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OPERATION AND MAINTENANCE MANUAL

IDENTIFICATION OF THE SUPPLIED PARTS	
DUGOM IDLE AND DRIVEN ROLLERS.	**FOR BELT AND ROLLER CONVEYORS**
CUSTOMER IDENTIFICATION	
CUSTOMER:	
OUR REF.:	
CUSTOMER REF.:	
DOCUMENT IDENTIFICATION	
DOCUMENT:	**ATEX OPERATION INSTRUCTIONS**
DATE:	
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Manual prepared in compliance with annex II paragraph 1.0.6 of ATEX Directive 2014/34/EU

CONTENTS:

1) Standards and general information

DANGER OF EXPLOSIVE ATMOSPHERES
This symbol places attention on the requirements or indications relative to Community Directive 2014/34/EU.
The operations referred to by these symbols must be carried out by highly qualified staff, knowledgeable on the theme of safety in zones characterised by the presence of potentially explosive atmosphere.

DANGER / ATTENTION
This symbol is used to identify operations that can cause damage to operators. Closely follow the information provided next to this symbol before going ahead with the aforementioned operations.

INDICATION
This symbol is used to identify operations that require special attention.
Therefore observe the information provided next to this symbol before going ahead with the aforementioned operations.

CAUTION / WARNING
This symbol is used to provide helpful indications on how to perform some operations or interesting information.
It is advisable to observe the provided indications before proceeding with the above operations.

1.1) Identification of the “INSTRUCTIONS MANUAL” document

The instructions manual is a document issued by DUGOMRULLI SpA and is an integral part of the roller supply. It is identified unequivocally to allow for traceability and any references thereafter.

1.2) Purpose of the document

The main purpose of the instructions manual is to provide the customer and staff appointed to the installation and maintenance of DugomRulli conveyor rollers for belt and roller conveyor that they are installed on, the information required for their correct installation and maintenance in optimal conditions.

Make sure that the safety precautions have been read, understood and implemented by the entire staff appointed to the installation of the DugomRulli conveyor rollers and the maintenance of the conveyors that they are installed on.

1.3) General warnings and manufacturer's liability limits

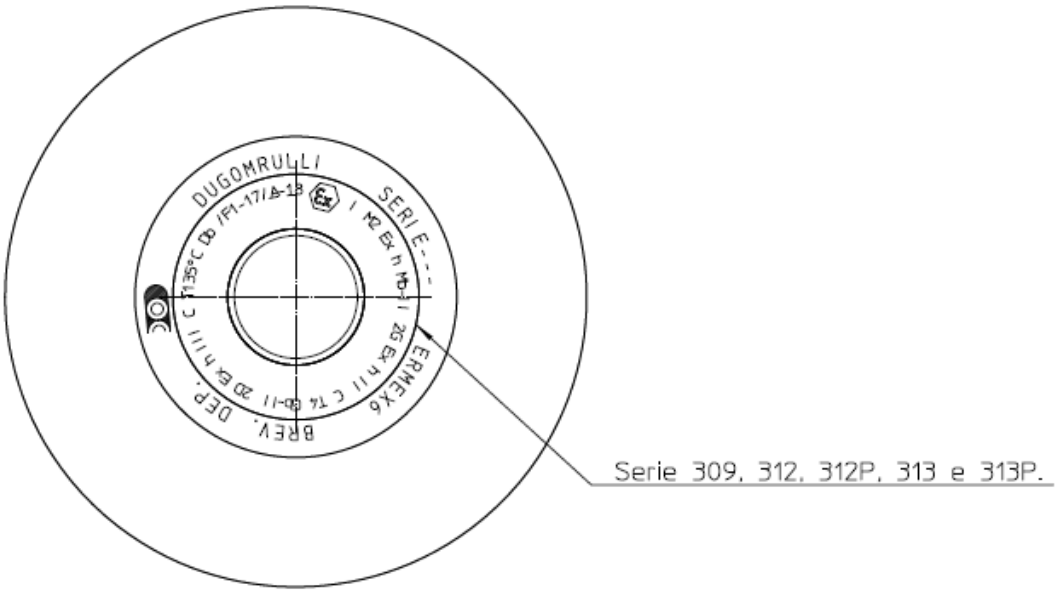
Every operator - DugomRulli conveyor roller interaction -, within the scope of intended use and the entire life span of the equipment has been carefully and closely analysed by the company during the design, construction and manual preparation stages. Nonetheless, it is understood that nothing can replace the experience, suitable training and "common sense" of the individuals appointed to the installation of the rollers and/or the maintenance of the conveyors that they are installed on.
Failure to observe the precautions or specific warnings contained in this manual, the improper use of all or part of the supply, the use of unauthorised spare parts violate every safety standard pertaining to the design, construction and intended use of the supply and relieve DUGOMRULLI SpA of every responsibility in case of damage to people or property.
DUGOMRULLI SpA will therefore not be held liable for the user's failure to observe the safety precautions set forth herein.

Safekeeping of the instructions manual
This document is an integral part of the supply and must therefore be kept and used for its entire operating life, including when transferred to third parties.
Any requests for additional copies of this document must be made through a purchase order to DUGOMRULLI SpA.

1.4) Manufacturer's identification data

DUGOMRULLI SpA is identified as the manufacturer of the roller conveyors that this document refers to in compliance with legislation through the deeds below:

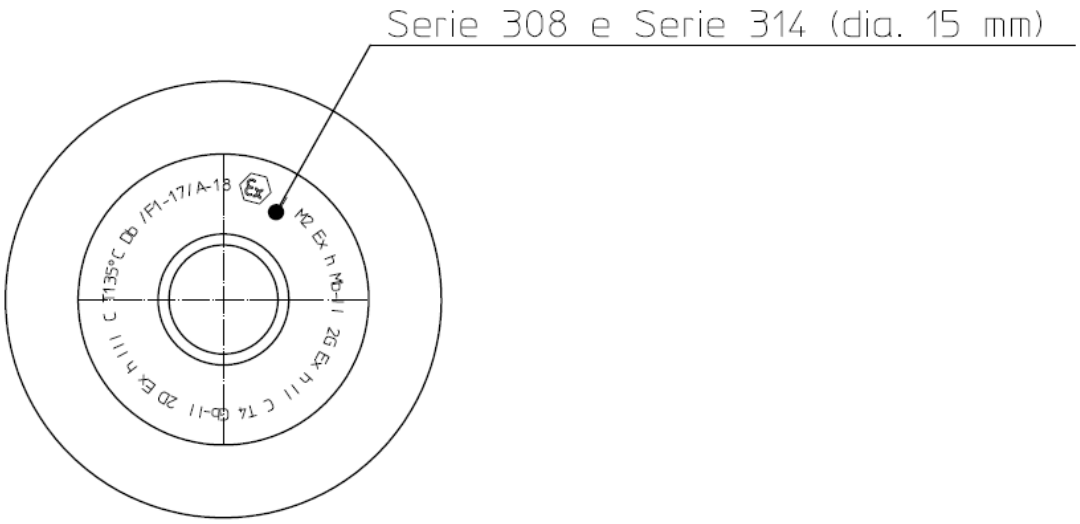
- EU Declaration of Conformity according to Community Directive 2014/34/EU.
- ATEX marking plate for the rollers (due to space restrictions, the ATEX marking can be separate from the manufacturer, production batch and roller series identification; also, this information can be provided on different parts for different roller series).
- Operation and maintenance manual.



Atex indication for rollers in Series 309, 312, 312P, 313 and 313P[i].

Atex indication for rollers in Series 314 (20 mm diam. and 25 mm diam.).

[i] Coated rollers and driven rollers require the same Atex indication and the reference base roller.



Atex indication for rollers in Series 308 and Series 314 (15 mm diam.).

Marking according to ISO 80079-36:2016

GROUP I

I M2 Ex h Mb

Mines susceptible to firedamp (Zone M2 and EPL Mb).

GROUP II

II 2G Ex h II C T4 Gb

Equipment for environments with explosive atmospheres due to the mixture of air and gas, vapours or combinations (category 2G, II C devices, maximum surface temperature T4 and EPL Gb).

GROUP III

II 2D Ex h III C T135°C Db

Equipment intended for use in places with an explosive dust atmosphere (category 2D, III C devices, maximum surface temperature T4 and EPL Db).

2) Obligations and duties

2.1) Employer's duties

The employer is responsible for sharing this document with the entire staff appointed to working with the rollers for belt and roller conveyors, of the following DugomRulli series in EX version:

- 308, 309, 312, 312P, 313 and 313P (idle rollers);
- 314 (cantilever idle rollers);
- 315 e 316 (impact and return rubber-coated rollers);
- 317 e 318 (chain-driven rollers).

2.2) Obligations in case of intervention

Operators who are appointed to interacting with the Dugom rollers that this manual refers to are obligated to duly learn about them using this manual before performing any work, adopting the relative specific safety requirements.

2.3) Obligation to observe standards

Operators must nevertheless implement and observe the general accident prevention regulations set forth by community directives and the legislation of the country of installation.

2.4) Obligations in case of malfunctions and potential dangers.

Operators are required to inform their supervisors of every fault or circumstance that can generate the risk of explosion.

2.5) User obligations

The user is required to promptly inform the supplier of the conveyor, or DUGOMRULLI SpA with direct supply, of every anomaly discovered during roller operation.
It is strictly forbidden for the user and/or third parties to make changes of any kind and extent to this technical document.
DUGOMRULLI SpA will not be held liable for malfunctions and/or dangers due to the failure to observe the above.

3) Introduction to the ATEX directive.

Explosive atmosphere

Pursuant to Directive 2014/34/EU, an explosive atmosphere is considered "*a mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture*".

The concept of potentially explosive atmosphere is also defined as "*when a mixture of air gases, vapours, mists, or dusts combine in a way that can ignite under certain operating conditions*".

The products that Community Directive 2014/34/EU refers to are only intended for this type of potentially explosive atmosphere.

In reference to the presence of explosive atmospheres, the European Union has issued two directives, one relative to product construction safety requirements ATEX 2014/34/EU, and the other relative to safety requirements in the work environment ATEX 99/92/EC.
Based on the probability of the presence of explosive atmospheres, work environments are classified into zones, where equipment that complies with the safety requisites of the zone may be installed and used.
The table below reports the suitable product categories for the installation zones.

EN 60079-0				Directive 2014/34/EU		EN 60079-10-1 EN 60079-10-2
EPL	***Level***	***Group***	***Explosive atmosphere***	***Equipment Group***	***Equipment Categories***	***Zone***
Ma	Very high	I	Mines susceptible to firedamp.	I	M1	NA
Mb	High				M2	
Ga	Very high	II	Devices for environments with explosive atmospheres due to the mixture of air and gas, vapours or combinations.	II	1G	0
Gb	High				2G	1
Gc	Normal				3G	2
Da	Very high	III	Devices for environments with explosive atmospheres due to the mixture of air and combustible dust.		1D	20
Db	High				2D	21
Dc	Normal				3D	22

4) General work accident prevention requirements

It is compulsory for the user and operators to observe the work accident standards in force, both with regards to the law and the company, and in particular it is necessary to observe the following points:

- no operating staff must be under the influence of sedatives, drugs or alcohol.
- DugomRulli conveyor rollers, included in the list of chapter 2.1, may be used in plants installed in zones classified as risk explosion Groups I, II and III, based on contract conditions, according to directive 99/92/EC.
- Operators in the classified areas must preferably wear antistatic, possibly natural fibre, clothing.
- Any work that needs to be carried out in the area classified as explosion risk must not entail the use of tools that can produce sparks.
- Do not use compressed air systems to clean gaps as this will only lift dust and create new deposits. Use an extraction system instead.
- The plant lines must be connected to an efficient earthing system so as to dissipate any electrostatic currents.
- It is strictly forbidden to use open flames.
- No smoking.
- It is forbidden to use cell phones unless ATEX-certified for the relative category that the plant belongs to, based on the zone classified according to directive 99/92/EC.

5) Product description

TERMINOLOGY

The rollers are the basic supporting and guiding parts:

- of the conveyor belts,
- or directly of the Unit Loads.

DESCRIPTION AND USE

Dugom rollers are designed specifically for the use on belt and roller also with heavy loads and high speeds.
A generous stock of water-repellent grease guarantees correct lubrication of the bearings for the entire duration of the roller's expected life span, therefore no re-lubrication is required. The bearings are protected with seals suitable for the most diverse environmental conditions. Rollers for belt conveyors, in particular, are equipped with Ermex C6 sealing elements that protect the bearings and relative grease against the infiltration of external elements, also in the most severe operating conditions.
The intended operating conditions are reported in the table below; use at temperatures differing from the stated values must be requested when placing the order and involves the use of lubricants, sealing elements and appropriate bearings.

SERIES	STANDARD APPLICATIONS	LOW TEMPERATURE APPLICATION
308	From -10°C to +90°C	From -30°C to +60°C
309		
312		
312P		
313		
313P		
314		
315	From -5°C to +80°C	From -15°C to +60°C
316		
317	From -10°C to +90°C	From -30°C to +60°C
318		

SIZING
Dugom roller size must be chosen so as to guarantee a design duration of 30,000 h (see Catalogue MR "Bulk Materials Handling" and Catalogue CI "Unit Loads Handling").

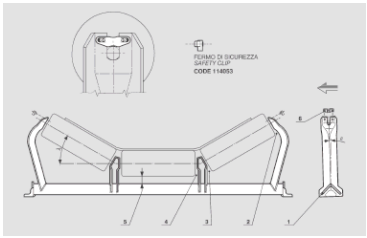
⚠ Dugom rollers are conductive and allow for any electrostatic charges generated by the friction between the rubber belt and the handled material to be discharged.
For rollers with rubber coating or rings, that might be installed in the impact zones or to support the return belt, DugomRulli may, on request, provide material with a conductivity level that is suitable for the intended type of ATEX environment.

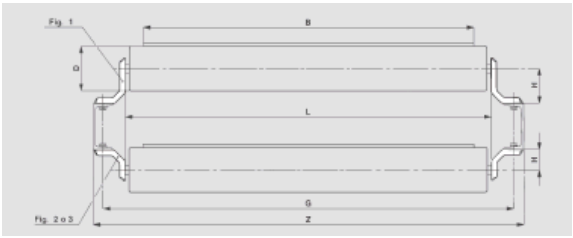
6) Storage and installation

STORAGE BEFORE INSTALLATION
Conveyors are often assembled on site. In these cases the rollers need to be contained in suitable packaging to prevent oxidation for the entire storage period.
If storage lasts longer than expected, it will be necessary to periodically check the conditions of the rollers by performing, as needed, additional protective treatments with Tectyl or equivalent.

ASSEMBLY:

6.1 Rollers for belts
The rollers will be inserted into their supports as shown in the standard diagrams below. No special tools are required (drop in).

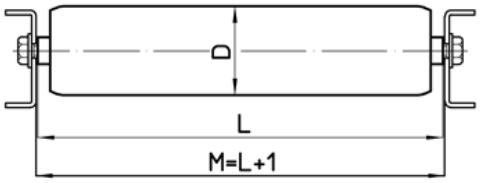




The axial backlash of the rollers inside the supports must not exceed 2 mm and, if it does, it needs to be reduced.
The use of a safety retainer is optional but recommended.
The milling on the roller axis coupling (Ch) must match up with the relative seat on the support, with a tolerance that does not exceed one millimetre.
Disassembly also does not require the use of special tools and must always be carried out with the belt at a standstill.
The garlands of two or more rollers, are assembled according to the specifications in the DugomRulli SpA technical documentation, to avoid accidental rubbing between the various components.

⚠ The roller supplier is not always the same as the supplier of the supports (crossbeams and supports).
Make sure that the gaps between the rollers and fixed parts of the support are no less than required by standard UNI 8726.
Supports and crossbeams must be shaped so as to prevent the accumulation of material as much as possible, that may otherwise prevent the rollers from spinning normally.

6.2 Rollers for idle or driven roller conveyors
The rollers are installed directly on the conveyor frame according to the standard diagrams below. Alternatively it is possible to use specific supports that are welded or bolted to the conveyor frame.



Roller conveyors driven by chains or belts operating at a speed over 1m/s must be equipped with tensioners that always keep them in contact with the drive parts (pinions, gearboxes, etc.); if this is not possible, it is necessary to equip the conveyor unit with suitable safety systems that eliminate or reduce the power if the chain breaks completely or partially.

ATTENTION

The system must be installed outside of a potentially explosive atmosphere by shutting off the flow in the installation channel.

Wear personal protective equipment.

Staff performing installation must wear dissipative clothing and footwear.
Dissipative *clothing: clothing made of material with surface resistivity below* $5x10^{10}\Omega$.
Dissipative footwear: footwear that guarantees a resistance towards ground greater than $10^{5}\Omega$*, but less than* $10^{8}\Omega$ *for an individual standing up on a conductive or dissipative floor.*

7) Scheduled maintenance

7.1 Rollers for belts
The rollers are permanently lubricated and cannot be re-lubricated.
Ignition in explosive atmospheres can occur due to the heat generated by friction between roller and belt, caused by:

- Material in between, especially between the rollers and their support, which stops or slows rotation;
- Seizing/breakage of bearings;
- Electrostatic discharges due to the use of non-conductive materials.

The maintenance service will be responsible for inspecting the system on a regular basis, especially:

- Making sure there is no accumulation of material stopping the rollers from spinning. If any build-up needs to be removed, also check the conditions of any belt scrapers, which are strongly recommended.
- Check the state of wear of the rollers, taking the following into account:
  a1) Rollers are chosen according to the conveyor manufacturer's expected design life.

At the end of this term, rollers that are installed in an ATEX environment must be replaced or at least checked frequently.

a2) The duration that the bearings are designed to last allows for 10% breakage at the end of the declared operating hours.

a3) When a roller's bearings start to deteriorate it operates less smoothly and presents clearly visible wear on the exterior (first sign).

a4) Deteriorated bearings get noisy and this noise can be heard by the maintenance technician (second signal).

Apparently worn rollers need to be taken down (with the plant shut down) and replaced.

7.2 Rollers for roller units

The rollers are permanently lubricated and cannot be re-lubricated.

Ignition in explosive atmospheres can occur due to

- seizing of bearings;
- chain damage or breakage;
- friction between rollers and objects that occasionally come into contact with them;
- friction between handled loads and the edges of the conveyor;
- electrostatic discharges due to the use of non-conductive materials.

The maintenance service will be responsible for inspecting the system on a regular basis, based on the following:

b1) Rollers are chosen based on the conveyor manufacturer's expected design life.
At the end of this term, rollers that are installed in an ATEX environment must be replaced or at least checked frequently.

b2) The duration that the bearings are designed to last allows for 10% breakage at the end of the declared operating hours.

b3) Deteriorated bearings get noisy and this noise can be heard by the maintenance technician (according to signal).

Plus:

- Apparently worn rollers need to be taken down (with the plant shut down) and replaced;
- any foreign objects preventing the rollers from rotating normally also need to be removed;
- if the handled objects rub against the edges of the conveyor, it will be necessary to adjust the metal work to ensure that the rollers are parallel to each other.

The special build does not allow for the product to be regenerated.
Therefore it is not possible to perform any repair work that would not guarantee restoring the original characteristics of the roller.

8) Precautions against the risk of explosion

The rollers need to operate at temperatures that do not exceed those set forth in the catalogue, as this is established by contract. During normal operation, the rollers do not produce a significant rise in temperature in relation to the ambient temperature. The materials that the rollers are built with do not make it possible for explosive mixtures to develop, up to a temperature of 220°C.

ATTENTION

Maintenance and cleaning must be performed outside of a potentially explosive atmosphere by shutting off the flow in the installation channel.

Wear personal protective equipment

Staff performing installation must use anti-spark utensils.

ATTENTION

Staff performing installation must wear dissipative clothing and footwear.
Dissipative clothing: clothing made of material with surface resistivity below 5x1010 Ω.
Dissipative footwear: footwear that guarantees a resistance towards ground greater than $10^5\Omega$, but less than $10^8\Omega$ for an individual standing up on a conductive or dissipative floor.