Sicurpal

INSTRUCTION MANUAL

FOR ASSEMBLY, USE AND MAINTENANCE

ALURAIL L

sicurpal.it

EDITION 1_JUNE 2021 - REV. 0

Instructions translated from the original language.

1. INTRODUCTION

This manual has been designed to provide the Customer with an indispensable tool for the correct use of the **ALURAIL L** anchor devices.

It is therefore advisable for the operators responsible for the use of the devices to read this manual carefully, in order to operate in absolute safety.

The operator and the qualified technician are required to read and understand the contents of this manual, which must be kept intact and be an integral part of the **ALURAIL L** devices.

Before operating the devices, carefully read the technical instructions contained in this publication and carefully follow the instructions given. Keep this manual and all attached publications in a place that is accessible and known to all users (operator and maintenance personnel).

1.1. NORMATIVE REFERENCE

This technical manual aims to provide both the installer and users with the technical information necessary to ensure the quality of the **SICURPAL S.r.l** "**ALURAIL L**" product, as well as the related installation and use information. The inspection activities are mentioned in this manual but are detailed and specified during the course "*Assembly and Inspection of the Alurail L system*". In this training event, documents and specifications are issued in order to perform the inspection activity correctly. “Competent” people who have carried out similar courses regarding competing products should be prevented from carrying out maintenance activities on the Alurail L unless they undertook the above-mentioned course.

This document has been prepared in accordance with the following legal and regulatory requirements:

- **Legislative Decree No. 81 of 9 April 2008** and subsequent amendments and additions.
- **UNI EN 795: 2012** "*Personal fall protection devices - Anchor devices*" valid for max. 1 (one) operator.
- **CEN/TS 16415: 2013** " *Personal fall protection equipment. Anchor devices. Recommendations for anchor devices for use by more than one person simultaneously*" valid for max. 4 (four) operators.
- **UNI 11578: 2015 Type D** "*Anchor devices intended for permanent installation - Requirements and test methods*".
- **UNI EN 363: 2008** "*Individual fall protection devices - Individual fall protection systems*".
- **UNI EN 365: 1993** "*Personal protective equipment against falls from a height - General requirements for instructions for use and marking*".
- **UNI 11158: 2015** "*Personal protective equipment against falls from above - Personal fall protection systems - Guide for selection and use*".
- **UNI 11560: 2014** "*Permanent anchor systems on roofs - Guide for identification, configuration, installation, use and maintenance*".
- **EU Regulation 425/2016 of March 9**, relating to personal protective equipment and repealing the directive **89/686/EEC**.

2. WARRANTY

The "ALURAIL L" product is intended as the set of individual components and their assembly. The warranty is **10 years** from the date of installation and covers:

- Production defects
- The defects of the materials
- Welding defects

The warranty on assembly will be decided by the installer.

2.1. GENERAL WARRANTY CONDITIONS

The warranty is considered valid in the event that:

- Damages due to overuse of moving parts such as bearings and / or sliding wheels are excluded [1].
- Damages due to deterioration attributable to incorrect or negligent handling are excluded.
- The conditions of use and maintenance contained in this manual are observed. Incorrect use or inadequate maintenance results in the forfeiture of the warranty.
- Cases of unauthorized replacement of the anchor device's components with unsuitable components are excluded.

Improper use of the system results in the forfeiture of the warranty.

The repair and / or replacement of parts involves the assumption of responsibility for the warranty of these products for the following 6 (six) months.

2.2. RETURN METHOD

The warranty is limited to the replacement of elements or equipment recognized as formally defective following an evaluation by the SICURPAL technical service.

All defective components must be returned to SICURPAL which will evaluate their characteristics and, in the event of a positive finding of such defects, will replace them with compliant material.

The warranty applies only to returned items and therefore does not cover the costs of removal, shipping and reinstallation of the equipment in the system in which it is integrated.

2.3. NOTES ON DELIVERY

Upon receipt of the supply of the material, check that:

- Packages received are intact and properly packed;
- The supply corresponds to the order specifications;
- The delivery note is present;
- The Declaration of Conformity of the product is present;
- The product manual is present.

In case of damage, sign the transport document for unchecked goods and report the incident to both the courier and the SICURPAL logistics office within 48 hours of delivery.

Detailed photographs are required to support the report sent; otherwise SICURPAL will not be liable for damages.

In case of faulty SICURPAL devices, contact SICURPAL (Tel: 059-81.81.79, e-mail: quality@sicurpal.it).

2.4. MANUFACTURER'S IDENTIFICATION DATA

Manufacturer:	SICURPAL S.r.l
Operational HQ:	Via dei Mestieri 12, 41030 Bastiglia (MO), Italy
Telephone:	+39 059 81 81 79
Fax:	+39 059 90 92 94
E-mail:	info@sicurpal.it
Certified e-mail:	info@cert.sicurpal.it
Logistics:	logistica@sicurpal.it
Quality Office:	qualità@sicurpal.it
VAT Number:	02399900360

[1] For these products the warranty is 2 years. The use of bearings in highly corrosive environments is not recommended as they have parts with high carbon level inside.

3. GENERAL AND SECURITY WARNINGS

	**According to the regulations in force, the managers of the areas responsible for the installation of the devices are obliged to carefully read the content of this Manual and to have it read by the operators and maintenance technicians and to verify their understanding. The time taken for this purpose will be largely rewarded leading to the product's use in conditions of absolute safety.**

The instructions, drawings and documentation contained in this manual are of a confidential technical nature, strictly owned by the Manufacturer and may not be reproduced in any way, either in whole or in part.

The Manufacturer reserves the right to update its production and, consequently, the applicable use and maintenance manual, without the obligation to notify the Customer of the changes that have occurred.

Therefore, the customer is also responsible for ensuring that, should this document be modified by the Manufacturer, only the updated versions of the Manual are actually present at the points of use.

The Customer can ask the Manufacturer for an update or a new copy of the Manual, indicating the following information:

- The model / type of the device;
- The identification code;
- The revision date of the Manual in possession;
- The lot of the product (s) contained in the fall arrest system.

The manufacturer is responsible for the descriptions given in Italian; any translations cannot be fully verified, therefore, if an inconsistency is detected, it is necessary to pay attention to the Italian version and, if necessary, contact our marketing department who will make the appropriate change.

.

	**Should the Manual become illegible or in any case difficult to consult, the Customer is obliged to request a new copy from the Manufacturer before carrying out any intervention. It is absolutely forbidden to remove or rewrite parts of the Manual**
	**The Customer is required to correctly comply with the instructions contained in this Manual and with what is reported in the technical documentation referred to in the contract. The manufacturer declines all responsibility for any issue that arises as a result of incorrect use of these recommendations.**
	**It must be ensured that each operation is performed exclusively by qualified personnel who is familiar with the instructions and technical data relating to the product and has been authorized by the intervention safety manager.**
	**This manual must be delivered to the installer, user, inspector and maintenance technician of the anchor system who, before installing, using, inspecting or maintaining the system, must carefully read all the instructions concerning their role and obtain materials and Personal Protection Equipment (PPE) necessary to operate safely (consult the Technical Covering Report). This document must be part of the Technical File of the Construction Project together with the design of the fall arrest system (Annex XVI of Legislative Decree 81/08).**
	**Use the device in original and perfect condition.** **Use the device only within the mechanical limits indicated (see section "Technical Data").** **Observe the indicated application parameters. Do not tamper with the device.**

4. PRESENTATION OF THE CONTENT

This paragraph lists uncommon terms and definitions with meaning different from the common one. The abbreviations used, and the meaning of the graphical symbols to indicate the operator qualification and device status are explained below. Their use allows to provide quick and unambiguous information necessary for the correct use of the anchor devices in safe conditions. In addition, the conceptual map reporting the topics and information on this anchor device is shown.

4.1. GLOSSARY

Anchor device: group of elements that incorporates one or more anchor points or movable anchor points.
Type D anchor device: anchor device that uses a rigid anchor line that deviates from the horizontal line by no more than 5°.
Structural anchor: element or elements designed to be permanently incorporated into a structure.
Fastening element: element or elements used to connect / fix the anchor device to the structure.
Element: part of an anchor system or anchor device.
Anchor point: point on an anchor system to which the individual fall protection device is to be fixed.
End anchors: element that connects the end of an anchor line.
Mobile anchor point: element with an anchor point that is intended to move along an anchor line.
Deflection: maximum displacement of the anchor point, measured at the center of the span (most unfavorable point), when it is subjected to a force developed during a fall in the direction of the force itself.
Structural designer: qualified technician designated by the customer to verify the structural suitability to the load forces transmitted by the anchor system to the support structure, as per the design values reported in the manufacturer's manual, and to check the anchors to the support structure itself.
Anchor: element that allows the connection between the element to be fixed and the support structure.
Span: distance between the two fastening elements.
Line length: total distance of the anchor system.

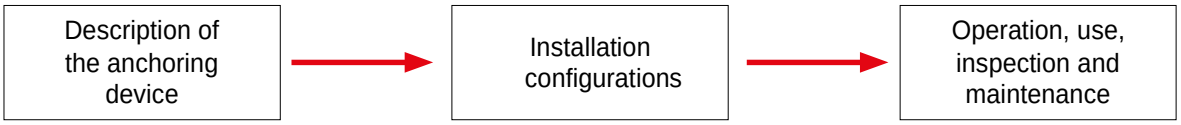
4.2. GRAPHICAL SYMBOLS

The graphical symbols shown below are taken from the *UNI EN ISO 7010: 2014* standard

	Generic caution
	Fall danger risk
	Falling danger
	Do not remove safety device
	No access for unauthorized persons

	Wear protective gloves
	Wear safety harness
	Wear safety helmet
	Safety footwear must be worn
	Read user manual before operating

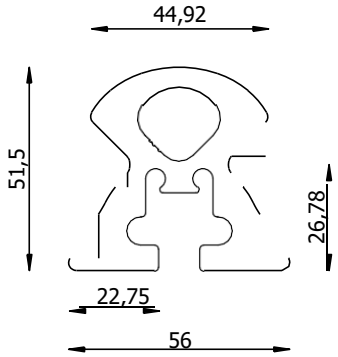
4.3. CONCEPTUAL MAP



5. TECHNICAL DATA

5.1. PRODUCT'S FEATURES

The **ALURAIL L** anchor device, designed for simultaneous use by a maximum of 4 (four) operators, allows the creation of rigid lifelines of variable length between 2m and 150m, with minimum spans of 0.5m and maximum of 4m - 6 m [(2)].
It is mainly composed of:

FALLSTOP RAIL ALURAIL L (REF. 003910/003911)		
 **Fig. 5.1.1**	- Manufactured in anodized aluminum - Size 56x51.50 with the possibility of fixing on the entire length of the profile - Ideal for ceiling lifelines where high smoothness is required - Available in 6m rods (REF. 003910) and/or 3m (REF. 003911)	
Used Material	6060 T6 aluminum with soft anodizing	
Weight	3,41 kg/m	
Number of holes for structural anchoring	2	Variable
Number of users per lifeline such as UNI EN 795 Type D	1	Minimum
Number of users per lifeline such as CENS / TS 16415: 2013 and UNI 11578: 2015 Type D	4	Maximum
Maximum weight of each user	125 kg	
Minimum distance between structural anchor devices	0,5m	
Maximum distance between structural anchor devices	4 m	
Lifeline length	Minimum	Maximum
	1,5 m	150 m

[2] For spans longer than 4m it is intended to be used in combination with tubular (Ch.5.7)

TUBOLAR ALURAIL L ON COMMISSION (REF. 005250)

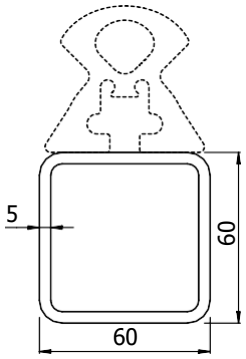


Fig. 5.1.2

- BinaryTubular System tested as a single system according to EN 795, CEN / TS 116415 and UNI 11158 standards
- Size 60x60x5 mm
- System of fixing [3] between binary and tubular with maximum span of 2
- Customizable tubular sizing on request
- Drilling of the rail, on commission

Used Material	304 stainless steel tubular 6060 T6 aluminum rail with soft anodizing	
Weight	9,8 kg/m	
Number of holes for structural anchoring	2	Variable
Number of users per lifeline such as UNI EN 795 Type D	1	Minimum
Number of users per lifeline such as CENS / TS 16415: 2013 and UNI 11578: 2015 Type D	4	Maximum
Maximum weight of each user	125 kg	
Minimum distance between structural anchor devices	0,5m	
Maximum distance between structural anchor devices	5m	
Lifeline lenght	Minimum	Maximum
	1,5 m	150 m

[3] Fixing system not included in the article as per ch. 5.2

ALURAIL L TRAVELLER (REF.003848)

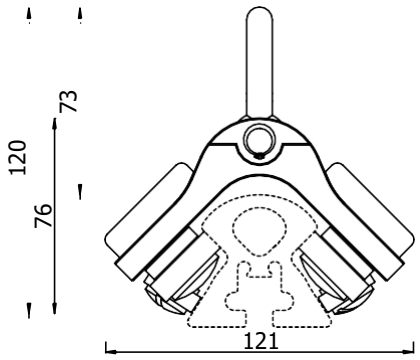


Fig. 5.1.3

- Manufactured in anodized aluminum
- 6 sliding wheels covered in 316 stainless steel
- 4 recirculating ball bearings with double protection against dirt
- Protection and sealing system of the sliding wheels made of stainless steel and reinforced with brass parts
- Protection against tampering and unlocking of rotating systems with 4 security levels
- Anchor hook adjustable by 180 ° on the axis perpendicular to the rail

Used Material	Body in 6060 T6 aluminum with hard anodizing Components in AISI 304/314 stainless steel and brass Anti-collision protection in Nylon POM type plastic wheel pin protections
Weight	1020 g
Dimension	120x121x100 mm
Number of users	One operator for each traveller (maximum 4 on the line)
Maximum weight of each user	125 kg
Anchoring ring for 1 person	1

[4] The hardening process of bearings could generate internal corrosive traces. It is advisable to protect the product during its non-use..

5.2 COMPOSITION OF THE FALL STOP SYSTEM

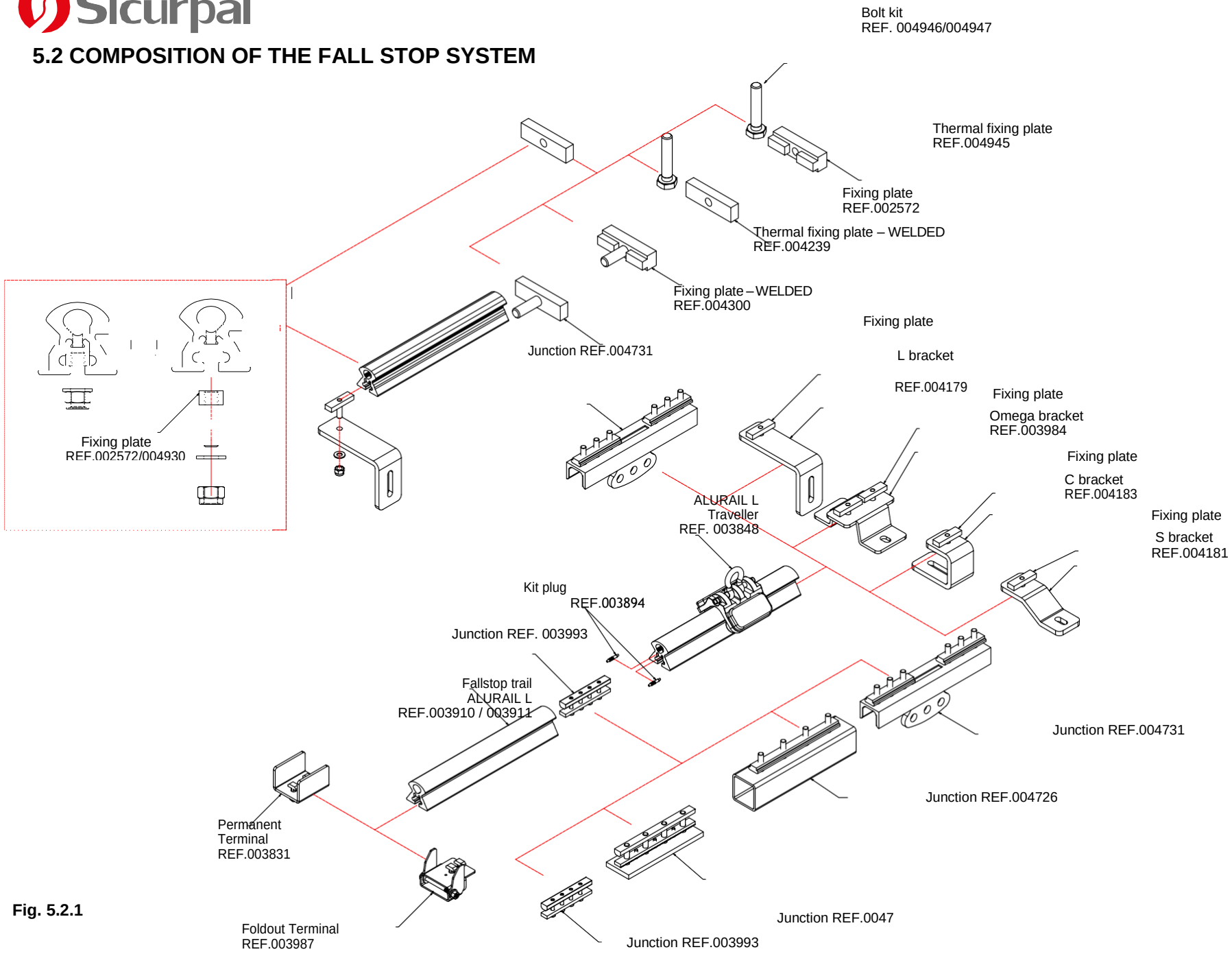


Fig. 5.2.1

5.3. ACCESSORIES

The accessories are to be installed on the rail to complete the ALURAIL L anchor device and / or the fall arrest system.

- **Terminal**

The terminal of the ALURAIL L line is an element composed of a 5 mm thick plate in stainless steel 304 with the purpose of closing the rail line. Sicurpal supplies 2 (two) types of terminals. Both products can be inserted from the end of the profile or along the rail itself using the special groove.

Permanent Terminal – REF. 003831

Fig. 5.3.1

Permanent terminal in stainless steel for Alurail L with hammer bolts for locking on the rail

Foldout Terminal – REF. 003987

Fig. 5.3.2

Foldout terminal in stainless steel for Alurail L with hammer bolts for locking on the rail

- **Connectors**

The connectors allow the connection between two rails while ensuring the mechanical and thermal alignment (expansion) between the two.

Kit plug – REF. 003894

Fig. 5.3.3

Kit consisting of 2 alignment pins. Made of 304 stainless steel, they have the function of preserving the alignment of the two rail in the presence of thermal expansion.

Junction with triple plate – REF. 004737

Fig. 5.3.4

Made of 304 stainless steel, it has the function of maintaining the mechanical seal. It is used on spans of up to 4 m.

Junction – REF. 003993

Fig. 5.3.5

Made of steel, it has the function of maintaining the mechanical seal. It is used on spans of up to 1 m.

PZ Junction – REF. 004731

Fig. 5.3.6

Made of S275 steel and 304 stainless steel, it has the function of maintaining the mechanical seal between two rails and at the same time acquiring the function of suspended bracket in systems with a maximum span of 4m.

Junction on tubular - REF. 004726

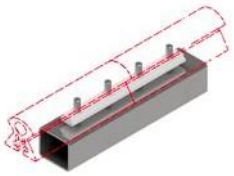


Fig. 5.3.7

Made of 304 stainless steel, it has the function of maintaining the mechanical seal of the rail, optimizing its components and integrating with the 60x60x5 mm tubular.

- **Fixing plate**

The fixing stop is used to anchor the rail to the fixing brackets, which are then anchored to the fixed support. Two types of fixing plates are available: one with a female thread to be used in combination with a bar of tailored length based on the structure chosen for anchoring and, a second with a male thread suitable to be fixed on structures varying from a minimum thickness of 3 mm to a maximum of 10 mm.

Fixing plate – REF. 002572/004930

Fig. 5.3.8

Fixing plate suitable for anchoring the rail to the support structure. Available in stainless steel 304 (REF. 002572) and in 316 stainless steel (REF. 004930) for spans greater than or equal to 1500 mm.

Welded fixing plate REF. 004923/ REF. 005199

Fig. 5.3.9

Fixing plate in stainless steel 304 suitable for anchoring the rail to the support structure (REF. 004923), or for anchoring the rail to the tubular (REF. 005199 length to be defined to measure). Bolts included.

Thermal fixing plate – REF. 004945

Fig. 5.3.10

Fixing plate in stainless steel 304, suitable for managing the thermal expansion of the ALURAIL L rail for spans greater than or equal to 1500 mm.

Welded thermal fixing plate - REF. 004239

Fig. 5.3.11

304 stainless steel fixing plate suitable for managing the thermal expansion of the ALURAIL L rail for spans of up to 1500 mm. Hardware included.

Bolt Kit 22 - REF. 004946

Fig. 5.3.12

Kit consisting of an M10 grower washer and a TE 10x25 screw in 304 stainless steel for fixing 002572/004930 and 004945 with OMEGA bracket.
For fixing with the other brackets provide for the 30 mm bolt with its kit in 304 and 316

Bolt Kit 23 - REF. 004947

Fig. 5.3.13

Kit consisting of an M10 grower washer and a 10x25 TE screw in AISI 316 stainless steel for fixing 004930.

- **TEMPLATE**

The junction's TEMPLATE is used to accurately carry out the drilling operation of the rail.

Junction template – REF. 003994

Fig. 5.3.14

Made of 304 stainless steel, it allows you to drill with precision the ALURAIL L rail for junction REF. 003993

Universal junction template – REF. 004751

Fig. 5.3.15

Allows you to accurately drill the ALURAIL L rail for junctions REF 004726 - 004731 - 004737

Bolt with pointed tip - REF. 005204

Fig. 5.3.16

Stainless steel bolt for rail marking or stamping

Rail drilling support - REF. 005200

Fig. 5.3.17

Made of plastic material, the drilling support allows you to correctly position
the rail during the on-site drilling phase to be made if the junction device is provided.

- **Bends ***

Bend – REF. 004916 *

Fig. 5.3.18

Standard bends in Anodized Aluminum with 90 ° bend radius

External vertical bend- REF. 005235*

Fig. 5.3.19

External vertical bend for Alurail L rail in anodized aluminum with a bend radius of 90°

Internal vertical bend - REF. 005236*

Fig. 5.3.20

Internal vertical bend for Alurail L rail in anodized aluminum with 90 ° bend radius

* Important: for the supply of bends see Appendix A in chapter 10.

- **Brackets**

The brackets have the purpose of connecting the ALURAIL L rail with the support structure.

Omega Bracket – REF. 003984

Fig. 5.3.21

Possibility of ceiling, wall and floor installation. 304 stainless steel plate
Thickness: 6 mm

C Bracket – REF. 004183

Fig. 5.3.22

Possibility of both floor and wall installation.
304 stainless steel plate
Thickness: 10 mm

L Bracket – REF. 004179

Fig. 5.3.23

Possibility of wall and floor installation.
304 stainless steel plate
Thickness: 10 mm

S Bracket – REF. 004181

Fig. 5.3.24

Possibility of both floor and wall installation.
304 stainless steel plate
Thickness: 10 mm

PZ Bracket - REF. 004731

Fig. 5.3.25

Ceiling installation only. UPN profile in S275 steel and 304 stainless steel.

- **Fallstop Rail accessories**

Fallstop rail cap - REF. 005128

Fig. 5.3.26

Cap in AISI 304 steel 56x51.5x2 mm against the intrusion of insects. To be installed near the ends of the entire system using two rivets.

Tubolar cap - REF. 005072

Fig. 5.3.27

Plastic cap 60x60x30 mm. Protects and closes the junctions of the tubular REF. 005250, in order to protect them from insect nests and bird entry.
Suitable for rails REF. 003910/003911. To be applied to the ends of the tubular by means of a snap fit.

- **Generic**

The "Generic" accessories contribute to the completeness of the system and its documentation

Lifeline ID – REF. 000291

Fig. 5.3.28

Life line identification code

Docubox – REF. 003334

Fig. 5.3.29

Document holder with fixing kit

Sign Rail – REF. 000705

Fig. 5.3.30

Aluminum access sign to be placed near each access to the secured area

System Register – REF. 002562

Fig. 5.3.31

Booklet for the registration of activities on the lifelines

5.4. TRAVELLER'S ACCESSORIES

Brush Kit – REF. 004215

Fig. 5.4.1

Kit consisting of two brushes and relative supports, to be installed directly on the traveller, for cleaning the rail against dust and dirt.

Replacement brushes - REF.005052

Fig. 5.4.2

Replacement brushes (right and left) for Alurail L, satin-finished in plastic with nuts and bolts mounting, to be installed directly on the traveller.

Traveller's connector - REF. 003909

Fig. 5.4.3

Connection to manage the movement of several travellers simultaneously.

Below are some methodologies as possible applications, subject to verification by a technician

DEVICES	MATERIAL	FIXING METHOD				
		Bars / Bolts * ≤M12	Two-component resin	Wood screws	Welding	Mechanic solutions **
OMEGA BRACKET REF. 003984	WOOD ***			✓		
	STEEL	✓			✓	
	REINFORCED CONCRETE	✓	✓			✓
	SPECIAL STRUCTURES ***					
L BRACKET REF. 004179	WOOD					
	STEEL	✓			✓	
	REINFORCED CONCRETE	✓	✓			✓
	SPECIAL STRUTURES***					
S BRACKET REF. 004181	WOOD					
	STEEL	✓			✓	
	REINFORCED CONCRETE	✓	✓			✓
	SPECIAL STRUCTURE***					
C BRACKET REF. 004183	WOOD					
	STEEL	✓			✓	
	REINFORCED CONCRETE	✓	✓			✓
	SPECIAL STRUCTURES***					

* The manufacturer advises the designer to consider the use of anti-vibration and self-locking systems (eg oversized washers, self-locking nuts, grower washers, etc.) for fixing.

** The solutions are not possible as the product is made of aluminum and is not suitable for merging with other materials. The welding of the rail with other aluminum products has never been considered by Sicurpal. In case of specific evaluations by the designer it is advisable to carry out destructive tests to check the behaviors. Pay close attention to dilations.

** In the case of mechanical solutions, it is advisable to prefer certified systems for dynamic loads, whose duration is greater than or equal to the potential life of the product (30 years), to avoid incurring further costs in the future.

*** Feasibility after evaluation by the designer. At the request of the customer, the manufacturer can provide assistance from a technician for the installation procedures of SICURPAL devices.

This manual is intended as an essential indication for the correct installation of the anchor system. SICURPAL offers courses for designers, installers and testers in order to improve the understanding of these indications and transmit its know-how for correct assembly and minimize any errors on site.

5.5. MARKING

Point **6** of **UNI EN 795: 2012** provides:

"The marking must comply with UNI EN 365 and any text must be in the language (s) of the country of destination. In addition to compliance with UNI EN 365, the marking must include the maximum number of workers that can be connected (ie 1 for the aforementioned legislation) ".

Point **6** of **UNI 11578: 2015** provides:

"*The marking of the anchor devices must comply with UNI EN 365 and, in addition, must show the maximum number of users allowed connected at the same time.*

In addition to the above requirements, access to coverage must be equipped with a plaque showing at least the following contents:

a) A warning to consult the contents of the anchor system file;
b) The date of the next inspection or the date of the last inspection together with the expected periodicity for the inspections;
c) A warning not to use the anchor system if the inspection has not been carried out."

Each component of the ALURAIL L anchor device is identified by laser marking (see example fig. 5.3.1):

Sicurpal	Name and identification mark of the manufacturer.
EN 795:2012 **CEN/TS 16415:2013** **UNI 11578:2015**	Certification standard
	Number of users
ALURAIL L	Name of the anchor device
XXXXXX	Production batch number
003848	Product identification code

Fig. 5.5.1: Example of marking ALURAIL L Traveller

In the absence of marking, the device is non-compliant and must be replaced.

5.6. DATA FOR CHECKING THE SUPPORT STRUCTURE AND THE FASTENING

A preliminary study should be carried out by a competent and qualified technician. This technician, depending on the type of structure and on the basis of structural calculations, with reference to the transmitted loads indicated in this manual, will design the most suitable anchor system to operate in safety; the project will also indicate:

- The type of anchor
- The most suitable fixing method
- Verification of the support structure

5.6.1. Load at the mobile anchor point

The UNI EN 795: 2012 and UNI 11578: 2015 standards relating to the test methods for a user, consider *dynamic strength and integrity* a fall arrest load of 9 kN.
For the purposes of the calculation, the designer must consider the dynamic load applied in the direction of application of the force.
The load of 9 kN must be considered if the system is used by a single operator, otherwise add 1 kN to 9 kN for each additional operator. We remind you that the maximum number of operators is 4 (four) people for a maximum of 12 kN. It remains the responsibility of the designer to check the anchors and the load-bearing structure by considering the necessary safety factors.

Fig. 5.6.1

The static and dynamic loads described above must be applied in every configuration and main direction that may occur in operation to ensure that the anchoring device is safe.

5.7. INSTALLATION CONFIGURATIONS

The **ALURAIL L** fallstop rail system offers multiple solutions based on assessments that take into account the basic structure, the entire system, the number of operators and the work design choice (fall arrest, fall restraint, suspension).

By way of non-exhaustive example, we will describe below some solutions whose correspondence to the specific case will remain under the discretion of the designer who will assume responsibility, depending on the context assessments.

The most frequent cases will be taken into consideration from which it is possible to take inspiration for a design of an anchor system beyond the assessments regarding the basic structure (although necessary and indispensable for the specific case).

Each installation test listed below meets the compliance requirements required by UNI EN 795: 2012 and CEN / TS 16415: 2013 having been tested according to the specifications indicated.

		Installation		
		Ceiling	Wall	Floor
OMEGA Bracket REF.003984	Fall arrest	✓	✓	✓
	Fall restrain	✓	✓	✓
	Suspension	✓	✓	✓
L Bracket REF.004179	Fall arrest		✓	✓
	Fall restrain		✓	✓
	Suspension			
S Bracket REF.004181	Fall arrest		✓	✓
	Fall restrain		✓	✓
	Suspension			
C Bracket REF. 004183	Fall arrest		✓	✓
	Fall restrain		✓	✓
	Suspension			
PZ Bracket COD. 004731	Fall arrest	✓		
	Fall restrain	✓		
	Suspension			

- **Omega Bracket - REF. 003984**

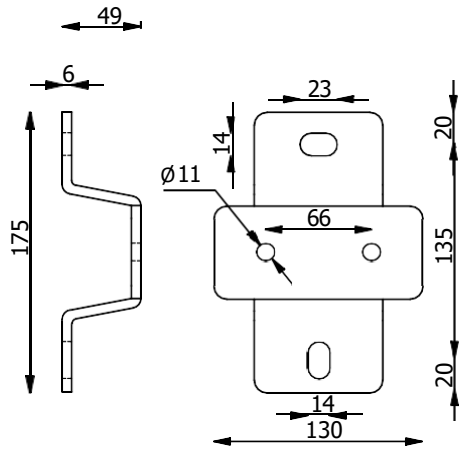
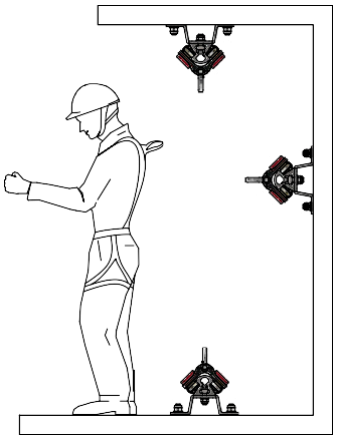
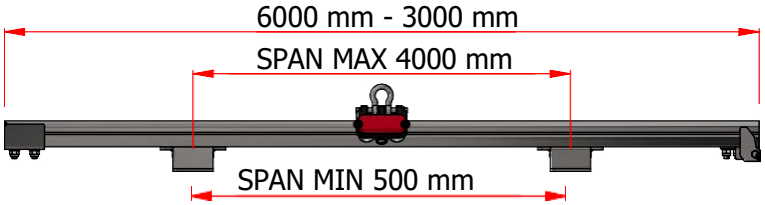


Fig. 5.7.1

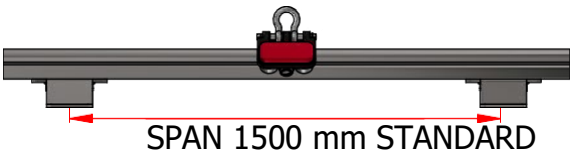
Orientation



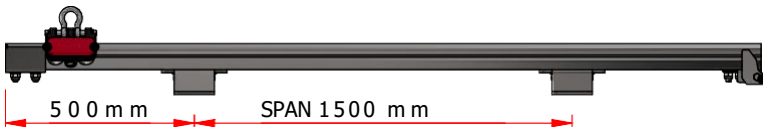
A) Single span with center load



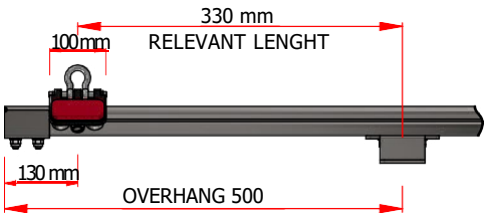
Recommended for suspended work



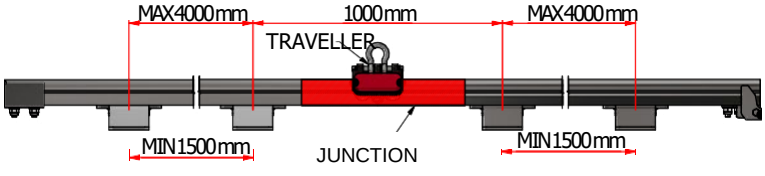
B) Overhang with load at the end



Relevant overhang

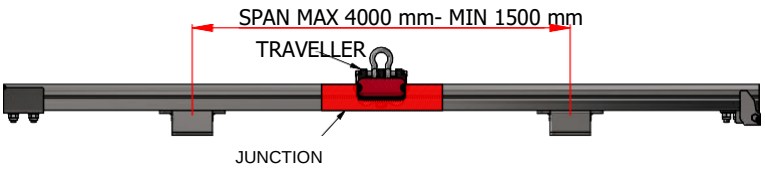


C) Span with central junction



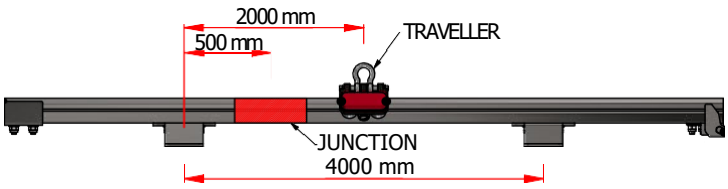
Type of junction -REF. 003993

D) Span with central junction subject to central load



Type of junction-REF. 004737

E) Span with junction at 500 mm from the fixing and central load



Type of junction-REF. 004737

To fasten the rail to the OMEGA bracket, refer to the relevant assembly in chap. 6.4.3

	SPANS			
Table: Deflection at 900 kg OMEGA Bracket	**1500 mm**		**4000 mm**	
				
	45 mm	53 mm	223 mm	262 mm

- **L Bracket - REF. 004179**

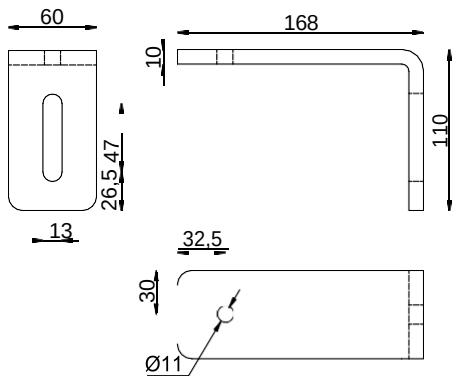
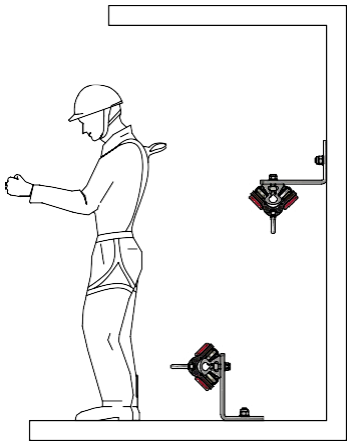
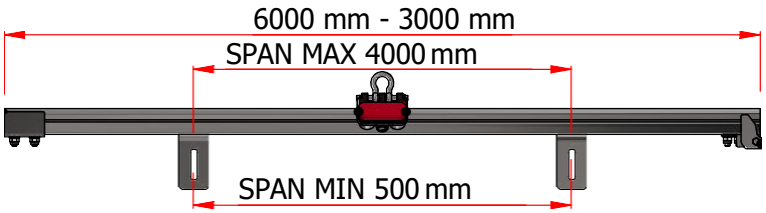


Fig. 5.7.2

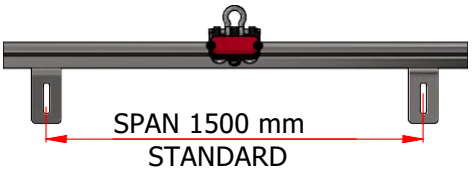
Orientation



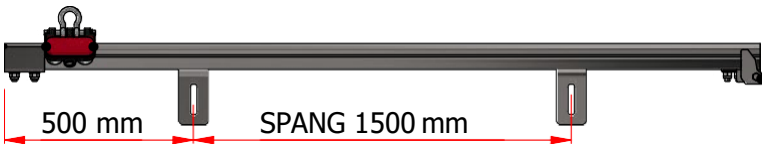
A) Single span with center load



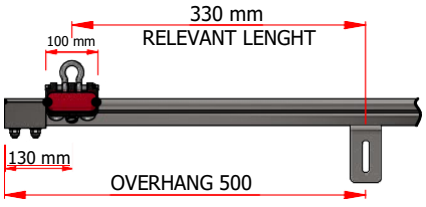
Recommended for suspended work



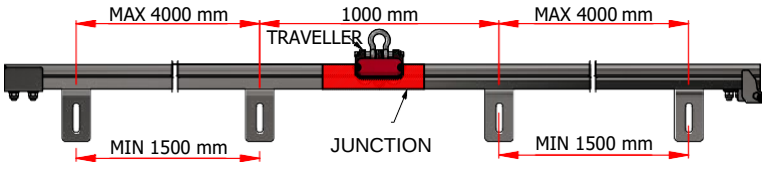
B) Overhang with load at the end



Relevant overhang



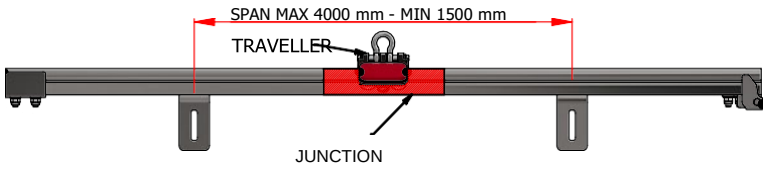
C) Span with central junction



Type of junction - REF. 003993

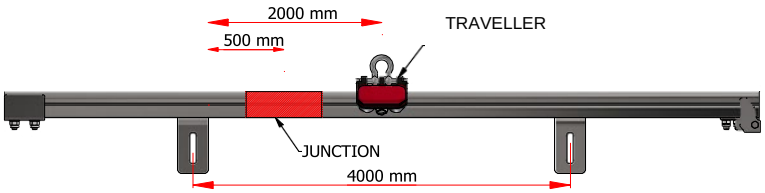
D) Span with central junction subject to central load

Type of junction-REF. 004737



E) Span with junction at 500 mm from the fixing and central load

Type of junction-REF. 004737



To fasten the rail to the OMEGA bracket, refer to the relevant assembly in ch. 6.4.3

	SPANS			
Table: Deflection at 900 kg L Bracket	**1500 mm**		**4000 mm**	
				
	53 mm	53 mm	317 mm	317 mm

- **C Bracket - REF. 004183**

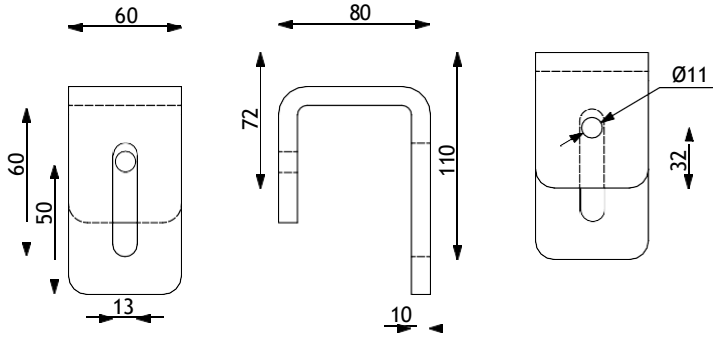
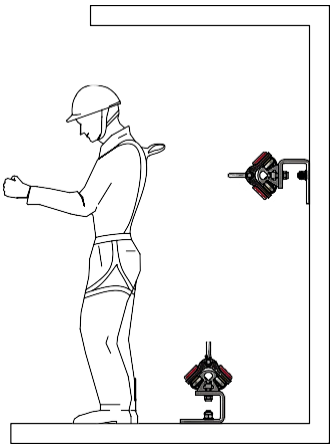
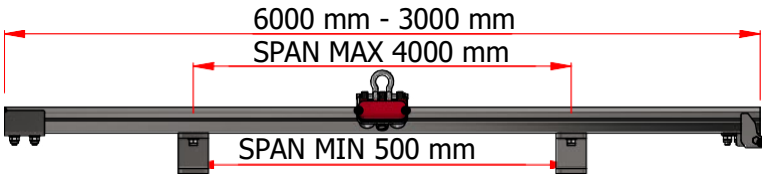


Fig. 5.7.3

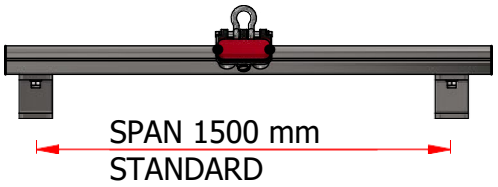
Orientation



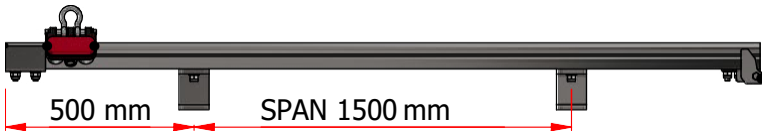
A) Single span with center load



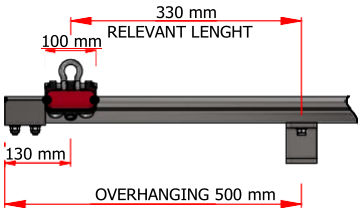
Recommended for suspended work



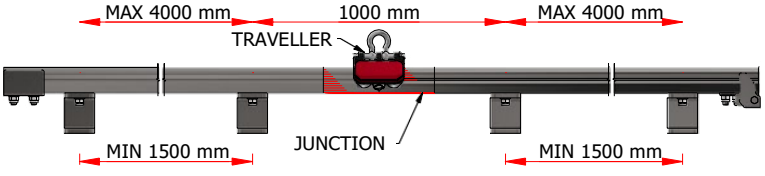
B) Overhang with load at the end



Relevant overhang

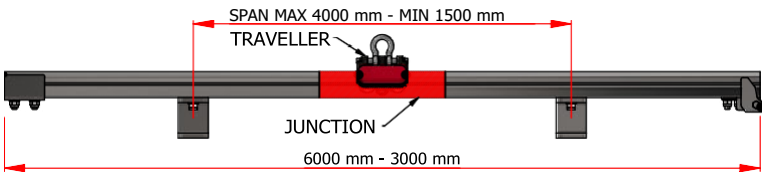


C) Span with central junction



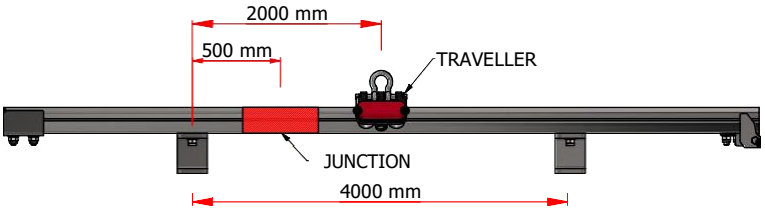
Type of junction-REF. 003993

D) Span with central junction subject to central load



Type of junction – REF. 004737

E) Span with junction at 500 mm from the fixing and central load



Type of junction -REF. 004737

To fasten the rail to the OMEGA bracket, refer to the relevant assembly in ch. 6.4.3

	SPANS			
Table: Deflection at 900 kg C Bracket	**1500 mm**		**4000 mm**	
				
	79 mm	79 mm	220 mm	220 mm

- **S Bracket - REF. 004181**

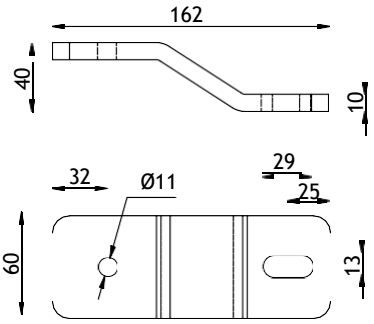
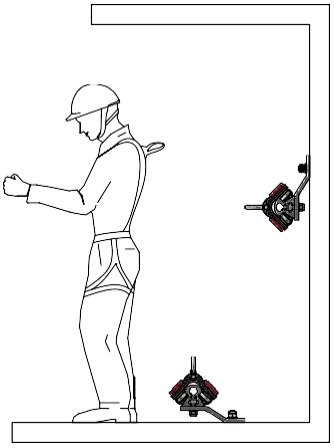


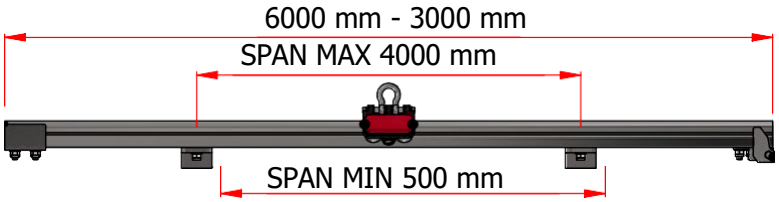
Fig. 5.7.4

Orientation



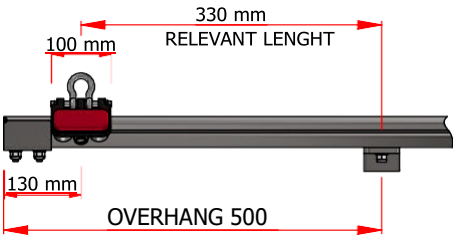
A) Single span with center load

Recommended for suspended work



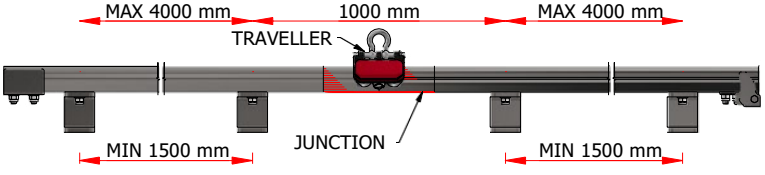
B) Overhang with load at the end

Relevant overhang

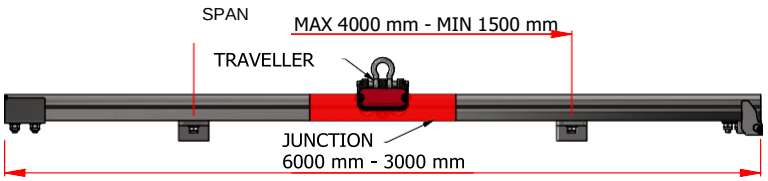


C) Span with central junction

Type of junction-REF. 003993

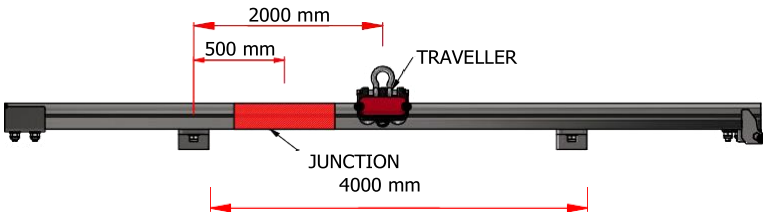


D) Span with central junction subject to central load



Type of junction-REF. 004737

E) Span with junction at 500 mm from the fixing and central load

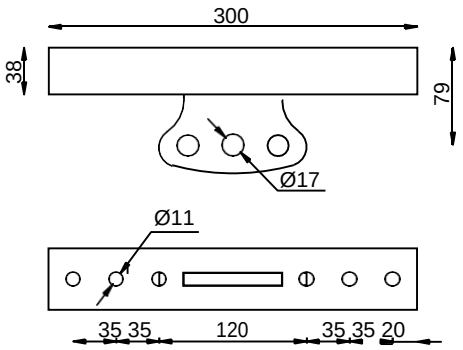


Type of junction-REF. 004737

To fasten the rail to the OMEGA bracket, refer to the relevant assembly in ch. 6.4.3

	SPANES			
Table: Deflection at 900 kg S Bracket	**1500 mm**		**4000 mm**	
				
	59 mm	59 mm	400 mm	400 mm

- **PZ Bracket- REF. 004731**



Orientation

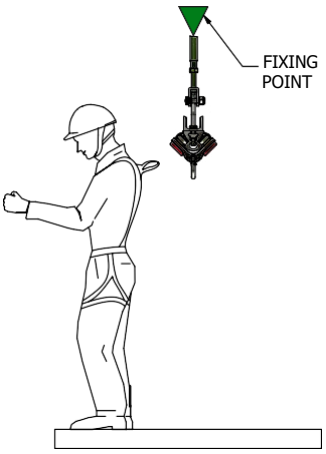
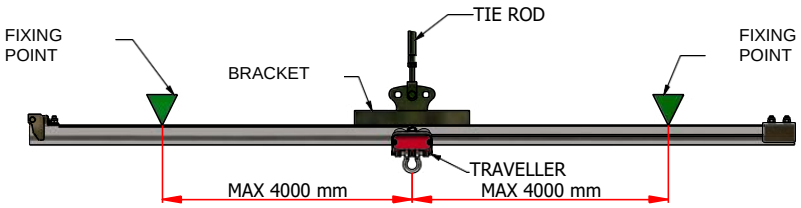


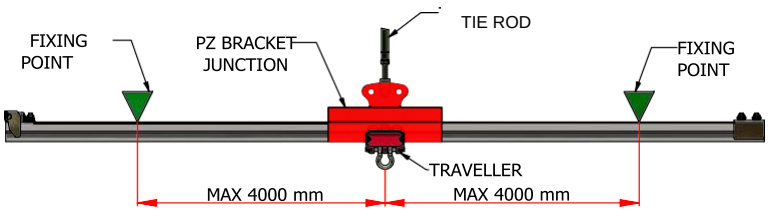
Fig. 5.7.5

A) Bracket in central position with respect to fixing

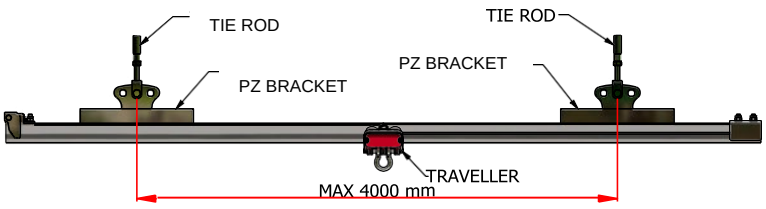


B) Double bracket / junction function

Double bracket / junction function



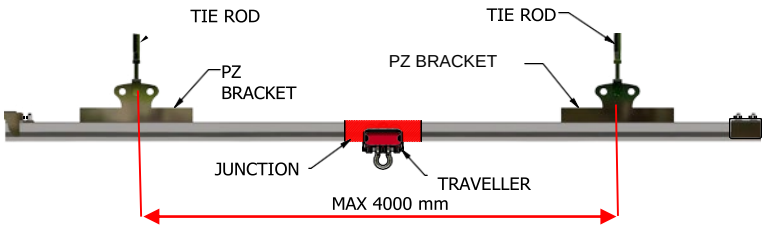
C) Span composed of two PZ brackets



In the event that the system provides for the use of only PZ brackets, it is necessary to provide on the fallstop rail system the use of tie rods or other fastening elements in order to constrain the movement along the parallel and perpendicular directions to the axis of the rail.

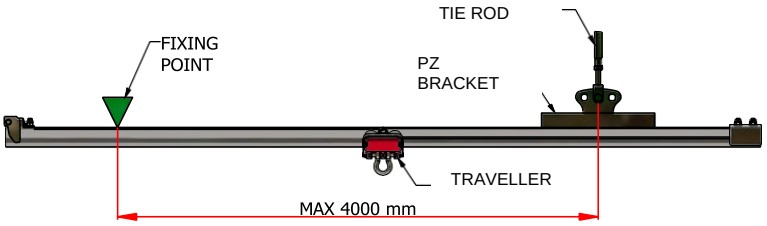
D) Span with central junction

Type of junction-REF. 003993



If the system provides for the use of the PZ bracket only, it is necessary to provide for the use of tie rods or other fastening elements on the fallstop rail system in order to constrain the movement along the directions parallel and perpendicular to the axis of the rail.

E) Span with PZ bracket and fixing bracket



To fasten the rail to the OMEGA bracket, refer to the relevant assembly in ch. 6.4.3

	SPANS
Table: Deflection at 900 kg PZ Bracket	**4000 mm**
	
	800 mm

- **Tubular for spans over 4m**

In addition to the cases listed above, there may be situations in which it is necessary to carry out spans greater than 4000 mm.
In this situation, the ALURAIL L rail rods are bolted directly to a 60x60x5 mm tubular by means of the fixing plates placed at a center distance of 2000 mm and, if the rail needs to be joined, the junction REF. 004726 is used. .
This union creates a single system that has been tested as a whole in order to have a more performing anchor system.

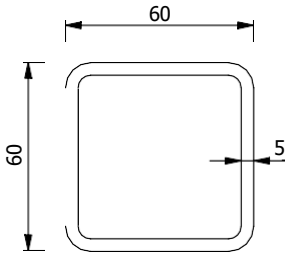


Fig. 5.7.6

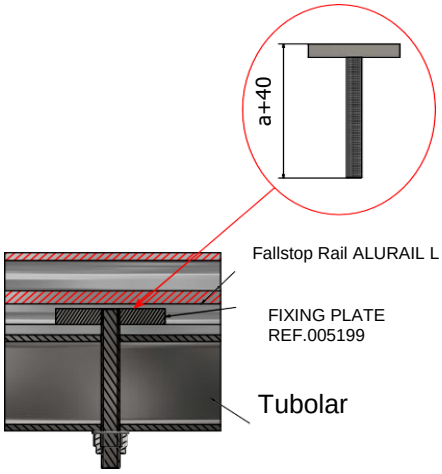


Fig. 5.7.7 - Rail - tubular connection

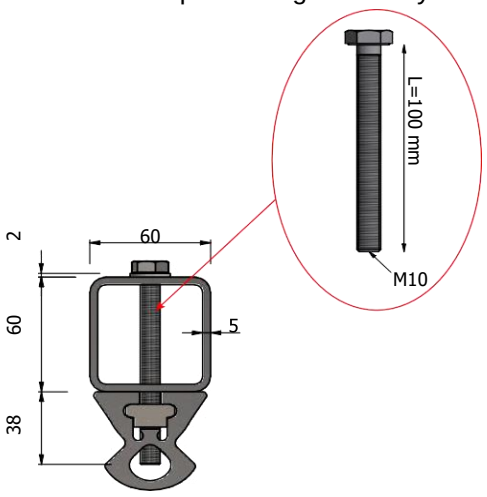
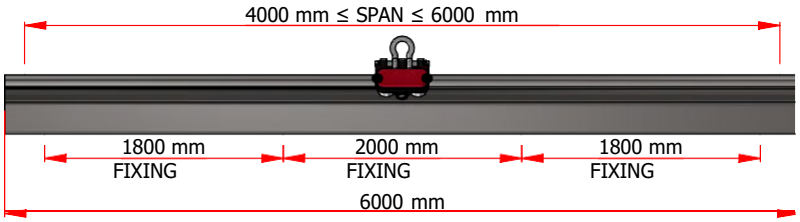
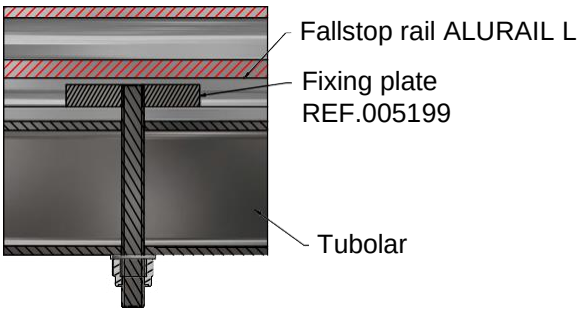


Fig. 5.7.8 - Sectional view of the junction REF. 004726

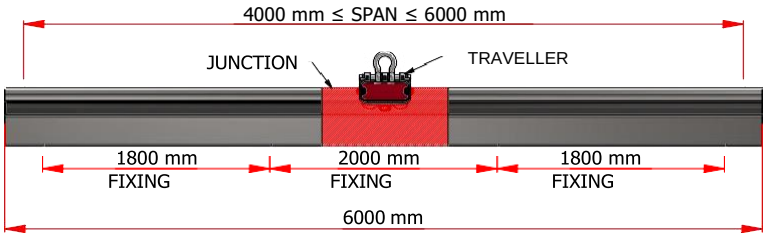
A) Application with tubular



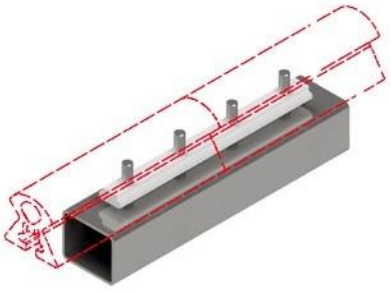
Fixing details



A) Junction on tubolar



Type of junction – REF. 004726



The tests carried out by Sicurpal involve the use of a tubular with dimensions 60x60x5 mm. This does not rule out the possibility to adapt the solutions shown here to different profiles, subject to verification by the designer.

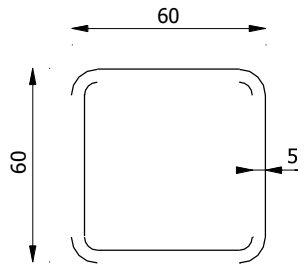


Fig. 5.7.9 – Header's Dimensions

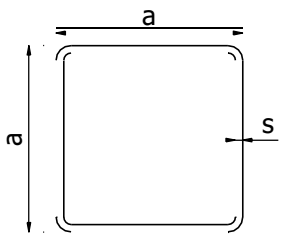


Fig. 5.7.10 - Square section

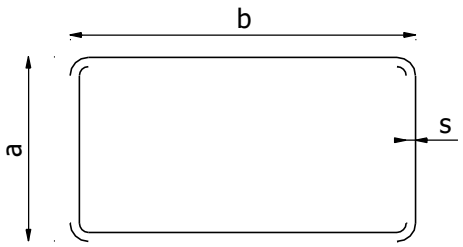


Fig. 5.7.11 - Rectangular section

In order to correctly size the length of the bolts in relation to the chosen profile, Sicurpal recommends adding 40 mm to the height of the profile.

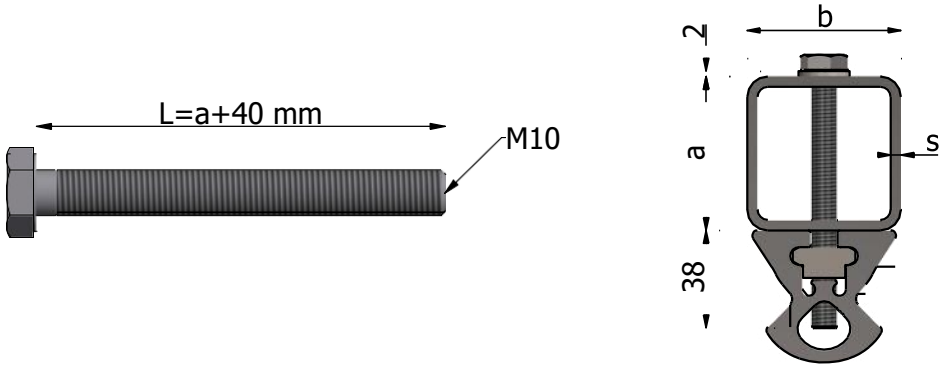


Fig. 5.7.12

What has been described up to now is valid in the case in which it is necessary to join the rail on a single section of tubular. Since the support tubular is also an element of well-defined dimensions (length), it is also necessary to provide for the junction of the tubular itself.

In this regard, Sicurpal suggests the use of the three junctions.

Avoid that both tubular and rail junctions coincide in the same point. A minimum distance of 1 meter between the two junctions is recommended.

[10] The values of the arrows shown in the table are to be understood as expressed in mm.

Tubolar junction with three plates REF. 005201

Fig. 5.7.13

Fig. 5.7.14

Type of junction that uses the combined action of the aluminum panel and the three hot-dip galvanized S235 plates. This junction will be used in places where no type of fastening (overhang) * is required.

* Warning: this product needs a space of at least 10 cm for the assembly phases.

Tubular junction L70 REF. 005202

Fig. 5.7.15

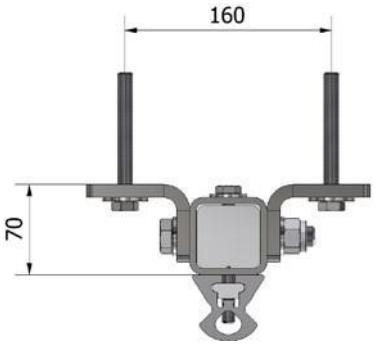


Fig. 5.7.16

Type of junction that uses the combined action of the aluminum panel and the four hot-dip galvanized S235 L-shaped brackets. This junction will be used in places where the junction itself acts as a fastening point to the structure *.

* Warning: this method of fixing requires the assembly of the rail and subsequently of the wall bracket. Tubular passage flush with the structure.

Tubular junction L160 REF. 005203

Fig. 5.7.17

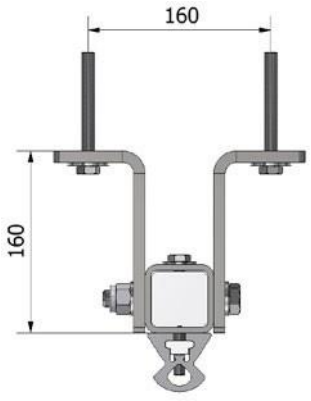


Fig. 5.7.18

As in the previous case, this type of junction uses the combined action of the aluminum panel and the four hot-dip galvanized S235 L-shaped brackets. It will be used where the junction itself plays the function of fixing point but, unlike the previous one, it is necessary to move away from the support surface, to facilitate the assembly phases.

It should be noted that the cases indicated here refer to the use of a tubular with dimensions of 60x60x5. Consequently, the use of tubulars of different sizes from that indicated (see Fig. 5.7.6) must provide for the appropriate sizing of the aluminum panel according to the following formula:

a'=(a-2s)-1 b'=(b-2s)-1

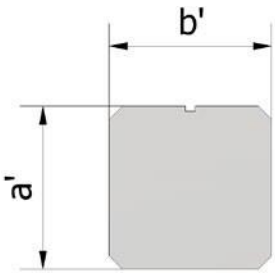


Fig. 5.7.19 – Header's Dimensions

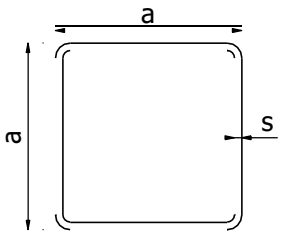


Fig. 5.7.20 – Square section

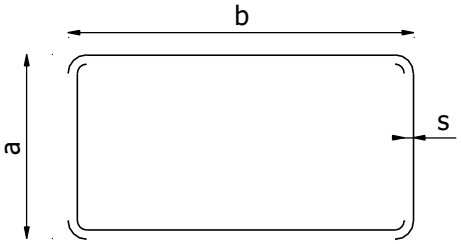


Fig. 5.7.21 – Rectangual section

For the dimensioning of the bolts it is recommended to use the same criterion shown in Fig. 5.7.13 and reported here for summary:

Fig. 5.7.22

In the case of bolts for fixing the L-shaped brackets for the junctions REF. 005202/005203 given the thickness of the brackets themselves, it is necessary to provide for an increase of 50 mm compared to the width of the tubular itself.

Fig. 5.7.23

- **Bends***

If there is the need, Sicurpal is able to supply curvilinear elements of the ALURAIL L rail.
UNI 11578: 2015 provides that for these elements "*the resistance tests are repeated in all foreseeable directions of application of the load in operation at the center of a corner*".

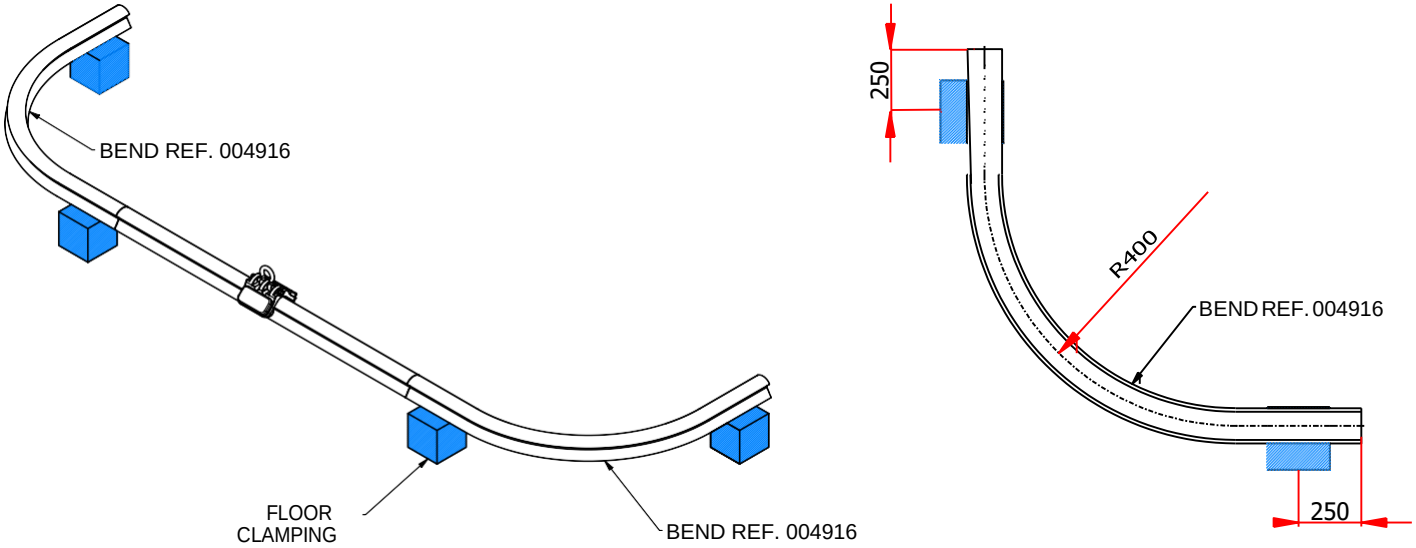


Fig. 5.7.24

For simplicity, in the previous image the floor fixing devices are generalized and highlighted in blue. In the case of curvilinear elements, the fixings must be placed 250 mm from the end of the section itself.
The following table provides the data of deflection of the curved rail section subject to the load P for each type of fixing. For the definition of the spans, refer to the cases described above.

* Important: for the supply of curves see Appendix A in chapter 10

6. INSTALLATION INSTRUCTIONS

6.1. CONDITIONS OF STORAGE, TRANSPORT, HANDLING AND DISPOSAL

In case of storage, the equipment must be stowed possibly in a position that is not subjected to forces that could damage its components. It must be stored in a dry and suitably ventilated environment or, in any case, not in the presence of water or other contaminating or corrosive agents.

Sicurpal ensures that, before transport, the devices will be carefully packed and insured against:

- Unforeseen solicitations;
- Excessive heat or humidity;
- Contact with sharp edges;
- Contact with corrosive substances or other substances that could damage the devices.

For greater protection of the environment, Sicurpal has decided to minimize packaging. For this reason, it is possible that multiple products are shipped inside the same package.

All personnel who in some way interact with the equipment must strictly comply with the recommendations described below:

- Handling, transport and unpacking must only be carried out by qualified personnel with a perfect knowledge of the equipment, referring to the accident prevention regulations in force on the subject;
- The means of handling, lifting and transport must be suitable for safely performing the required operations taking into account the size, weight, protruding parts, delicate parts and the center of gravity of the equipment;
- Avoid improper use and maneuvers, above all avoid carrying out maneuvers outside one's own field of competence and responsibility;
- Always use work gloves, helmet and safety shoes;
- Do not insert hands or other parts of the body under raised components;
- Do not wear rings, watches, bracelets or clothing that is too loose and dangling during the assembly and disassembly of the equipment.

The unpacking operations are limited to the elimination of protective plastic, the opening of the wooden crates and the ties used.

Plastic is a polluting material and must be disposed of in accordance with the regulations and laws in force.
The handling of the single pieces on the construction site must comply with the above rules.

Sicurpal s.r.l advises the customer to request the installation of ALURAIL L by qualified, adequately trained and competent personnel, with a team of at least 2 (two) installers. They will install the device according to the instructions in this manual and in compliance with the good technical standard.

It is forbidden to make changes to the ALURAIL L elements. Tampering with one or more original components can compromise the structural strength of the device and endanger the life of the user. Tampering invalidates the manufacturer's warranty.

6.2. PRELIMINARY OPERATIONS

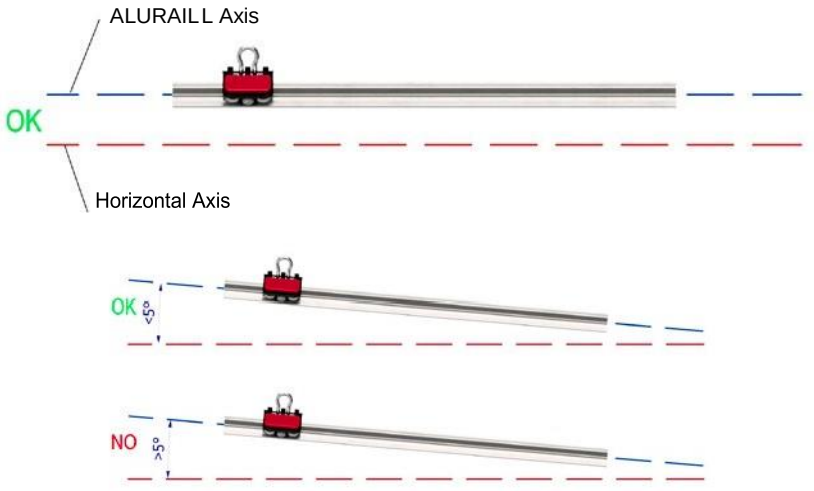
At the time of delivery, it is necessary to check the integrity of the material and correspondence to the order placed (see **2.3 Notes on delivery**). The device must bear the Sicurpal s.r.l. identification and the marking as described in ch. **5.5**.

After checking the material and before carrying out the assembly, the installer must check for the absence of obstacles along the installation path, as well as any obstacles in the passage area of the worker that could represent a risk during the use of the device.
As a manufacturer, before installation Sicurpal requires checking the expiration date of the chemical anchors, if their use is intended. We also recommend reporting the warranty date and, if present, its duration in the declaration of correct assembly.

N.B.: For work at height where the anchor device must be installed, the suitability of the support structure, of the fixing elements and structural anchor elements must always be considered, taking into consideration the maximum load that could be transmitted in service (see chap. **5.4.1**). The structural designer must verify the safety conditions of the installation in an appropriate manner, for example by calculation or test. Please note that the fall arrest force exerted on the operator must not exceed 6 kN (UNI EN 363: 2003).

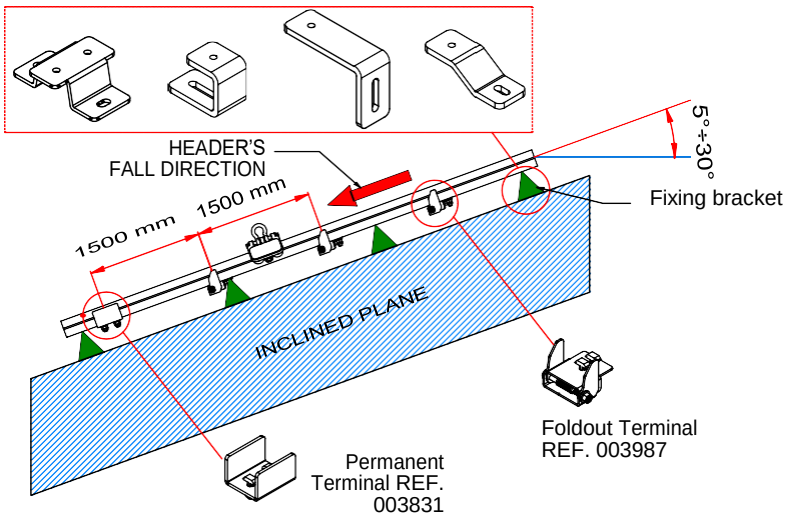
6.3. INSTALLATION

The operation of the anchor devices requires that their installation complies with the requirements set by the manufacturer and the current standard. With reference to the UNI 11578: 2015 standard, the installation must be performed with an angle of inclination of the device less than 5 ° with respect to the horizontal axis.



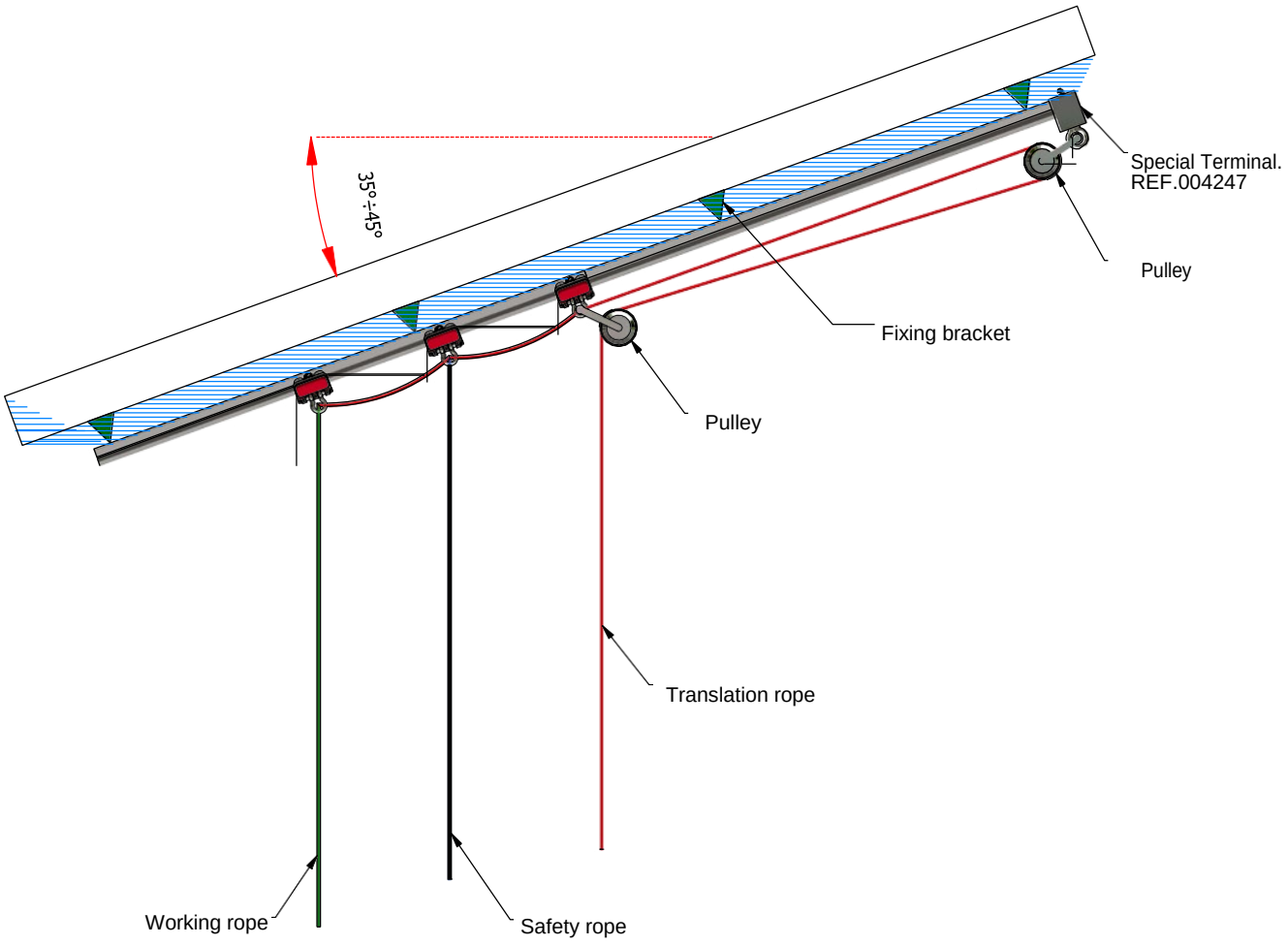
Despite this feature, Sicurpal has tested other configurations that go beyond the provisions of the standard. In this case, the inclination goes beyond 5 ° and up to 45 °. The tested configurations are shown below.

Case 1: inclination between 5° and 30°



a) Working in walkways with inclination up to 30°

Case 2: inclination between 30° and 45°



b) Suspended work with inclination up to 45°

Fig. 6.3.1: Out of standard configuration

We remind you that for greater safety the system was tested in the directions shown in the drawing (fig.6.3.1a) to ensure that the locking systems worked in the worst possible conditions.

To manage the problems related to slipping, 2 methods have been hypothesized:

- the first, which works for all inclined planes with walkways with an inclination of up to 30 °, provides for the positioning of an opening fastening stop every 1500 mm capable of preventing slipping beyond 1500 mm of distance (see example diagram fig. 6.3 .1a);
- the second system is designed for structures inclined up to 45 ° in which the operator works in suspension with respect to the vertical axis. In this situation, a system of anchors, pulleys and trolleys has been provided to ease the descent with the aid of ropes (fig.6.3.1b).

Please note that these are only simple indications that each operator can improve based on the experience and training received.

There are also trolleys with friction brakes that can help or better manage their movements.

6.3.1. Other installations

For greater clarity on the types and configurations of the following installations, please refer to the relative use and maintenance manuals.

Fig. 6.3.1.1

Fixed portal

- Designed to ensure the safety of the worker operating on tankers and tank trucks.
- Designed to guarantee the continuous smoothness of the trolley in the presence of dust, even fine granulometry, or of material deposited during the transport phases.
- Accessories available that can clean and eliminate any incrustations as the trolley passes.
- Accessories available to eliminate ice formed on the rail.
- Does not require extraordinary maintenance (purchase of spare parts).

Fig. 6.3.1.2

Self-supporting portal

- Designed to guarantee the safety of the worker who works on tankers, by creating a system without foundations.
- Installation of three galvanized steel portals, fixed to the ground by reinforced concrete ballasts and steel tie rods to anchor them.
- Availability of accessories capable of cleaning and eliminating incrustations due to ice and a mix of humidity, liquids and powders as the trolley passes over the rail.

Fig. 6.3.1.3

Recovery system for reel

Ideal for keeping the reel functional.

- Available in versions with coded key release system.
- Variable length based on the height of the structure.
- Safety system against accidental release.
- Can be installed on any structure (reinforced concrete, iron, wood)

- **Hoist**

This cutting-edge product has been designed and manufactured to comply with European and international standards and directives. It also meets the requirements of the standards (if applicable): CSA, UL, OSHA, CCC, GOST, CO5, ASME B30.16 and ASME HST-1. The product complies with the RoHS directives.

- Reel recovery and handling system
- Ideal in large spaces where there are several work points
- Variable length based on the height of the structure

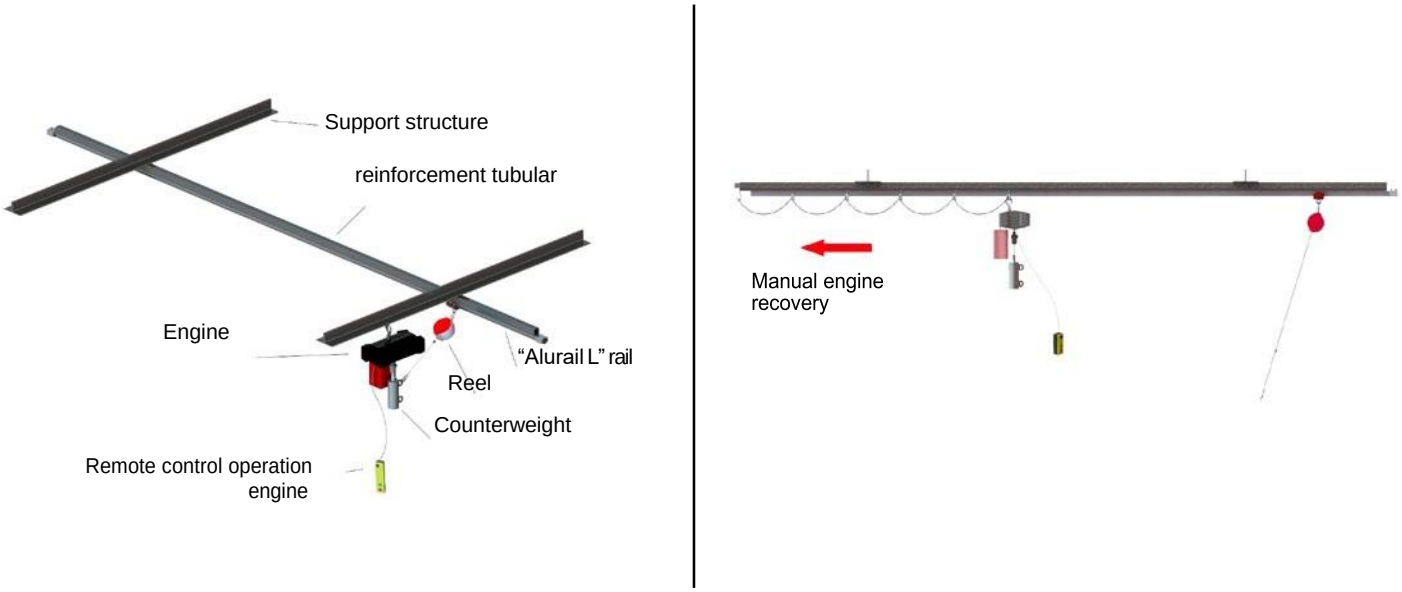
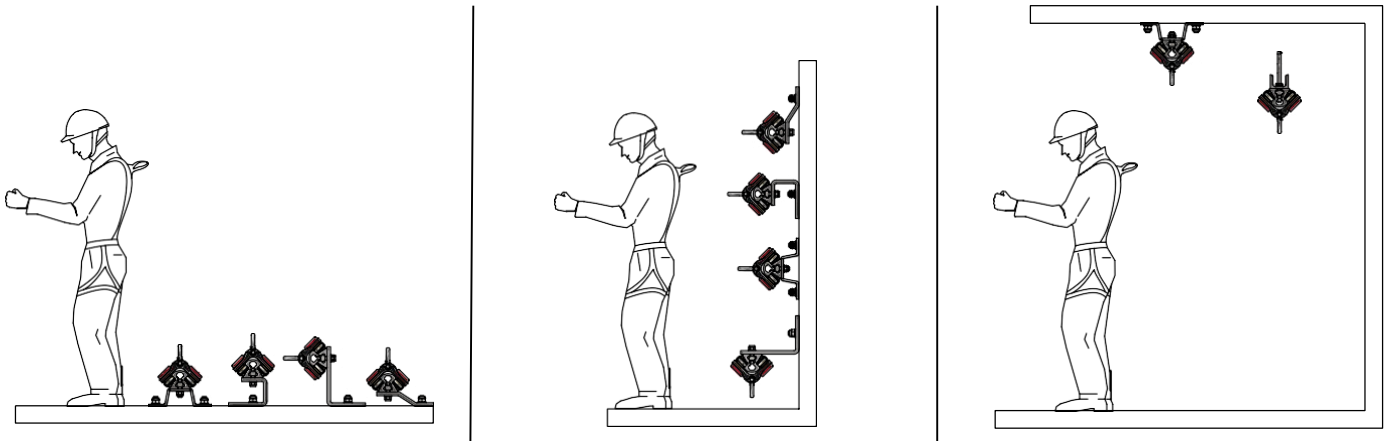


Fig. 6.3.1.4

6.3.2. Type of assembly

The installation of the ALURAIL L anchor device must be carried out by qualified personnel who is able to assemble and disassemble the anchor system (ref. UNI 11560: 2014) according to the instructions contained in the "*Calculation Report*" drawn up by a technician, containing all the detailed characteristics inherent to the chosen fixing (for example: type of fixing, dimensions of bars / screws, anchoring depth, distances from edges, etc.).
The ALURAIL L anchor devices can be installed in the three main configurations indicated in fig. 6.3.2.1, depending on whether floor, wall or ceiling fixing devices are to be used.



Floor fixing *Wall fixing* *Ceiling fixing*

Fig. 6.3.2.1 – Operator's position compared to the rail

6.4. Assembly

6.4.1. Terminal

The fixing of the terminal, whether permanent or foldout, to the ALURAIL L rail involves the use of two M10 hammer head bolts with their respective washers and self-locking nuts.
In order to make the assembly of the device as easy as possible, Sicurpal recommends positioning the faces of the bolt head in a direction parallel to the axis of the rail (see fig. 6.4.1.1) and then inserting the terminal into the appropriate seat (fig. 6.4.1.2 and fig. 6.4.1.3) with subsequent tightening.

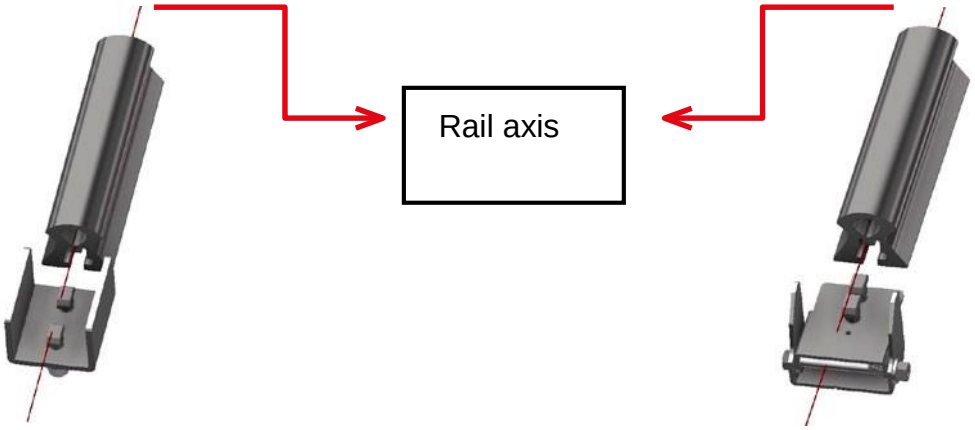


Fig. 6.4.1.1 - Hammer head bolt orientation for insertion into the rail

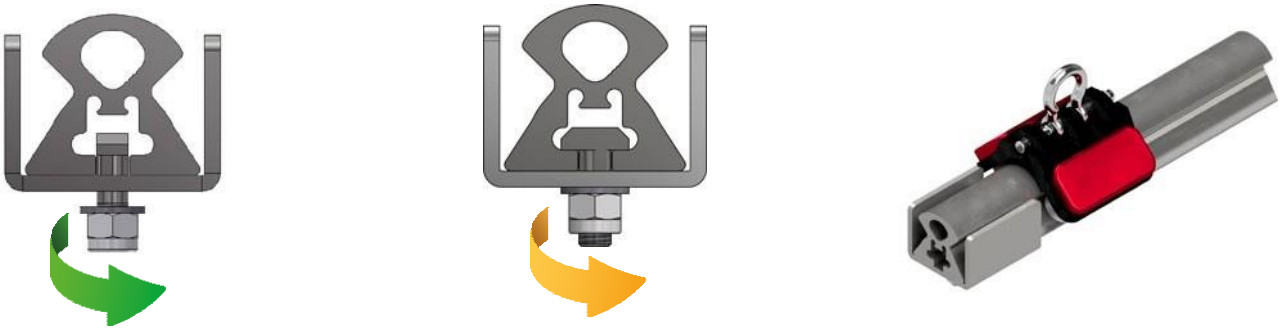


Fig. 6.4.1.2 – Permanent terminal

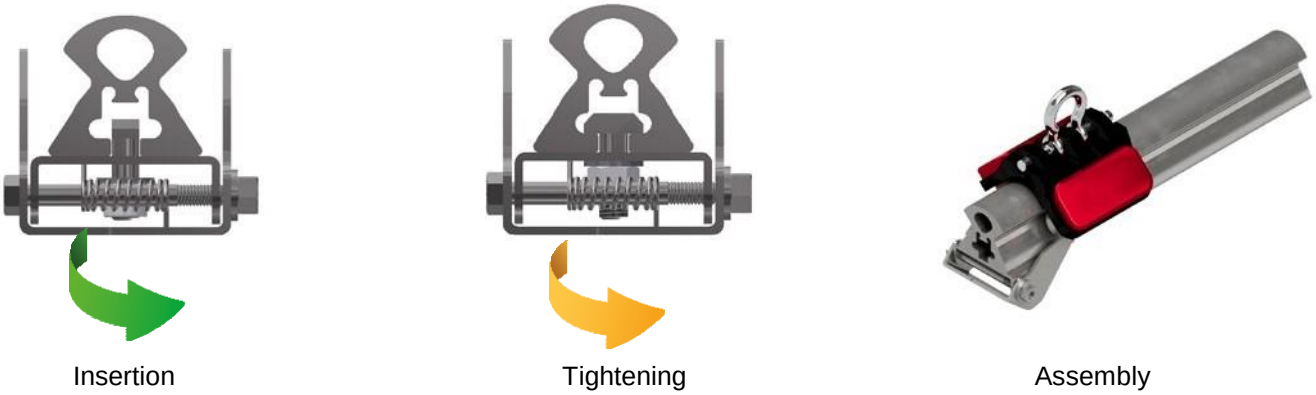


Fig. 6.4.1.3 – Foldout terminal

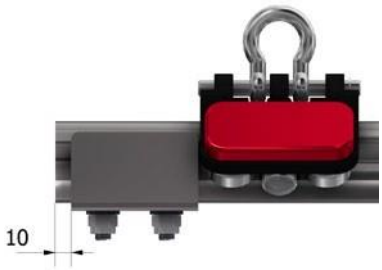
The tightening torque to be applied to the self-locking nut, on both terminals, must be ≥48 Nm for each bolt. It is also necessary to check the correct position of the cuts present at the base of the screw shank. These, at the end of tightening, must be perpendicular to the axis of the rail.

Permanent Terminal

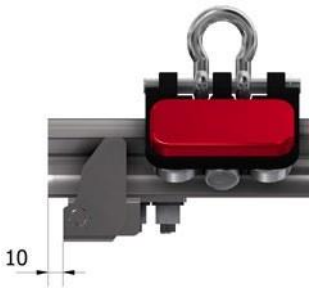
Foldout Terminal

This locking method allows the installation of the terminals even with the fall arrest system already installed and the ability to customize the path of the user who will use the system freely.

In the case of installations at the ends, the minimum installation distance of each terminal must be with the external side at 10 mm from the external face of the rail (fig. 6.4.1.3).



Permanent terminal



Foldout terminal

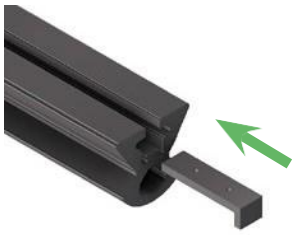
Fig. 6.4.1.4 - End installation

6.4.2. Connectors

The ALURAIL L type rail connection system involves the use of connectors and related bolts.

It is highly recommended not to use only one connection device. The 2 (two) devices, alignment and splice pins, must both be installed in each connection.

Since the rail does not have holes for inserting the junction device, these must be made on site using the junction template (*REF. 003994 or REF. 004751)* relating to each type of assembly with a Ø3 mm tip (see fig. . 6.4.2.1), then widen the holes with a specific tip relating to the type of junction (see next page). The TEMPLATE must be used prior to inserting the alignment pins in the appropriate housings.



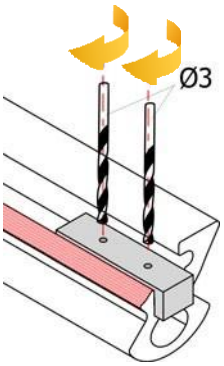


Fig. 6.4.2.1 - Template insertion and drilling

- **Kit plug – REF. 003894**

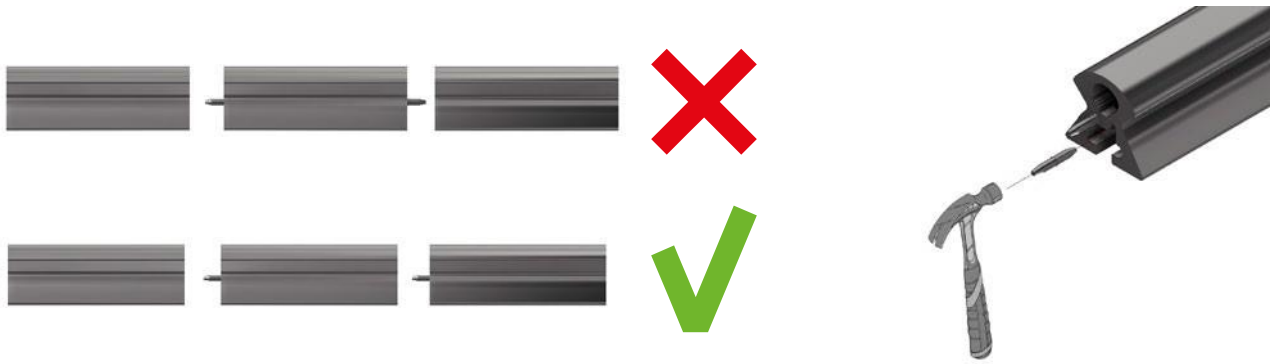
The assembly of the kit plug requires a pair to be used for each rail section (fig. 6.4.2.2). The kit plug consists of two easily identifiable areas separated by a circular crown:

- knurled area which must be inserted by force into the housing located on the rigid profile;

Note: insert the pins on the first rail rod from the knurled side (as shown in the image below)

- smooth area guarantees the preservation of the alignment between the two ALURAIL L rail profiles.

The plugs must both be assembled in the same direction. Pay attention to insert the pins linearly without creating an angle.



Arrangement on the rails

Insertion

Fig. 6.4.2.2 – Kit plug installation

Following the insertion of the kit plug, between the two connected sections of the rail, there will be a gap of 0.2 mm due to the thickness of the circular crown of the pin itself (fig. 6.4.2.3).

Circular crown thickness of the plug

Gap between the sections of the rails

Fig. 6.4.2.3 – Kit plug details

- **Junction – REF. 003993**

The assembly of the junction REF. 003993 provides that, following the operations described in the previous paragraph, the plate with the threaded holes (**1**) is inserted inside the upper groove of the rail. Insert the second plate (**2**) and then proceed to tighten the T.C.E.I. bolts. **M6x30** (**3**) (see fig. 6.4.2.4).

The tightening torque to be applied to each bolt, on both rails, must be ≥10 Nm.

Fig. 6.4.2.4 – Junction assembly– REF. 003993

- **Junction with triple plate - REF. 004737**

The assembly of the junction with **triple plate** requires that, following the drilling operations described in paragraph **6.4.2**, the plate is inserted inside the lower groove of the rail with the knurled surface facing the base of the rail (fig. 2.5 Knurled plate assembly). Subsequently, the external plate will be bolted by means of T.C.E.I. **M6x30** (fig. 6.4.2.5 External plate assembly). Leave the screws loose in order to facilitate the passage of the screws that secure the internal plate. Finally, proceed to insert the last component inside the upper groove of the rail and then proceed with the fixing by means of T.E. **M10x55** (fig. 6.4.2.5 Junction assembly).

Knurled plate assembly

External plate assembly

Junction assembly

Assembled

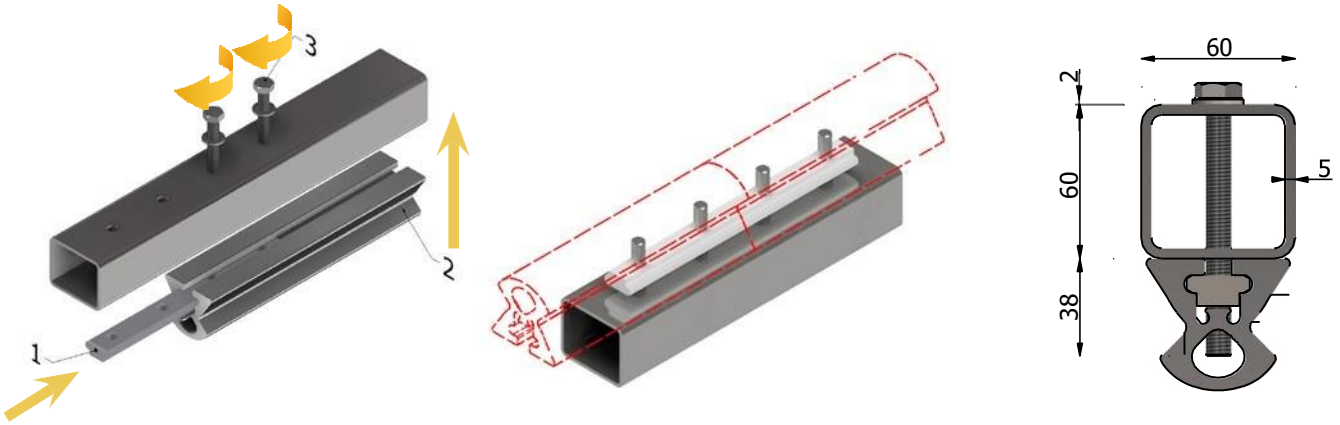
Fig. 6.4.2.5 - Assembly of triple plate junction

The tightening torque to be applied to each bolt, on both rails, must be: ≥10 Nm for M6x30 and ≥ 48 Nm for M10x55

Tighten the M10x55 screws first and then the M6x30 screws to the required force. Do not do the reverse.

- **Junction on tubular - REF. 004726**

The assembly of the junction on tubular provides, following the drilling operations described in paragraph **6.4.2**, that the plate with the 4 (four) threaded holes (1) is inserted inside the lower groove of the rail. Subsequently, the 60x60x5 mm tubular (**2 - 3**) will be bolted to it with T.E. **M10x90** (see fig. 6.4.2.6).



Junction assembly Assembled Section view

Fig. 6.4.2.6 - Assembly of the junction on tubular

The tightening torque to be applied to each bolt, on both rails, must be ≥48 Nm.

The assembly of the **PZ** junction requires that, following the drilling operations described in paragraph **6.4.2**, the plates with the 3 (three) threaded holes (**1**) are inserted inside the lower groove of the rail. Subsequently, the UPN profile constituting the PZ type junction (**2 - 3**) will be bolted to them by means of T.E. **M10x45** (see fig. 6.4.2.7). For assembly as a bracket, see ch. **6.4.4**.
The tightening torque to be applied to each bolt, on both rails, must be ≥48 Nm.

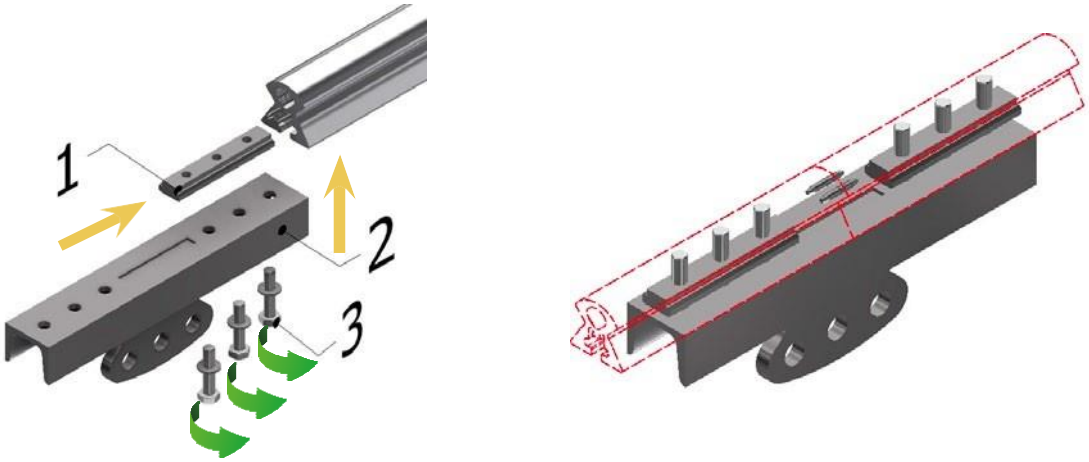


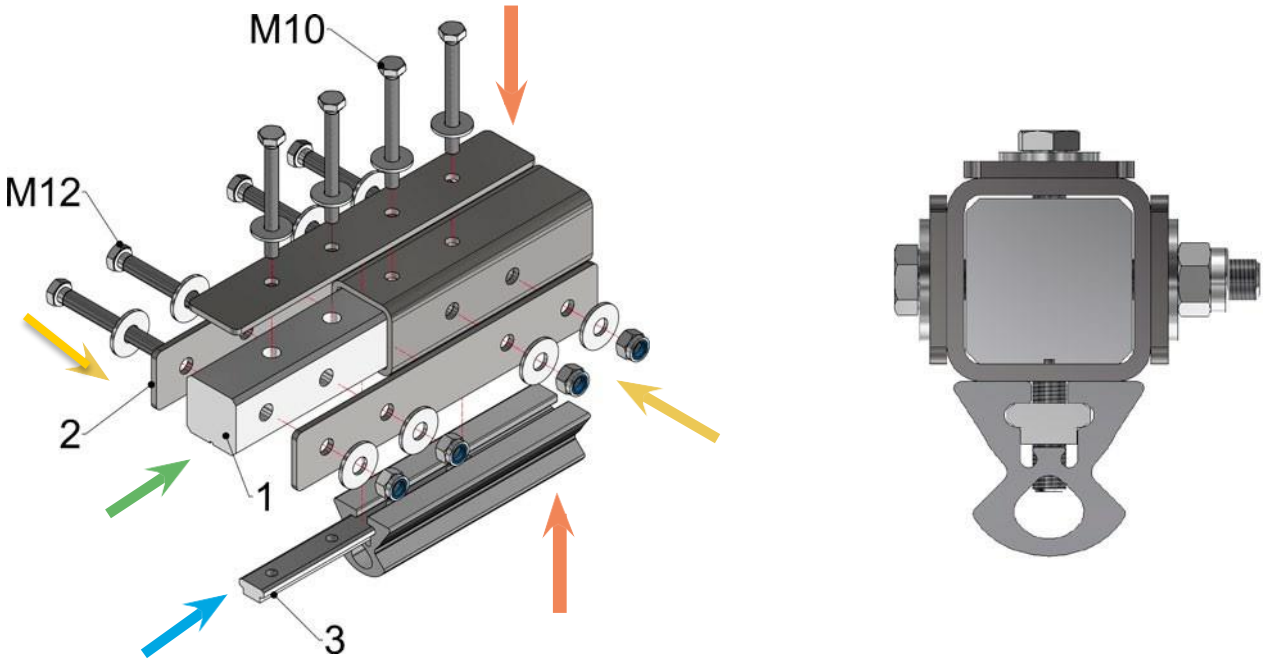
Fig. 6.4.2.7 – PZ junction assembly

- **Tubular junction with three plates REF. 005201**

The assembly of the REF. 005201 junction involves the insertion of the aluminum framework inside the tubular profile (**1**). The groove on the aluminum panel must be placed near the weld bead of the tubular itself, respecting the codes of the tubulars provided in the assembly drawing. The side plates must then be placed (**2**) which will be bolted by means of T.E. **M12x100** in order to carry out a first fixing of the components.

Subsequently, following the drilling operations described in paragraph **6.4.2**, it is necessary to insert the plate with the 4 (four) threaded holes inside the groove of the rail (**3**) and place the third plate above the tubular. Finally, proceed with fixing by means of T.E. **M10x100** (see fig. 6.4.2.8).

***N.B**. For each bolt, the use of UNI 6593 wide flat washers is recommended*.



Junction assembly

Assembled sectional view

Fig. 6.4.2.8 - Assembling the tubular junction with three plates

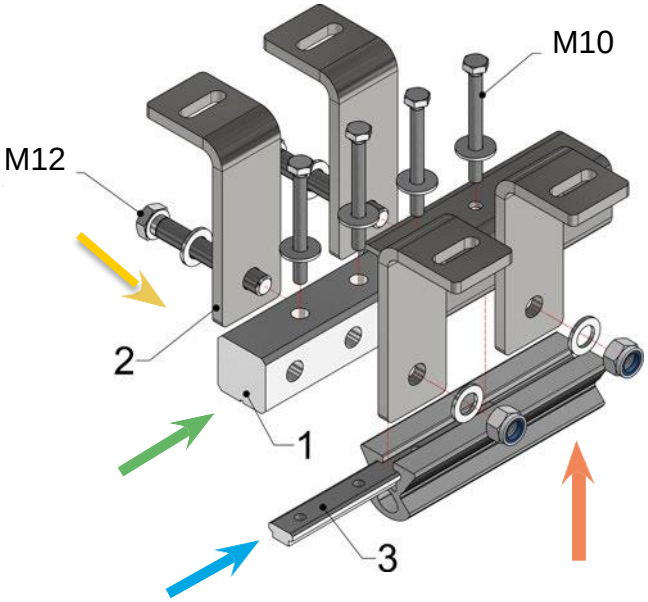
The tightening torque to be applied to each **M10** bolt must be ≥48 Nm.
The tightening torque to be applied to each **M12** bolt must be ≥83 Nm.

- **Tubular junction L70 REF. 005202 / L160 REF. 005203**

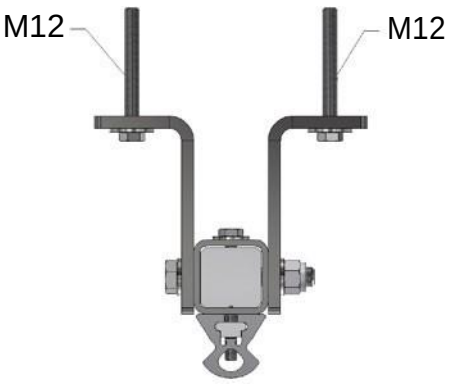
The two junctions, L70 and L160, are geometrically identical except for the height of the L bracket. It follows that the two require an almost identical assembly.
The assembly of the tubular L junction provides for the insertion of the aluminum framework inside the tubular profile (**1**). The groove on the aluminum panel must be placed near the weld bead of the tubular itself, a wrong insertion could create coupling problems.
Subsequently, L brackets (**2**) will have to be positioned and will be bolted by means of T.E. **M12x110** screws in order to carry out a first fixing of the components.

Subsequently, following the drilling operations described in paragraph **6.4.2**, it is necessary to insert the plate with the 4 (four) threaded holes inside the rail groove (**3**) and proceed with fixing by means of T.E. M10x100 (see fig. 6.4.2.9).
Fixing to the support surface will be carried out by means of appropriately sized **M12** screws.

***N.B**. For each bolt, the use of UNI 6593 wide flat washers is recommended.*



Junction assembly



Section of tubular junction L160

Section of tubular junction L70

Fig. 6.4.2.9 - Assembly of the L70 / L160 tubular junction

The tightening torque to be applied to each **M10** bolt must be ≥48 Nm.
The tightening torque to be applied to each **M12** bolt must be ≥83 Nm.

In order to facilitate the workers in the assembly operation of the ALURAIL L type rail and of any tubular, SICURPAL recommends placing the tubular in an elevated position and supporting the chosen rail rod by means of straps. This allows to easily position the fixing plates (REF. 005199) near the holes on the tubular, as shown in the following image:

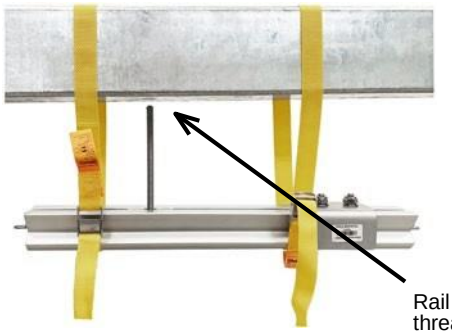
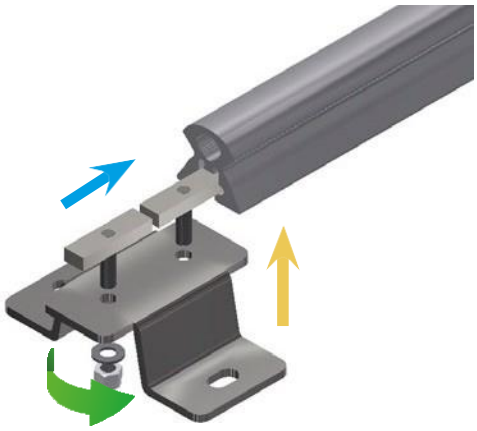


Fig. 6.4.2.10

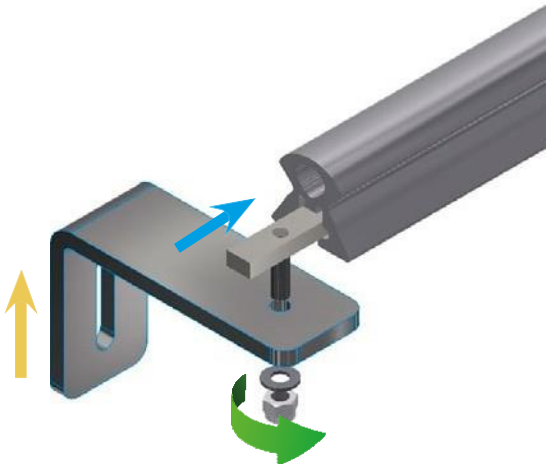
6.4.3. Support brackets and fixing clips

The support brackets have the purpose of connecting the ALURAIL L rail with the support structure. These devices are connected to the ALURAIL L type rail by means of fixing clips (simple or thermal).

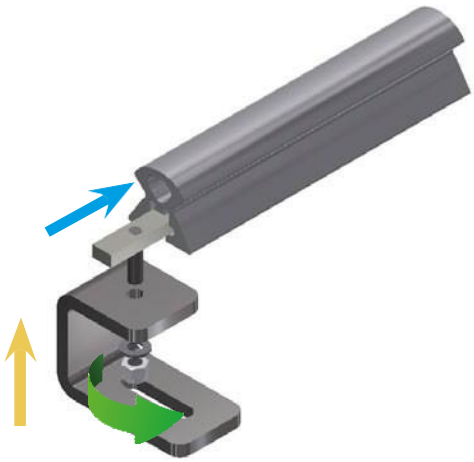
In order to facilitate the assembly of the devices, Sicurpal recommends firstly inserting the fixing clips inside the groove in the rail and then fix the type of bracket chosen for assembly (fig. 6.4.3.1).



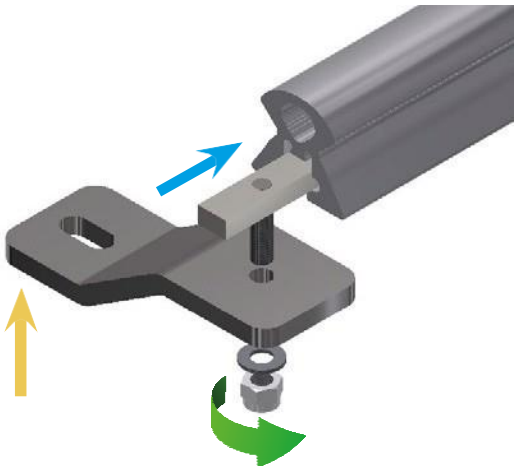
Omega Bracket



L Bracket



C Bracket



S Bracket

Fig. 6.4.3.1 - Installation of support brackets and fixing clips

The previous figure shows the f stops REF. 002572. For the other types of fasteners (simple or expansion), follow the same procedure indicated above. In particular, in the case of a "female" fastening stop, consider a T.E. **M10x30**.

In the case of fixing to the tubular, refer to the "*Fixing detail*" (**Application with tubular element** page 28).

Where possible, it is advisable to pre-assemble the "*fixing bracket / stop*" group and then proceed with tightening.

- **Fixing plates and thermal expansion**

Unlike the *"fixed"* plates, the *"dilatation"* ones allow the rail to compensate for thermal expansion. The mandatory use of both types of fastening depends on the environment in which the system is located: thermal expansion can be considered negligible if the rail is not installed in an external environment. Therefore, for **outdoor installations**, the SICURPAL technical department recommends that fixing plates for thermal expansion are always to be provided, regardless of the length of the rail.
The quantitative relationship between the fixed plates and the expansion plates is that described in fig. 6.4.3.2 bearing in mind the provisions of the spans described in chap. 5.7.

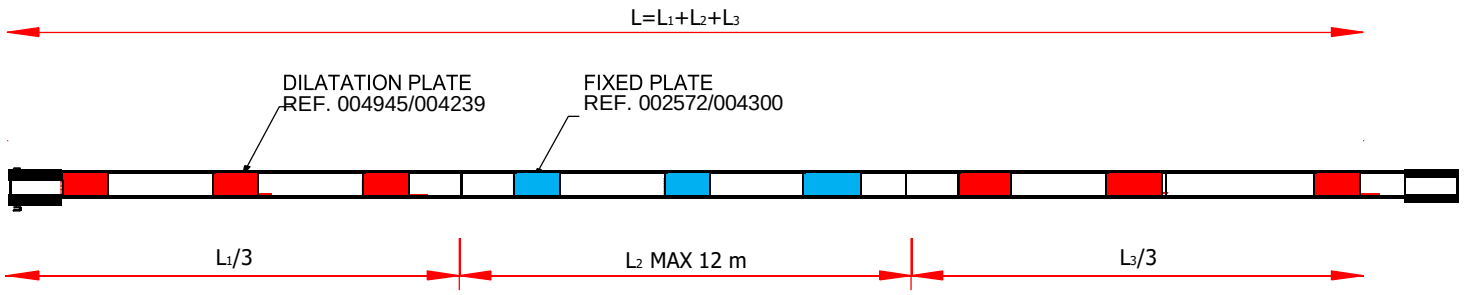


Fig. 6.4.3.2 - Example of arrangement of fixing plates

By way of non-exhaustive example, the data relating to the measurements carried out following the heating of the 3000 mm rail rod are reported.
It should be noted that the data reported here exclusively concern linear expansion, referring to the configuration shown in the figure:

	Δt = 0°C	Δt = 15°C	Δt = 30°C	Δt = 45°C	Δt = 60°C
ΔL	0 mm	2,6 mm	3,6 mm	4,7 mm	5,8 mm

To calculate the measurements not contained in the table you can use the following formula:

$$\Delta L = \gamma \cdot l_0 \cdot \Delta t$$

$\Delta L = l_f - l_0$ = elongation, $l_0 = 3000$ mm
$\Delta t = t_f - t_0$ = temperature increase, $t_0 = 20$ °C

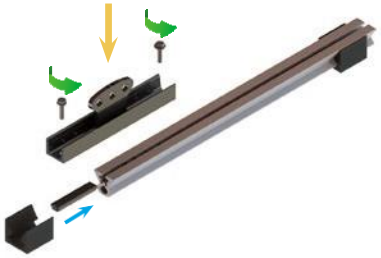
$\gamma = 23{,}4 \cdot 10^{-6}\ °C^{-1}$ = coefficient of thermal expansion of 6060 aluminum

The data shown in the table show a measurement error of about 1.5 mm compared to the pure analytical rule indicated above. It is therefore recommended to add the constant 1.534 when using the analytical formula.

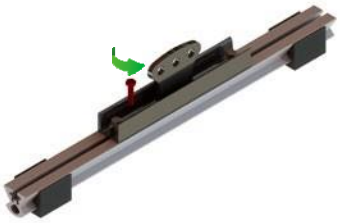
$$\Delta L = (\gamma \cdot l_0 \cdot \Delta t) + 1{,}534$$

6.4.4. Assembly of PZ Bracket

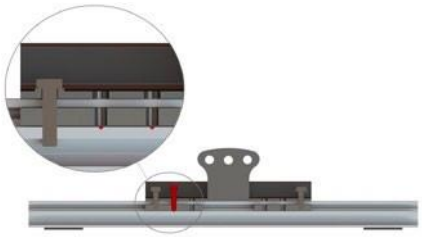
In case of use of the PZ bracket REF. 004731 as a fixing bracket, it is necessary to drill the core of the rail using the bolt with tip REF. 005204. Position the rail inside the "DRILLING SUPPORT" (REF. 005200) in order to ensure the stability of the rail and facilitate subsequent operations. Next, install the PZ bracket in the desired position using only the two end bolts and tightening with minimum torque in order to prevent the bracket from sliding and at the same time avoiding damage to the rail (fig 6.4.4.1.a) . Insert the pointed screw and tighten until the rail core is marked (fig 6.4.4.1.b - c). Subsequently, remove the PZ bracket and proceed with the drilling near the marking just carried out. Finally, re-install the PZ bracket with appropriate hardware.



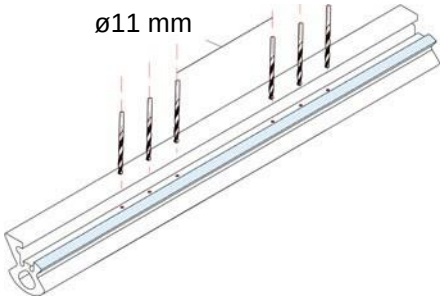
a) Support insertion and bracket positioning



b) Rail marking



c) Rail marking - section



d) Drilling

Fig. 6.4.4.1 – Drilling for PZ Brackets

Following the drilling, the two T-profile plates must be inserted into the rail and made to slide to the position of the holes just created (1). Then the PZ bracket will be applied (2) which will be bolted with T.E. M10x45 (3), fig. 6.4.4.2.
Please note that the use of the PZ REF. 004731 as a fixing bracket, requires the aid of a tie rod (see page 26).

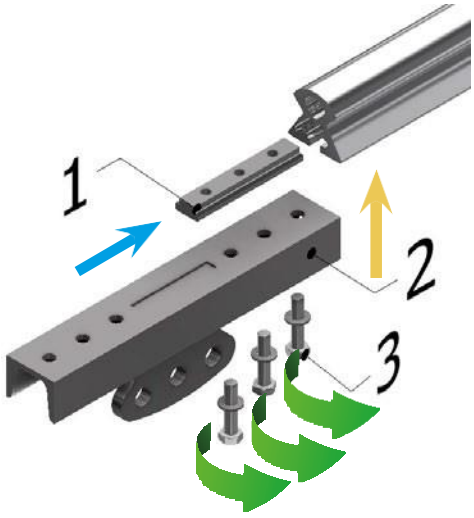


Fig. 6.4.4.2 – PZ Bracket Assembly

6.4.5. Brush Assembly

For installations in environments with excessive dust and in order to ensure adequate cleaning of the system and therefore the correct sliding of the traveller, it is possible to install the brush device REF. 004215 on each side (*fig*. 6.4.5.2).

To install the device on the traveller itself, it is necessary to remove the caps (**1**) and then proceed to screw the two T.S.E.I **M4x8** screws (**2**), fig. 6.4.5.1.

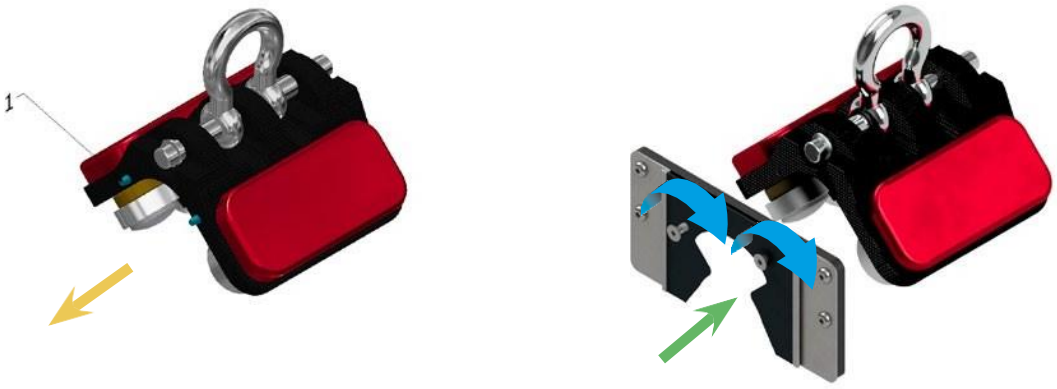


Fig. 6.4.5.1- Brush assembly

Fig. 6.4.5.2 - Assembly

6.4.6. Rail cap assembly

In order to avoid the intrusion of insects and stinging animals inside the Alurail L rail, Sicurpal recommends the use of the appropriate caps REF. 005128 to be installed at the ends of the entire system.

The assembly of the caps involves the use of two watertight stainless steel rivets Ø4.8x9.5 which will form the "flower" in the seat of the alignment pins. (see fig. 6.4.6.1)

Fig. 6.4.6.1

7. OPERATION AND USE

7.1. GENERALITY

The type D anchor device, model **ALURAIL L**, is a device that can be used by up to 4 (four) operators. The operator anchors himself to the device by inserting his connector into the mobile anchoring point, Alurail L Single Traveller.

The rail must only be used by authorized, competent and adequately trained personnel who have read and fully understood the instructions contained in this manual and who are in suitable physical and mental conditions.

The range of use of fall arrest devices falls into high-risk work in which incorrect selection, use or maintenance of the equipment could cause damage, serious injury or death.

Before start working at height, it is advisable to prepare a plan to deal with possible emergency situations that may occur during work.
Sicurpal S.r.l declines all responsibility in the event of accidents resulting from improper use of the fall arrest devices of the ALURAIL L type.

The devices must be used exclusively as individual protection devices (PPE) against falls.

The intended use of the product is only that indicated in this manual. Any use that does not comply with these warnings will invalidate the guarantee.

They are not suitable to use as:

- Support for fixing the radio-television antenna;
- Support for the handling of objects and / or materials;
- Lightning rod;
- Support for the passage of cables or technical systems of various types;
- Any other use than the proper use of a fall arrest system anchor.

The design of the anchor system configuration, carried out by the anchor system designer, must be done on the basis of the risk assessment. For safety, it is essential that the anchor device is positioned in such a way as to minimize the risks associated with the pendulum effect and the available air draught. In the presence of insufficient air draught, it is necessary to adopt adequate fall arrest systems, such as to reduce the stopping distance, combined with an appropriate positioning of the anchor system or the elimination of the risk of falling.
UNI 11560: 2014 defines **air draught** (TA or Tirante d'aria) "*the free space, starting from the fall point of the worker, necessary to compensate for the free fall (CL or Caduta Libera) of all the elongations / deformations of the anchor system and fall arrest, without the worker hitting obstacles during the fall, and which includes a possible safety margin (R)*".

In fig. 7.1.1 an example is shown for the calculation of the air draught.

Description:

a) Anchoring point:

$$TA = DA + R = CL + CF + R = LC - DR + CF + IP + R$$

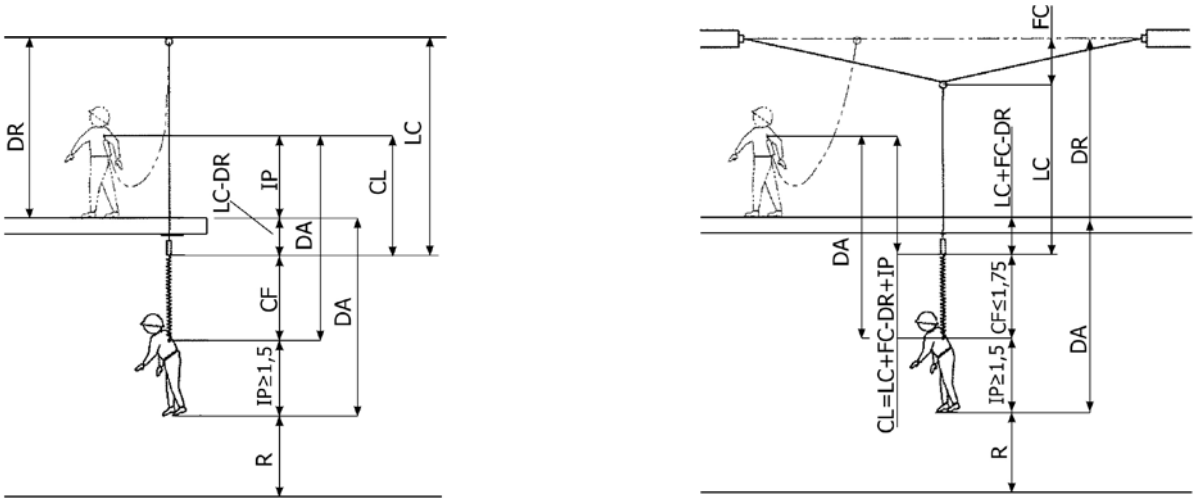
b) Linear anchor, lanyard and energy absorber:

$$TA = DA + R = CL + CF + R = LC + FC - DR + CF + IP + R$$

CF – Caduta frenata
(***slowdown fall***)

CL – Caduta libera
(***free fall***)
DA – Distanza di arresto
(***stopping distance***)
DR – Distanza tra l'ancoraggio e il punto di caduta
(***Distance between the anchor and the drop point***)
FC – Freccia della linea di ancoraggio
(***Deflection of the anchor line***)

IP – Distanza tra l'attacco dell'imbracatura e i piedi del lavoratore
(***Distance between the attachment of the harness and the feet of the worker***)
LC – Lunghezza del cordino
(***Length of the lanyard***)
R – Margine di sicurezza
(***Safety margin***)



Single anchor point

Anchor line

Fig. 7.1.1 - UNI 11560:2014 Air draught

Since the device is a fall arrest system, it is important to draw up a recovery plan that includes rescue maneuvers and emergency procedures to reduce the inert suspension times of the fallen worker.

The maximum number of users who can connect to the Alurail L Single Traveller is 1 (one). Each user must be anchored with his own connector directly to the Traveller.

Operators who use Alurail L devices must be informed and trained in the correct use of the anchor device in combination with the appropriate PPE fall arrest necessary to form the individual fall protection system. Fig. 7.1.2 shows the correct insertion of the connector in the mobile anchor point.

Fig. 7.1.2 – Correct insertion of the connector

For the safety of the user it is recommended to always use PPE tested in compliance with current regulations.
When using the linear anchor device it is always recommended to be extremely careful, in order to avoid falling or slipping into the void.
The worker is advised to use the Alurail L device in the presence of a second operator who must be able to intervene in an emergency, alerting the necessary help or intervening directly.

7.2. USE OF FALL ARREST SYSTEMS

ALURAIL L devices are suitable for use by operators and comply with the requirements of **UNI EN 363: 2008, UNI 11560: 2014** and **UNI 11158: 2015** standards and the provisions of Art 15 Legislative Decree 81/08 and subsequent amendments.
They are suitable for use in the following types of personal protection systems:

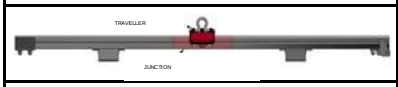
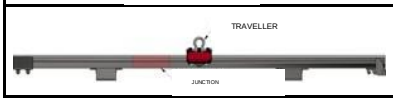
- Restraint systems;
- Work positioning systems;
- Rope access systems;
- Fall arrest systems;
- Rescue systems.

A protection system against falls from above is composed of the assembly of components intended to protect the worker against falls from above, including a body gripping device and a connection system, which can be connected to the anchor system.

7.2.1. Fall Restraint systems

A fall restraint system is an individual fall protection system that prevents the worker from reaching areas where there is a danger of falling from height.

Table of deflection in the event of an operator in restraint and / or positioning (70 kg).

CONFIGURATIONS	SPAN [mm]	DEFLECTION [mm]				
						
	1500	0	5	0	3	*
	4000	10	9	6	5	*
	500	4	5	5	6	*
	1500	5	0	0	0	*
	4000	9	2	9	10	*
	4000	16	5	8	10	*
	500	12	4	6	7	*

* PZ: the deflection may vary according to the type of ceiling fixing

The data shown in the table must necessarily be taken into consideration by the operator who will have to use the system with PPE of restrain and / or positioning.

7.2.2. Work positioning systems

A work positioning system is an individual fall protection system that allows the operator to work in tension or restrained, in such a way that falling from above is prevented.

7.2.3. Rope access systems

A rope access system is an individual fall protection system that allows the worker to access the workplace, supported in tension or suspension, in such a way that free fall is prevented or arrested. It will be the designer's responsibility to analyze the working method and above all the structure that will be used as fastening of the rail with a correct risk assessment. For rope work, the OMEGA bracket REF. 003984 is used with appropriate fixing according to the type of support. The recommended span of OMEGA brackets is 1500 mm / MAX 2000 mm.

Table of deflection in case of suspended operator anchored to the lifeline (125 kg).

	SPAN			
Table: Deflection at 125 kg OMEGA Bracket	**1500**		**2000**	
				
	3 mm	3 mm	3 mm	4 mm
	3 mm	6 mm	13 mm	6 mm
	8 mm	7 mm	10 mm	9 mm

7.2.4. Fall arrest systems

A fall arrest system is an individual fall protection system that stops free fall and limits the impact force on the worker's body during fall arrest.
Below is the summary table of deflection:

		SPAN			
Table of Deflection at 900 kg		**1500 mm**		**4000 mm**	
OMEGA BRACKET		 45 mm	 53 mm	 223 mm	 262 mm
L BRACKET		 53 mm	 53 mm	 317 mm	 317 mm
C BRACKET		 79 mm	 79 mm	 220 mm	 220 mm
S BRACKET		 59 mm	 59 mm	 400 mm	 400 mm
PZ BRACKET				 800 mm	

7.2.5. Rescue systems

A rescue system is an individual fall protection system that is used to arrest an employee in a fall, in such a way that free fall is prevented.

A rescue system:

- Avoid the free fall of both the rescued person and the rescuer during the rescue operation;
- Allows the rescued person to be raised or lowered to a safe place.
- This system has been designed to ensure operation even after a fall for the rescue of the operator with a load of 250 kg. The test was performed as an additional check to what is required by the standard by applying an additional static load of 200 kg to the 100 kg in suspension after the dynamic test of 900 kg for a duration of 15 minutes. The system did not have any additional breakages, failures or slippages compared to what is reported in the load / displacement tables.

8. SCHEDULE OF INSPECTION AND MAINTENANCE

The UNI 11560: 2014 standard provides for four types of inspection that the manufacturer implemented and applies as follows:

8.1. ASSEMBLY INSPECTION

The inspection of the components before assembly and of the system after assembly must be carried out by the installer in accordance with the instructions of **SICURPAL** as the manufacturer of the devices, the designer of the anchor system and the structural designer (UNI 11560:2014).

SICURPAL, as manufacturer, prescribes:

- To check, before installation, the expiration date of the chemical anchors, if to be used.

8.2. INSPECTIONS BEFORE USE

Before using **SICURPAL** anchor devices, visually perform the following preliminary inspections:

- Waterproofing
- Deterioration
- Oxidation / corrosion
- Deformation of components
- Abnormal deformation of the rail
- Tightening of nuts and bolts of visible devices

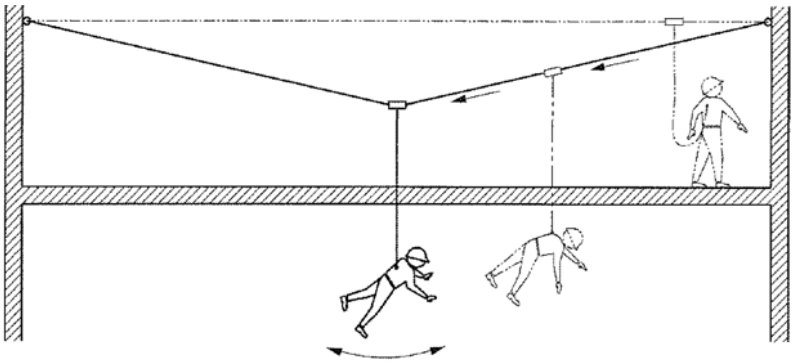
Given the complexity of the ALURAIL L system, the operator is obliged to carry out specific training courses for the installation and assembly of the system.

In the event that anomalies are found following the above-mentioned checks, the system cannot be used. It is also necessary to prevent access to other users and inform the client, who will have to withdraw the system from the service and, if necessary, restore it by requesting the intervention of competent personnel

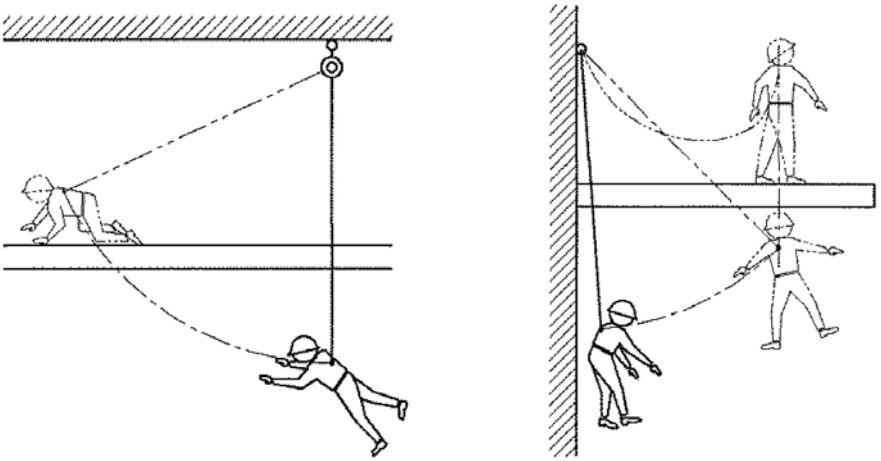
Before accessing the covering, the user must carry out a check on the air draught in all parts of the roof where there is a risk of falling, in order to eliminate, in the event of a fall, the risk of collision with the floor or other obstacle in the path of the fall. Before climbing onto the roof, make sure that there are environmental and climatic conditions that do not compromise the health of the user of the fall arrest system.

[12] By competent personnel we mean a person who is aware of the current inspection requirements before the use, periodic and extraordinary, of the recommendations and instructions issued by the manufacturer applicable to the relevant component, subsystem or system (UNI EN 365 § 3 "TERMS AND DEFINITIONS ")

The user must refer to *Technical Document* to check for the presence of a **pendulum effect** danger (see fig. 8.2.1) and for any special requirements.



Pendulum effect on linear anchor system



Pendulum effect with point anchor system

Fig. 8.2.1 – Pendulum Effect UNI 11560:2014

Failure to comply with these indications can lead to anomalous behavior of the device, including its damage. Before working at height, the installer must secure himself to an anchor point with suitable characteristics and comply with the occupational health and safety regulations.

8.3. PERIODIC INSPECTION

Periodic inspection of each anchor system must be performed by a competent person. **SICURPAL** recommends annual inspections as regards the devices, and at intervals recommended by the structural designer for the part concerning the structure's fastening system. In any case, the interval between two periodic inspections cannot be greater than 2 years for checks relating to the anchor system and 4 years for checks relating to the support structure and anchors (UNI 11560: 2014, see Plant Book).

It is advisable to check the bolts for tightness 12 months after assembly

For further information, contact your local authorized dealer or SICURPAL S.r.l.

8.4. EXTRAORDINARY INSPECTION

Following a report of a defect or a fall, the anchor system must be immediately put out of use. Subsequently, an extraordinary inspection must be carried out by **SICURPAL** or a company authorized by **SICURPAL**, in order to identify any necessary interventions to restore the performance characteristics of the anchor system, anchors and support structure.

8.5. MAINTENANCE

Maintenance must be carried out, if necessary, following an extraordinary inspection. If maintenance involves the replacement of components and / or interventions on the support structure, with the possible involvement of a qualified technician (UNI 11560: 2014), the maintenance technician must issue a declaration of correct execution of the required maintenance intervention, to confirm the system as suitable for use.

The re-commissioning of the ALURAIL L system must take place following final certification by SICURPAL or by a company authorized by SICURPAL.

9. WARNINGS AND RECCOMENDATIONS

9.1. INSTALLATION

9.2. USE

It is possible to install the devices of the **ALURAIL L** line only after evaluation, by a qualified technician, of the risks of falling from above and verification of the suitability of the structures on which the devices must be installed.	**SICURPAL** anchor devices must be used only and exclusively by persons authorized by the employer (or client) who have fully read and understood the instructions contained in this manual. They must also be informed and trained in the use of PPE category 3.
The qualified structural engineer must indicate the most suitable fixing method according to the type of base material, the dimensions and the mechanical characteristics of the load-bearing structures, on which the product must be installed, whose installation must take place according to the performance values provided by the manufacturer.	**SICURPAL** anchor devices must be used exclusively by people who have PPE compliant with the specific technical standards in force, which have regular maintenance and which have not exceeded the expiry period indicated by the manufacturer.
During the installation of **SICURPAL** anchor devices, it is strictly forbidden to use components other than those supplied without the authorization of the manufacturer.	The manufacturer is also relieved of any responsibility for accidents due to improper use of the system and failure to observe the warnings and recommendations in this manual. In this case the responsibility falls on the client and / or employer.
The installer must ensure that the materials and the support to fix the anchor devices comply and are suitable for the requirements set out in the Calculation Report.	The choice of PPE during the phase of use of the anchor devices must be carried out and indicated by the employer (or client) in the operational safety plan.
It is absolutely forbidden to create new holes, enlarge existing ones or modify the shape of the device without the written authorization of the manufacturer **SICURPAL**. Tampering the product will cause forfeiture of warranty.	

9.3. INSPECTIONS AND MAINTENANCE

In the event of deformation and damage, the anchor device must be replaced immediately. Any replacement of the products must be carried out by **SICURPAL** or by qualified and authorized personnel.

9.4. EARTHNG

In areas with risk of lightning, as per CEI 81-10 standard, connect the lower part of the support plate of the anchor device to an equipotential / earth circuit with a cable equipped with eyelet terminals of adequate section for protection from possible lightning strikes (in the case of Lifelines, the operation is to be made for every device). This operation must be performed by a qualified person authorized in accordance with the D.M. 37 of 22/1/2008.

10. MANUFACTURER'S INFORMATION NOTE

The information required by point 7 of the UNI EN 795: 2012 standard is listed below:

A) The **ALURAIL L** Type D anchor device can be used by **1 (one) operator** following certification tests according to *UNI EN 795: 2012*, max. **4 (four) operators** following the certification tests according to the Technical Specification *CEN / TS 16415: 2013*.

The **ALURAIL** Type D anchor system can be used by max. **4 (four) operators** following the certification tests according to the Technical Specification *CEN / TS 16415: 2013* and *UNI 11578: 2015.*

B) The anchor device can be used with fall arrest systems as long as the Personal Protective Equipment contains an energy absorber.

C) The maximum load that can be transmitted by the **Type D** anchor device is 15 kN in the vertical direction or in the horizontal position parallel to the roof and in each direction.

D) The maximum deflection value of the **ALURAIL L** Type D line is 20 cm.

E) See Chapter 7.

F) The anchor devices are composed exclusively of metal elements, therefore no additional information is required on the materials with which they were made.

G) Following each inspection, the verifier's stamp and signature must be affixed to the System Booklet or to the sign positioned near the access to the roof.

H) Not relevant - Type B anchor devices

I) i) At present there are no intermediate anchors with angles of 90 ° / 135 ° / 180 °.
ii) **ALURAIL L** Type D anchor devices could be used with retractable type fall arrest devices as long as they are tested by the manufacturer. Sicurpal has carried out tests only with CAMP Cobra 10mt devices. The same did not show operating problems compared to what was reported by the manufacturer of the retractable.
iii) The potential dangers that could arise when using the fall arrest system with **SICURPAL ALURAIL L** products are:

- fall from above with suspension of the operator,
- pendulum effect,
- collision with an obstacle beyond the edge of the covering due to insufficient air draught,
- vertical fall due to breaches of the covering,
- falling into open or breakable skylights and dormers.

There may be residual dangers which, depending on the type of coverage, need to be assessed in each specific case.

J) i) The anchor devices can be installed on roofing surfaces and / or floors to be secured with inclinations of up to 15 °.
ii) The manufacturer allows direct connection to the anchor line after installing a mobile anchor traveller by means of a connector (UNI EN 362: 2005).

K) Not relevant - Type E anchor devices

L) At the end of the installation, the installer must deliver to the customer the Declaration of Correct Assembly (Appendix A1 UNI EN 795: 2012) signed by him, as evidence and guarantee of the

correct and appropriate execution of the installation. It will constitute basic documentation for subsequent periodic examinations. It is the responsibility of the client to keep this documentation, for possible reading by the maintenance technicians / installers / users. A more detailed documentation will be kept by SICURPAL and can be consulted by making an appointment by calling n. 059818179.

According to Appendix A2 - Guide for documentation to be provided after installation, the documentation necessary for the customer's self-installation, must include:

- address and location of the installation;
- name and address of the installation company;
- name of the person responsible for the installation;
- product identification (name of the manufacturer of the anchor device, type, model / article);
- fastening device (manufacturer, product, permissible tensile and transverse forces);
- schematic installation plan and relevant information for the user / client, such as the arrangement of the anchor points.

The schematic installation plan should be posted at the access point to the building in such a way as to be visible or available to all.
The Declaration of Correct Installation provided by the installer must contain the following information regarding the anchor device:

- It has been installed in accordance with the installation instructions provided by the manufacturer;
- It was carried out according to the installation plan, above;
- Has been fixed to the specified substrate;
- Has been fixed as specified (number of bolts, correct materials, correct position, correct location);
- Was commissioned in accordance with the manufacturer's information;
- Has been equipped with photographic information / documentation.

It is recommended that if more than one anchor point is to be photographed for identification, the anchors are marked with numbers and that this numbering is incorporated in the inspection records of the anchor device and in the schematic plan of the installation area.

M) The anchor device must be used only for PPE. against falls and not for lifting equipment. For more detailed information on the subject, see chapter 2.1 "Warranty".

N) **ALURAIL L** devices do not include a fall indicator.

APPENDIX A

The article BEND REF. 004916 is currently out of stock.

For information regarding the supply of the curves, please send an e-mail before confirming the order to the following address:

RECIPIENT info@sicurpal.it
MAIL SUBJECT Art. 004916 Alurail Bend availability

SICURPAL will reply as soon as possible.

DICHIARAZIONE DI CONFORMITÀ

DECLARATION OF CONFORMITY

Il fabbricante Sicurpal S.r.l.
The manufacturer Sicurpal S.r.l.

Via dei Mestieri, 12 - Bastiglia (MO) - ITALIA
Tel. +39 059 / 818179 - Fax +39 059 / 909294
www.sicurpal.it - Info@sicurpal.it
P. IVA e CF 02399900360

Dichiara che i dispositivi di ancoraggio descritti:
Hereby declares that the described anchor devices:

ALURAIL L

E gli accessori indicati nel Manuale di istruzioni per il montaggio, uso e manutenzione.
And the accessories mentioned in the Instruction Manual for assembly, use and maintenance.

ALURAIL L - ED. 1 GIUGNO / JUNE 2021

sono:
comply:

With the norm EN 795:2012 - Type D

With the norm CEN/TS 16415:2017 - Type D

With the norm UNI 11578:2015 - Type D

Il legale rappresentante
The legal representative

Giampiero Geom. Morandi

Data / Date: 18 Giugno/June 2021

Ed. giugno 2021 - Rev.0

Sicurpal

Via dei Mestieri, 12
41030 Bastiglia (MO)
Tel. +39.059.818179
Fax. +39.059.909294
www.sicurpal.it
info@sicurpal.it