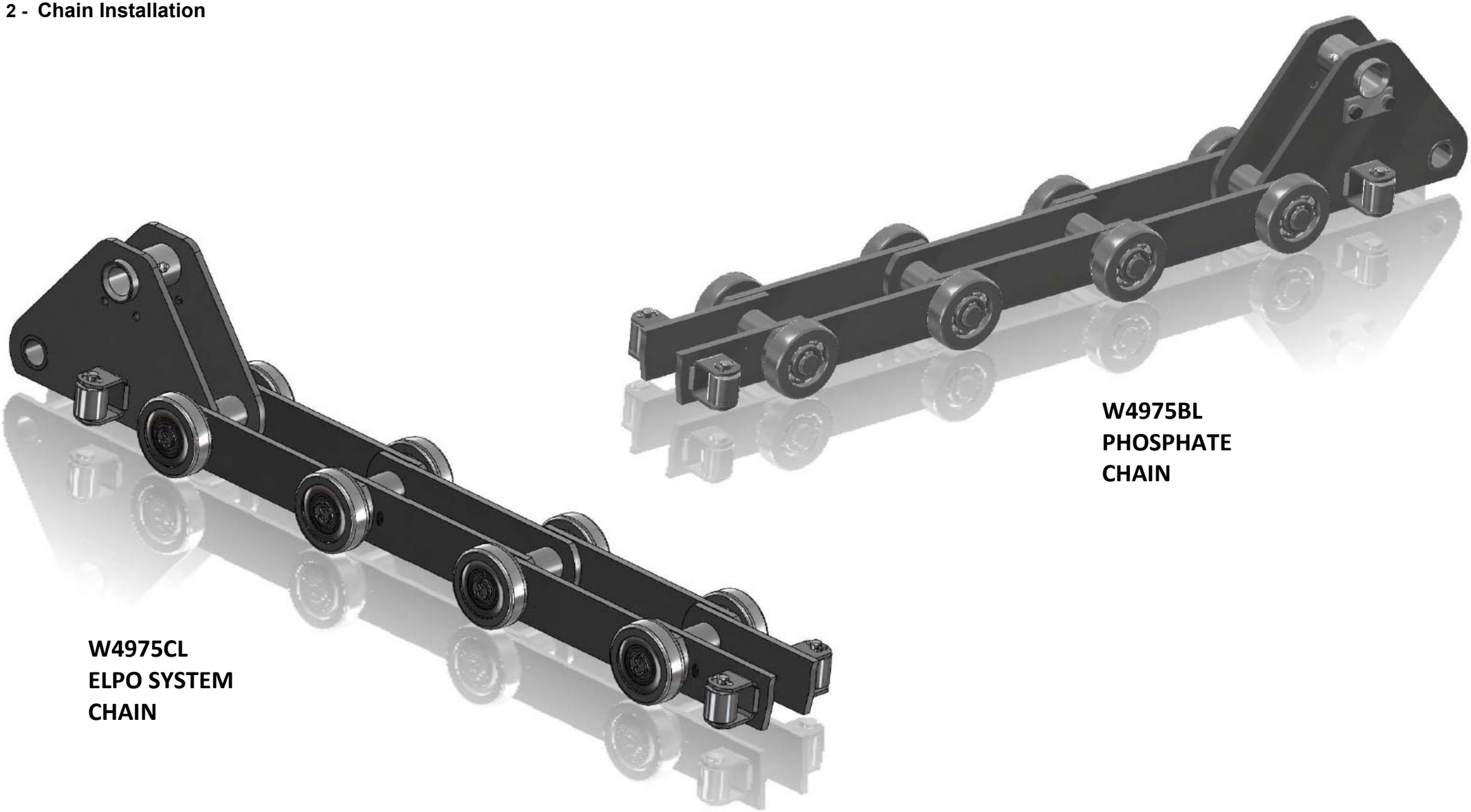
2 - Chain Installation



Img_1

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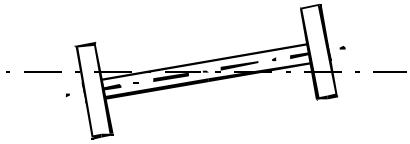
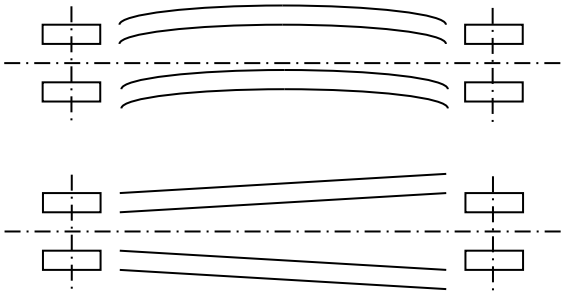
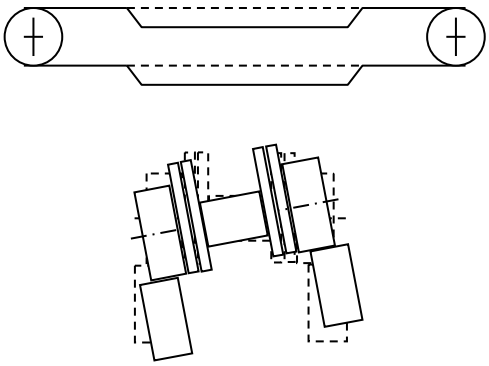
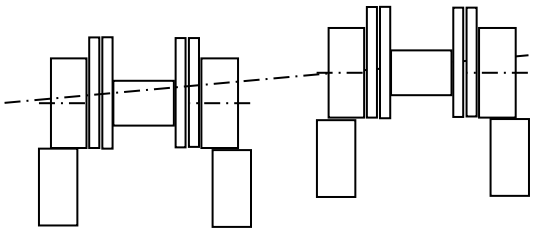
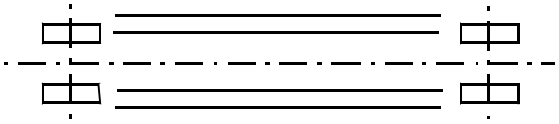
2.1 – Check of the Conveyor before the Installation of the chain

Checks to be excuted on the conveyor before assembling the chain are reported in order to obtain a correct running of the chain. The failure to respect one or more of the geometric requirements may affect the function of the chain; the presence of misalignments or inclinations force the chain to operate with an uncorrect distribution of the load, from which an excessive elongation of the chain or damage of chain components could result.
In the following, the list of checkpoints is illustrated.

	Check
	**Inclination of the shafts** To be checked both in the vertical and horizontal plane.
	Tooth gap alignment
	**Flatness of tracks**
	**Straightness of tracks**
	**Coplanarity of tracks for the two chains**
	**Alignment between chains and sprockets**

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2.2 – Assembly of the chain Right and Left side

The W4975BL (Phosphate Plant) and W4975CL (Elpo Plant) chains must be assembled on the plant so that the right and left sections remain facing each other, as indicated in the assembly diagram below and also highlighted in the overall drawing of the chains

In the case of the W4975BL chain, the details that allow you to recognize the right chains from the left are:
• the recessed grease nipple on the head of the pin, present on one side and absent on the other
• the position of the fixing plate of the bush on the special carrier trapezoidal attachment

In the case of the W4975CL chain, the details that allow you to recognize the right chains from the left are:
• the recessed grease nipples on the pin head, single on one side and double on the opposite side
• the position of the fixing plate of the bush on the special carrier trapezoidal attachment

These differences are shown in the images on the following pages.

The chains will be supplied packaged and divided into suitably labeled pallets to highlight the type of chains they contain (right or left), the pallets will also be numbered and the packing list will indicate the type of chains (right or left) present on each pallet.

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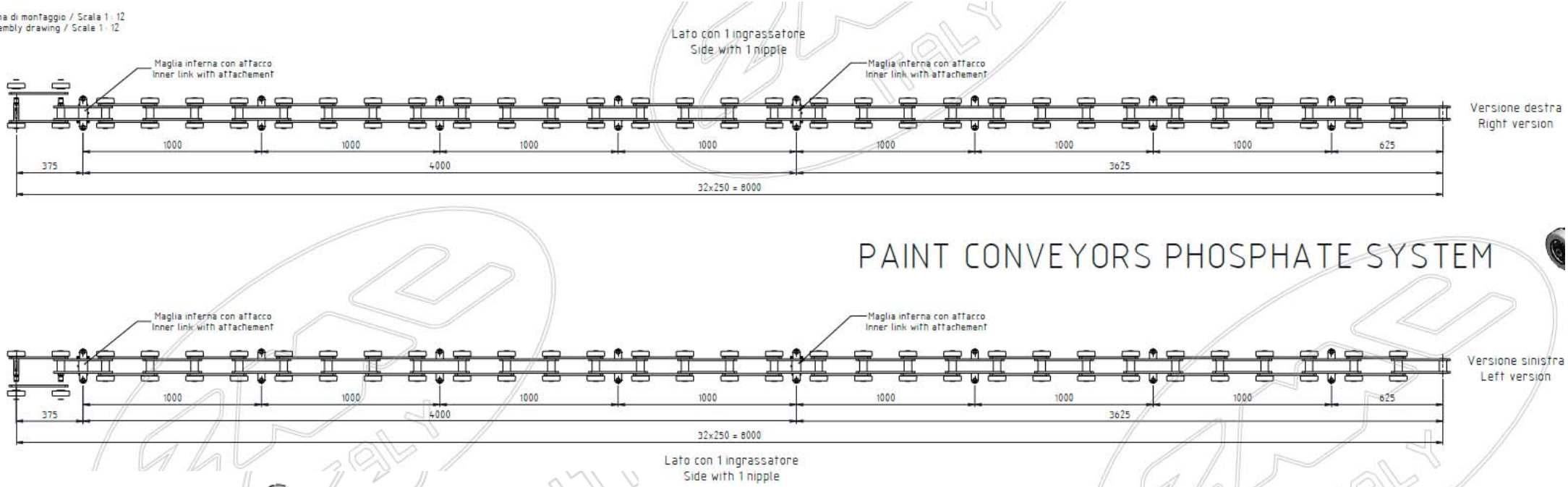
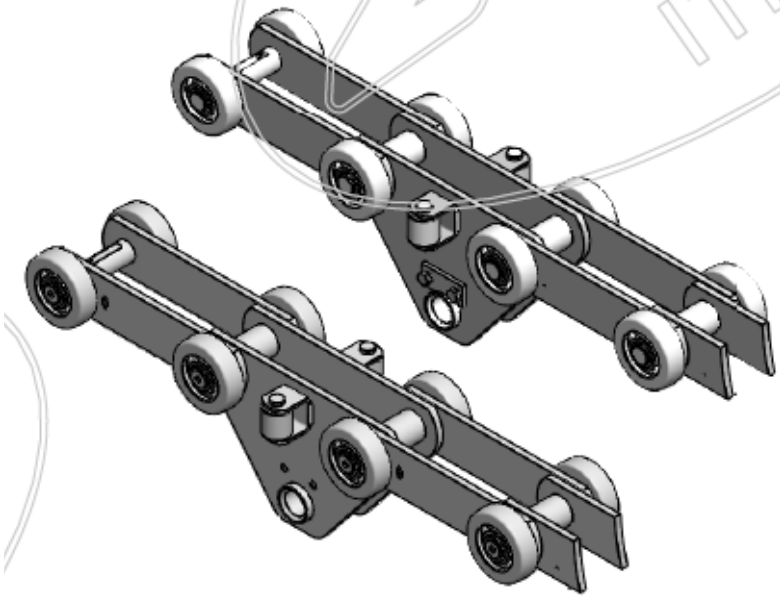
Schema di montaggio / Scala 1 : 12
Assembly drawing / Scale 1 : 12





ASSEMBLY DIAGRAM CHAIN W4975BL
PHOSPHATE PLANT

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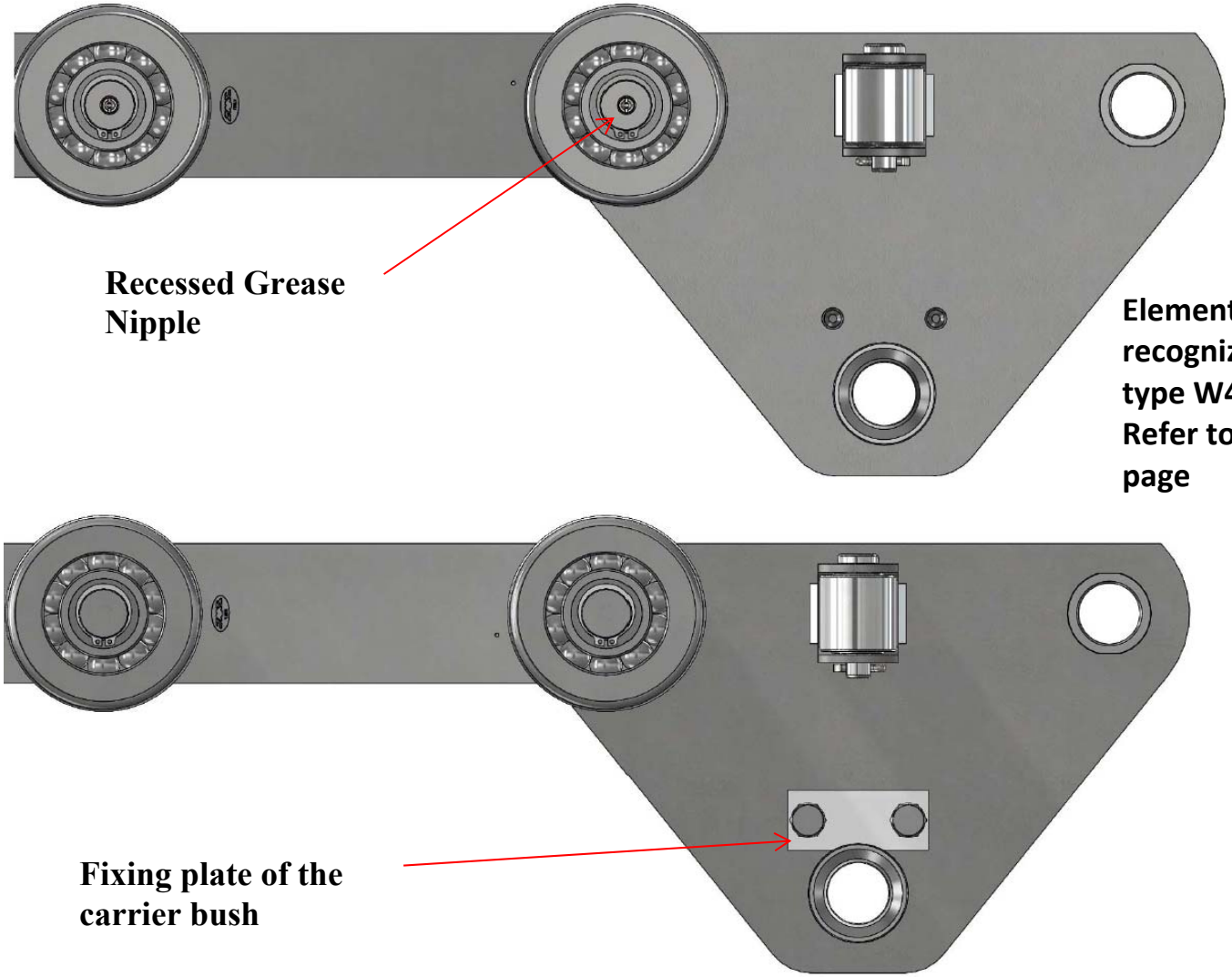

Elements whose position allows you to recognize the right chains from the left ones type W4975BL
Refer to the assembly diagram on the previous page

Img_2

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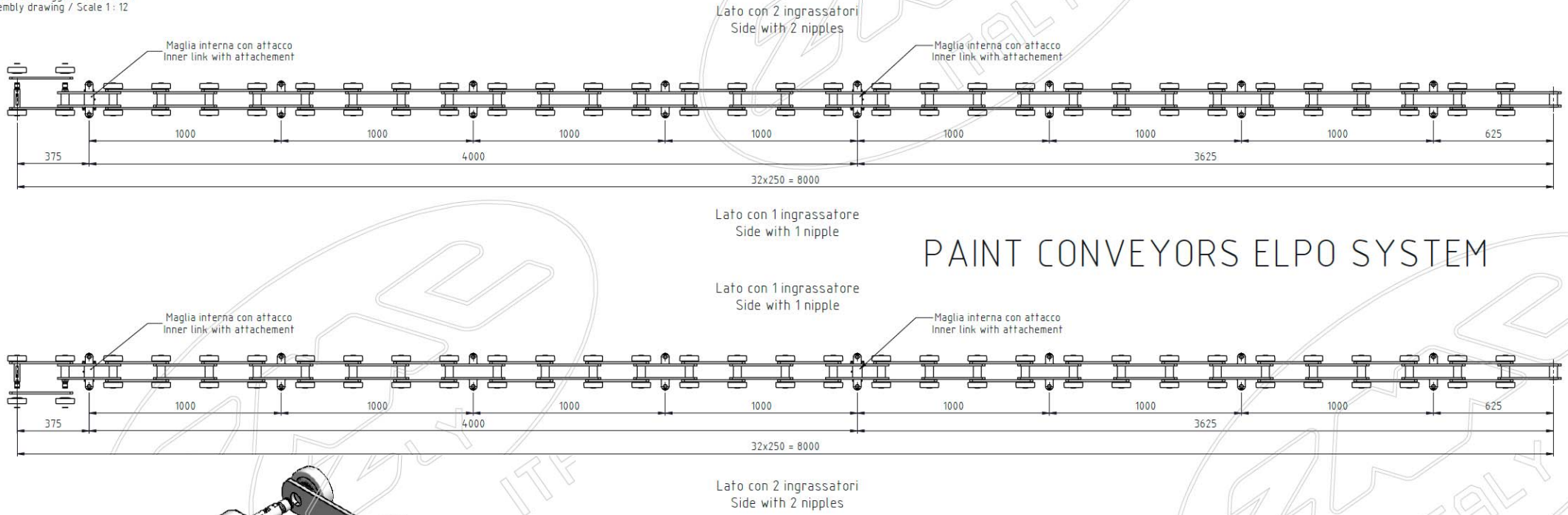
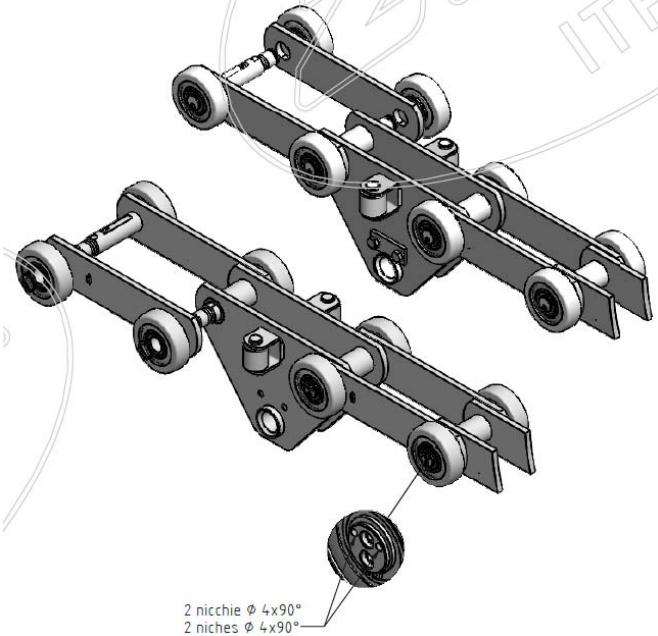
Schema di montaggio / Scala 1 : 12
Assembly drawing / Scale 1 : 12



PAINT CONVEYORS ELPO SYSTEM



ASSEMBLY DIAGRAM CHAIN W4975CL
ELPO PLANT

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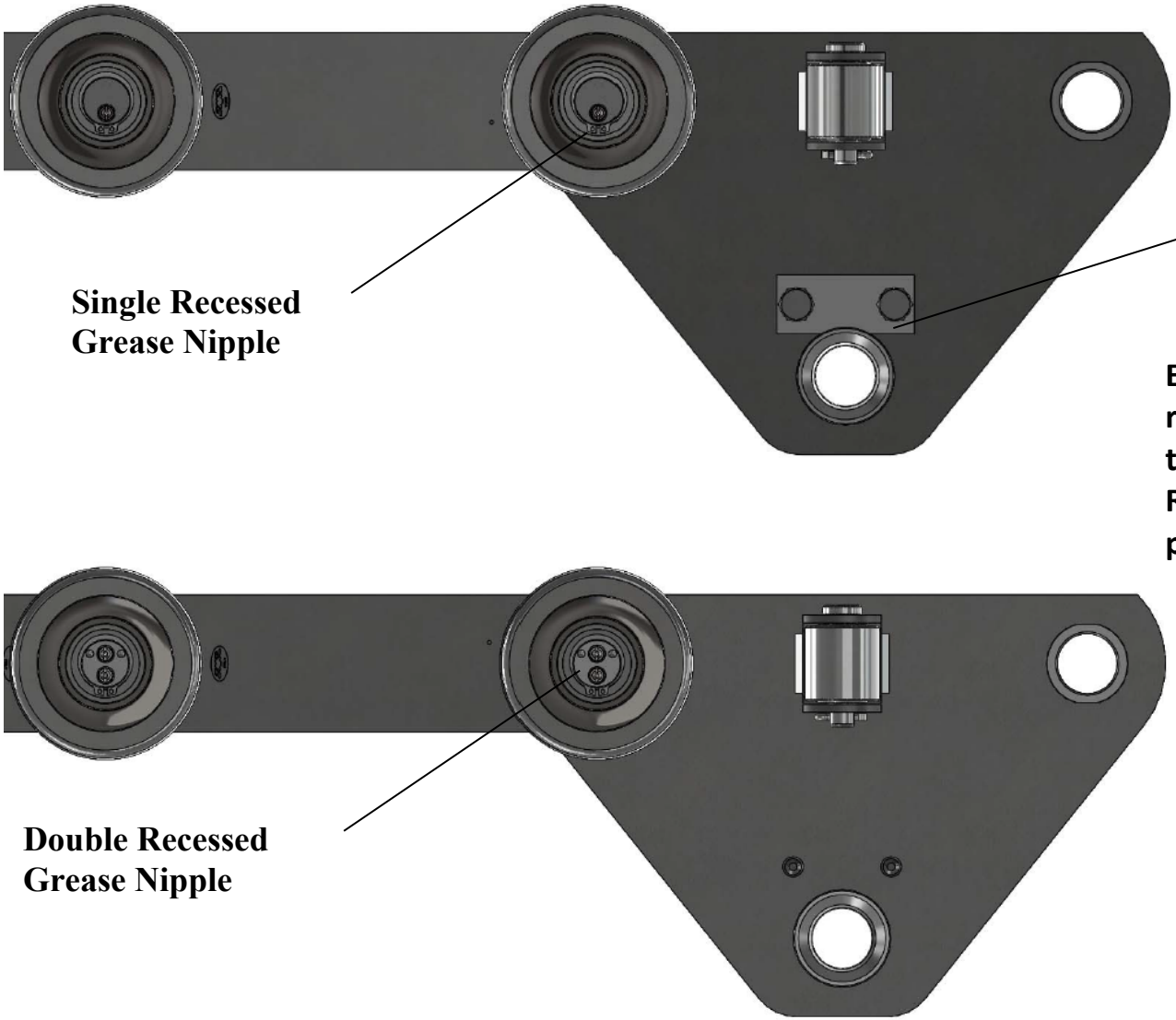

Elements whose position allows you to recognize the right chains from the left ones type W4975CL
Refer to the assembly diagram on the previous page

Img_3

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2.3 – Tensioning of the Chain

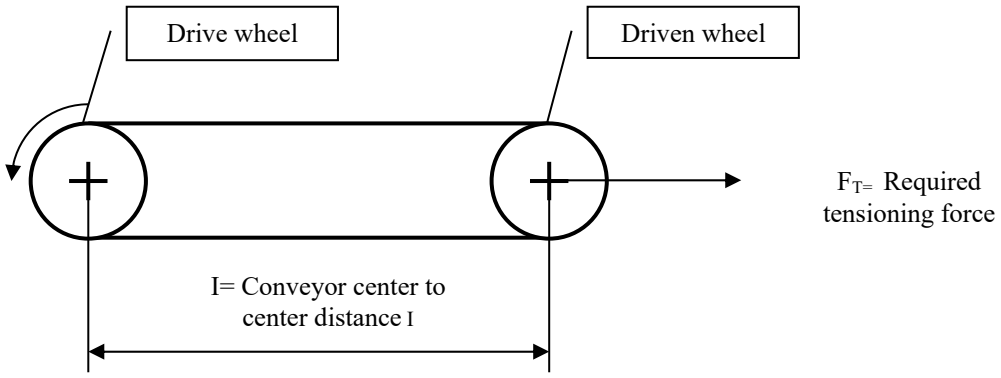
The system used to apply tension on the chains can be different from one conveyor to another, the more correct and reliable system is the counterweigth that allows to control the exact amout of load applied on the chain. The complex configuration of a pendulum conveyor does not allow to present a simple formula for the calculation of the tensioning load, the general concepts usually applied for standard horizontal conveyors apply anyway. The aim of the tensioning force is only to maintain in the unloaded part of the chain along the return strand a pull that is enough to keep the chain straight even where the chain is not supported by any guide.
The magnitude of this force depends on:

- The weigth of the chain plus the elements supported by the chain in the return strand (e.g. carriers)
- The friction factor of the chain in the return path
- The length and geometry of the mentioned path.

It is important to remember that using a tensioning load greater than needed causes unexpected stresses on the components of the chain and this may lead to a faster wear.

In any case the main point is that the actual load applied on the chain can be checked and suitable safety devices are present (such as position sensors or other system) in order to guarantee that no extra load, continuous or momentary, is exerted on the chain.

Only for example the simple calculation used for an horizontal conveyor is reported:



The required force F_T referred to one side of the conveyor (left or right strand) is calculated as follows:

$$F_T = 2 \cdot P_C \cdot I \cdot f \cdot 1{,}1$$

where :

P_C = weight of the chain $\left[\frac{kg}{m}\right]$. In this case P_C = 30 $\left[\frac{kg}{m}\right]$.

I = Center to center distance $[m]$

f = 0.05 friction factor of the outboard bearing wheels on steel tracks

2.4 – Break in and adjustment of the chain

A break-in of the chain on the empty conveyor for at least 24 hours in operating conditions (temperature and environment) is recommended in order to ensure a first adjustment of the chain.

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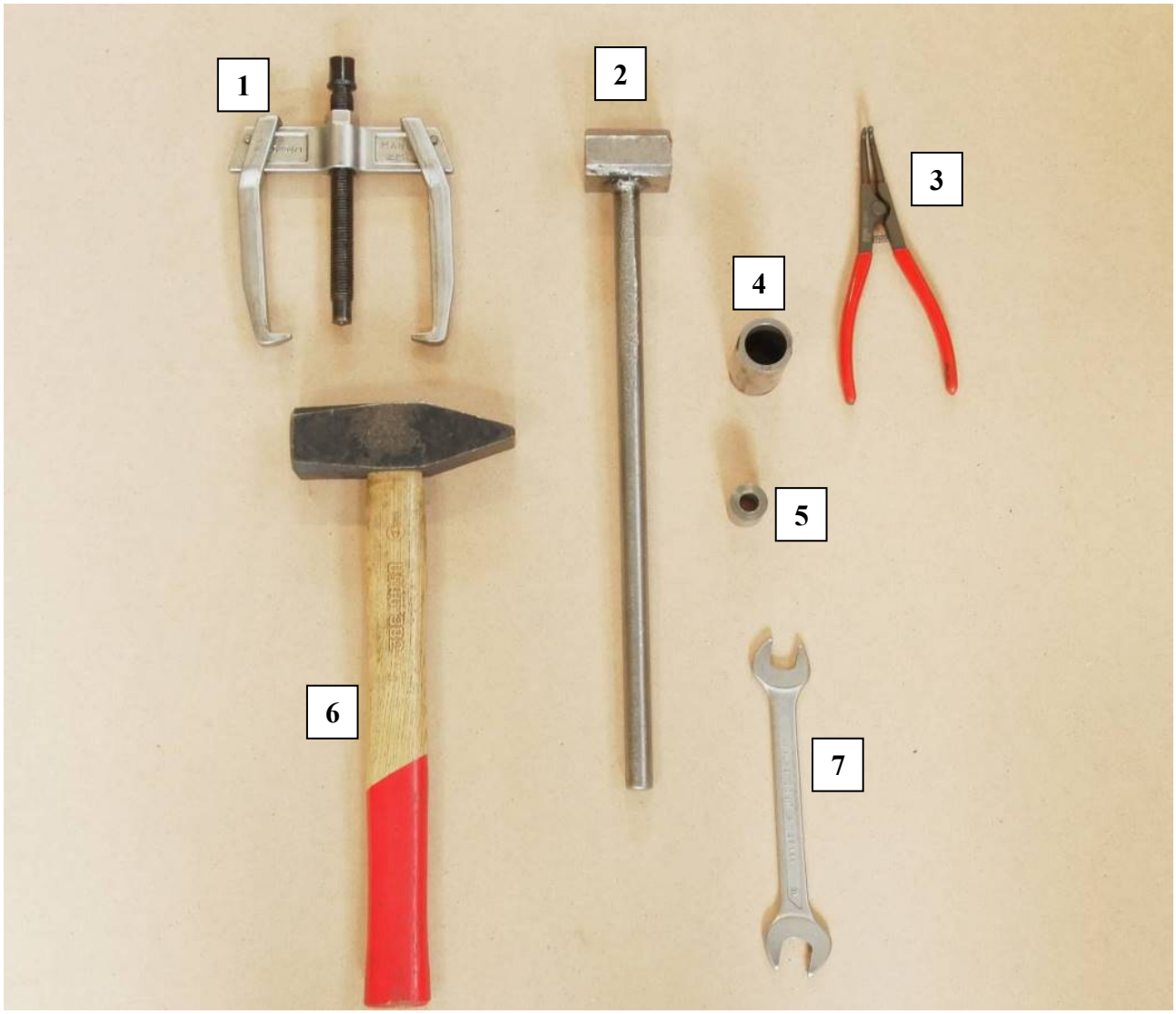
2.5 – Disassembly and Assembly of the chain

Img_5 shows the tools needed for the disasembly and assembly of the pendulum chains type W4975BL032 - W4975CL032.



Img_5

1 Extractor
2 Spacer used during the removal of the outer plate to avoid the damaging of the pin head
3 Pliers for seeger rings
4 Spacer used during the assembly of outer plate and bearing wheel
5 Spacer for removal of the bearing wheel
6 Hammer
7 Wrench

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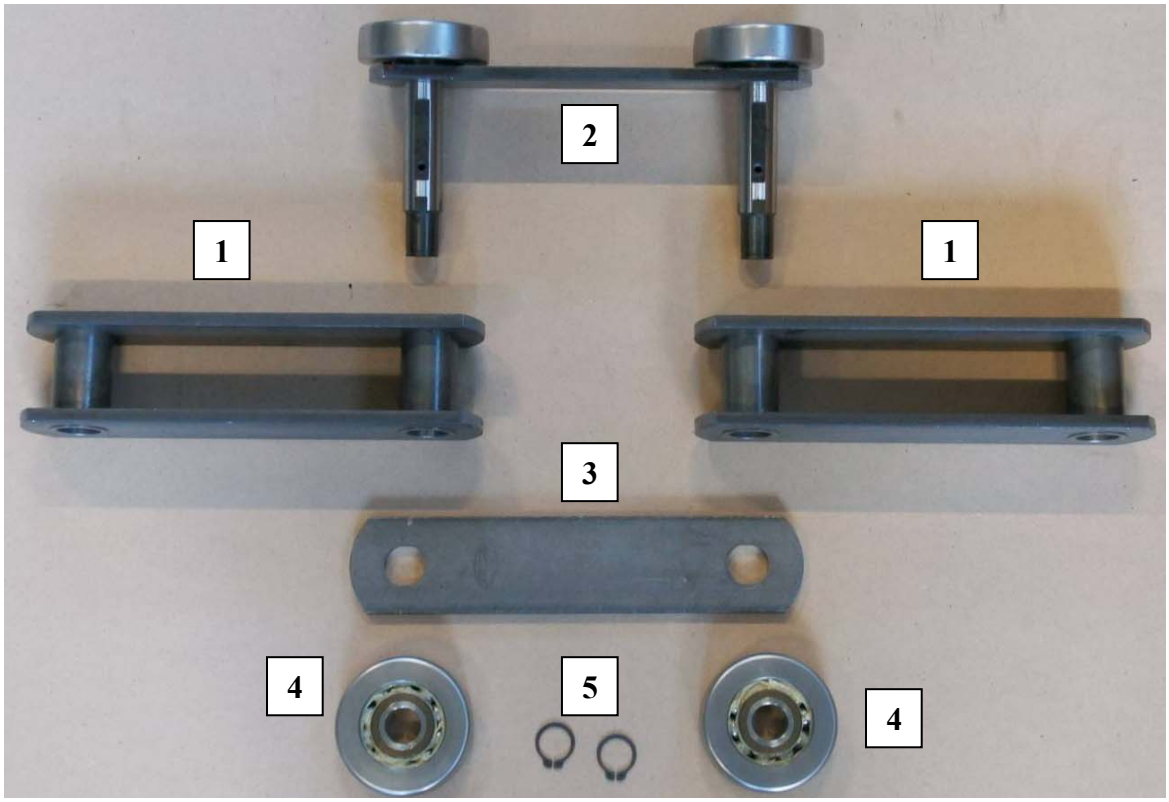
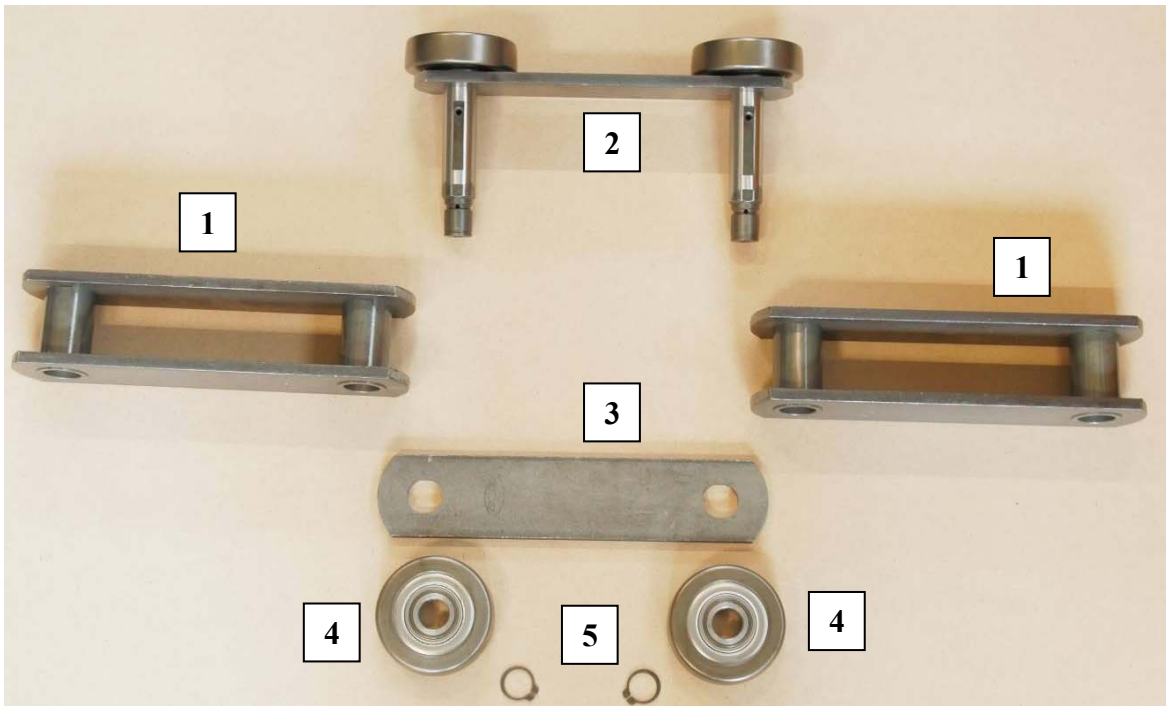
Img_6 e 7 show the components of chains type W4975BL e W4975CL



Img_6 W4975BL



Img_7 W4975CL

1 Inner link
2 Outer plate with assembled pins
3 Opposed outer plate
4 Bearing wheel (Outboard roller)
5 Seeger ring

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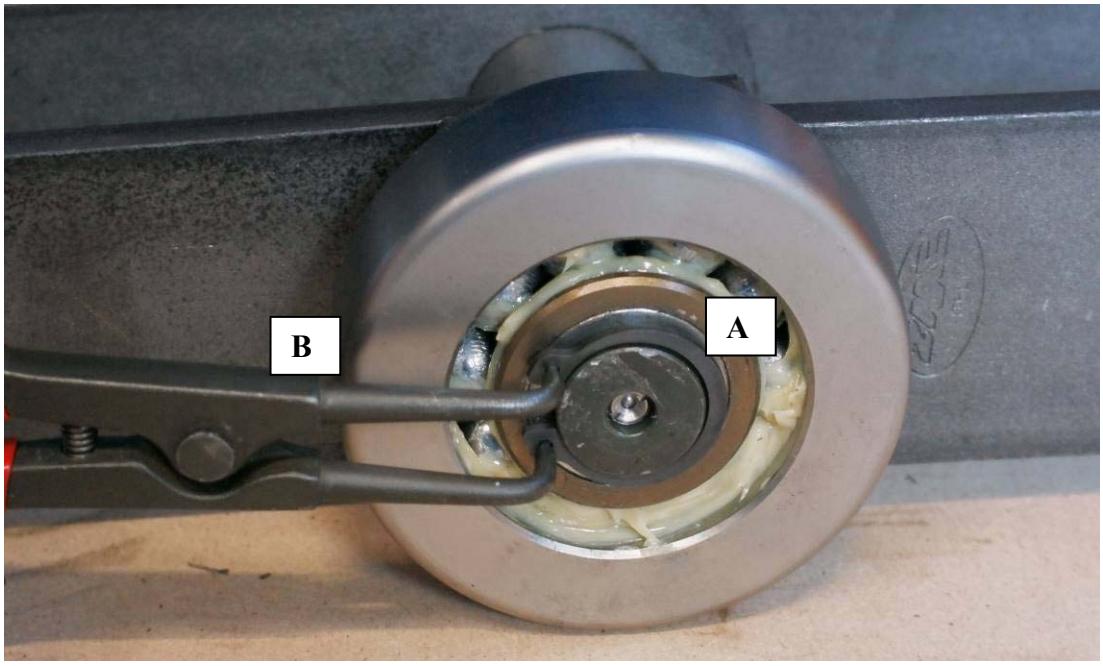
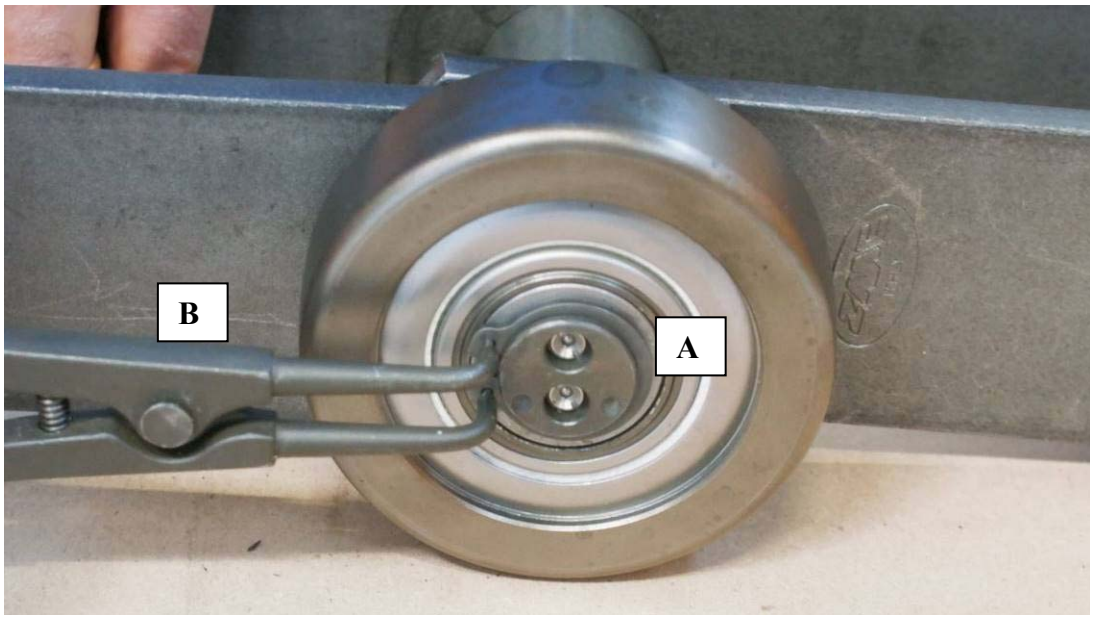
2.5.1 Disassembly of the chain

The diassembly of the chain can be executed as follows.



Img_8 W4975BL



Img_9 W4975CL

Img_8 and 9 Remove the seeger ring [A] using the suitable pliers [B]

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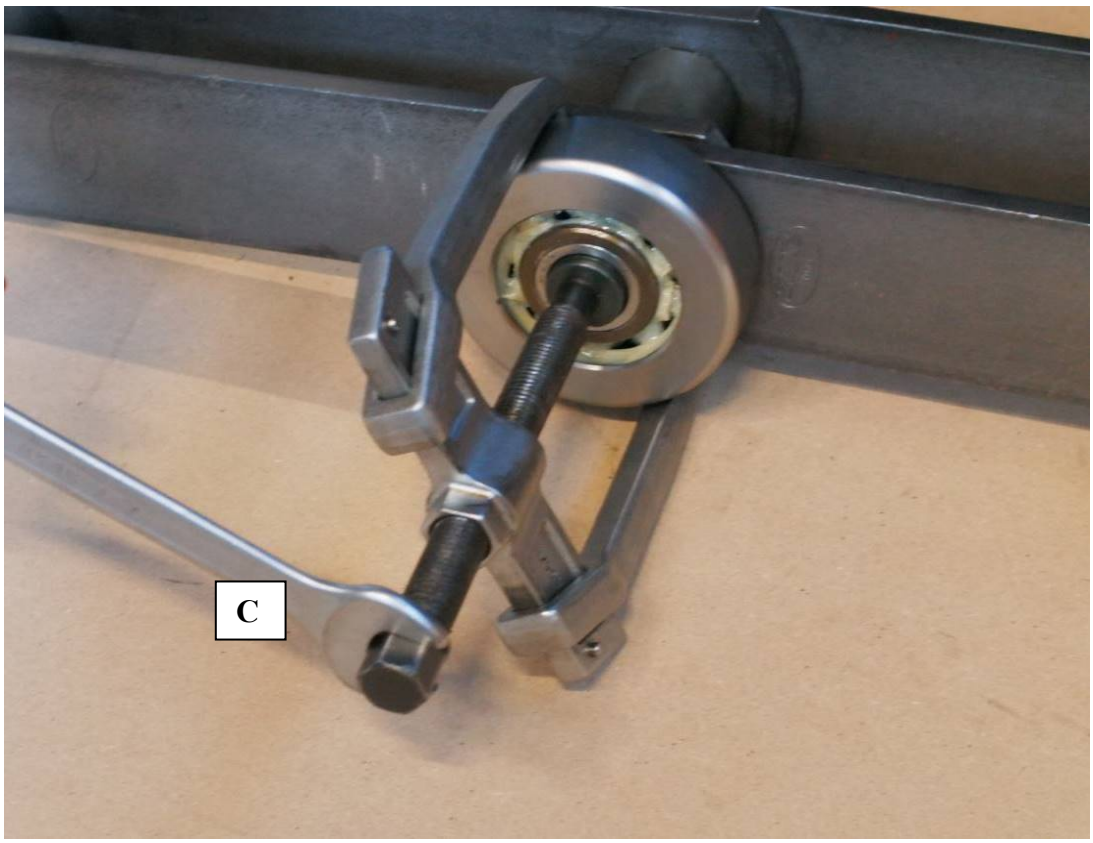
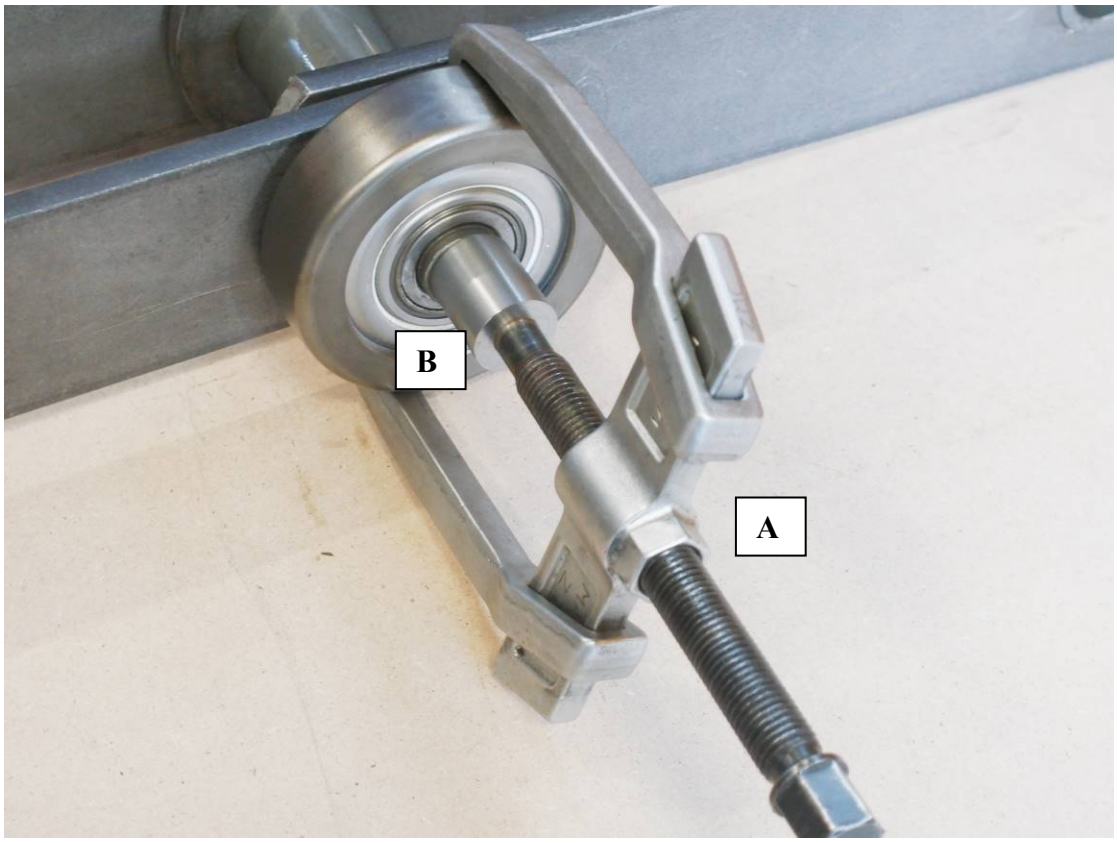


Img_10 W4975BL



Img_11 W4975CL

Img_10 and 11 Using the extractor [A}, with the help of a spacer [B] and of the wrench [C], remove the bearing wheel from the pin.

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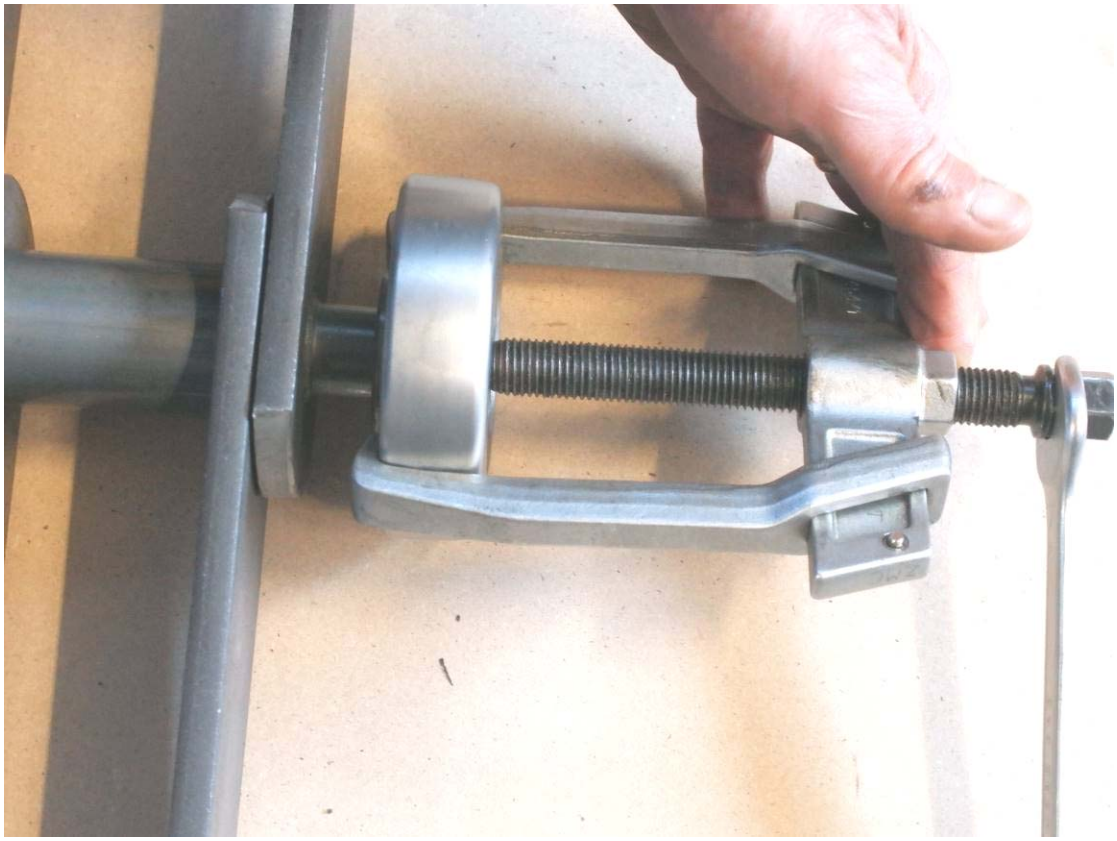
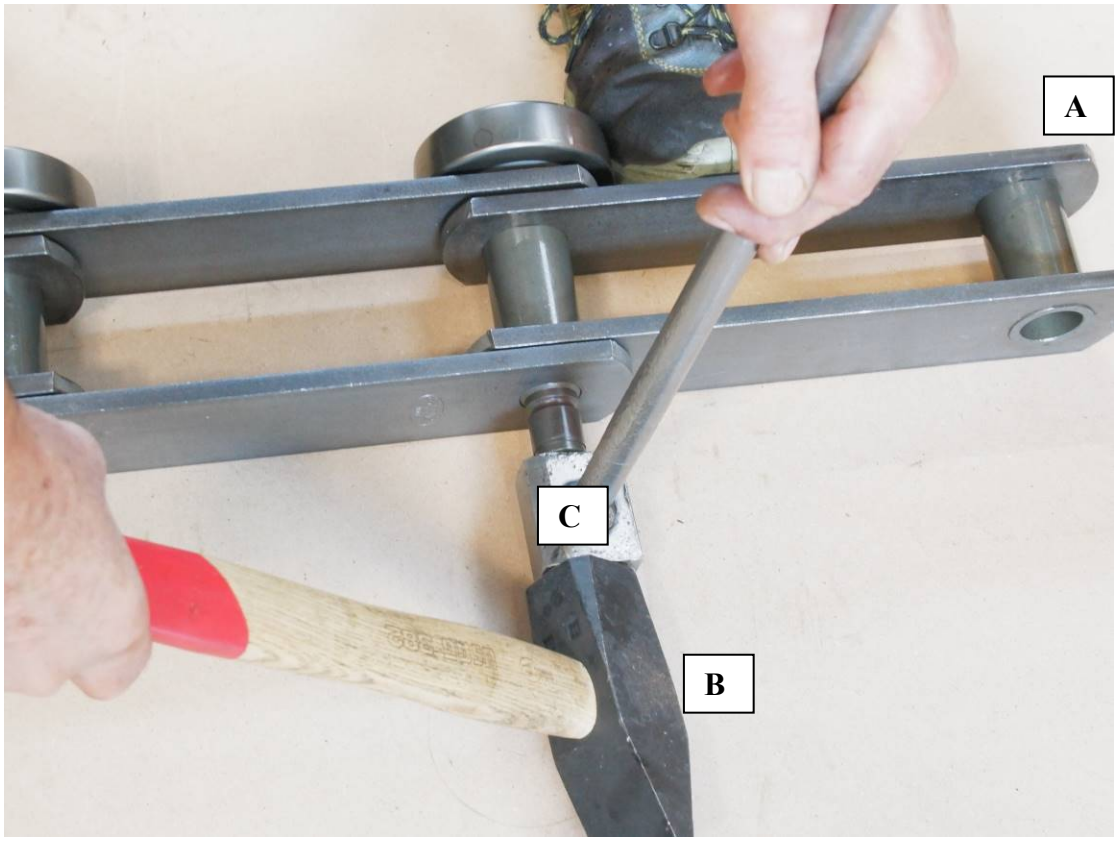


Img_12 Diassembly of the bearing wheel, final configuration.



Img_13 While holding the Inner Link [A], strike the head of the pin with the hammer [B] until it loses the press-fit with the outer plate.
To avoid damaging the head of the pin, we recommend the use of a spacer [C].

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Img_14 Disassembled chain

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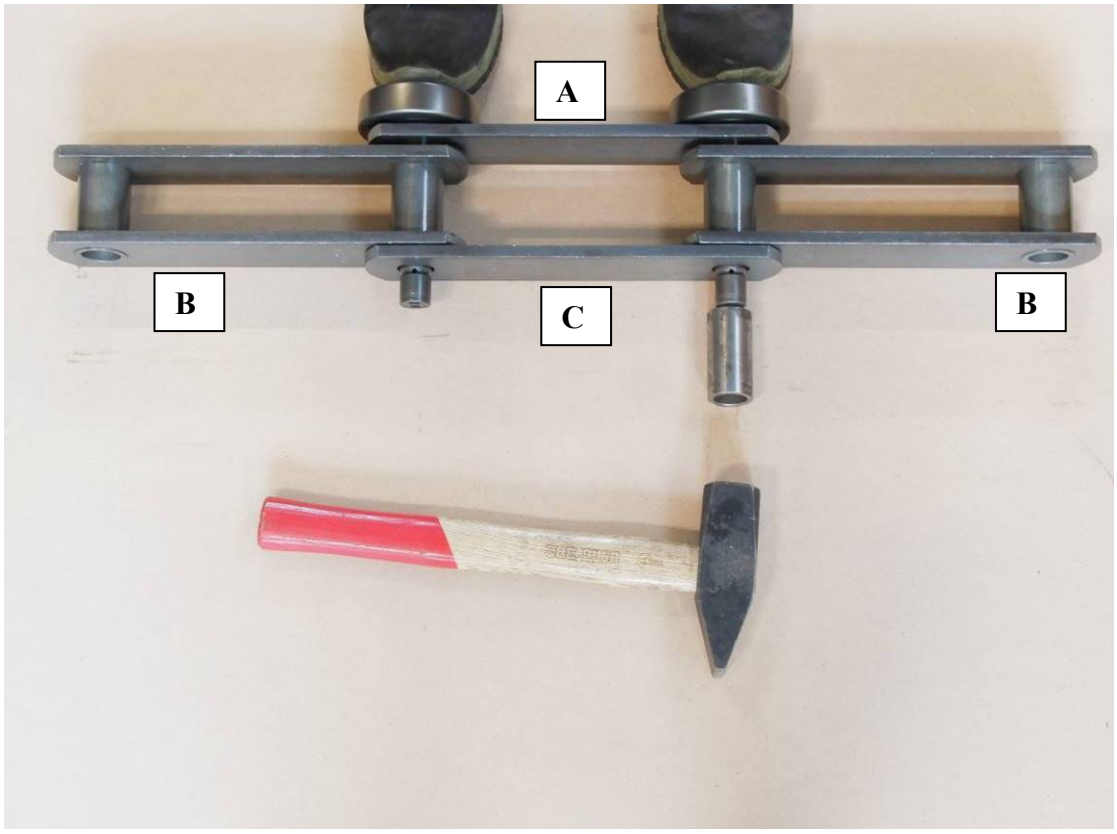
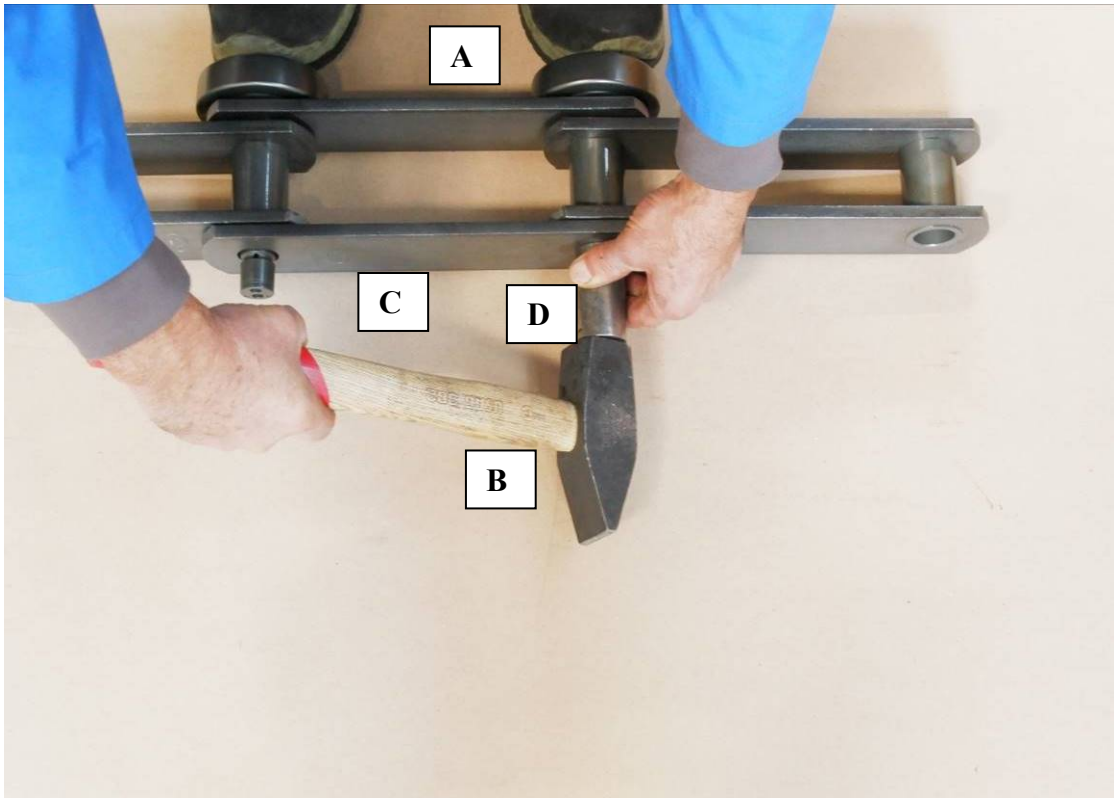
2.5.2 Assembly of the chain



Img_15 Insert the plate with assembled pins [A] in the bushes of the two adjacent inner links [B] and put in position the opposed outer plate [C]



Img_16 While holding the bearing wheels [A], strike the outer plate [C] with the hammer [B] until the pins are fully inserted into the holes in the plate.
To bring the plate into position, use a spacer [D]

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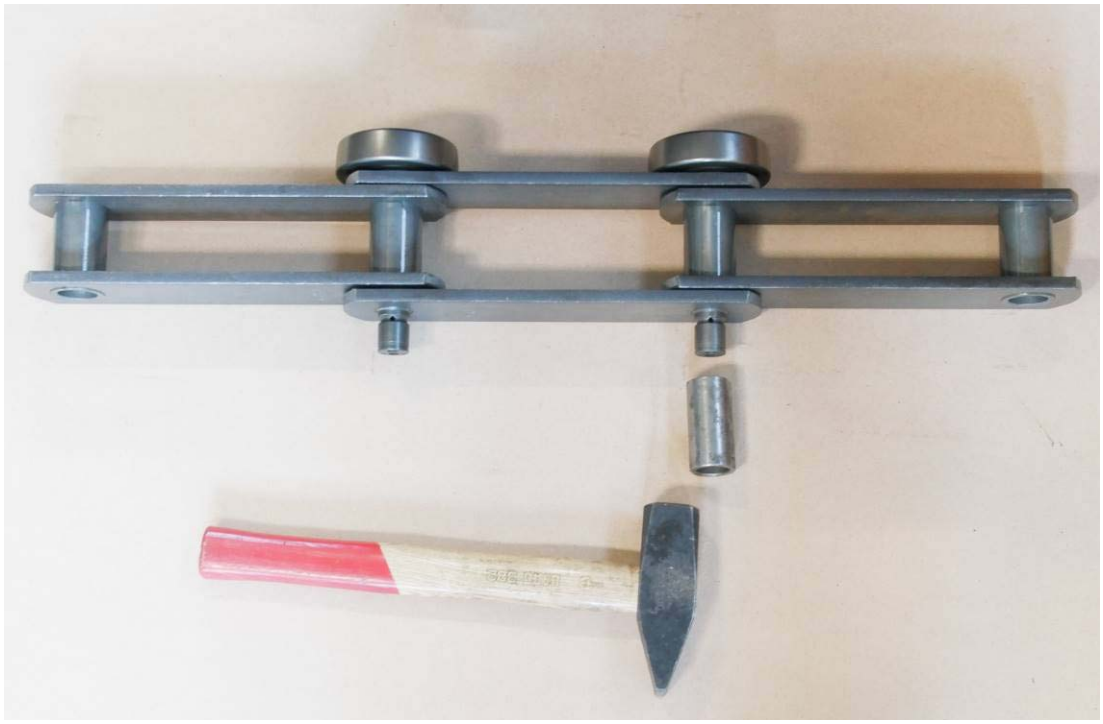
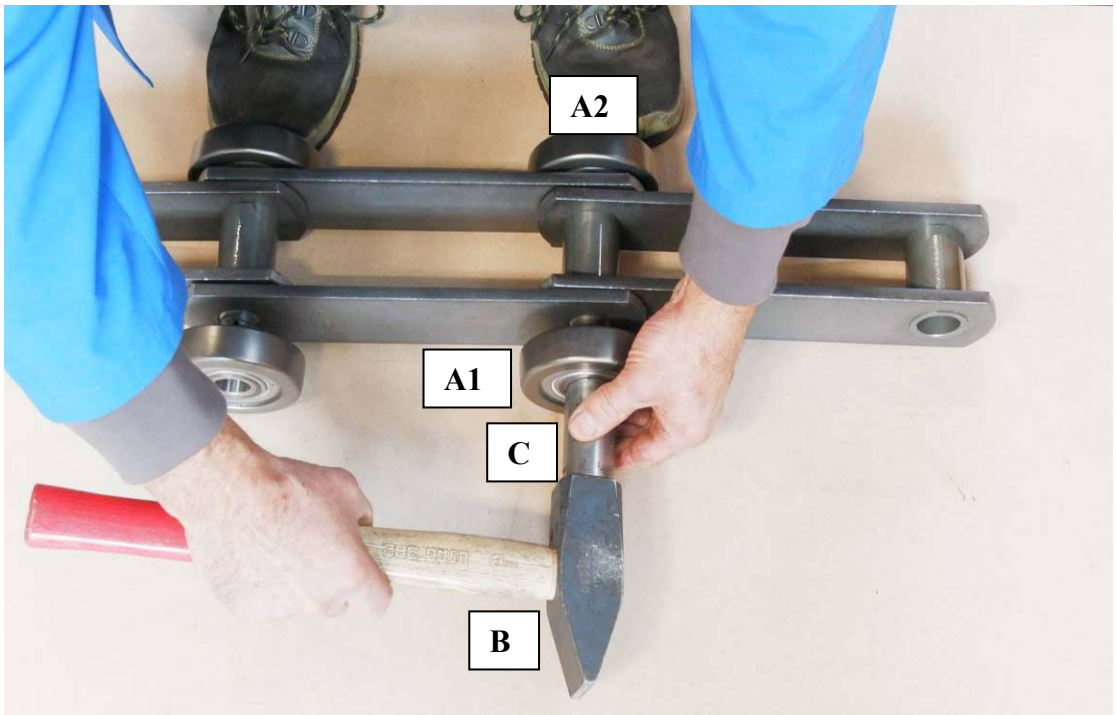


Img_17 Assembled chain



Img_18 Insert the bearing wheel [A1] into the pin.
While holding the bearing wheel on the opposite side [A2], hit the inner ring of the wheel with the hammer [B] until it is fully inserted into the pin.
To avoid damaging the bearing wheel, we recommend using a spacer [C]

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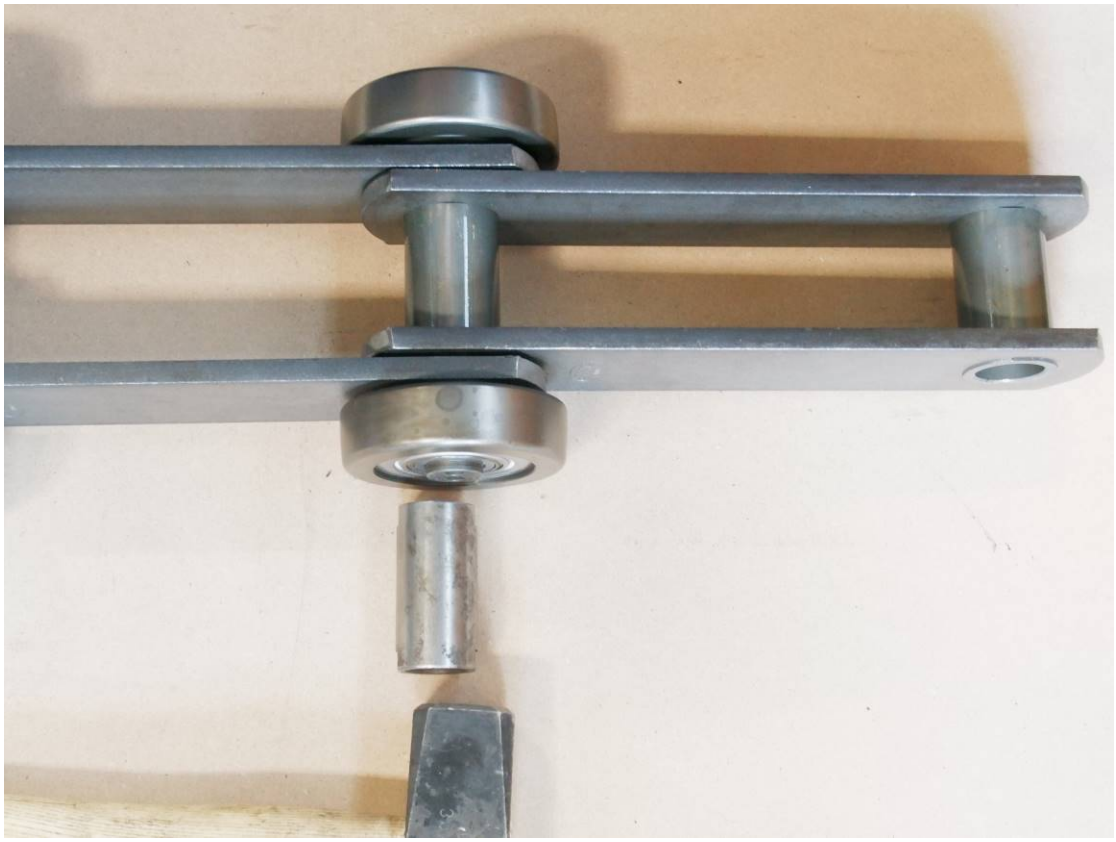
Img_19 W4975BL



Img_20 W4975CL

Img_19 and 20 Assembled bearing wheel

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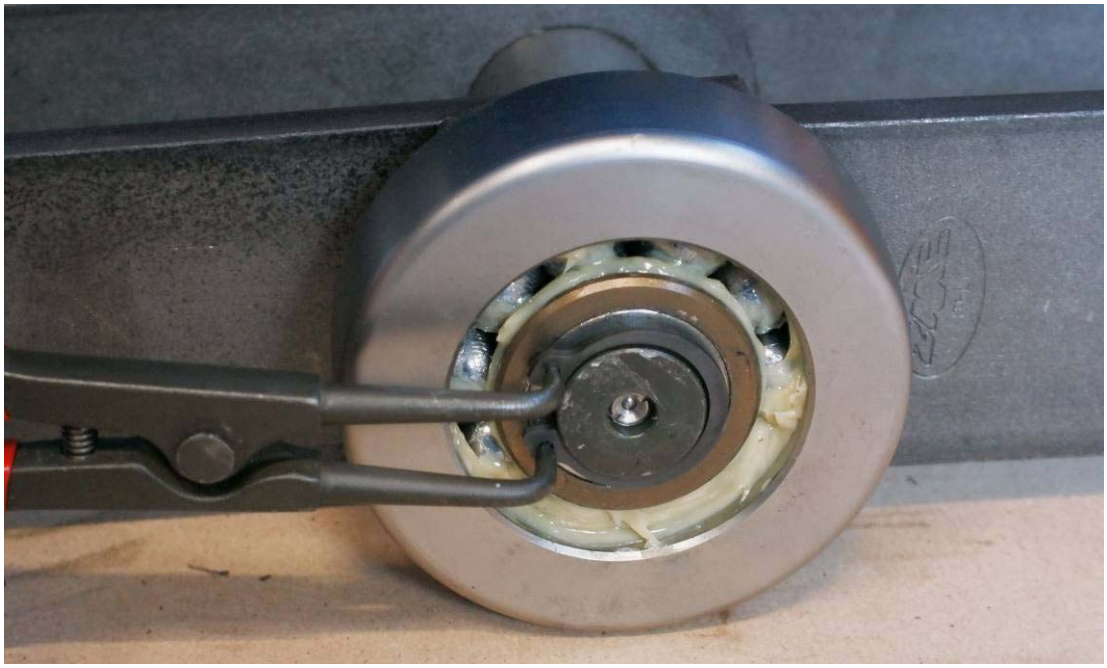
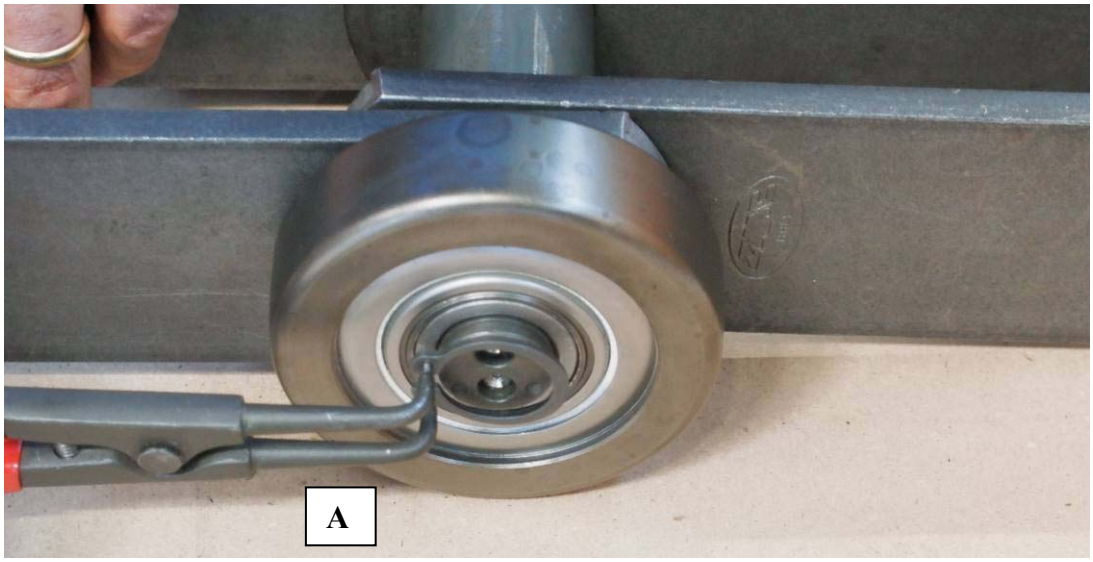


Img_21 W4975BL



Img_22 W4975CL

Img_21 e 22 Using special pliers [A], insert the seeger ring into the groove of the pin

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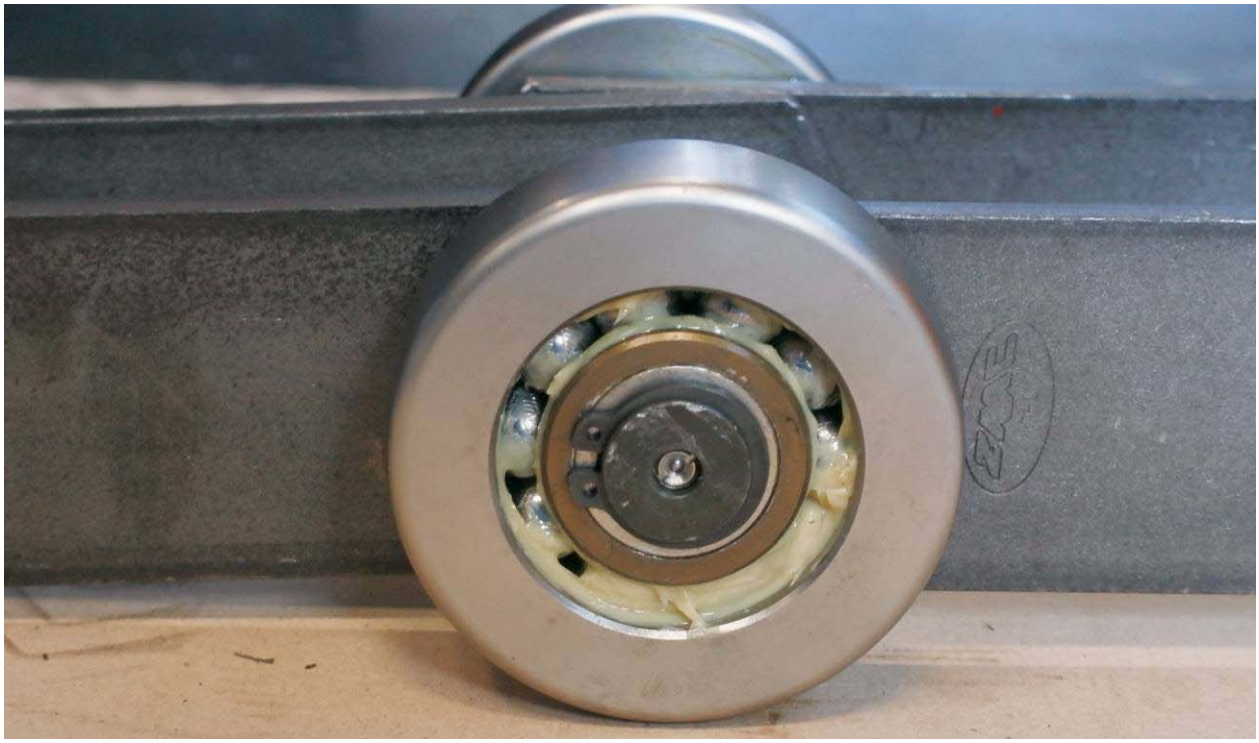
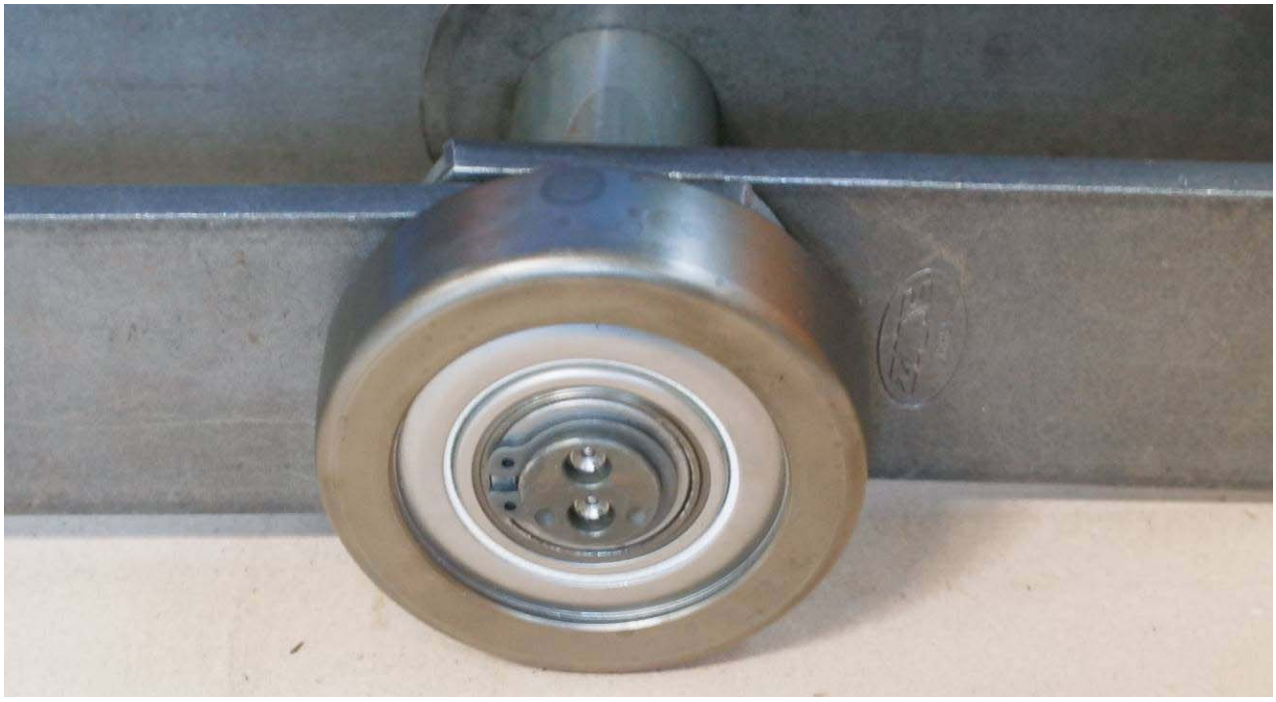


Img_23 W4975BL



Img_24 W4975CL

Img_23 and 24 Complete assembly of the bearing wheel

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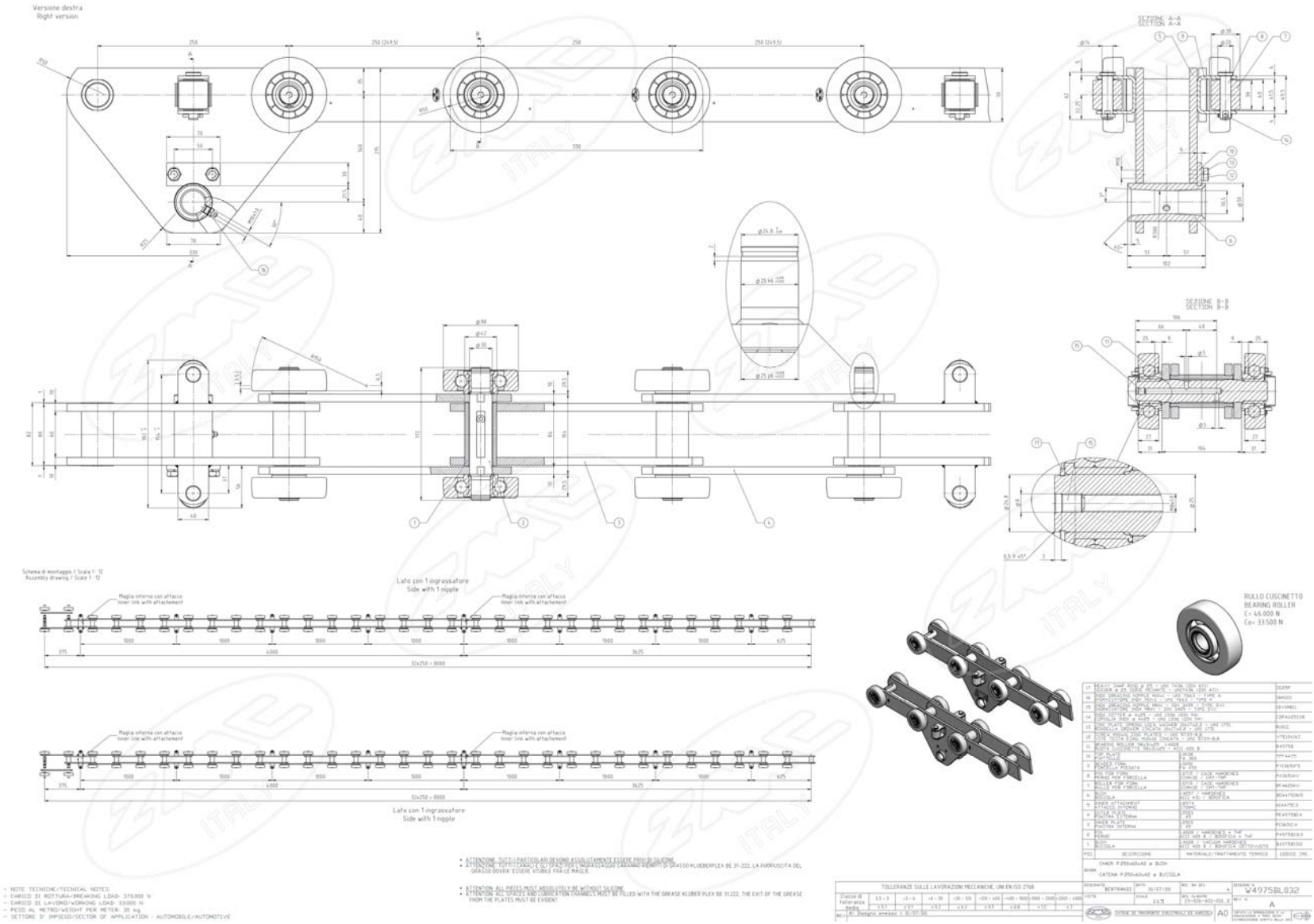
3 - Characteristics of the ZMC chains W4975BL-CL and operationg conditions

3.1 – Drawings

W4975BL



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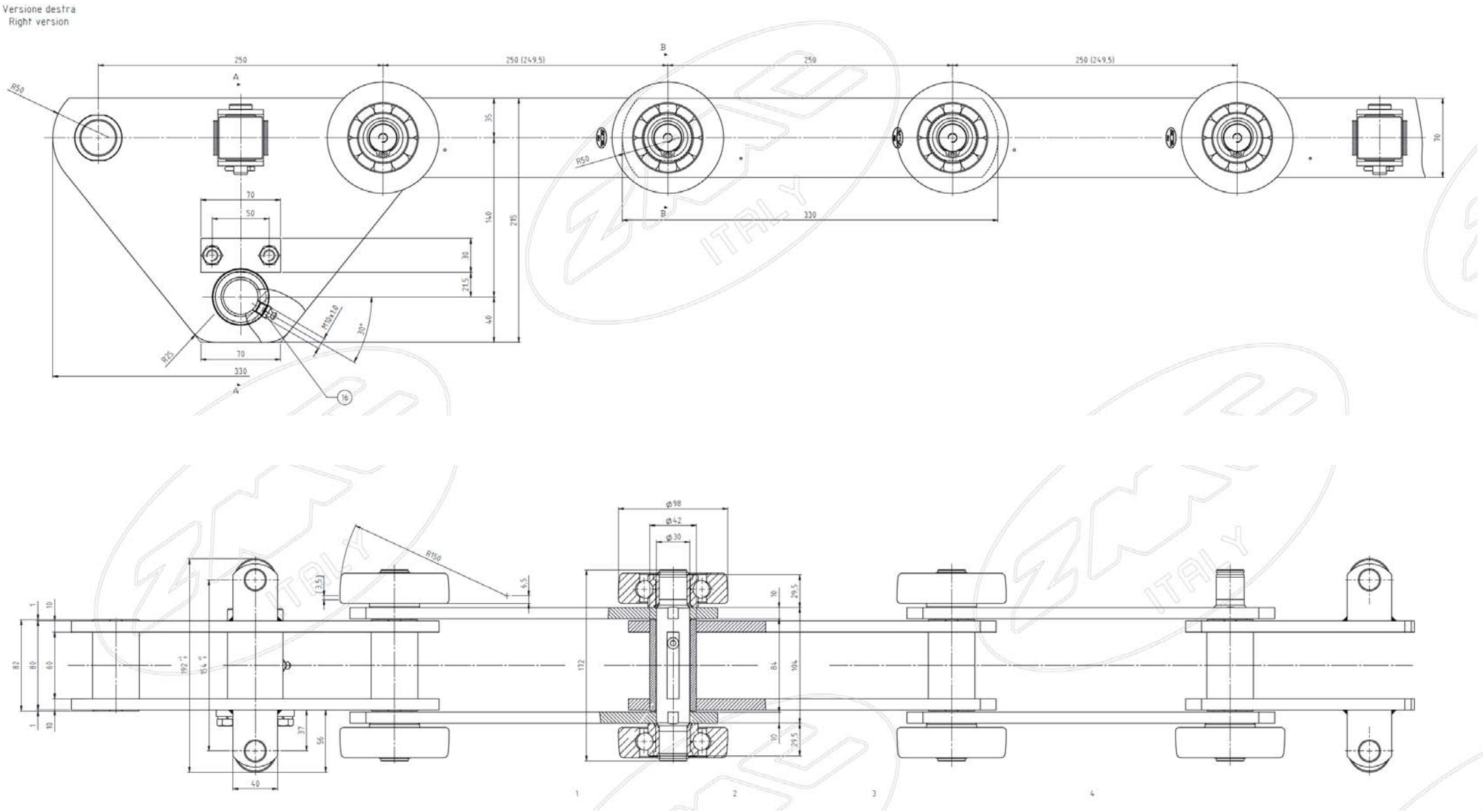

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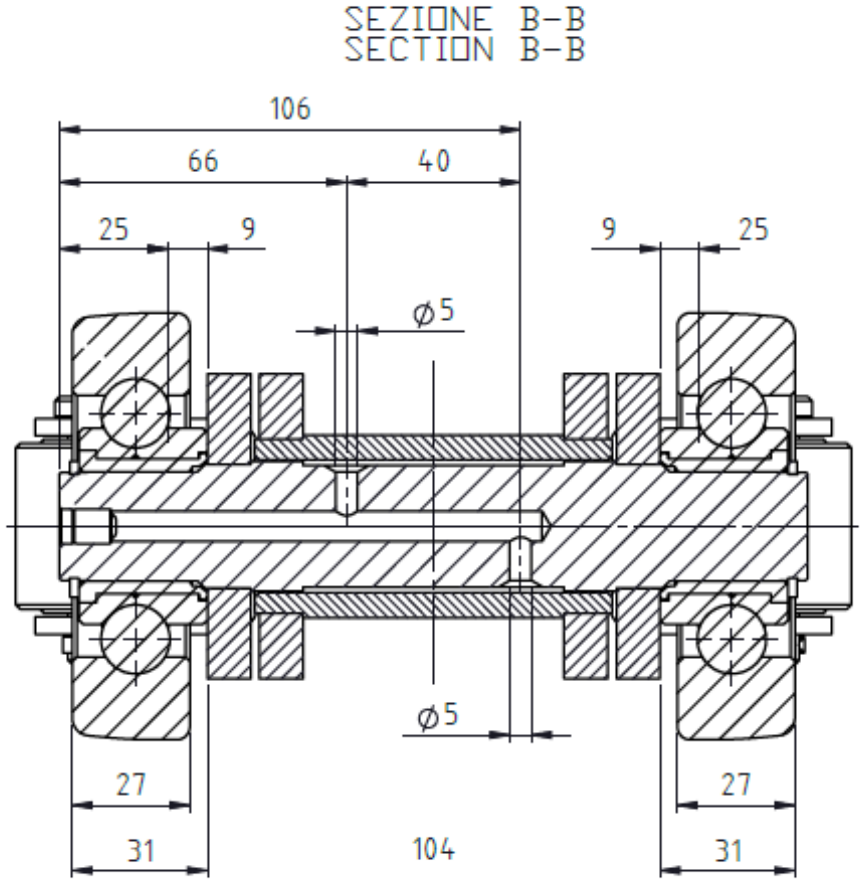

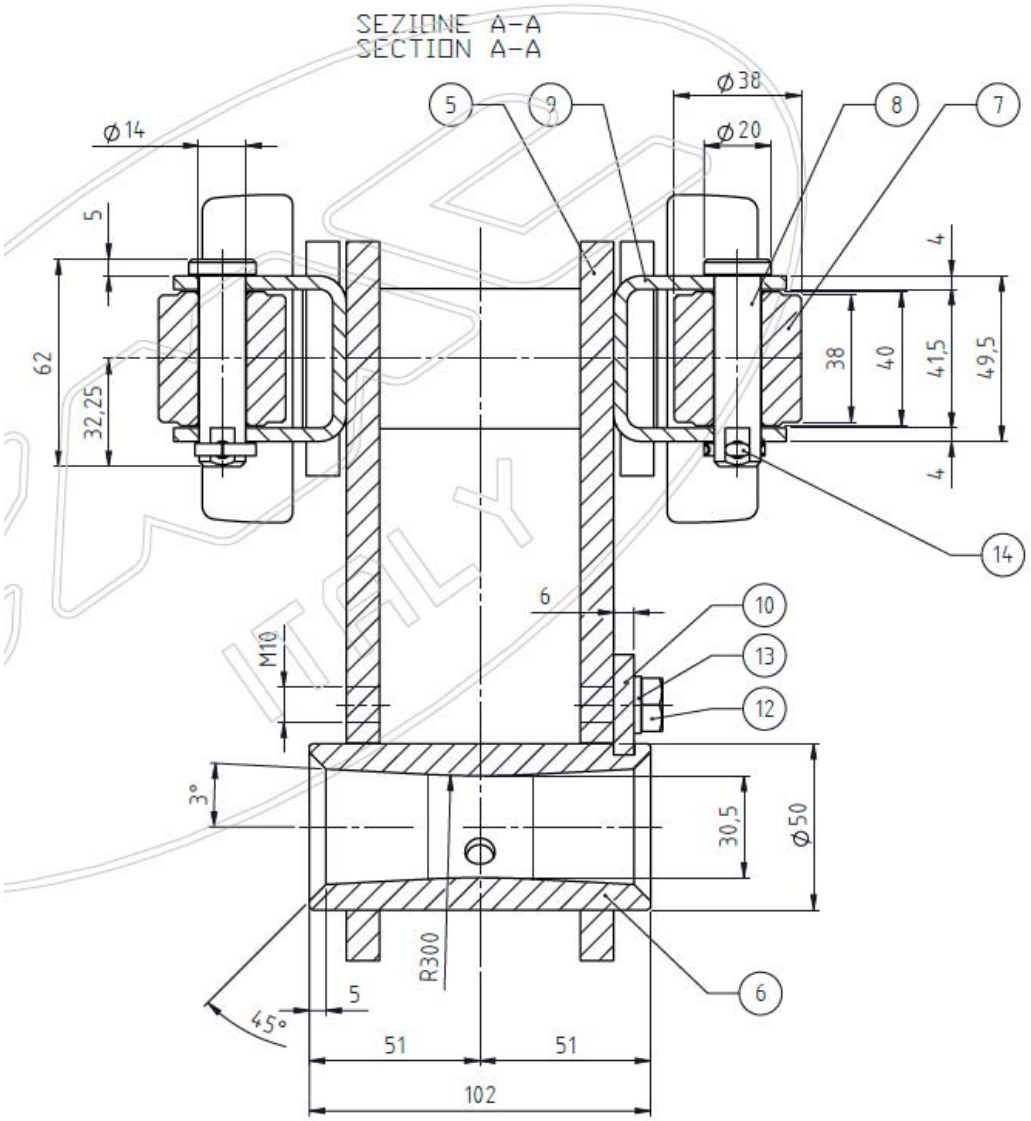

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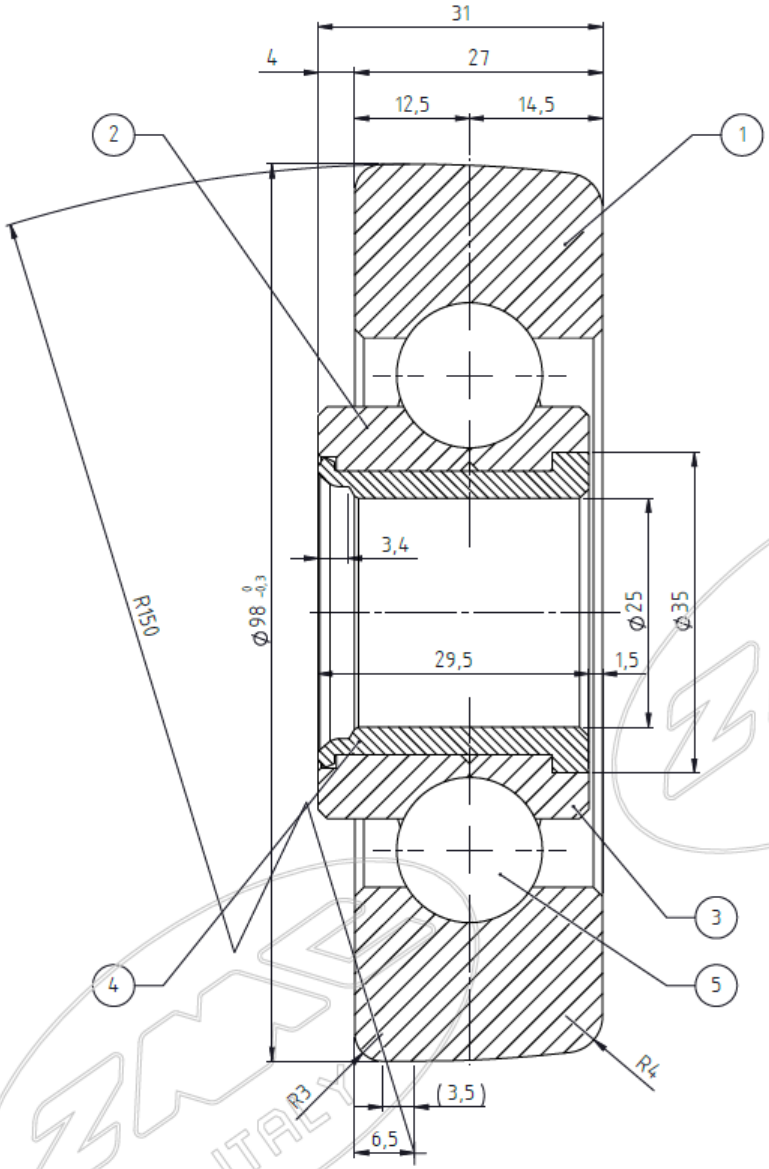
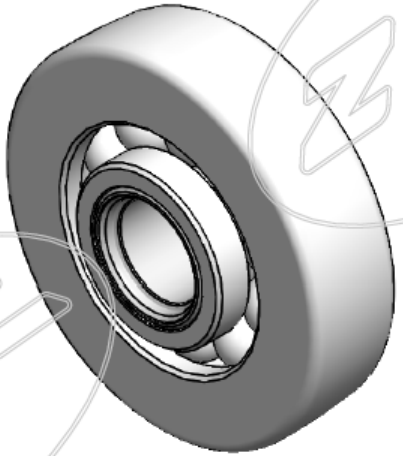


DISEGNO ESEGUITO CON CAD NON MODIFICARE A MANO

Cuscinetto lubrificato con 5÷6 grammi
di grasso KLUBERPLEX 31.222



C= 46.000 N
Co= 33.500 N

POS.	DESCRIZIONE	Q.TA'	MATERIALE
5	SFERE	10	AISI 420 C
4	BOCCOLA DI SERRAGGIO	1	AISI 304
3	SEMINTERNO TIPO BASSO	1	AISI 420 B
2	SEMINTERNO TIPO ALTO	1	AISI 420 B
1	ANELLO ESTERNO	1	AISI 420 B

REV B) Aggiornato disegno con distinta materiali, il 26/06/20. Bertrandi

DENOMINAZIONE
BEARING ROLLER 98x31x25 1.4028
RUOTA CUSCINETTO 98x31x25 - AISI 420 B

DISEGNATO	DATA	RIC. DA DIS.	DISEGNO N.
PIGNI	25/06/20	20-2804-C	R4975B
VISTO	SCALE 2:1	DIS. CLIENTE .	REV. N. B

CATENE DI TRASPORTO INDUSTRIALI ED AGRICOLE — A3

VIETATA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA AUTORIZZAZIONE SCRITTA DELLA ZMC

POS	DESCRIZIONE	MATERIALE/TRATTAMENTO TERMICO	CODICE ZMC
17	HEAVY SNAP RING ø 25 - UNI 7436 (DIN 471) SEEGER ø 25 SERIE PESANTE - UNI7436 (DIN 471)		SE25P
16	INOX GREASING NIPPLE M10x1 - UNI 7663 - TYPE A INGRASSATORE INOX M10x1 - UNI 7663 - TIPO A		IAM10I1
15	INOX GREASING NIPPLE M8X1 - DIN 3405 - TYPE DV1 INGRASSATORE INOX M8X1 - DIN 3405 - TIPO DV1		IDV1M8I1
14	INOX COTTER ø 4x25 - UNI 1336 (DIN 94) COPIGLIA INOX ø 4x25 - UNI 1336 (DIN 94)		COP4X25SSR
13	ZINC PLATE SPRING LOCK WASHER 10x17x2,2 - UNI 1751 RONDELLA GROWER ZINCATA 10x17x2,2 - UNI 1751		R10GZ
12	SCREW M10x16 ZINC PLATED - UNI 5739-8,8 VITE TESTA ESAG. M10x16 ZINCATA - UNI 5739-8,8		VTE10X16Z
11	BEARING ROLLER 98x31x25 1.4028 RUOTA CUSCINETTO 98x31x25 - AISI 420 B		R4975B
10	TOP PLATE PIATTELLO	1.0038 Fe 360	TPF4475
9	BENDED FORK FORCELLA PIEGATA	1.0050 Fe 490	PYI3651F5
8	PIN FOR FORK PERNO PER FORCELLA	1.0715 / CASE HARDENED 11SMn30 / CMT-TMP	PX3651AV
7	ROLLER FOR FORK RULLO PER FORCELLA	1.0715 / CASE HARDENED 11SMn30 / CMT-TMP	RF4605AV
6	BUSH BOCCOLA	1.4057 / HARDENED AISI 431 / BONIFICA	BO4475I815
5	INNER ATTACHMENT ATTACCO INTERNO	1.8974 S700MC	AI4475C3
4	OUTER PLATE PIASTRA ESTERNA	1.0503 C 45	PE4975BC4
3	INNER PLATE PIASTRA INTERNA	1.0503 C 45	PI3651C4
2	PIN PERNO	1.4028 / HARDENED + THF AISI 420 B / BONIFICA + THF	P4975BI313
1	BUSH BUSSOLA	1.4028 / VACUUM HARDENED AISI 420 B / BONIFICA SOTTOVUOTO	B4975BI310

DENOM.
CHAIN P.250x60x42 ø BUSH
CATENA P.250x60x42 ø BUSSOLA

DISEGNATO: BERTRANDI	DATA: 01/07/20	RIC. DA DIS.: x	DISEGNO N.: W4975BL032
VISTO: .	SCALE: 1:1.5	DIS. CLIENTE: 19-016-X01-011_2	REV. N.: A
CATENE DI TRASPORTO INDUSTRIALI ED AGRICOLE	A0	VIETATA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA AUTORIZZAZIONE SCRITTA DELLA ZMC	

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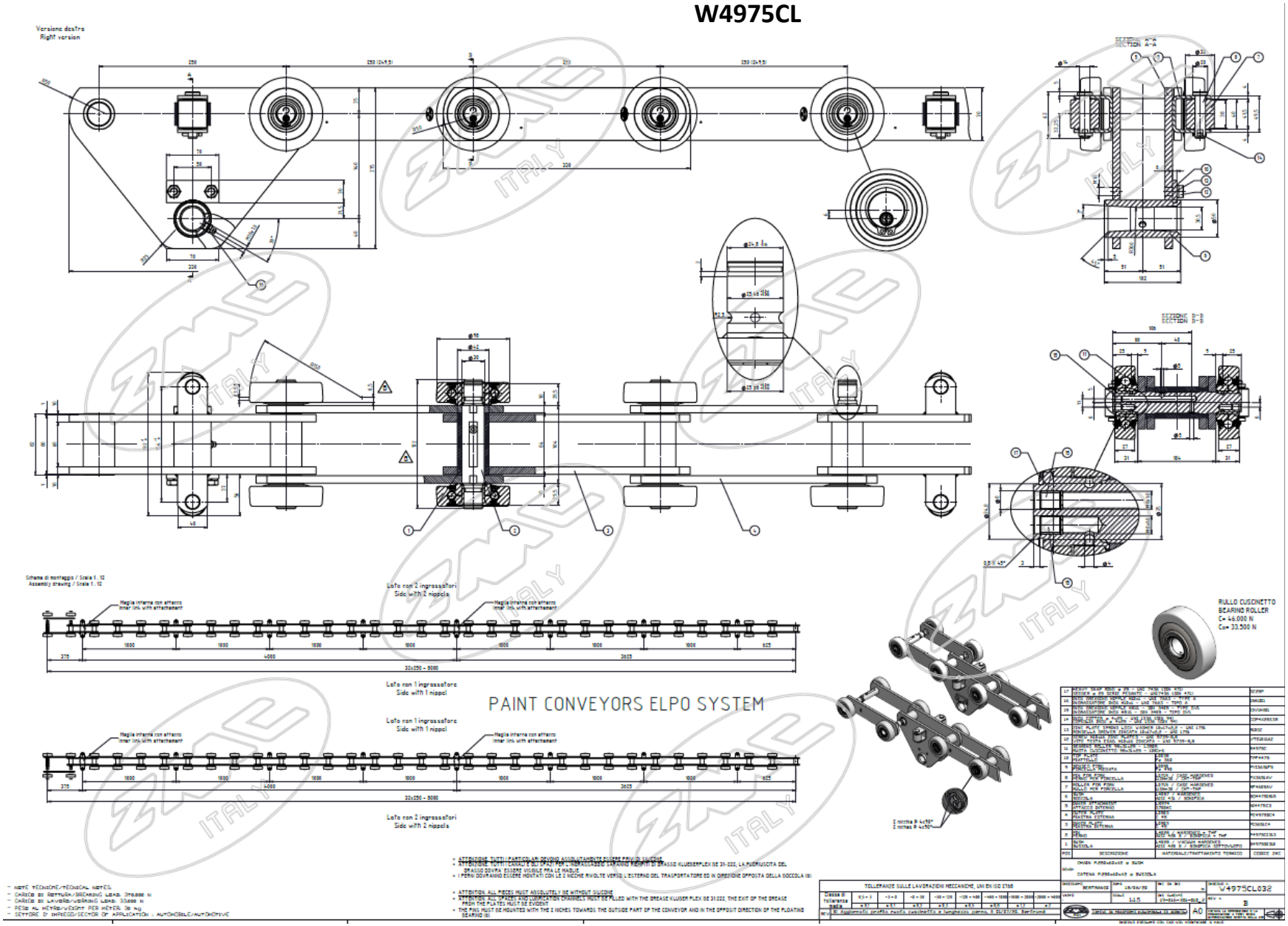
W4975CL



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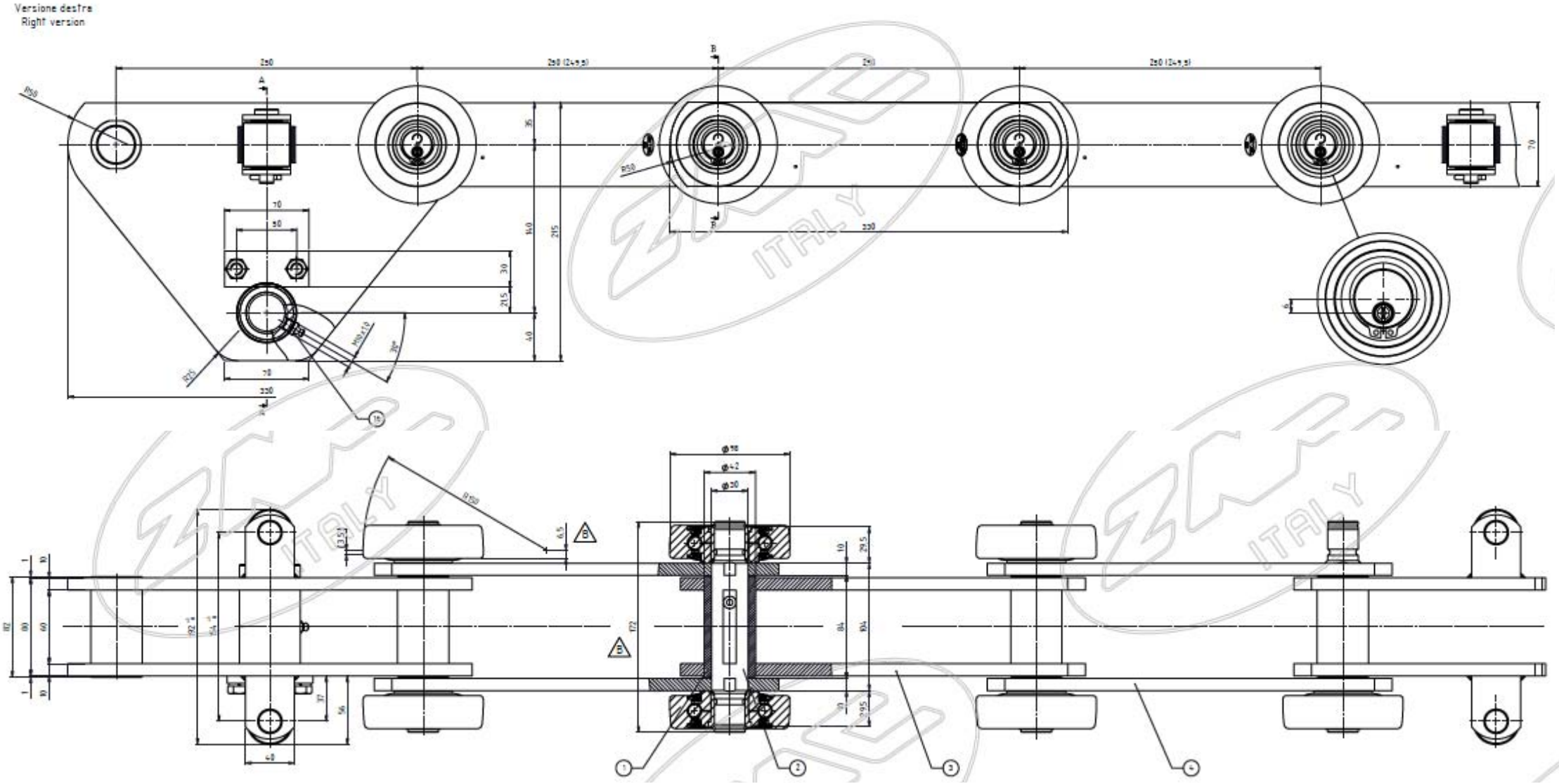
Versione destra
Right version



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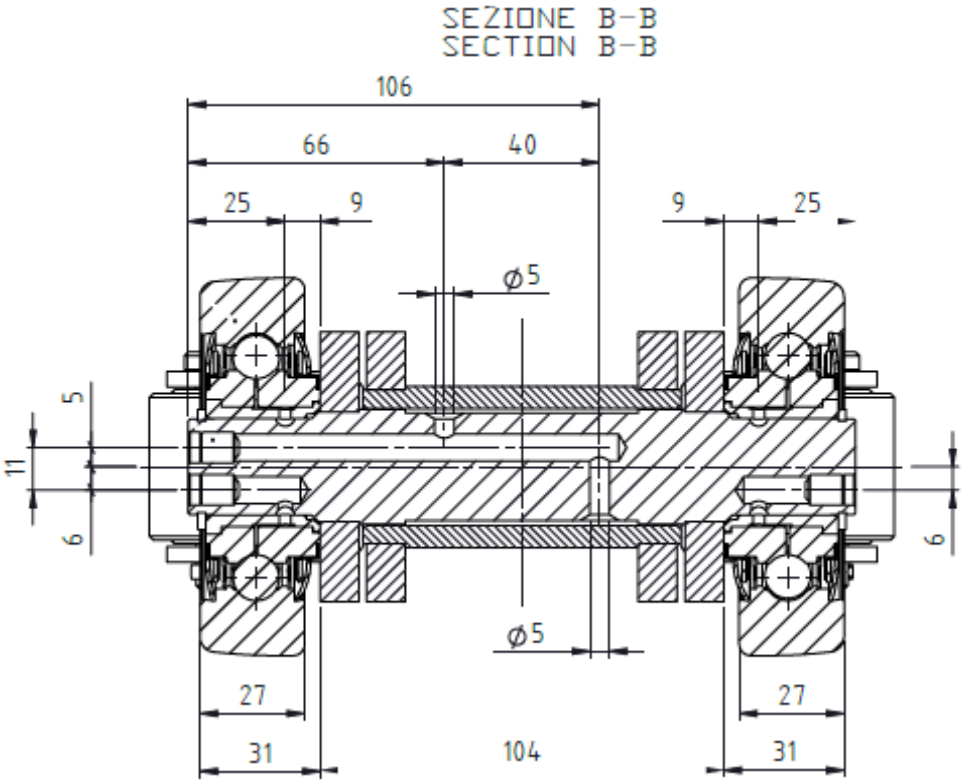

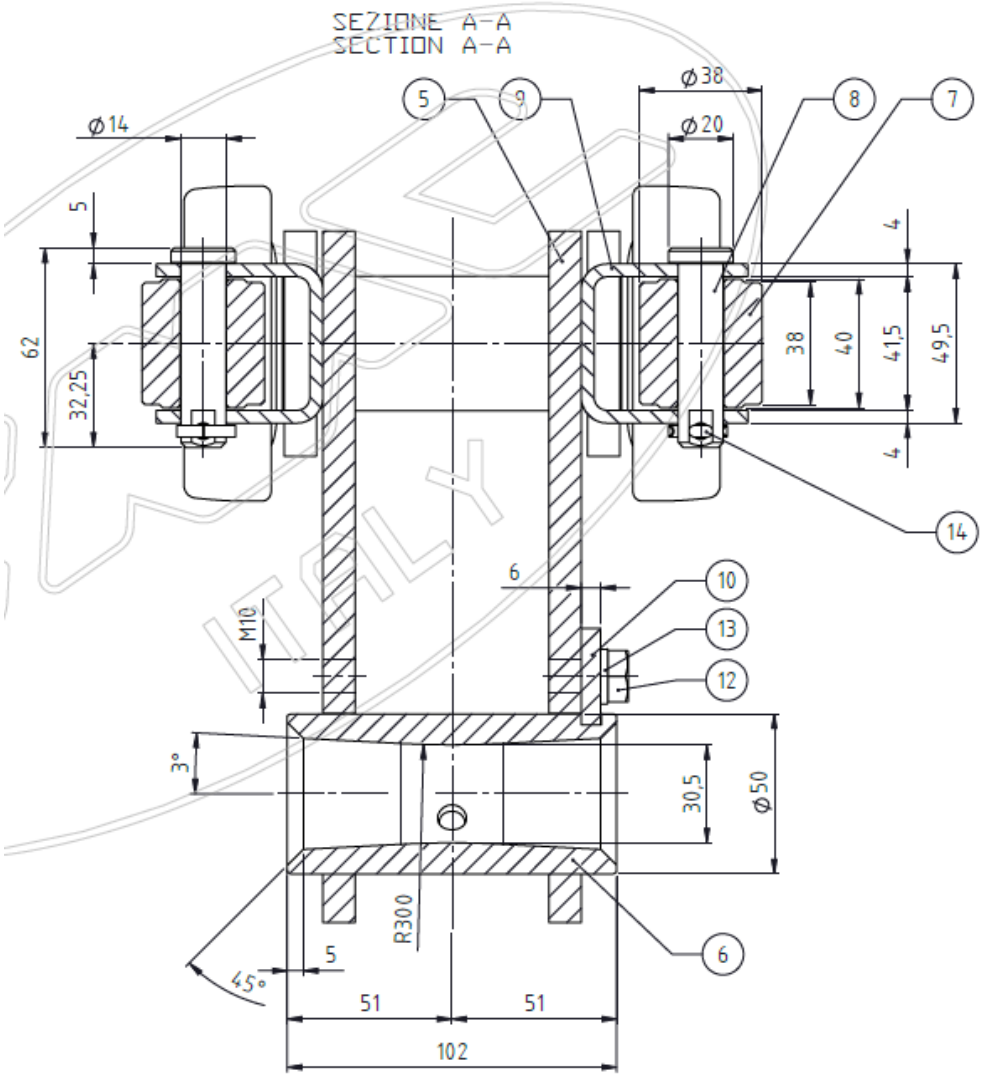

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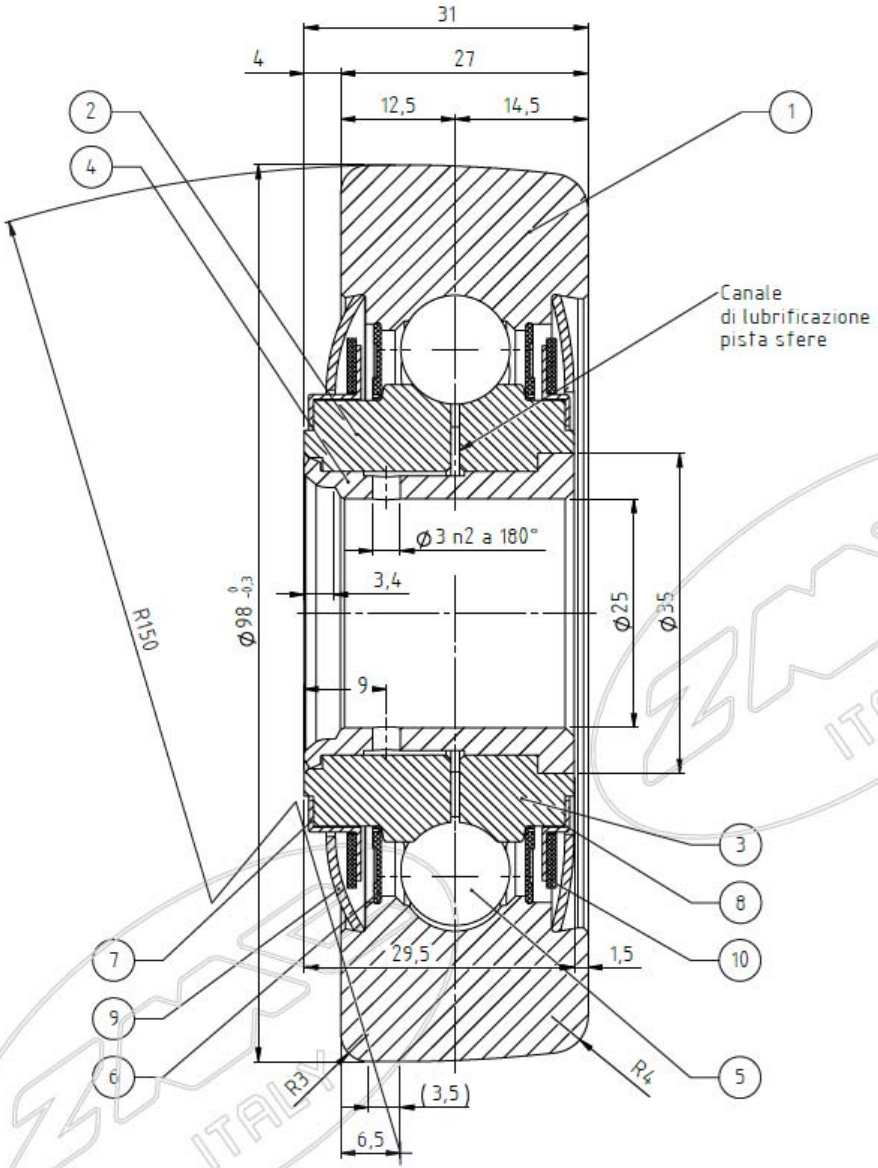


DISEGNO ESEGUITO CON CAD NON MODIFICARE A MANO

Cuscinetto lubrificato con 8÷10 grammi di grasso KLUBERPLEX 31.222

C= 46.000 N
Co= 33.500 N

POS.	DESCRIZIONE	Q.TA'	MATERIALE
10	RONDELLA FILTRO	2	FELTRO
9	COPRIPOLVERE	2	DC04
8	RIPARO	1	DC04
7	RIPARO	1	DC04
6	GUARNIZIONI	2	VITON
5	SFERE	15	100Cr6
4	BOCCOLA DI SERRAGGIO	1	11SMnPb30
3	SEMINTERNO TIPO BASSO	1	100Cr6
2	SEMINTERNO TIPO ALTO	1	100Cr6
1	ANELLO ESTERNO	1	100Cr6

REV: B) Aggiornato disegno con distinta materiali, il 26/06/20. Bertrandi

DENOMINAZIONE: BEARING ROLLER 98x31x25 - 1.3505
RUOTA CUSCINETTO 98x31x25 - 100Cr6

DISEGNATO	DATA	RIC. DA DIS.	DISEGNO N.
PIGNI	25/06/20	20-2904-C	R4975C
VISTO	SCALE 2:1	DIS. CLIENTE	REV. N. B

CATENE DI TRASPORTO INDUSTRIALI ED AGRICOLE — A3

VIETATA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA AUTORIZZAZIONE SCRITTA DELLA ZMC

POS	DESCRIZIONE	MATERIALE/TRATTAMENTO TERMICO	CODICE ZMC
17	HEAVY SNAP RING ø 25 - UNI 7436 (DIN 471) SEEGER ø 25 SERIE PESANTE - UNI7436 (DIN 471)		SE25P
16	INOX GREASING NIPPLE M10x1 - UNI 7663 - TYPE A INGRASSATORE INOX M10x1 - UNI 7663 - TIPO A		IAM10I1
15	INOX GREASING NIPPLE M8X1 - DIN 3405 - TYPE DV1 INGRASSATORE INOX M8X1 - DIN 3405 - TIPO DV1		IDV1M8I1
14	INOX COTTER ø 4x25 - UNI 1336 (DIN 94) COPIGLIA INOX ø 4x25 - UNI 1336 (DIN 94)		COP4X25SSR
13	ZINC PLATE SPRING LOCK WASHER 10x17x2,2 - UNI 1751 RONDELLA GROWER ZINCATA 10x17x2,2 - UNI 1751		R10GZ
12	SCREW M10x16 ZINC PLATED - UNI 5739-8,8 VITE TESTA ESAG. M10x16 ZINCATA - UNI 5739-8,8		VTE10X16Z
11	BEARING ROLLER 98x31x25 - 1.3505 RUOTA CUSCINETTO 98x31x25 - 100Cr6		R4975C
10	TOP PLATE PIATTELLO	1.0038 Fe 360	TPF4475
9	BENDED FORK FORCELLA PIEGATA	1.0050 Fe 490	PYI3651F5
8	PIN FOR FORK PERNO PER FORCELLA	1.0715 / CASE HARDENED 11SMn30 / CMT-TMP	PX3651AV
7	ROLLER FOR FORK RULLO PER FORCELLA	1.0715 / CASE HARDENED 11SMn30 / CMT-TMP	RF4605AV
6	BUSH BOCCOLA	1.4057 / HARDENED AISI 431 / BONIFICA	BO4475I815
5	INNER ATTACHMENT ATTACCO INTERNO	1.8974 S700MC	AI4475C3
4	OUTER PLATE PIASTRA ESTERNA	1.0503 C 45	PE4975BC4
3	INNER PLATE PIASTRA INTERNA	1.0503 C 45	PI3651C4
2	PIN PERNO	1.4028 / HARDENED + THF AISI 420 B / BONIFICA + THF	P4975CI313
1	BUSH BUSSOLA	1.4028 / VACUUM HARDENED AISI 420 B / BONIFICA SOTTOVUOTO	B4975BI310

CHAIN P.250x60x42 ø BUSH

DENOM.

CATENA P.250x60x42 ø BUSSOLA

DISEGNATO: BERTRANDI	DATA: 18/06/20	RIC. DA DIS.: x	DISEGNO N.: W4975CL032
VISTO: .	SCALE: 1:1,5	DIS. CLIENTE: 19-016-X01-010_2	REV. N.: B

CATENE DI TRASPORTO INDUSTRIALI ED AGRICOLE — A0

VIETATA LA RIPRODUZIONE O LA COMUNICAZIONE A TERZI SENZA AUTORIZZAZIONE SCRITTA DELLA ZMC

3.2 - Tensile strength (Breaking load)

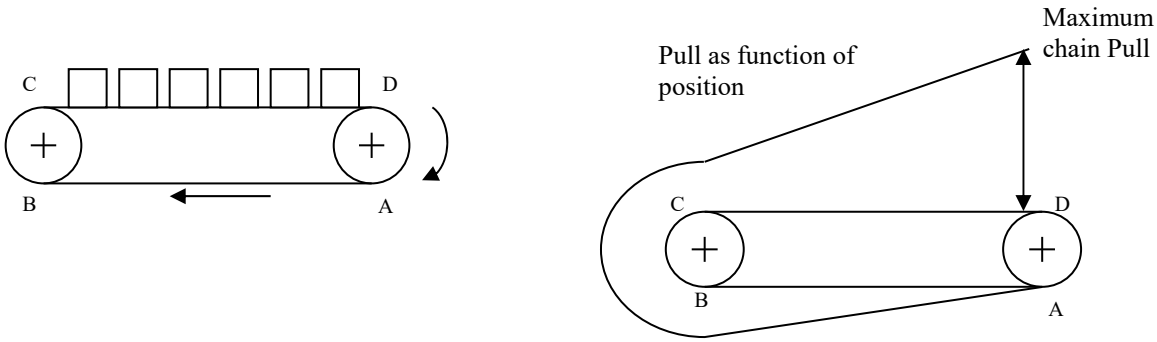
The ZMC chains type W4975BL e W4975CL have a nominal tenisle strength (Breaking load KR) of a 370 kN.

3.3 - Working load

The maximum suggested working load constantly applied in operating conditions is 33 kN.
Momentary peaks of up to 35 kN can however be tolerated by the chain.
The maximum working load is the greatest chain pull allowed during the operation of the conveyor.
We recall that the chain pull is a function of the following parameters:

- the load conveyed (including the weight of the chains and of all the additional parts assembled to the chain)
- the global friction factor of the chain and the position of the chain.

As a matter of fact the chain pull is not the same on the whole path of the conveyor and the maximum value occurs immediately before the driving wheel (see the pictures showing the progress of the chain pull T as it develops along the path of an horizontal conveyor).



Img_25

3.4 - Lubrication

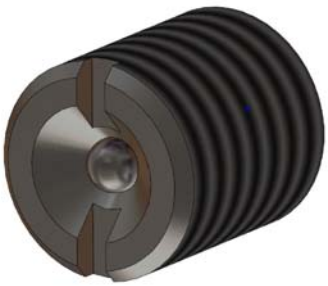
The chain is lubricated before delivery to the customer. The grease used for the first lubrication is **Klüber Plex BE 31 222 from Klüber Lubrication**.

During the assembly of the chain, this product was injected into the pins of the chain through the appropriate holes for lubrication until it reached the surface between the pin and the bush.

ATTENTION: The pins of the connecting links that are supplied separately are already lubricated with grease. However, it is advisable to lubricate these pins after their assembly by injecting grease through the special recessed grease nipples.

Attached to the manual is the technical datasheet of the recommended lubricant product.

Remember that to properly lubricate this chain the lubricating product must reach the surface between the bush and the pin and the bearing wheels.
These specific chains are equipped with pins with threaded seat for mounting the recessed grease nipples with M8x1 thread according to DIN 3405 Type DV1. See also Img_26.



Img_26

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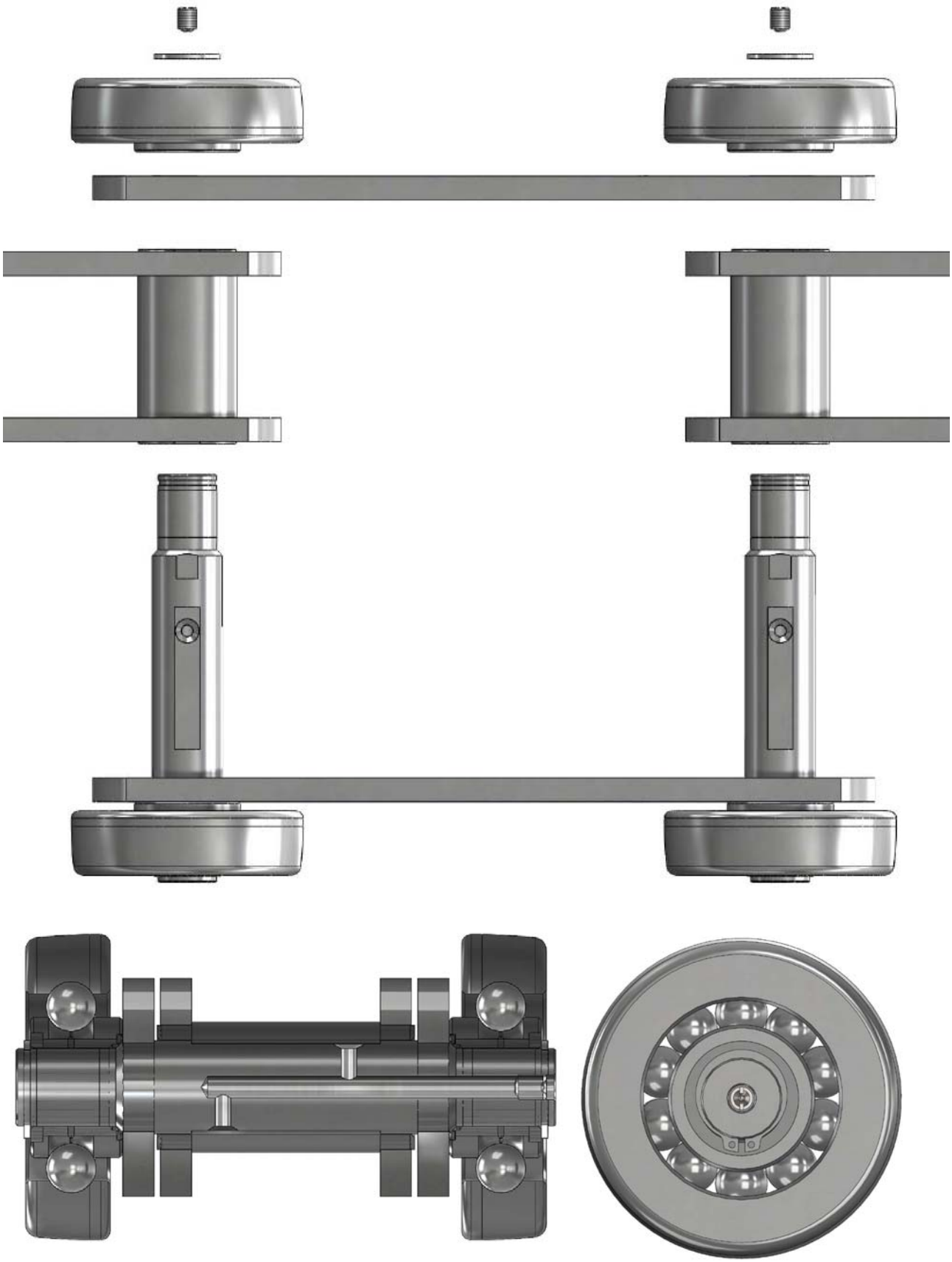
The W4975BL chain has a one-sided grease fitting that carries the grease between the pin and bush. The bearing wheels have no side shields and can be lubricated from the outside.



Img_27

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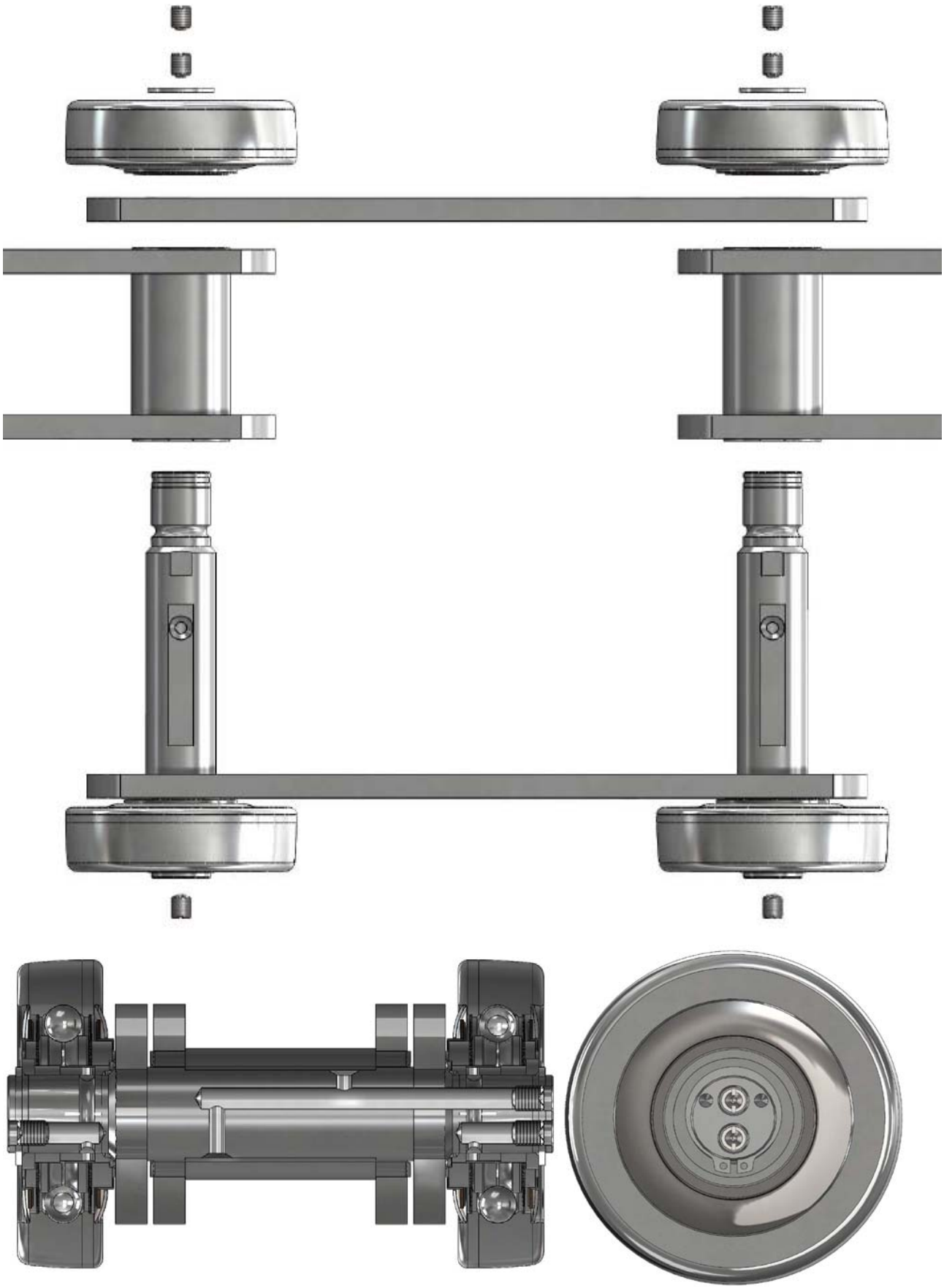
The W4975CL chain has two grease fittings on one side and one on the opposite side; of these three grease nipples, two carry the lubricant to the bearing wheels and the third carries it between the pin and the bush.



Img_28

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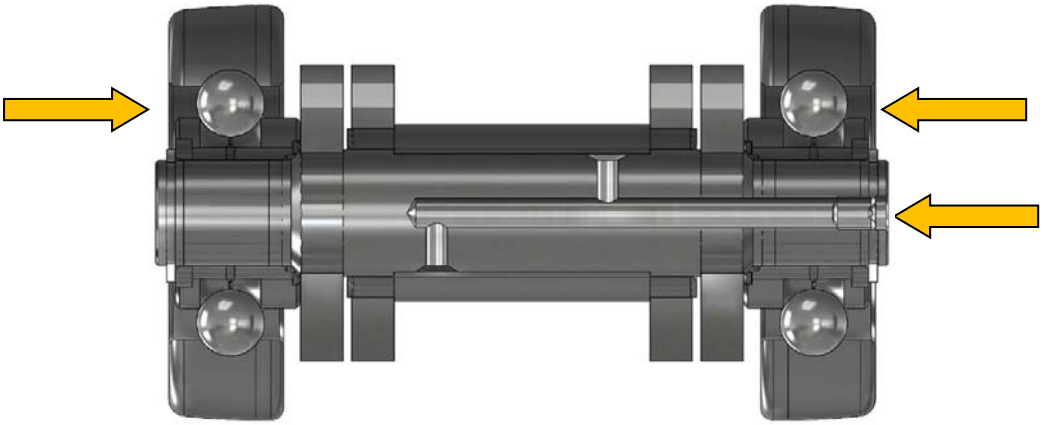
The presence of grease on the tracks and/or on the outside diameter of the rollers must be avoided, this may cause the rollers to slide instead of turn, leading to a damage of the guides and/or the outer surface of rollers.
It is very important to ensure the injection of the lubricant in every pin/bush joint and to make sure that the greasers hold the lubricant and are not clogged. Together with the reduction of the friction factor between the chain components in these chains the lubricant has also the function to protect the chain from oxidation due to the environment.

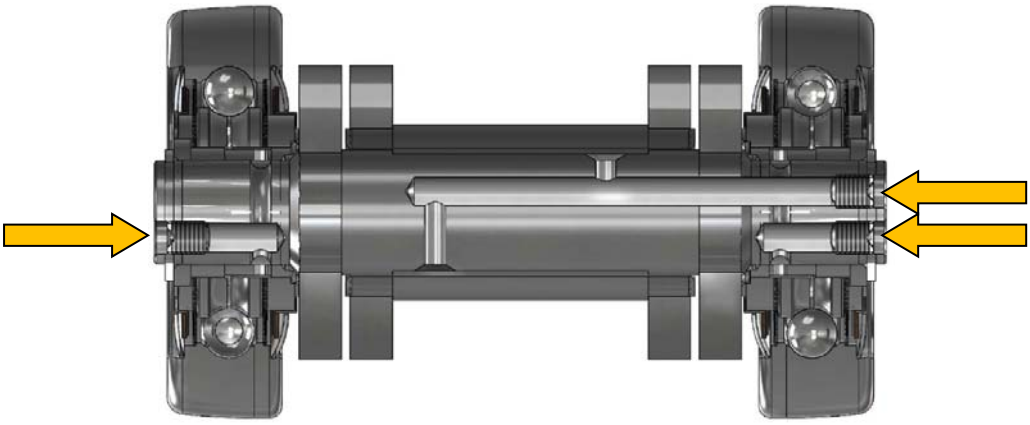
For the bearing wheels without shields of chain W4975BL, lubrication must be carried out through the side openings of the roller so that enough grease is brought into contact with the balls and bearing races to form a lubricant film.

It is recommended to carry out the lubrication using suitable automatic systems installed on the conveyor.

The figures Img_29 and Img_30 below summarize the lubrication points for the two chains W4975BL and W4975CL



Img_29



Img_30

Img_29 and 30 lubrication points with grease **Klüber Plex BE 31 222**

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IN ANY CASE the chain must never be in a condition of poor lubrication. Otherwise the damage could be irreparable beacuse the oxidation of the surfaces of the chain components would increase substantially the friction factor and, as a consequence, the wear.

Regarding the interval of time between one lubrication and the next it is suggested to consider a maximum of one week This is not the ideal interval but only a first hypothesis. It is also recommended to perform a complete cycle of lubrication of the chain before every long stop.

The most effective interval between two consecutive lubrications can be determined by means of tests and taking in consideration three fundamental parameters:

- Energy consumption. With new chain, after the break in and at full load, it is advised to record the energy consumption of the conveyor. This value can be kept as a reference of good functioning of the chain. A significant deviation (more than 20%) respect to this initial parameter show an increase of friction tha may be due to an insufficient lubrication. See also par. 4.1.e.
- Noise. The onset of the noise associated with the sliding of the rollers and / or the engagement of the chain on the sprockets could be signs of insufficient lubrication.
- Elongation. With new chain, after the break in, it is advised to check the position of the tensioning system (see par. 2.3) and to make detectable the initial position with an indelible and easily recognizable mark on the structure of the conveyor. This should be done on both sides of the conveyor and becomes an important reference for evaluating the variations in length of the chain with respect to the starting condition. See also par. 4.1a. Significant elongation in a short period of time and / or different elongations between the two sides of the conveyor (left and right) are signals of incorrect operation of the system that can also be due to insufficient lubrication.

In case of specific requirements relating to the lubrication we suggest to contact:

KLÜBER LUBRICATION NA LP
32 Industrial Drive
Londonderry, N.H. 03053
info@us.kluber.com
+1-603-647-4104
+1-603-647-4106

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3.5 - Gear Motor

The engine of the carrier must be equipped with a control device to avoid starts with tears or excessive accelerations. Furthermore, to prevent overload on the chain, the presence of a torque limiter is strongly advised.

3.6 - Position of the load

When the conveyor is in operation, the load must be evenly distributed between the two sides of the system (left and right). The chain should be aligned with the reference guides.

3.7 - Operating temperature

The operating temperature prescribed for this chain is between 0 ° C and 40 ° C.

3.8 - Expected life

When used properly, that is in accordance with the requirements given in this handbook, it can be assumed for the chain a life expectancy of not less than 5 years of operation (frequency of two shifts of 8 hours per working day).
This assessment is based on the experience accumulated by ZMC for chains of the same type and application.

4 – Preventive checks and maintenance

4.1 - Pull, elongation of the chain and energy consumption

4.1.a After a break-in period, it is essential to record the actual length of the chain in both rings, for example with an indelible mark on the mobile part of the tensioning system of the chains or on the conveyor frame. Only in this way it will be possible to control the elongation of the chain over time compared to an initial reference.

4.1.b Check regularly, at least every three months, the tension in both sides. The pull of the chain must have the same value for the left and right chain. Apply to the chain only the load necessary to maintain the condition of straightness of the specific chain in the specific plant. Avoid applying a value in excess of the required tension because it would increase the risk of wear. See also par. 2.3.

4.1.c Simultaneously control the chain elongation in both sides compared with the original length. The elongation detected must be equal in the two chains left and right. Unequal elongation between left and right is a sign of a probable error in the running of the conveyor.

4.1.d Usually, a chain properly sized for the operation request, with proper maintenance program, without being subjected to overloads or breakdowns, shows no elongation after break-in. Since, however, the nominal conditions are not always met, it must be veirfied that the elongation does not exceed the limit value of 0.4% (that is 4mm over 1m of chain) compared to the nominal size of the chain.
This limit is purposely conservative to prevent a failure of the chain due to permanent deformation or wear exceeding the limit described above. Such failures may cause damage to the system and the operators.

4.1.e If possible, check the power consumption of the conveyor to get a first evaluation of the chain behavior during running. This value should serve as a comparison for the following measurements. A significant increase in power consumption would indicate a problem in the running of the conveyor (ie, the friction factor increased because of wear, problems in joints and / or rollers, or damage to the guides).

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4.2 - Fitting of chain on the sprockets

Every 6 months verify the correct fitting between chain and sprockets. Any sign of contact and/or wear on the links of the chain caused by the teeth of the sprockets must be carefully analyzed. The sprocket must not, for any reason, guide the chain but only pull it and accompany it from one track to the next. The repeated contact between chain and sprocket may cause a significant reduction of the thickness of the teeth and generates an axial overstressing between plate and bush and between bush and pin.

4.3 - State of the Tracks

Every six months the area of contact between tracks and chains must be checked. Each roller or wheel must be allowed to turn freely in any part of the tracks, as a consequence the wear of the rails should be kept under control.
The chain must not meet any obstacole or have any interference with the fixed parts of the conveyor.
Attention must pe paid to the wear of the tracks, an excess of wear could lead to a fast deterioration of the chain. If sliding of the rollers and/or wear of the tracks occurs, it is strongly recommended to restore the original operating condition.

4.4 - Cleaning of the chain

The frequency of the cleaning operation regarding a chain should be determined keeping in cosideration several factors, such as: the actual running hours of the chain, the consistency of the layer to be removed, the difficulty in removing the layer of dirt, the need to prevent pollution and damage of the chain components. Therefore the suitable frequency can't be stated in advance but must be calibrated beased on the specific operating conditions and needs of each installation.

ATTENTION: Due to the presence of bearings the products and the systems used for cleaning must be carefully chosen in order not to damage these components.

When to clean

- Before long stops of the conveyor (e.g before long holidays), an accurate lubrication should follow the cleaning
- When the dirt adherent to the components of the chain is altering the function of the chain (e.g. blocked rollers)
- When a re-lubrication of the chain with a product not miscible with the one previously used is about to be done

Products to be used

- Structovis GHD Oil, that is a low viscosity oil from Klüber which can effectively help in removing the dirt layer and also provide a first lubrication.
- Other solvents.

How to clean

- Wash the chain with the solvent, so that the product can penetrate in the articulations of the chain, and afterwards remove the dirt with rags or brushes.
- With high pressure water- jet or steam- jet, provided that a test is made to verify that pressure or temperature do not damage the bearings.

In case of doubts or problems in the selection of the suitable solvent and/or the effective cleaning system, we suggest to contact Klüber Lubrication for detailed advice.

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4.5 - Monitoring of the chain

These controls must be carried out directly on the chain to evaluate its conditions and detect any sign of damage.

4.5.1 - Visual control

In a part of the conveyor where free access to the chain is available it is possible to check the following:

Outboard bearing wheels
(part. Nr 11 of drawings W4975BL032 e W4975CL032, see tables at page 28 ad 33):

4.5.1.a Presence of facets on the outside diameter of the outboard wheel (signs of blocking of the roller/wheel or difficulty to rotate);

4.5.1.b Wear of the side surfaces of the wheel and/or damage of the side screens;

4.**5.1.c** Freedom to rotate, all bearing wheels must rotate freely;

4.5.1.d Gap between balls and tracks of the bearing, the initial gap is less than 0.1mm. The gap can be manually evaluated using a new bearing (taken from the spare parts) for comparison. If the gap seems to be enlarged, open the bearing and check the diameter of the balls and the condition of the tracks.
In pictures Img_31 and Img_32 examples of damaged ball and track are shown. The main factors that can damage a ball bearing wheel are: wear, corrosion and eddy currents; the first two phenomena are caused by inadequate lubrication while the presence of eddy currents is due to an incorrect use of the system.

Img_31

Img_32

Pin
(part. Nr 2 of drawings W4975BL032 e W4975CL032, see tables at page 28 and 33):

4.5.1.e Integrity of the head of the pins, including the grease nipples where they are present (scratches, holes, signs of wear must not be present);

4.5.1.f Stability of the pins in the holes of the plates, undesired gaps between pins and holes must not be present, the pins must not be allowed to rotate in the correspondant holes of the plates;

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Bush
(part. Nr 1 of drawings W4975BL032 and W4975CL032, see tables at page 28 and 33):

4.5.1.g Outside diameter, the nominal outside diameter is 41.86mm, the maximum acceptable wear is 1mm. Note that in general the wear on the outer diameter due to contact with the teeth of the sprockets is not symmetrical but occurs mainly on one side of the bush;

4.5.1.h Gap between pin and bush, originally this is about 0.6mm. A first evaluation can be done manually on the assembled chain, trying to move an inner link respect to an outer link, if the gap seems to be significantly increased it is advised to disassemble a few links (at least one inner and one outer) and carry out the checks mentioned in paragraph 4.5.2. Remember that the wear of a chain articulation (pin/bush) can be indirectly evaluated thorugh the total elongation of the chain, see par. 4.1.c.

Chain in general

4.5.1.i Corrosion of each chain component;

4.5.1.l Scratches or signs of wear in each component (for example: marks on the inside of the links show bad alignment between chain and sprocket; faceted surface or abnormal wear of the lateral guide rollers, especially if always placed on the same side of the chain show incorrect chain running);

4.5.1.m Straightness of the chain;

6.5.1.n Comparable elongation of the left and right chain.

4.5.2 - Dimensional control of chain samples

After the first 3-6 months of use, and afterwards every year, it is recommended to replace one inner and one outer link of each chain (left and right) in order to carry out, with suitable instruments, the following checks:

4.5.2.a outside diameter of the bearing wheels;
4.5.2.b inside and outside diameter of the bush;
4.5.2.c outside diameter of the pin;
4.5.2.d gap between balls and tracks of the bearing, if the manual check is not conclusive, disassemble a bearing and check the single components;
4.5.2.e simmetry of wear of the components, wear must be similar on the two samples of chain (left and right).

We also recommend to send the disassembled parts to ZMC for detailed analysis in the laboratory.

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4.6 - Maintenance checkpoints

Maintenance checkpoints		
Checks / Maintenance operations	**Paragraph of Reference**	**Frequency and Specifications / Responsabiliy**
Check of the conveyor	2.1	Before installing the chain in the conveyor Resp.: Manufacturer of the conveyor or Maintenance staff
Handling and installation	2.2 to 3.3	During the installation of the chain in the conveyor Resp.: Manufacturer of the conveyor or Maintenance staff..
Characteristics and limitations of use	3.3 to 3.7	**Always** During the whole lifetime of the chain all the specified limitations of use must be respected, particularly: ▪ Working load (par. 3.3) ▪ **Lubrication (par. 3.4)** ▪ Features of the gearmotor (par. 3.5) ▪ Position of the load (par. 3.6) ▪ Temperature (par.3.7) Resp: End user of conveyor
Chain Pull and Elongation	4.1.a a 4.1.d	**3 months** It is important that the chain pull is the same in both chains (left and right) Remember that applying unnecessary pull via the tensioning system will lead to faster wear o pins and bushes Resp: End user of conveyor
Energy Consumption	4.1.e	**3 months** The reference value of th energy consumption should be evaluated during the break in period. Resp.: Maintenance staff.
Fitting of chains on the sprockets	4.2	**6 months** Check the presence of wear signs on the inner surface of the links and/or the outer surface of the teeth; if necessary re-align chain and sprockets. Resp.: Maintenance staff.
State of tracks	4.3	**6 months** Check the wear of the guides and the correct allignment between chains and tracks Resp.: Maintenance staff.
Cleaning of the chain	4.4	When it is necessary in order to restore the chain function. A complete lubrication cycle is recommended before every long stop.
Visual check of the chain	4.5.1	**1° check after 3 months.** **2° check after 6 months.** **3° check after 12 months.** **Follwing checks: every year.** The maintenance staff carries out the visual control (4.5.1) on the chain samples; the samples can be sent to ZMC for detailed inspection (4.5.2)
Bearing wheels, Bushes and Pins	4.5.1	
Dimensional control of chain samples	4.5.2	

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5 - Identification of the Maintenance and Use Manual

Chain drawing: W4975BL032 W4975CL032

Year of manufacturing: 2020

Version of the Manual: UM W4975BL-CL032 RevA

Manufacturer: **Z.M.C. ITALIA S.r.l.**
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ANNEX Datasheets of lubricant.

Grease for the lubrication of the chain **KLÜBERPLEX BE 31 222**

Product information

KLÜBER LUBRICATION

Klüberplex BE 31-102…-222…-502

Lubricating greases for extreme requirements

Benefits for your application

- **Longer component life**
  - **due to reduced wear and good pressure absorption capacity**
- **Reduced maintenance due to**
  - **good sealing effect and resistance to water and other media**
  - **long relubrication intervals and food ageing and oxidation stability**
- **NSF H2 registration allows use in food-processing industry for applications with no direct food contact**

Description

Klüberplex BE 31-102…-222…-502 are lubricating greases based on mineral oil and special calcium soap. They offer high resistance to mechanodynamical loads and good adhesion properties. Klüberplex BE 31-102…-222…-502 are highly resistant to media, water and water vapour. We recommend testing compatibility prior to series application.

Application

Klüberplex BE 31-102…-222…-502 are lubricating greases for e.g. rolling and plain bearings, pivoting bearings, small gears. They can also be used as sealing and lubricating greases for labyrinth seals and industrial valves and fittings.

Application notes

Klüberplex BE 31-102…-222…-502 can be applied by grease guns, brush or spatula. For application via central lubrication systems, please check pumpability with the manufacturer.

Commercial detergents can be used for pre-cleaning the friction points.

Compatibility with plastics and elastomers

Klüberplex BE 31-102…-222…-502 are compatible with plastics that are resistant to mineral oil or greases based on mineral oil. However, for safety reasons, we recommend checking compatibility prior to series application.

Minimum shelf life

The minimum shelf life is approx. 36 months if the product is stored in its unopened original container in a dry, frost-free place.

Material safety data sheets

Material safety data sheets can be downloaded or requested via our website www.klueber.com. You may also obtain them through your contact person at Klüber Lubrication.

Pack sizes	Klüberplex BE 31-502	Klüberplex BE 31-222	Klüberplex BE 31-102
Can 1 kg	+	+	+
Bucket 25 kg	+	+	+

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Klüberplex BE 31-102…-222…-502

Lubricating greases for extreme requirements

Product data	Klüberplex BE 31-502	Klüberplex BE 31-222	Klüberplex BE 31-102
Article number	017126	017132	017135
Upper service temperature	140 °C / 284 °F	140 °C / 284 °F	120 °C / 248 °F
Lower service temperature	-10 °C / 14 °F	-10 °C / 14 °F	-15 °C / 5 °F
Speed factor (n x dm)	approx. 200 000 mm/min	500 000 mm/min	1 000 000 mm/min
Worked penetration, acc. to Klein, 25 °C, upper limit value	275 0,1 mm	275 0,1 mm	295 0,1 mm
Worked penetration, acc. to Klein, 25 °C, lower limit value	245 0,1 mm	245 0,1 mm	265 0,1 mm
Kinematic viscosity of the base oil, DIN 51562 pt. 01/ASTM D-445/ASTM D 7042, 40 °C	approx. 500 mm²/s	approx. 220 mm²/s	approx. 100 mm²/s
Kinematic viscosity, DIN 51562 pt. 01/ASTM D-445/ASTM D 7042, 100 °C	approx. 31 mm²/s	approx. 19 mm²/s	approx. 12 mm²/s
Corrosion inhibiting properties of lubricating greases, DIN 51802, (SKF-EMCOR), test duration: 1 week, distilled water	<= 1 corrosion degree	<= 1 corrosion degree	
Drop point, DIN ISO 2176	> 190 °C	> 190 °C	> 190 °C
Colour space	brown	brown	brown
Density at 20 °C	approx. 0.96 g/cm³	approx. 0.96 g/cm³	approx. 0.96 g/cm³
Flow pressure of lubricating greases, DIN 51805, test temperature: -10 °C	<= 1 400 mbar	<= 1 400 mbar	
Flow pressure of lubricating greases, DIN 51805, test temperature: -15 °C			<= 1 400 mbar
NSF-H2 registration	135 681		
Texture	homogeneous	homogeneous	homogeneous
Texture	fibrous	fibrous	fibrous

Klüber Lubrication – your global specialist

Innovative tribological solutions are our passion. Through personal contact and consultation, we help our customers to be successful worldwide, in all industries and markets. With our ambitious technical concepts and experienced, competent staff we have been fulfilling increasingly demanding requirements by manufacturing efficient high-performance lubricants for more than 80 years.

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