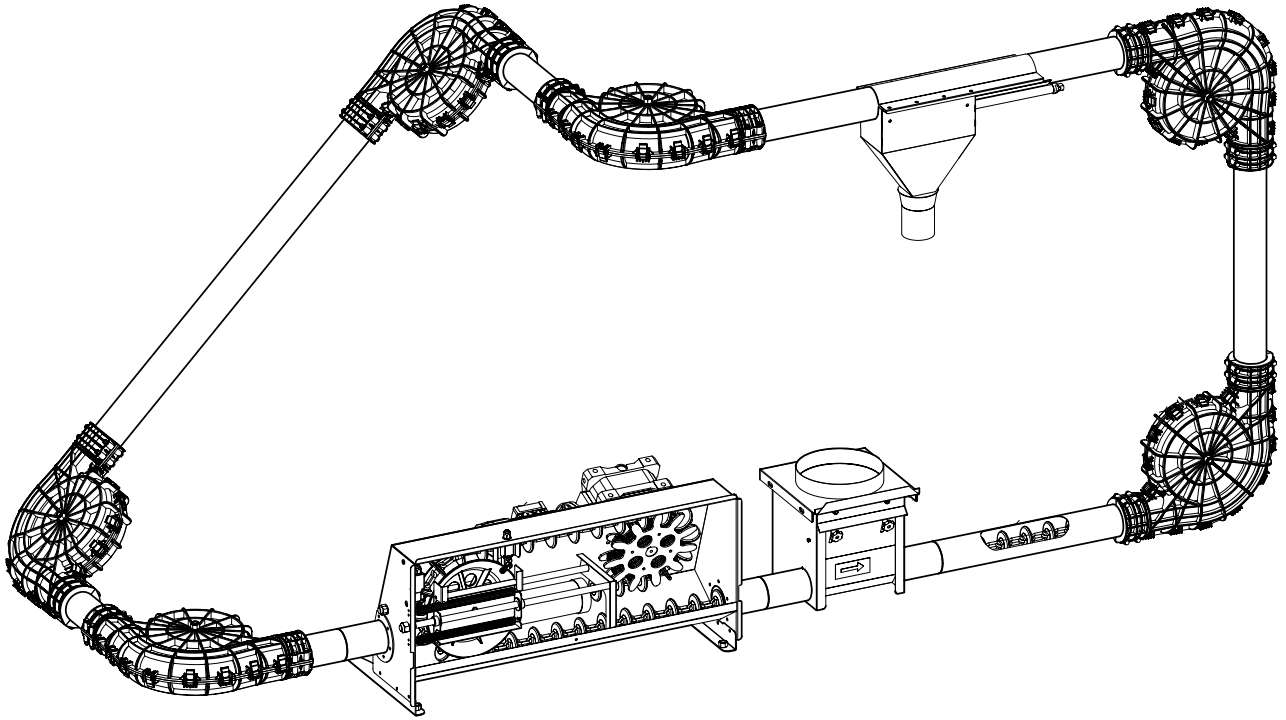
Installation manual of the transport system referred to as:

CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN



☞ translation from ORIGINAL INSTRUCTIONS ☜

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manufacturer: **MIAL F.lli Massini srl** – Industrial zone – 06081 Tordandrea di Assisi, Perugia (I)

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This manual is about the system manufactured by: **MIAL F.lli Massini srl** – **Industrial zone – 06081 Tordandrea di Assisi, Perugia (I)**
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INTRODUCTION:

This manual is destined to the staff hired for installing the system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" that has been manufactured and provided by **MIAL F.lli Massini srl.**
Concerning the instructions for operation, risk analysis, routine maintenance, supplementary maintenance, troubleshooting and the list of spare parts for the system, please refer to the user and maintenance manual **MIL-CHF**.
This manual provides the staff hired for installing the system with technical and practical recommendations and offer technical solutions deriving from the company, 25-year experience.
If the interpretation of texts, tables, drawings, pictures or diagrams turns out to be difficult, we invite you to contact **MIAL F.lli Massini srl** and ask for all clarifications you require to the experts dealing with the system operation, use and maintenance.
MIAL F.lli Massini srl will welcome all suggestions coming from users, people charged with maintenance, sales managers and from all other units that wish to cooperate to improve the quality of its manuals and the understanding of each part of them.

In the first part of the manual, we provide the system planning criteria and technical specifications.
In the second part of the manual, we will schematize some standard components and define the different operating details.

§ 1. DEFINING THE SYSTEM SPECIFICATIONS

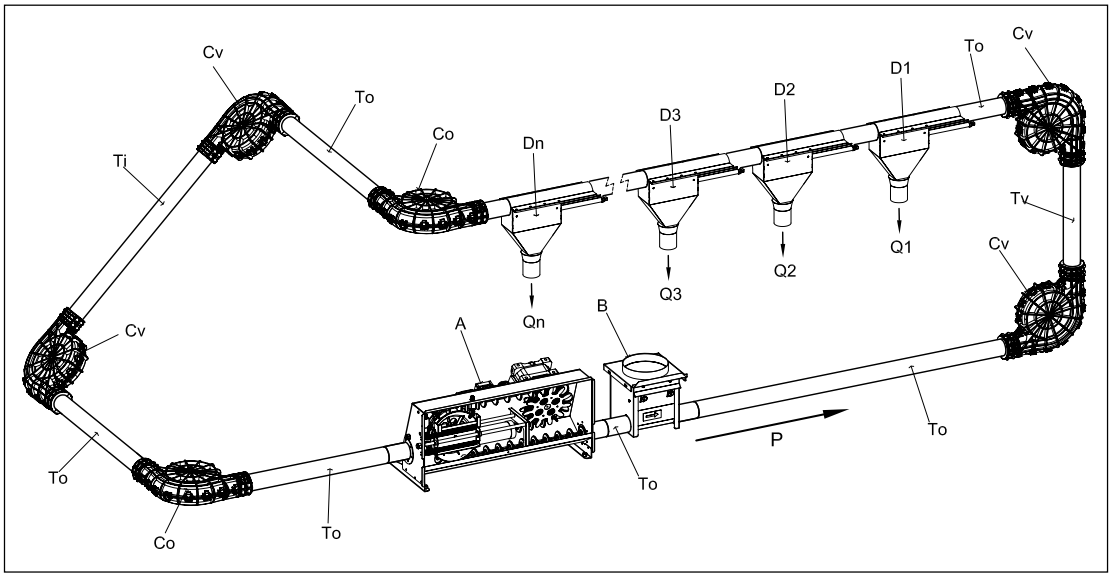
The system called "CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN" is extremely flexible and can be adapted to any specific need. Please find below the parameters that will allow you to choose the system that best suits your needs.
The **average quantity per hour** that you want to obtain and the **overall tube lengths** composing the ring that closes the system are the main parameters you should take into account when choosing the system.

§ 1.1- Calculation of the average quantity per hour (Qtot)

The average quantity per hour of product is expressed in kg/hour and corresponds to the sum of the average quantities in the different unloading points (Q1+Q2+Q3+...+Qn) = Qtot.

§ 1.2- Calculation of the real and "virtual" lengths (Lr, Lv) of the tubes

Figure 1: Simplified drawing
(A= traction unit; B= loading hopper; Cv=vertical 90° curve; Co= horizontal 90° curve; To= horizontal straight tube; Tv= Vertical straight tube; Ti= inclined, 45° tube; D1÷Dn= unloading hoppers; Q1÷Qn= average quantity per hour to be unloaded P= Chainflex direction)



From the drawing, we can derive the following data:

TABLE "1" – SYSTEM DATA		
Description	***Acr.***	***Quantity***
Horizontal tube length	To	meters
Vertical tube length	Tv	meters
Inclined tube length (≈45°)	Ti	meters
(Lr) Tube real length) →		meters
Number of vertical/inclined 90° curves	Cv	n°
Number of horizontal 90° curves	Co	n°
(Nc) Number of 90° curves→		n°

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TABLE "2" - SIZES					
Description	*Acr.*	*Quantity*	*Sizes*	*Increase*	*Final value*
Horizontal tube length	To	MTO	No variations in size	0	MTO
Vertical tube length	Tv	MTV	3 times bigger than usual length	A1	MTV + A1
Inclined tube length	Ti	MTI	1 time bigger than usual length	A2	MTV + A2
Number of vertical 90° curves	Cv	NCV	add 30 metres for every curve	A3	NCV + A3
Number of horizontal 90° curves	Co	NCO	add 20 metres for every curve	A4	NCO + A4
			(Lv) System virtual length →		metres

Please bear in mind that the system size may vary due to the friction and the yield of the different components, as indicated in Table 2. It is then necessary to calculate a virtual length that is higher than the real one.

§ 1.3- Defining the tube type and the filling percentage

TABLE "3" - NET USABLE QUANTITY				
Tube external diameter	*Power supply frequency*	*Use of the tube section (%)*	*Average quantity per hour (kg/h)*	
			Normal system	*Super system*
45 mm	50 Hz	(max qty)	1,100	
		70 %	800	
		50 %	580	
		25 %	300	
	60 Hz	(max qty)	1,300	
		70 %	900	
		50 %	650	
		25 %	325	
60 mm	50 Hz	(max qty)	1,700	2,400
		70 %	1,200	1,700
		50 %	900	1,200
		25 %	450	600
	60 Hz	(max qty)	2,000	2,850
		70 %	1,400	2,000
		50 %	1,000	1,400
		25 %	500	700
102 mm	50 Hz	(max qty)	6,000	
	50 Hz	70 %	4,200	

The quantities indicated in table 3 have been calculated basing on the average values of different operating systems.
For our convenience, the product density had a fixed value of 0.7 kg/litre.

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§ 1.4- Summary of the system data

Summary: **At § 1.1., we calculated the required average quantity per hour …… = Qtot**
At § 1.2., we calculated:

- **the number of required curves (Table "1") ……..... = Nc**
- **the system virtual length (Table "2") …….. = Lv**

§ 1.5- Calculation of system data

Basing on the data indicated at § 1.4., you should make the following choices:

1.5.1- FOR THE TUBE SECTION AND ITS USE in %:

The Qtot which is compatible with table "3" at § 1.3.

1.5.2- FOR THE CORRECT POWER SUPPLY OF THE DRIVING UNIT:

The graphical interpolation with the diagrams in table "4" for the tubes measuring ⌀ 45, ⌀ 60 and ⌀ 102

NOTE: PLEASE VERIFY IN THE RELEVANT DIAGRAMS OF TABLES "4" THE DRIVING UNIT POWER CALCULATED FOLLOWING TABLE "3" AT § 1.3. SO THAT TO TAKE INTO CONSIDERATION THE NUMBER OF CURVES AND THE VIRTUAL LENGTH.
THE CHECK IS UNSUCCESSFUL IF THE CROSS POINT BETWEEN VIRTUAL LENGTH AND NUMBER OF CURVES IS ABOVE THE DIAGRAM LINE.
THE CHECK IS SUCCESSFUL IF THE CROSS POINT BETWEEN VIRTUAL LENGTH AND NUMBER OF CURVES IS BELOW THE DIAGRAM LINE.

BEWARE: CALCULATIONS IN TABLES "4" ARE BASED ON AVERAGE DATA DERIVED FROM OPERATING SYSTEMS. ENVIRONMENTAL CONDITIONS (minimal temperatures and moisture) AND THE TYPE OF PRODUCT USED (granulometry, material moisture, technical specifications) CAN AFFECT THE SYSTEM YIELD. PLEASE ADOPT "HIGH SECURITY MARGINS" BASING ON DATA CONTAINED IN TABLES "4".

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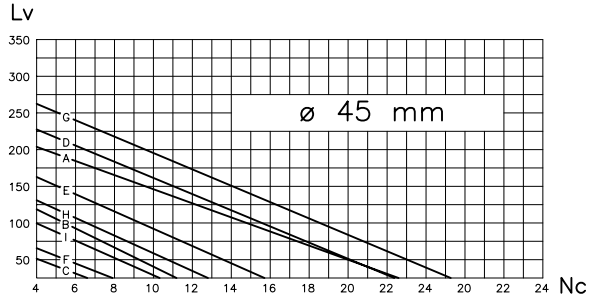
Table "4" for tube measuring ∅ 45 mm

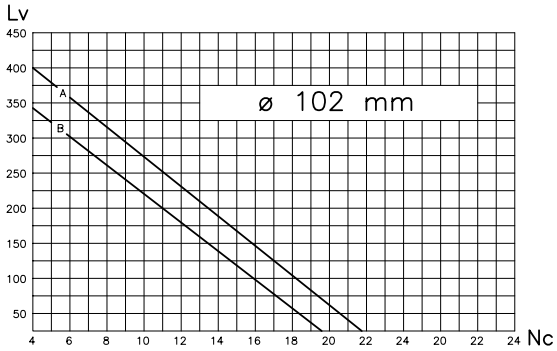
diagrams A ÷ I system virtual length (Lv, metres) – number of curves (Nc, n.)



line	filling (%)	dr. unit (kW)	line	filling (%)	dr. unit (kW)
A	**70**	**1.5**	**F**	**50**	**0.75**
B	**70**	**1.1**	**G**	**25**	**1.5**
C	**70**	**0.75**	**H**	**25**	**1.1**
D	**50**	**1.5**	**I**	**25**	**0.75**
E	**50**	**1.1**			

Table "4" for tube measuring ∅ 102 mm

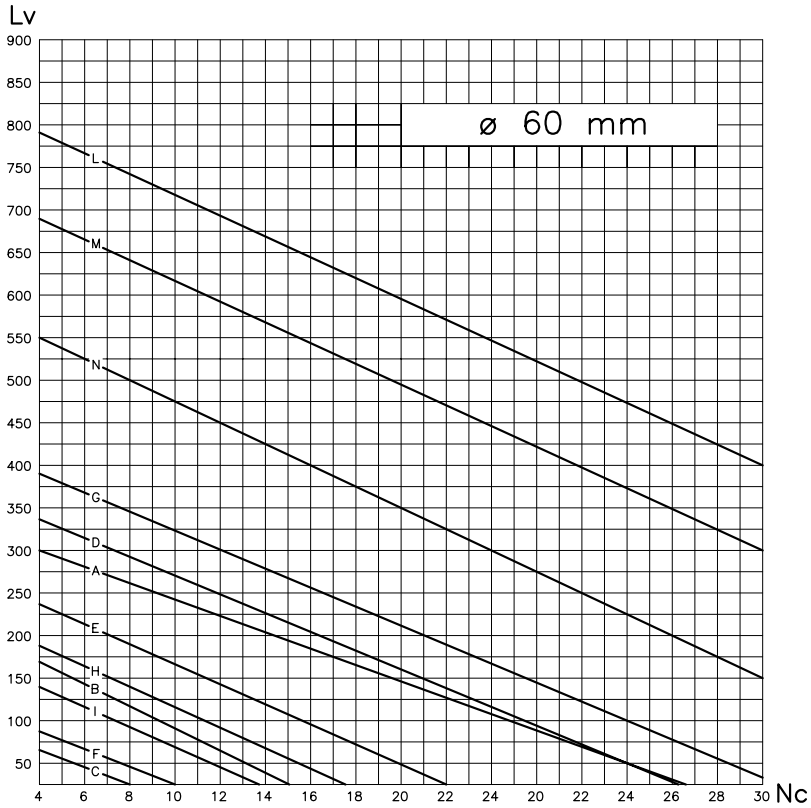
diagrams A ÷ I system virtual length (Lv, metres) – number of curves (Nc, n.)



line	filling (%)	dr. unit (kW)	line	filling (%)	dr. unit (kW)
A	**70**	**4.0**	**B**	**70**	**2.2**

Table "4" for tube measuring ∅ 60 mm

diagrams A ÷ I system virtual length (Lv, metres) – number of curves (Nc, n.)



line	filling (%)	dr. unit (kW)	line	filling (%)	dri. unit (kW)
A	**70**	**1.5**	**G**	**25**	**1.5**
B	**70**	**1.1**	**H**	**25**	**1.1**
C	**70**	**0.75**	**I**	**25**	**0.75**
D	**50**	**1.5**	**L**	**25**	**1.8**
E	**50**	**1.1**	**M**	**50**	**1.8**
F	**50**	**0.75**	**n**	**70**	**1.8**

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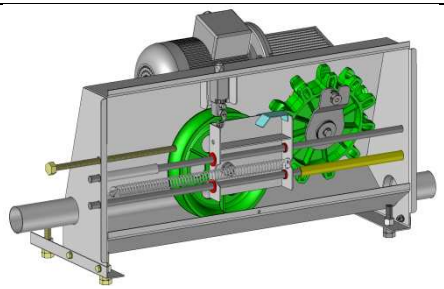
§ 2.- DESCRIPTION OF THE SYSTEM COMPONENTS

The system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" is often installed on a pre-existing structure. The stocking area and the unloading ones (that should not be modified) should be properly connected. In certain cases, it is possible to install additional components so that to enlarge an existing system. **MIAL F.lli Massini srl** provides the client with the main components and a series of accessories listed in Figure 2. Accessories may be used on typical devices and equipments composing the feed distribution system in cattle-breeding farms. The components and the accessories are made of steel, stainless steel, plastic materials of different kinds and/or colours. You can find the detailed list of components and accessories in your purchase order.

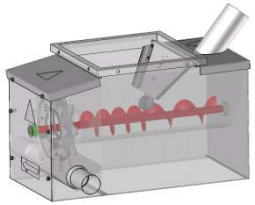
BEWARE: SCHEMES, DRAWINGS AND PICTURES SIZES HAVE BEEN INCREASED / REDUCED DEPENDING ON THE SPACE AVAILABLE FOR THE IMAGE.

Figure 2: list of accessories

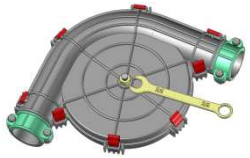
Traction unit with or without loading hopper (§7)



One-way or two-way loading hoppers with or without mixers and loading screw (§8÷11)

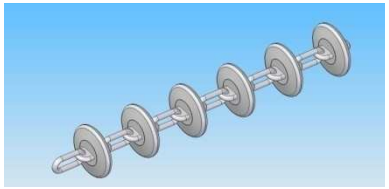


Two-shell, 90° curve (§12)



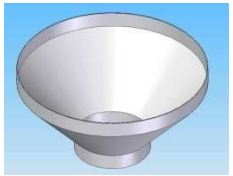
Straight tube (§13)

Chainflex chain of standard size (50 metres, §14)

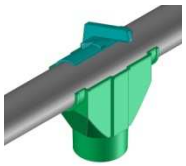


Telescopic supports (§13)

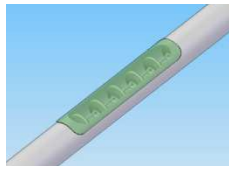
Connection to silos with or without gate (steel or fibreglass §15)



Manually or pneumatically activated unloading hopper with gate (§15)

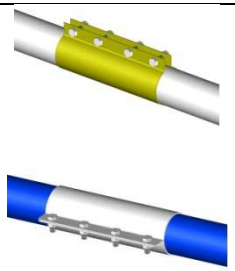


Inspection window with transparent screen (§14)

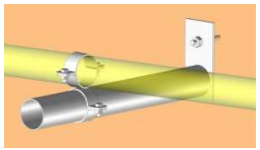


Joint for Chainflex chain (§14)

Joints with 1 or 2 pieces (§13)



Brackets for tubes (§13



Galaxy volumetric dosing unit (§15)

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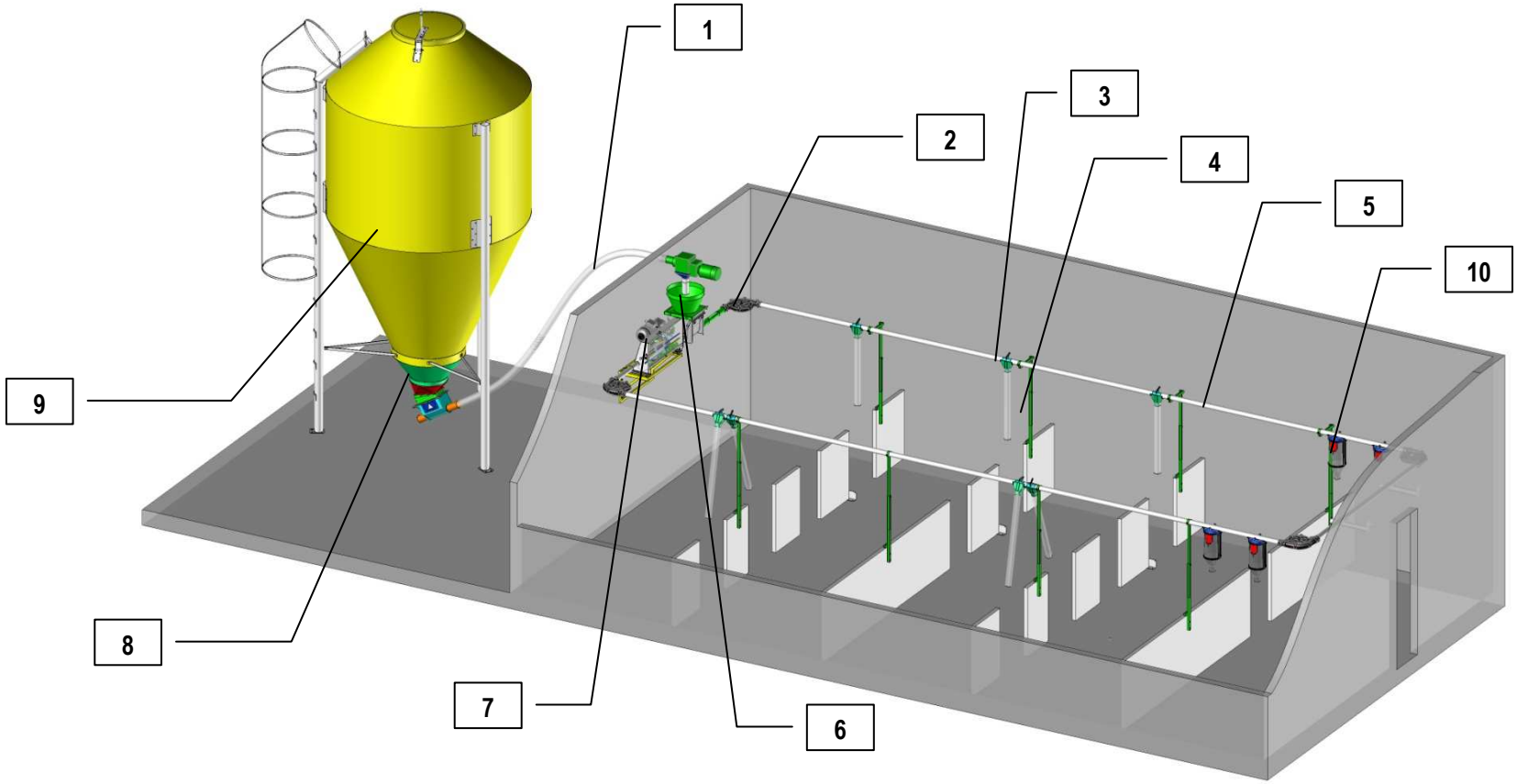
§ 3.- REPRESENTATION OF A SYSTEM WHERE THE TRACTION UNIT IS FAR FROM THE STOCKING SYSTEM

The system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" is normally installed inside a building. The stocking system may be installed at a certain distance from the traction unit (outside the building). In this case, it is necessary to transport the product from the silo to the loading hopper next to the traction unit. Please find in Figure 3 the standard configuration of this system.

Figure 3.- representation of a system where the traction unit is installed at a certain distance from the stocking system

(1= flexible transport system; 2= 90° curve; 3= unloading hopper; 4= telescopic tube; 5= horizontal straight tube; 6= loading hopper; 7= traction unit; 8= connecting hopper; 9= stocking system; 10= Galaxy volumetric dosing unit)



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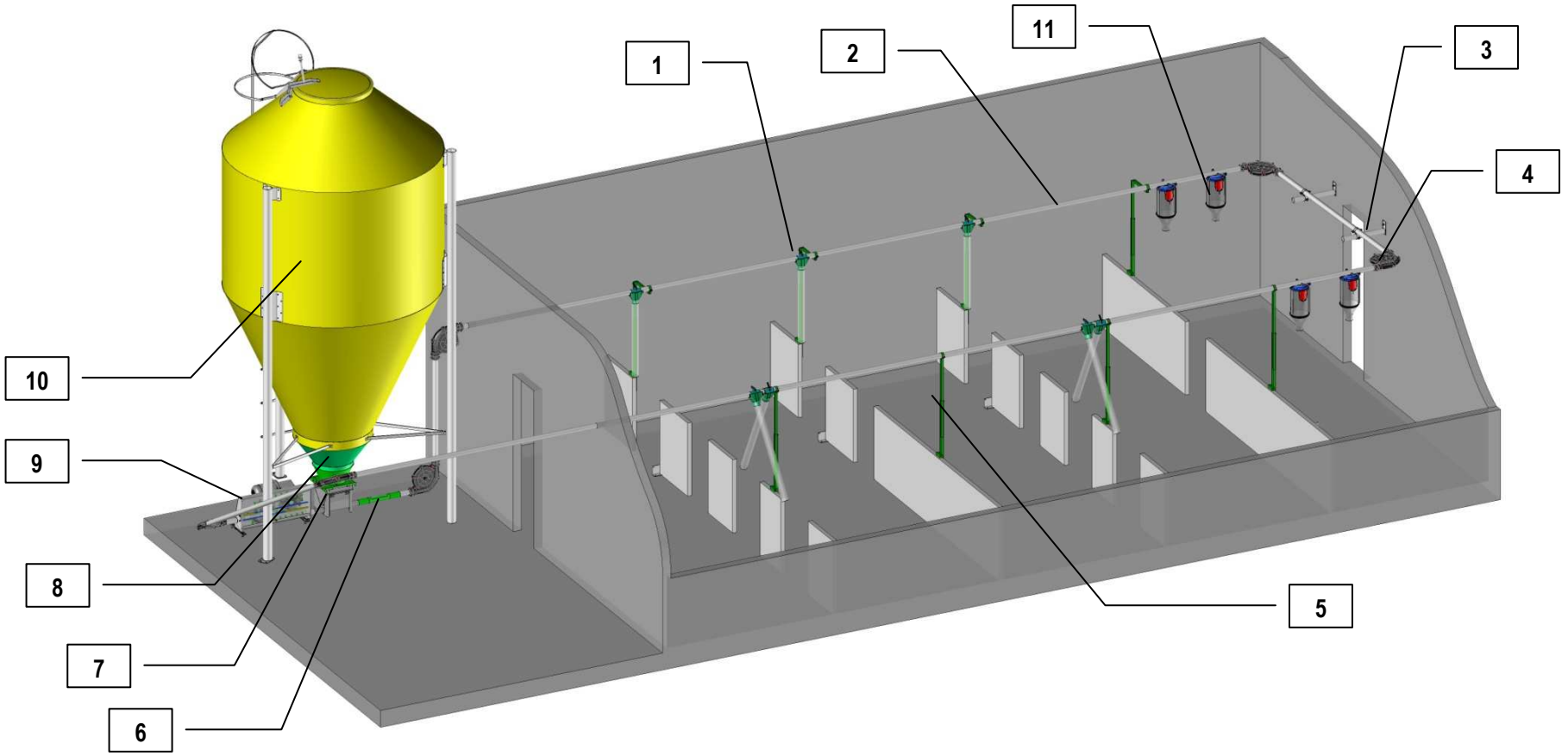
§ 4.- REPRESENTATION OF A SYSTEM WHERE THE TRACTION UNIT IS NEAR THE STOCKING SYSTEM

The traction unit of the system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" may be installed near the stocking system.
Please find in Figure 4 the standard configuration of this system.

Figure 4.- representation of a system where the traction unit is near the stocking system

(1= unloading hopper; 2= horizontal straight tube; 3= support bracket; 4= 90° curve; 5= telescopic tube; 6= tube with inspection door; 7= loading hopper; 8= connecting hopper; 9= traction unit; 10= stocking system; 11= Galaxy volumetric dosing unit)



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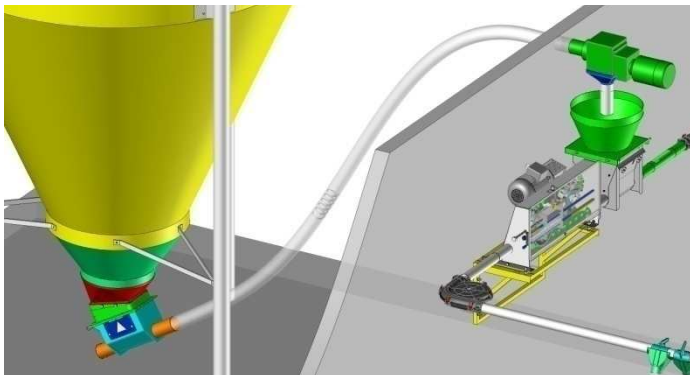
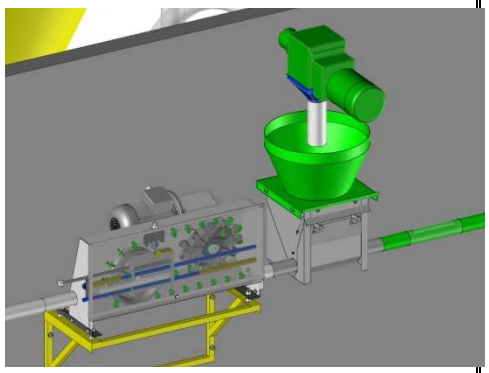
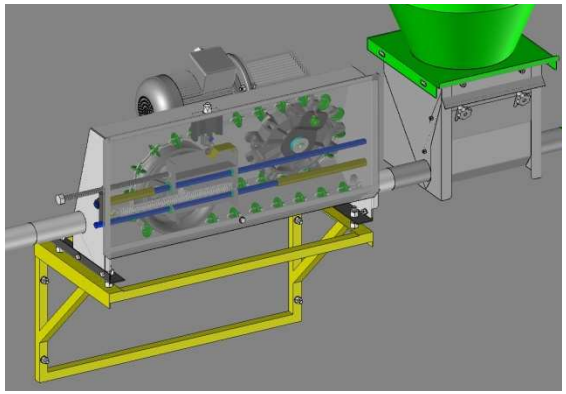
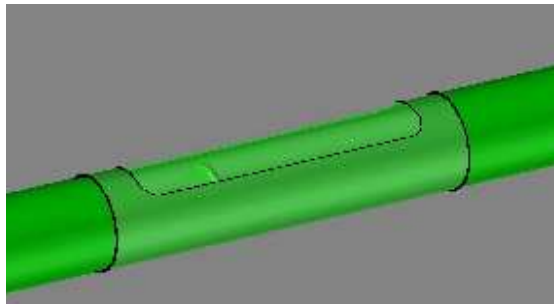
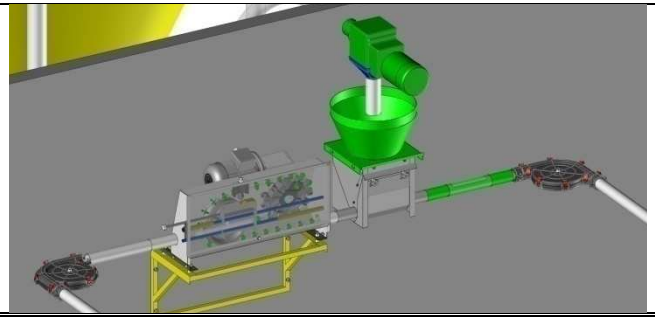
§ 5.- TRACTION UNIT INSTALLATION FAR FROM THE STOCKING SYSTEM

When the traction unit of the system referred to as **"CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN"** is installed at a certain distance from the stocking system, it is required to implement an intermediate transport system. Please find in Figure 5 a flexible spiral transport system (see manual MIL-TSF). You can also use an equivalent transport system. Please find in Figure 5 the different installation steps. Point n. "5" shows the final and functioning system.

Figure 5.- traction unit installation at a certain distance from the stocking system

1: *provide a transport system from the stocking system to the loading hopper*	**2:** *inside view*	**3:** *wall fixing of the traction unit*
		
4: *detail of the inspection window with transparent screen*	**5:** *installation completed*	**REMARKS**
		***a- the distance between the traction unit and the loading hopper should vary from 500 to 1.200 mm.*** ***b- in the figure, the traction unit is fixed to a solid bracket of appropriate size. It is advisable to install the hopper on a similar support.*** ***c- the inspection window with transparent screen should be installed downstream of the loading hopper, in the first section which can be easily monitored: this window allows the user to monitor the transport cycle at its beginning.***

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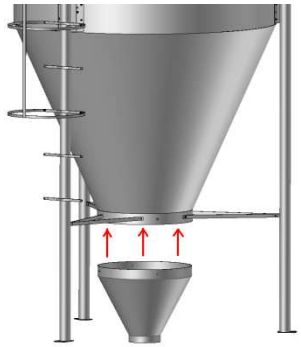
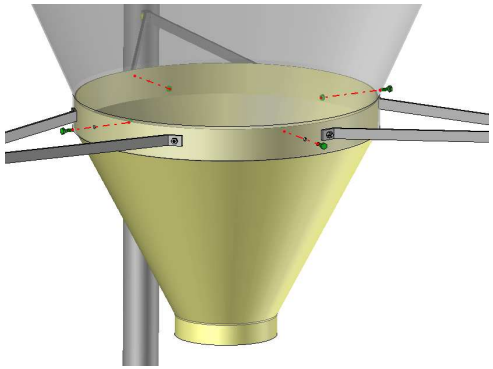
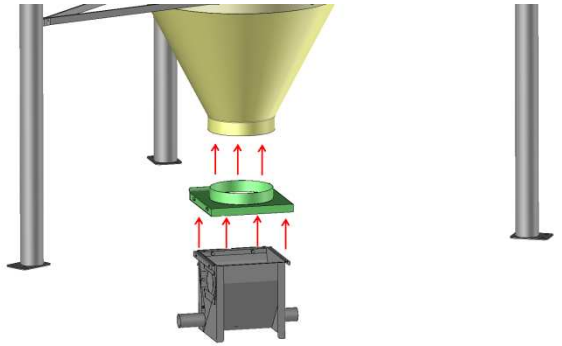
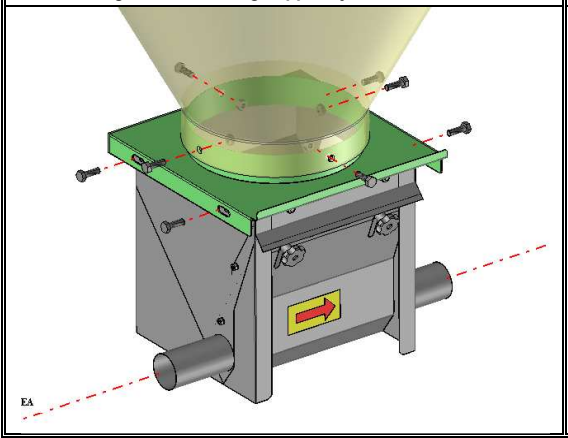
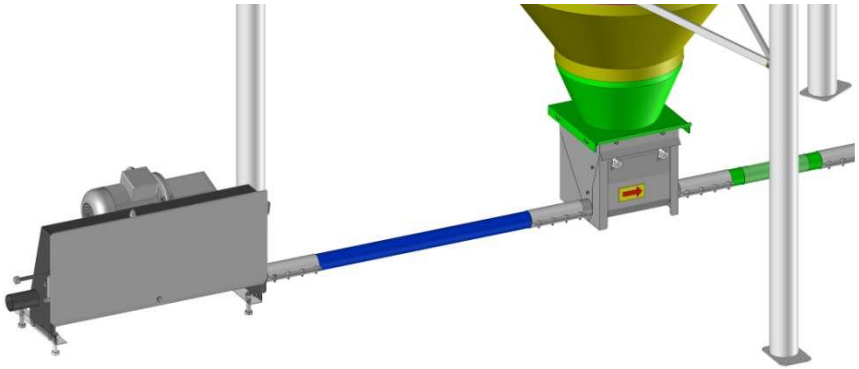
§ 6.- TRACTION UNIT INSTALLATION NEAR THE STOCKING SYSTEM

The traction unit of the system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" may be installed near the stocking system. The alignment of the traction unit depends on the hopper fixing to the stocking system. Please find in Figure 6 the different installation steps. Point n. "5" shows the final and functioning system.

Figure 6.- traction unit installation near the stocking system

1: *insert the connecting hopper at the base of the silo*	**2:** *tighten the connecting hopper by means of screws*	**3:** *position the loading hopper by aligning the tube*
		
4: *tighten the loading hopper by means of screws*	**5:** *position the traction unit by adjusting the support feet: connect to the loading hopper*	**REMARKS**
		***a- the distance between the traction unit and the loading hopper should vary from 500 to 1000 mm.*** ***b- the traction unit should be positioned on a support plate and the feet position should be adjusted so that to align the outlet tube axis of the chain to the inlet tube of the unloading hopper.*** ***d- the unloading hopper is "hanging" on the stocking system.*** ***e- the inspection window with transparent screen should be installed downstream of the loading hopper, in the first section which can be easily monitored: this window allows the user to monitor the transport cycle at its beginning.***

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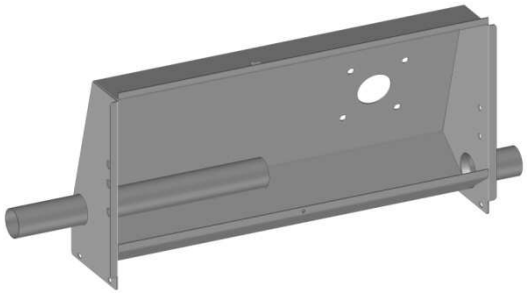
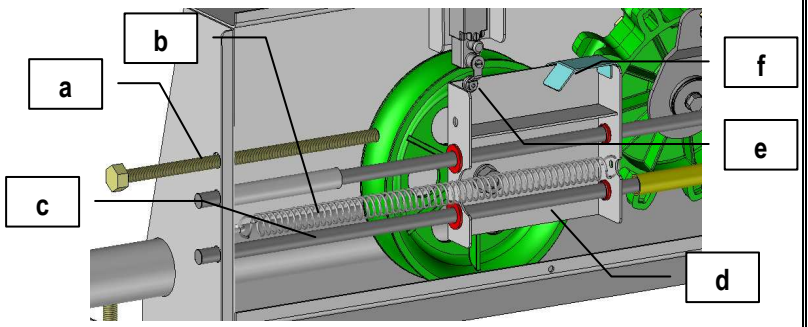
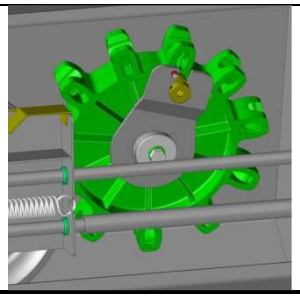
§ 7.- TRACTION UNIT: TECHNICAL AND INSTALLATION SPECIFICATIONS

The system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" is activated by the traction unit. It is possible to install different types of traction which should be equipped with the suitable connections for the 3 types of tubes (ø45, ø60 e ø102 mm of diameter). Powers available: 0.75 kW, 1.1 kW, 1.5 kW, 1.8 kW, 2.2 kW, 4.0 kW. Please refer to § 1 to choose the suitable power of the traction unit.

Figure 7: main components of the traction unit

<table>
<tr><td colspan="2">BEARING FRAME OF THE TRACTION UNIT: the frame is made of shaped sheet metal which is welded to tubes and sections</td><td>Tooth wheel with special sections (max transmission and low wear of the Chainflex chain component)</td><td>Dead pulley to tension the Chainflex chain</td><td colspan="2">a= pull screw (d) to tension the Chainflex chain and/or reinsert the joint; b= tensioning spring; c= guides; d= support slide for dead pulley; e= security micros; f= bracket connected to the micros (e).</td></tr>
<tr><td colspan="2">  </td><td>  </td><td>  </td><td colspan="2"> 
</td></tr>
<tr><td>Electric, three-phase motor with orthogonal reducer</td><td>Axis</td><td>Bracket for safety pin</td><td colspan="2">Tooth wheel with bracket and security pin</td><td rowspan="2">REMARKS

a- For all use and maintenance operations, refer to the manual MIL-CHF.
b- before activating the traction unit:
-remove the screw (a) from its housing
-close and tighten the protection carter of the traction unit
c- for instructions on the security pin, please refer to the manual MIL-CHF.</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td colspan="2">  </td></tr>
</table>

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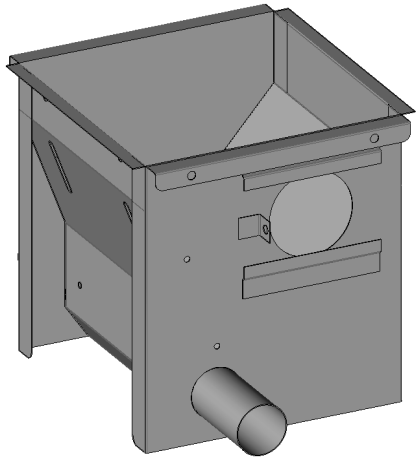
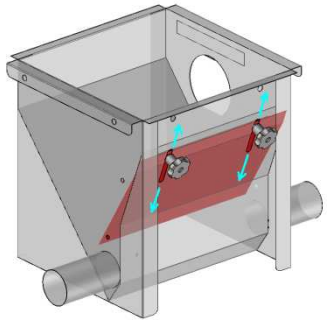
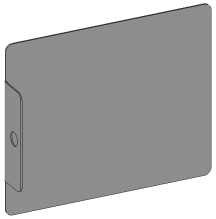
§ 8.- LOADING HOPPER: ONE-WAY MODEL

In the system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**", the loading hopper conveys the product to the transport system. The hopper is a sort of "lung". Inside the one-way hopper, we installed an oscillating device which is activated by the chain discs when moving. The oscillating feeler conveys a vibration to the hopper frame. In this way, the product is evenly distributed and lumps are avoided. The adjusting gate allows the user to measure the quantity of the transported product.

Figure 8: main components of the one-way loading hopper

BEARING FRAME OF THE HOPPER: *the frame is made of shaped sheet metal which is welded to tubes and sections*	*Slide gate for adjusting the flow. Position the gate by unscrewing the knobs. The gate can slide on the inclined wall by means of two slots:* *- upward to increase the product flow* *- downward to decrease/close the product flow* *At the end, tighten the knobs*	*Oscillating feeler. It is composed of a lever hinged to the upper end by means of a bolt and a bush. The terminal part moves upward by the action of the chain discs. Once the disc has passed, the lever falls again and bangs against the gate. Thus, the product falls easily.*	*Transparent inspection door made of steel or plastic material to monitor the flow entering the hopper.*
			

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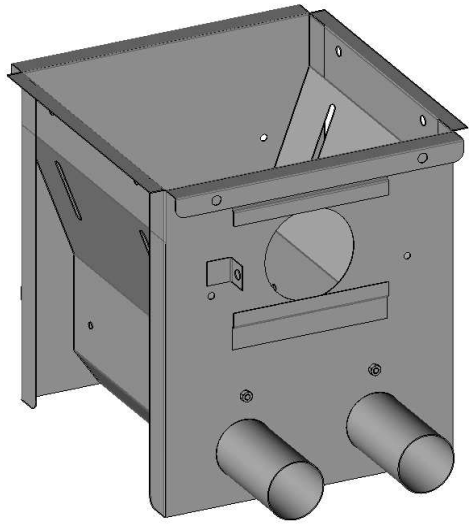
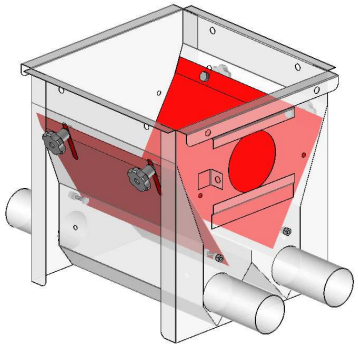
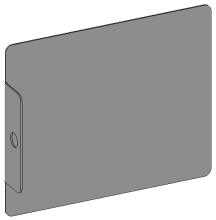
§ 9.- LOADING HOPPER: TWO-WAY MODEL

In the system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**", the loading hopper conveys the product to the transport system. The hopper is a sort of "lung". The two-way hopper allows feeding the systems. Inside the two-way hopper, we installed an oscillating device which is activated by the chain discs when moving. The oscillating feelers convey a vibration to the hopper frame. In this way, the product is evenly distributed and lumps are avoided. The adjusting gates allow the user to measure the quantity of the transported product.

Figure 9: main components of the two-way loading hopper

BEARING FRAME OF THE HOPPER: *the frame is made of shaped sheet metal which is welded to tubes and sections*	*2 Slide gates for adjusting the flow. Position each gate by unscrewing the knobs. The gate can slide on the inclined wall by means of two slots:* *- upward to increase the product flow* *- downward to decrease/close the product flow* *At the end, tighten the knobs*	*2 oscillating feelers. Each feeler is composed of a lever hinged to the upper end by means of a bolt and a bush. The terminal part moves upward by the action of the chain discs. Once the disc has passed, the lever falls again and bangs against the gate. Thus, the product falls easily.*	*2 Transparent inspection doors made of steel or plastic material to monitor the flow entering the hopper.*
			

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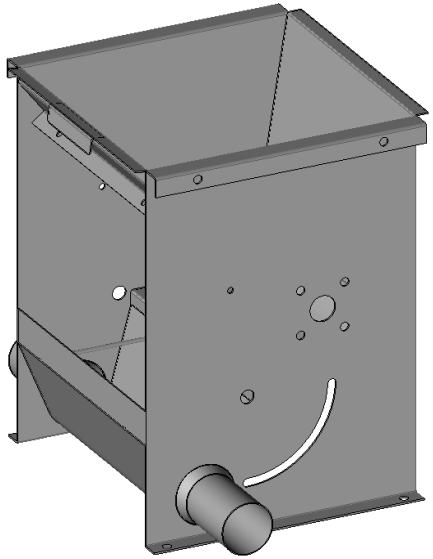
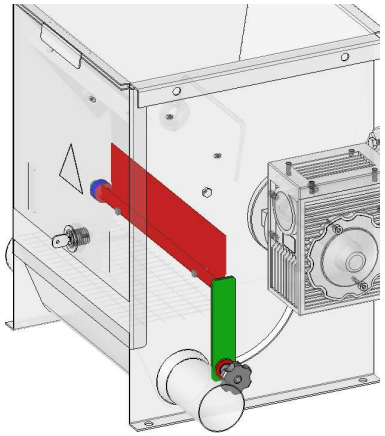
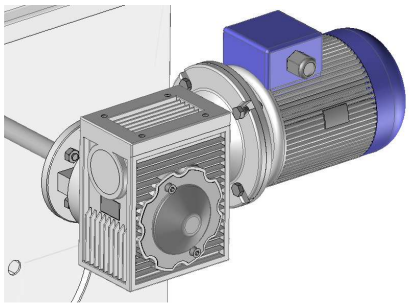
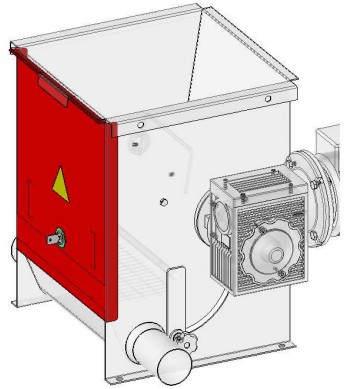
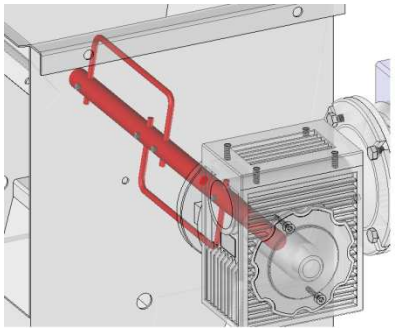
§ 10.- LOADING HOPPER: MOTOR-DRIVEN MODEL

In the system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**", the loading hopper conveys the product to the transport system. The hopper is a sort of "lung". Inside the motor-driven hopper, we installed a rotating reel activated by an external motor reducer. The continuing rotation of the reel allows an even distribution of the product and avoids lumps. The adjusting single blade gate allows the user to measure the quantity of the transported product.

Figure 10: main components of the motor-driven loading hopper

<table>
<tr>
<td>BEARING FRAME OF THE HOPPER: the frame is made of shaped sheet metal which is welded to tubes and sections</td>
<td>Single blade gate for adjusting the product flow.
As in figure = gate open position= max flow of product
Rotated anticlockwise (90°) = gate closed position = flow of product interrupted</td>
<td>Electric, three-phase motor with orthogonal reducer</td>
<td>Inspection door with gate on the front side of the hopper</td>
</tr>
<tr>
<td>  </td>
<td>  </td>
<td>  </td>
<td>  </td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rotating reel with brackets that mixes up the product and avoids lumps.
  </td>
<td></td>
</tr>
</table>

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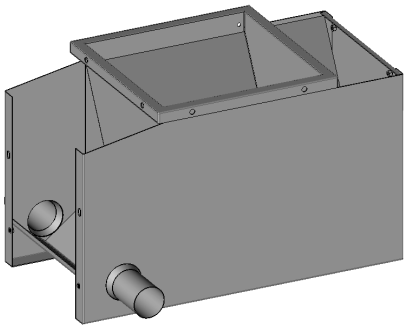
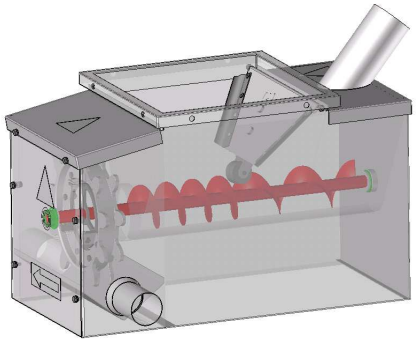
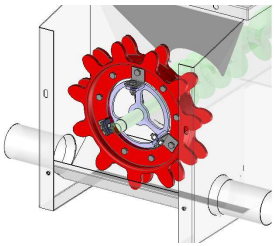
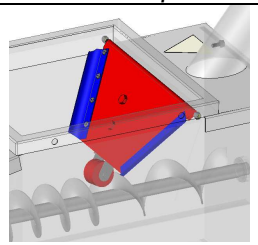
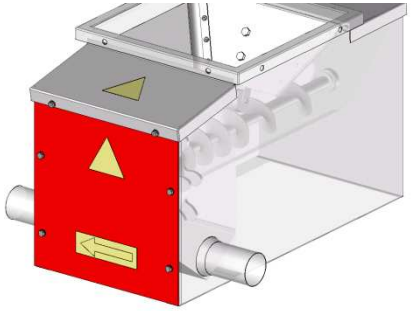
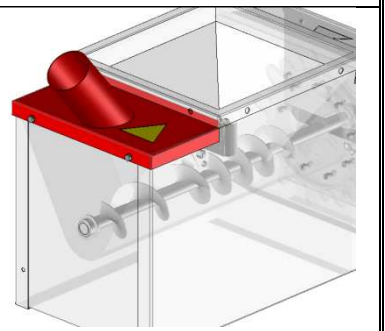
§ 11.- LOADING HOPPER: MODEL WITH RECIRCULATION

In the system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**", the loading hopper conveys the product to the transport system. The hopper is a sort of "lung". Inside the recirculation hopper, we installed a screw that is activated by the chain through a tooth wheel. The continuing rotation of the screw allows the product to move easily to the chain and avoid lumps. An oscillating strap hinge, which is activated by a wheel feeler, convey a vibration to the hopper frame so that to allow an even distribution of the product. The wheel feeler is enabled by the contact section of the screw.

Figure 11: main components of the recirculation hopper

<table>
<tr><td>BEARING FRAME OF THE HOPPER: the frame is made of shaped, welded sheet metal.</td><td>Variable rate screw activated by a tooth wheel. The screw mixes up the product and pushes it to chain.</td><td>The tooth wheel is made of plastic material and is moved by the chain</td><td>Oscillating strap hinge activated by the screw sections. The wheel feeler brushes against the screw and falls after the spiral section has passed: when falling, it bangs against the hopper frame and allows an even distribution of the product.</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td colspan="2"></td><td>Inspection door with screws bearing the support of the screw rotating axis.</td><td>Cover to avoid obstructing the system</td></tr>
<tr><td colspan="2"></td><td>  </td><td>  </td></tr>
</table>

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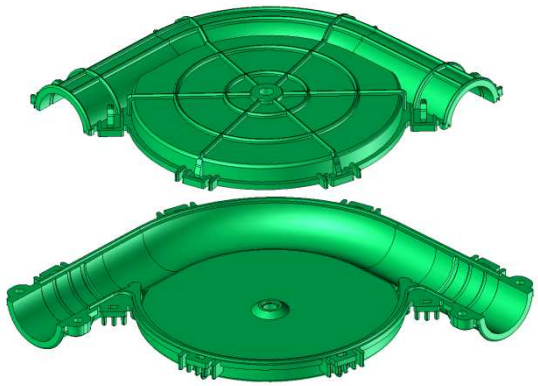
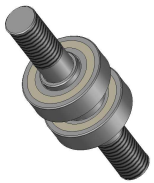
§ 12.- 90° curve - Components - Types

The system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" is composed of a traction unit, a loading hopper (the main components) and a series of straight tubes of different lengths which are connected by means of 90° curves. Each curve is composed of 2 semi-shells that can be closed through snap-locks. Insert the tube as far as possible forward and tighten by means of the side-mounted sleeves and the relevant screws. The central pin, equipped with sealed bearings, allows the dead pulley to rotate. It is tightened to the semi-shells by means of a self-locking nut.

Figure 12: main components and types of curves

90° CURVE - ***lower and upper semi-shell***	***Rotation axis of the dead pulley***	***Dead pulley: different types depending on the workload***	**90° curve -** ***MOUNTED***
			

art. 609300: ***shells: aluminium*** ***dead pulley: cast iron*** ***bearings: sealed*** ***bolts: stainless steel***	***art. 609200-609400*** ***shells: PA6*** ***dead pulley: cast iron*** ***bearings: sealed*** ***bolts: stainless steel***	***art. 609500-609600*** ***shells: PA6-FV30*** ***dead pulley: nylon*** ***bearings: sealed*** ***bolts: stainless steel***	***art. 609800*** ***shells: PA6-FV30*** ***dead pulley: nylon*** ***bearings: sealed*** ***bolts: stainless steel***	***art. 609801*** ***shells: trocamid-T500*** ***dead pulley: nylon*** ***bearings: sealed*** ***bolts: stainless steel***	***art. 609900*** ***shells: PA6-FV30*** ***dead pulley: cast iron*** ***bearings: sealed*** ***bolts: stainless steel***	***art. 609901*** ***shells: trocamid-T500*** ***dead pulley: cast iron*** ***bearings: sealed*** ***bolts: stainless steel***	***art. B1029000*** ***shells: PA6-FV30*** ***dead pulley: cast iron*** ***bearings: sealed*** ***bolts: stainless steel***
for tubes ø 60 mm	***for tubes ø 45-60 mm***	***for tubes ø 45-60 mm***	***for tubes ø 60 mm***	***for tubes ø 60 mm***	***for tubes ø 60 mm***	***for tubes ø 60 mm***	***for tubes ø 102 mm***
							

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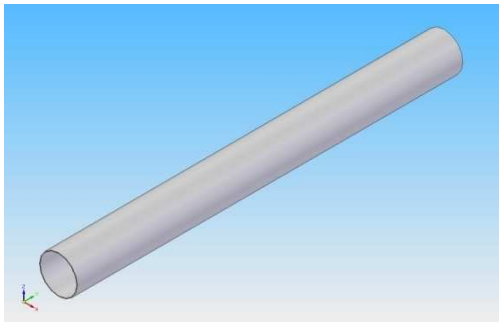
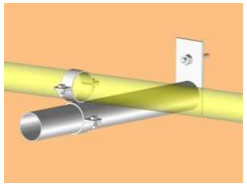
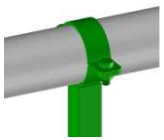
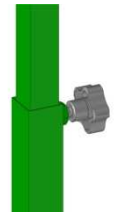
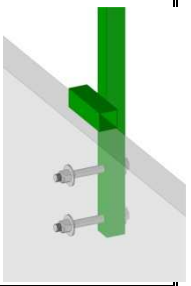
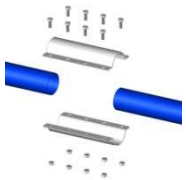
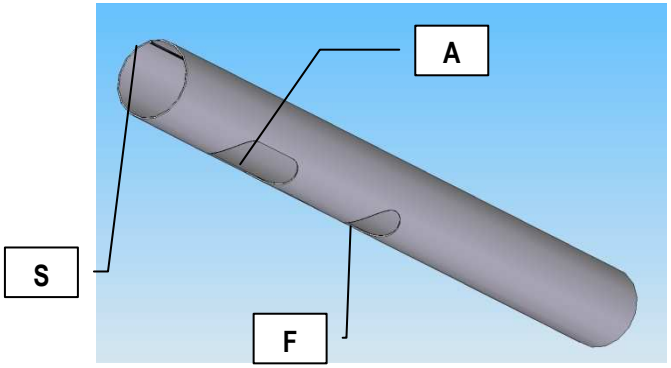
§ 13.- STRAIGHT TUBES – Telescopic tubes – Support brackets

The system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" is composed of a traction unit, a loading hopper (the main components) and a series of straight tubes of different length which are connected by means of 90° curves. The tubes are supplied in 3/6 metre bars. When installing the system, they should be cut to size and connected to the curves and/or joints. Please, drill holes next to the unloading points. Please observe the following rules while installing:
1= drill holes from the **DIAMETRICALLY OPPOSED** section to the internal welding; 2= remove any internal or external residues; 3= position the tube **WITH THE WELDING FACING UPWARD**.

Figure 13.- straight tubes – telescopic tubes – support brackets

<table>
<tr><td colspan="2">EXTERNAL TUBE Ø 45, 60, 102 mm: 3/6 metre bars</td><td colspan="2">support bracket</td><td colspan="4">telescopic tube</td></tr>
<tr><td colspan="2" rowspan="2">  </td><td>mounted</td><td>components</td><td>mounted</td><td>bracket for fixing the tube</td><td>telescopic part - knob</td><td>wall fixing</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td colspan="2">two-piece joint</td><td colspan="2">one-piece joint</td><td colspan="2" rowspan="2">slots (A) and holes (F) position with respect to the tube internal welding (S)</td><td colspan="2" rowspan="2">REMARKS</td></tr>
<tr><td>not mounted</td><td>mounted</td><td>not mounted</td><td>mounted</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td><td colspan="2">  </td><td colspan="2">a- the supports for the sections of the straight tube should be positioned every 3 metres for the tube measuring ø 45 and every 4 metres for the tubes measuring ø 60 and ø102.
b- if you cannot use brackets or telescopic tubes, please use tie rods to fix the tube to the ceiling (it is advisable to sue V-shaped tie-rods).
c- the telescopic tube can bear tubes at a height of 1.900 - 2.150 mm.
d- alignment: as far as straight tubes are concerned, it is acceptable to have a deviation of the tube diameter in the order of 60% from the central axis (measured on a 4-metre section).
e- in the fixing point, the tube should be wrapped with self-fastening bands or with two omega brackets (see the bracket component)</td></tr>
</table>

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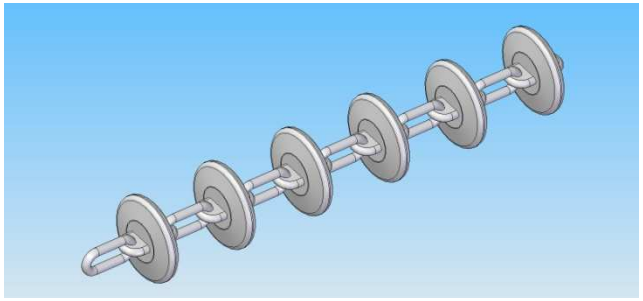
§ 14.- CHAINS – Joints – Inspection window

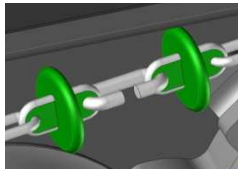
In the system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**", the series of tubes and curves, when connected, form a closed, circular system. Inside the tubes and curves, we inserted the chain called "Chainflex". Consult the manual MIL-CHF to see instructions related to use, installation and maintenance.

Figure 14.- chains – joints – inspection window

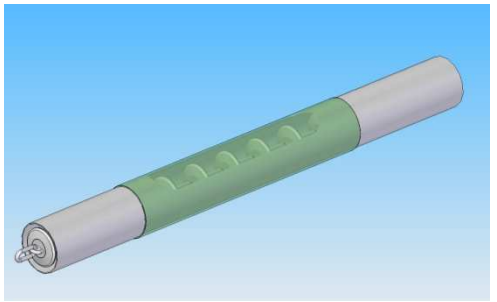
CHAINFLEX CHAIN: ***for tubes ø45, 60 e 102 mm. Overall length: 50 metres***



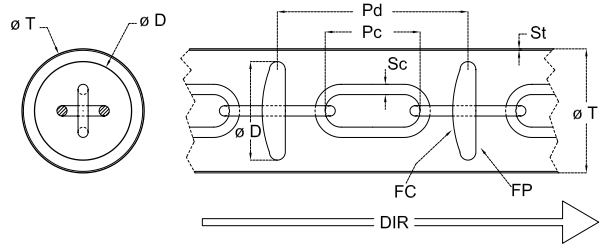
how to connect two sections of the Chainflex chain

end to be connected enlarge the holes for inserting the joint	*joint*	*connected ends: the joint is working. DO NOT bend – tighten – weld it*
		

inspection window with transparent screen The transparent screen should be properly fixed to the tube by means of self-fastening bands or glued using silicon



Chainflex chain drawing *(DIR= direction of the chain and product movement)*



chain code compatible with the joint		joint code	joint code	description
607042-W, Y, R, G, B, O		*451110*	**607019**	galvanised steel joint for chain
		451120	**607020**	stainless steel joint for chain
		455135	**455136**	galvanised steel joint for chain
60750	*607048*	*607047*	**607021**	stainless steel joint for chain
		B1028078	**B1028000**	steel joint for chain

Available sizes of Chainflex chain:

ø **T**,mm	**St**, mm	ø **D**, mm	**Pd**, mm	**Pc**, mm	**Sc**, mm	chain code	notes	description
45	**1**	**38**	**70**	**35**	**5**	**451110**		cemented, galvanised chain
45	**1**	**38**	**70**	**35**	**5**	**451120**		stainless steel chain
45	**1**	**35**	**51**	**35**	**5**	**455135**		cemented, galvanised chain
60	**1**	**45**	**70**	**35**	**5**	**607042-W**		cemented, galvanised chain, white disc in PVC
60	**1**	**45**	**70**	**35**	**5**	**607042-Y**		cemented, galvanised chain, yellow disc in PVC
60	**1**	**45**	**70**	**35**	**5**	**607042-R**		cemented, galvanised chain, red disc in PVC
60	**1**	**45**	**70**	**35**	**5**	**607042-G**		cemented, galvanised chain, green disc in PVC
60	**1**	**45**	**70**	**35**	**5**	**607042-B**		cemented, galvanised chain, blue disc in PVC
60	**1**	**45**	**70**	**35**	**5**	**607042-O**		cemented, galvanised chain, orange disc in PVC
60	**1**	**45**	**70**	**35**	**5**	**607043**		stainless steel chain
60	**1**	**48**	**70**	**35**	**5**	**607048**		"Super", cemented, galvanised chain
60	**1**	**48**	**70**	**35**	**5**	**607049**		"Super", stainless steel chain
60	**1**	**48**	**70**	**35**	**5**	**607050**		"Super-reinforced", stainless steel chain
102	**1,5**	**78**	**80**	**40**	**6**	**B102078**		steel chain

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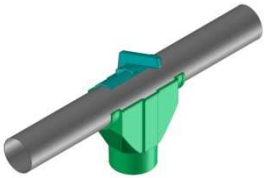
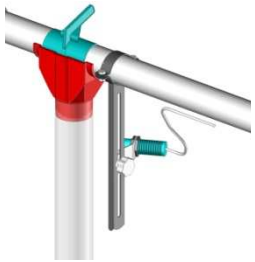
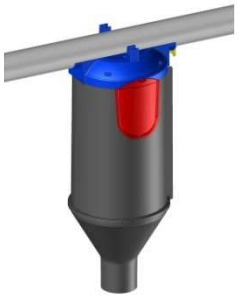
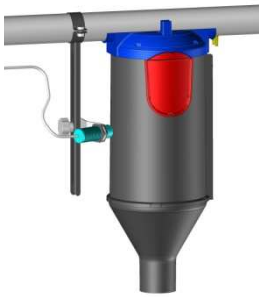
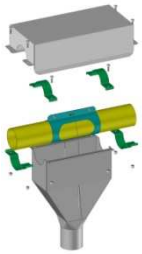
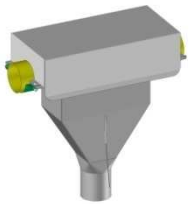
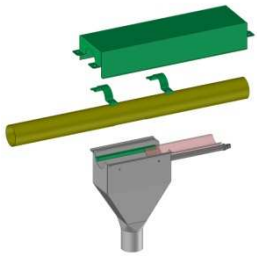
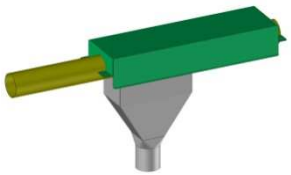
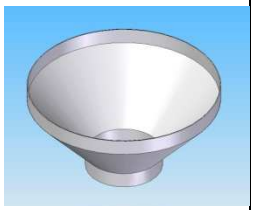
§ 15.- UNLOADING HOPPERS – Galaxy dosing unit – Accessories

The system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" transports, by means of a chain which is positioned inside the tubes and the curves, the product on the system. Next to the unloading points, it is required to drill holes. Next to the holes, it is possible to install different types of unloading hoppers or the "Galaxy" volumetric dosing unit. Consult the manual MIL-GAL to see instructions related to use, installation and maintenance of the "Galaxy" volumetric dosing unit.

Figure 15.- Unloading hoppers – Galaxy dosing unit – accessories

unloading hopper: made of plastic material, can be snapped	*unloading hopper: equipped with gate valve = CLOSE*	*unloading hoppers: equipped with gate valves = OPEN*	*unloading hopper: equipped with gate valve = OPEN and sensor for product tracking*	*GALAXY dosing unit*	*GALAXY dosing unit with level sensor*
					

unloading hoppers: made of steel, can be equipped with brackets	*steel unloading hopper: mounted*	*unloading hopper: made of steel, can be equipped with a pneumatic cylinder*	*unloading hopper with pneumatic cylinder: mounted*	*connecting hopper*	**REMARKS**
					*a- accessories should be fixed to the distribution tubes by means of omega brackets with bolts or self-fastening bands. DO NOT SQUEEZE THE TUBE.* *b- the connecting hopper should be adapted to the stocking system in use by drilling the necessary holes.* *c- the inclined unloading hoppers should not exceed an inclination angle of 22° compared to the vertical line.*

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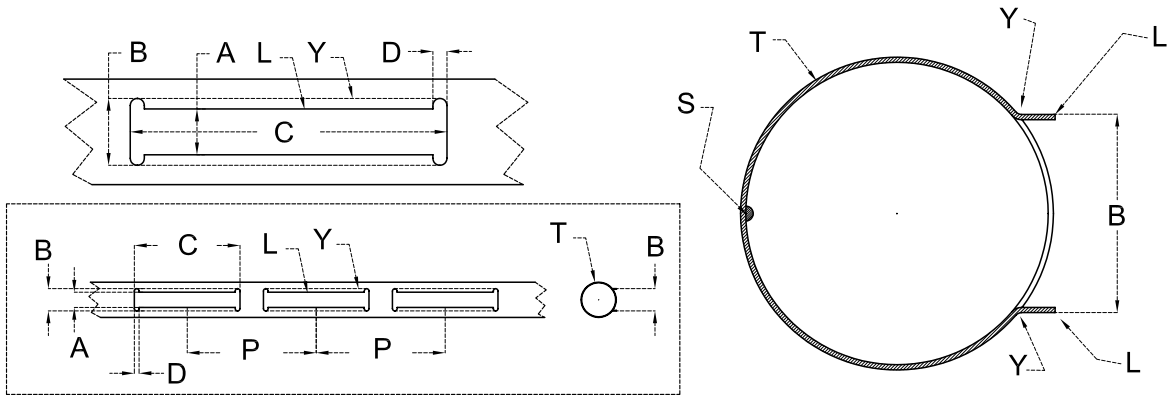
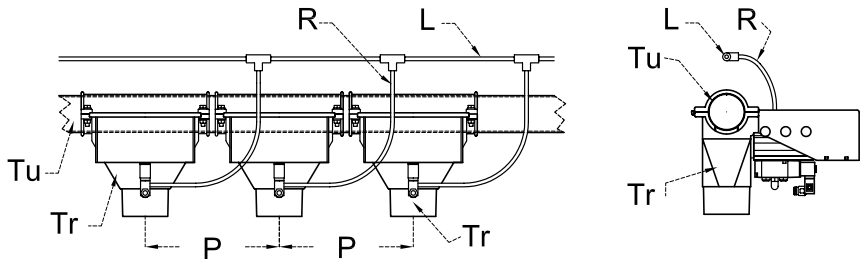
§ 16.- INSTALLATION OF HOPPERS FOR "RATIONED FEEDING"

The system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" may be provided with one or more hoppers that are equipped with a gate activated by a pneumatic cylinder. The application of these hoppers allows the user to have a rationed feeding. For rationed feeding we intend transporting to one or more unloading points a preset quantity of product at specified hours. The application of the hopper for rationed feeding implies a particular installation of the unloading slots in the lower part of the straight tube. **MIAL F.lli Massini srl** usually performs this special installation at its premises and with its own equipment. The minimal clearance between two consecutive hoppers is 220 mm. The operating pressure of the compressed-air system is 4÷6 bar. The solenoid valves can be manually or automatically (remote control, PLC, PC) activated.

how to work the tube	*caption*
	*A= 26mm;* *B=38mm;* *C= 180mm;* *D= 8mm;* *P= 220 mm (minimum);* *T= tube ø60mm;* *Y= bend around 70°;* *L= bended section;* *S= tube internal welding*
how to mount a series of hoppers for rationed feeding	***caption***
	*Tu= tube ø60mm:* *Tr= hopper* *R= "Rilsan" tube 6/4;* *L= compressed air line;* *P= 220 mm (minimum)*

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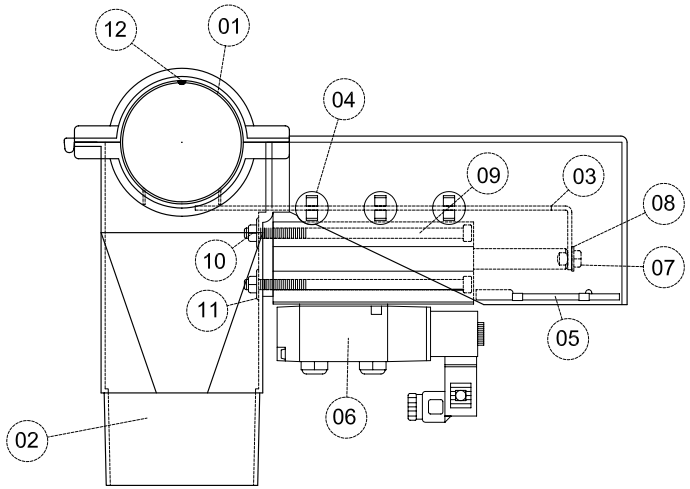
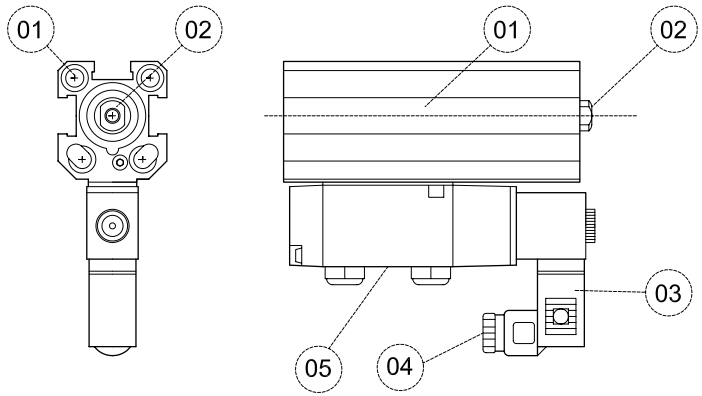
§ 16.1.- INSTALLATION OF HOPPERS FOR "RATIONED FEEDING". Detail of the hopper and pneumatic activation

detail of the hopper equipped with a pneumatic gate	*caption*
	*01= tube ø60mm;* *02= hopper;* *03= gate;* *04=guide for gate;* *05=protection grid;* *06=electro-pneumatic block;* *07=screw;* *08=washer;* *09=screw;* *10=nut;* *11=washer;* *12= tube internal welding*
detail of the pneumatic activation	*caption*
	*01= pneumatic cylinder* *02= stem;* *03= electro-pneumatic block;* *04= electrical cables inlet;* *05= compressed air plug 1/8" F*

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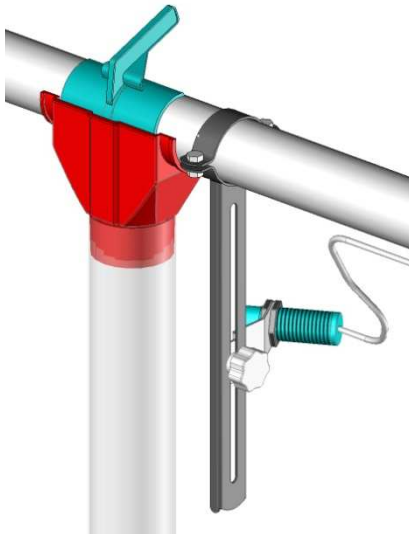
§ 17.- ACCESSORIES FOR END OF LINE CONTROL

The system referred to as **"CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN"** may be provided with a series of control accessories that should be positioned at the end of the feeding line. These accessories monitor the quantity of product, so that to avoid transporting excessive quantities of product to the unloading points.

gravity sensor	*dynamometer equipped with warning micros*	*passage sensor*
		
It is a contact button into a sealed container made of plastic material. It can also be inserted into a container with an unloading point and placed at the end of the feeding line. Normally, the product should not fall into such container. If there are product residues that are not absorbed by the unloading points, the residues fall into the container where the gravity sensor is installed. The weight of the product activates the contact button that, if connected to the feeding system, may generate an alarm or stop the power supply to the main motor.	*It is composed of a system which works as a spring-type dynamometer. This device is hanging on a support structure by means of the upper triangular hook. Apply an empty container to the lower hook. The container receives the last quantity of product in the line. Normally, the product should not fall into such container. If there are product residues that are not absorbed by the unloading points, the residues fall into the container where the gravity sensor is installed. When the product falls, its weight is higher than the resistance of the spring, and the mobile contact activates the micro-switch that, if connected to the feeding system, may generate an alarm or stop the power supply to the main motor. The position of the micro-switch can be changed using the special knob so that to allow activating the device only when a minimal weight threshold is exceeded.*	*It is composed of a proximity sensor that signals whether the product is passing through the tube. The last quantity of product in the line is transported, by means of a tube, into a container. Normally, product should not pass through the tube. If there are product residues that are not absorbed by the unloading points, the residues fall into the container. The passage of the product activates the sensor that, if connected to the feeding system, may generate an alarm or stop the power supply to the main motor.*

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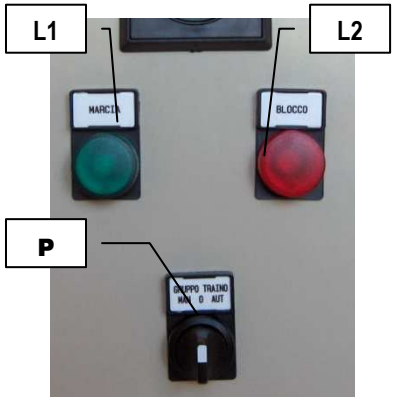
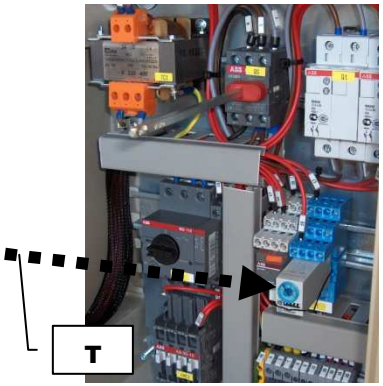
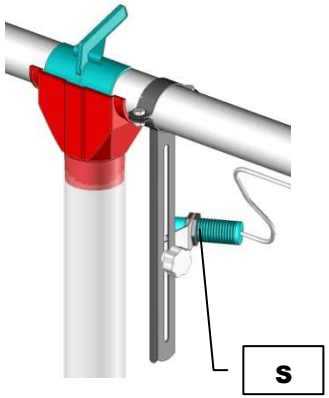
§ 18.- FUNCTIONING OF THE CONTROL DEVICE ON A ONE-LINE SYSTEM

The system referred to as **"CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN"** may be provided with a control device that guarantees its correct operation and automatic stop in case of malfunctioning. The control device is composed of an electrical panel and a proximity sensor that are installed next to the last unloading point.

NOTE: FOR "LAST UNLOADING POINT" WE INTEND THE LAST POINT FROM THE TRACTION UNIT and/or THE STOCKING SYSTEM FOLLOWING THE DIRECTION OF THE CHAINFLEX CHAIN MOVEMENT.

electrical control panel	*buttons and selectors*	*position of the "T" time register*	*position of the "S" sensor (last unloading point)*
			

PRELIMINARY OPERATIONS TO BE PERFORMED AFTER THE FIRST INSTALLATION: *manually activate the system ("P" selector on "MAN"). Take note of the time between the transport system activation and the beginning of the unloading operations in the last unloading point (detected time = "TC"). Check whether the "S" sensor detects the presence of falling product. Calibrate the system by adjusting the "T" time register and set a time which is higher than the "TC" time (at least 3÷5 minutes higher).*

MANUAL OPERATION: *The "P" selector is on the "MAN" (MANUAL) position. The traction system is activated and STOPS when there is no product circulating (the traction system may also stop if the motor safety guards intervene and/or following a lack of power supply).*

WARNING LAMPS: "L1" lamp: green; ON = SYSTEM ACTIVATED – OFF = SYSTEM NOT ACTIVATED
"L2" lamp: red; ON = SYSTEM ANOMALY – OFF = NO ANOMALY

AUTOMATIC OPERATION: *The "P" selector is in the "AUT" (AUTOMATIC) position. The traction system is activated. The "T" time register checks possible anomalies of the system. If the "S" sensor does not detect the presence of product within the time previously set in the "T" time register (which is 3÷5 minutes higher than the "TC time = time required to fill the whole system"), the traction system is disabled. In fact, "THERE ARE SYSTEM ANOMALIES AS THE SYSTEM DOES NOT FILL WITHIN THE STANDARD TIME EVEN AFTER ADDITIONAL MINUTES HAS GONE BY". On the other hand, if the sensor detects the presence of product in the last unloading point within the preset time in the "T" time register, the system continues to work.*
The system STOPS IF THE "P" SELECTOR is moved to the "0" (ZERO) position (the traction system may also stop if the motor safety guards intervene and/or following a lack of power supply).

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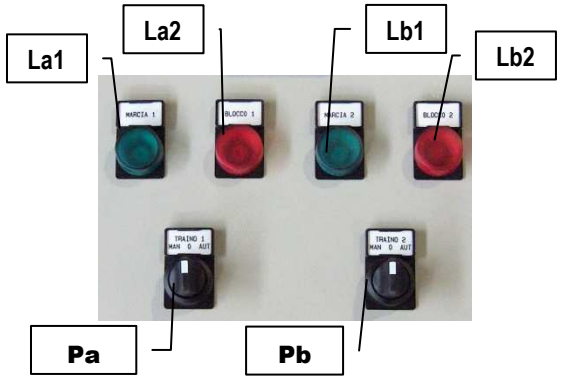
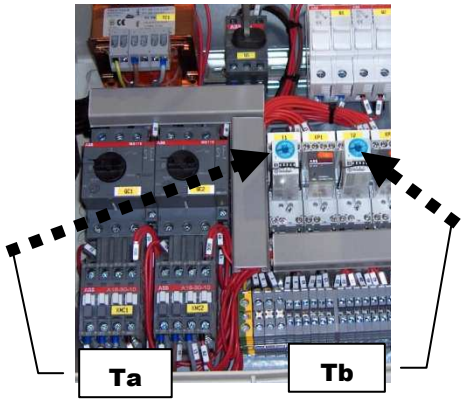
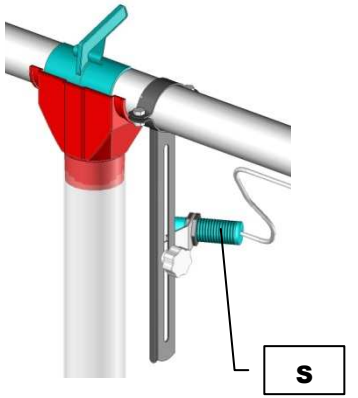
§ 19.- FUNCTIONING OF THE CONTROL DEVICE ON A TWO-LINE SYSTEM

In some cases, it is possible to manufacture two-line transport system. The lines are separated and autonomously managed. The lines may start from the same loading hopper (see the two-way loading hopper at § 9). In this case, the system referred to as "**CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN**" may be provided with a double control device that guarantees its correct operation and automatic stop in case of malfunctioning. The control device is composed of a single electrical panel and a proximity sensor that are installed next to the last unloading point of each line.

NOTE: FOR "LAST UNLOADING POINT" WE INTEND THE LAST POINT (OF EACH LINE) FROM THE TRACTION UNIT and/or THE STOCKING SYSTEM FOLLOWING THE DIRECTION OF THE CHAINFLEX CHAIN MOVEMENT.

electrical control panel	*buttons and selectors*	*position of the "Ta" and "Tb" time registers*	*position of the "S" sensors (last unloading point)*
			

PRELIMINARY OPERATIONS TO BE PERFORMED AFTER THE FIRST INSTALLATION (FOR EACH LINE): *manually activate the system ("Pa/Pb" selectors on "MAN"). Take note of the time between the transport system activation and the beginning of the unloading operations in the last unloading point (detected time = "TCa/TCb"). Check whether the "S" sensor detects the presence of falling product. Calibrate the system by adjusting the "Ta/Tb" time registers and set a time which is higher than the "TCa/TCb" time (at least 3÷5 minutes higher).*

MANUAL OPERATION: *The "Pa/Pb" selectors are on the "MAN" (MANUAL) position. The traction system is activated and STOPS when there is no product circulating in the line (the traction system may also stop if the motor safety guards intervene and/or following a lack of power supply).*

WARNING LAMPS: "La1/Lb1" lamp: green; ON = ("a" / "b" line) SYSTEM ACTIVATED – OFF = SYSTEM NOT ACTIVATED
"La2/Lb2" lamp: red; ON = ("a" / "b" line) SYSTEM ANOMALY – OFF = NO ANOMALY

AUTOMATIC OPERATION: *The "Pa/Pb" selectors are in the "AUT" (AUTOMATIC) position. The traction system is activated. The "Ta/Tb" time registers check possible anomalies of the system. If the "S" sensor does not detect the presence of product within the time previously set in the "Ta/Tb" time register (which is 3÷5 minutes higher than the "TCa/TCb time = time required to fill the whole system"), the traction system is disabled. In fact, "THERE ARE SYSTEM ANOMALIES AS THE SYSTEM DOES NOT FILL WITHIN THE STANDARD TIME EVEN AFTER ADDITIONAL MINUTES HAS GONE BY": On the other hand, if the sensor detects the presence of product in the last unloading point within the preset time in the "Ta/Tb" time registers, the system continues to work. Each system STOPS IF THE "Pa/Pb" SELECTORS are moved to the "0" (ZERO) position (the traction system may also stop if the motor safety guards intervene and/or following a lack of power supply).*

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§ 98.- FAQ – Frequently Asked Questions

The system referred to as **"CHAINFLEX, TRANSPORT SYSTEM WITH CHAIN"** is provided with a user and maintenance manual (MIL-CHF) and with this installation manual. In the manual, we tried to describe all technical aspects related to assembly, installation, maintenance and use. We also recommended specific techniques for assembling and installing. In this page, we have listed the frequently asked questions addressed to our Customer service on some topics which have not been fully described. This page and the following ones are constantly updated by our Customer service. When reviewing the manuals, the topics integrated into the manuals will be removed from this section.

topic (in short)		
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99.- REMARKS

Please use this page to write down important data such as statistics, contact information of Mial F.lli Massini Srl experts and all other remarks relevant to the system operation.

#	Remarks	Date

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BEWARE!: Please carefully keep this manual and other documents provided with it. Please, make sure that ONLY QUALIFIED STAFF THAT HAS CAREFULLY READ THIS MANUAL AND THE OTHER DOCUMENTS PROVIDED WITH IT can access and use the machinery.

MIAL F.lli Massini srl is a premier company in the planning and construction of industrial systems in the following divisions:

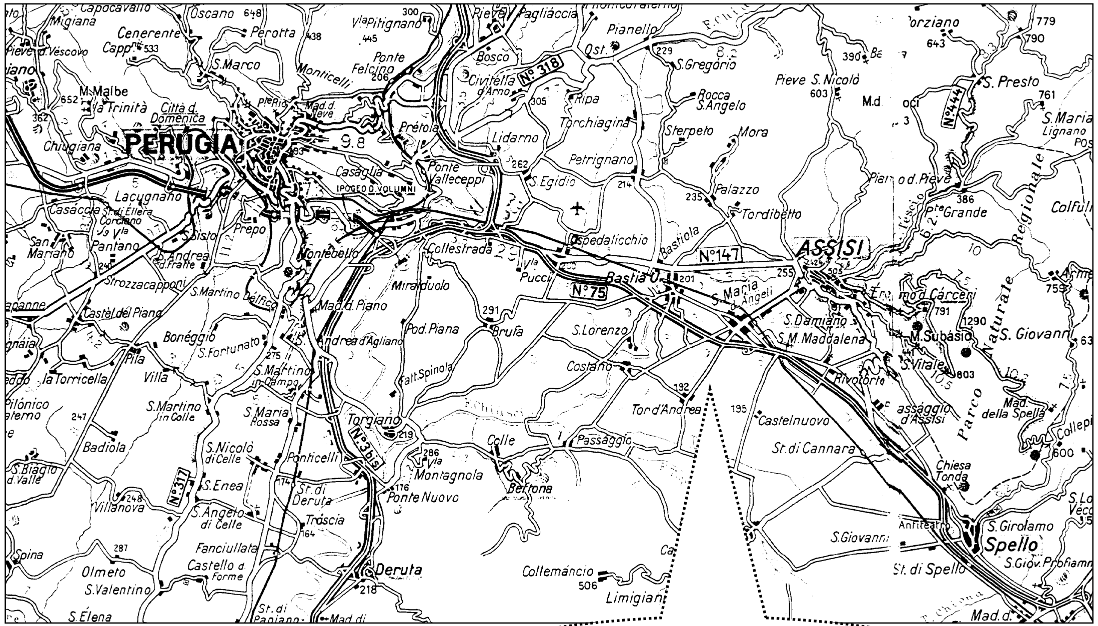
- Installation of zootechnical systems and tanks
- INDUSTRIAL PACKAGING – Sacker machineries, Palletizers, Conveyor belts, Rollers
- Systems for Agriculture, Forestry and Zootechnics
- Metal sectional structures, Industrial covers

In all these fields, the company **MIAL F.lli Massini srl** stands out for the commitment it lavishes on the preliminary stages, on the planning and on the search for the best technical solutions. And when it comes to comply with national and European technical standards, our company is precise and accurate.

We are able to comply with national law regulating safety at work and with all relevant EEC directives through continuous training of our managers and people charged with planning and production.

We make all efforts and allocate huge resources to manufacture innovative products and services. Furthermore, we supply our systems and equipments with:

- A detailed preliminary executive planning with real-time update;
- An accurate and complete codification of components;
- Technical documentations (EC manuals and diagrams)



MIAL F.LLI Massini srl

Our outstanding international experience combined with the professional skills of our staff and the state-of-the-art technological supports at our disposal, fosters our legitimate aspiration to become a world leader in the above industrial divisions.

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