

■ Green Up the Roof!



TECHNICAL MANUAL

DiaSafe® Line Multi

Fall Protection Anchoring Systems

Anchoring devices permanently secured by layering sequence as per standards EN 795:2012 and CEN/TS 16415:2013





Table of contents

1	Description of symbols	3
2	Introduction – General description	4
2.1	Line wire-rope system	4
2.1.1	DiaSafe® Line Multi	4
2.1.2	Possibility of combinations	4
3	Safety instructions	4
3.1	General safety instructions	4
3.2	Application	6
4	Manufacturer's warranty	7
4.1	General terms of warranty	8
4.2	Expected lifetime	8
5	System design, components	9
5.1	DiaSafe® Line Multi wire-rope system	9
5.1.1	DiaSafe® Line Multi	9
5.1.2	DiaSafe® Multi / Wire-rope system components:	9
5.1.3	Recommended carabiner to connect to the system	10
5.2	DiaSafe® system accessories	10
6	Load bearing structure and ballast layer	10
6.1	Load bearing structure	10
6.2	Ballast material	11
6.2.1	Installation of the system in the case of ballast materials with various layer thicknesses	12
6.2.2	Uniform layer thickness	13
6.2.3	Varying layer thickness	13
7	Information on system installation and usage	13
8	System installation and annual inspection information	13
8.1	System installation and annual inspection	13
8.2	Information regarding required free fall height	14
9	Documentation	14
10	Technical data	14
11	Disposal	14
12	Manufacturer certification	15

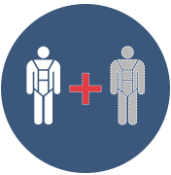
1 Description of symbols

Pictograms in the Technical Manual have the following meanings:



System users are obliged to carefully read this manual, installation guide and the related service book, and shall closely follow all relevant safety regulations and user requirements listed herein.

By their signature, they shall declare that they have understood the contents. The safety regulations and installation instructions must be strictly observed. In case of any ambiguities or questions, contact the supplier or the manufacturer.



Types of application of the fall arrest system based on the number of simultaneous users (in the standard case: 1+1 persons):

In case of 1+1 - persons - use (by 2 persons - including a first aider in case of rescue), the system can be used by 2 persons at the same time, but the fall arrest system provides only the required safety in case the fall of both persons does not occur simultaneously.



The use of personal protective equipment against falls from a height (PPE in accordance with EN 361 and EN 363) is required. The manufacturer's specifications for the use of personal protective equipment against falls from a height must be strictly observed



The fall arresting system can be used by more users simultaneously, so that maximum 1+1 users can be connected into each second span.



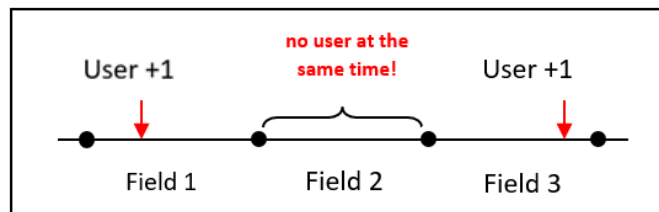
Danger, which could lead to severe injury or death.

2 Introduction – General description

2.1 Line wire-rope system

2.1.1 DiaSafe® Line Multi

The **DiaSafe® Line Multi** was developed as a horizontal wire-rope safety technical system based on the standards **EN 795:2012 (Type C)** and **CEN/TS 16415:2013**, for the simultaneous catch of max. **1+1 persons**, in every second post space, in case of max. 5° roof angle, permanently secured by layering sequence. The anchoring point can be used solely with personal protective equipment defined according to EN 363:2018.



2.1.2 Possibility of combinations

All types of **DiaSafe® Line** and **RoofX® Glide** safety systems (**RoofX®-C Glide**, **RoofX®-W/T Glide**, **DiaSafe® Glide**, **DiaSafe® Line Multi**, **Wall-Fix® Line Multi**, **Wall-Fix® Glide**) can be combined with each other in order to create a continuous wire-rope system that can be fixed to various surfaces. In such cases the system functions and number of permitted users shall be adjusted according to the least favourable conditions.

The highest manufacturing quality of the fall arrester anchoring systems is guaranteed by the manufacturer's quality management system complying with the standards ISO 9001:2015 and ISO 14001:2015, from the high-level product development through the selection of high-quality base materials up to the final quality control.

3 Safety instructions

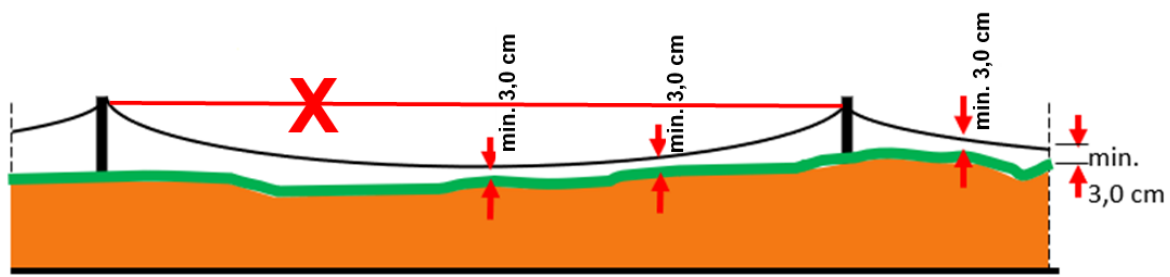
3.1 General safety instructions

- The installer is solely responsible for the professional installation of our fall protection systems. The system is to be installed and used in accordance with these instructions for use and assembly. The fitter should therefore be familiar with our system, e.g. through appropriate training, which we recommend.
- The user of the fall protection system must be familiar with and comply fully with local, safety and health and safety regulations.
- The system may only be used by people who:
 - are trained in the use of PPE (Personal Protective Equipment).
 - are physically and psychologically fit (health restrictions such as heart and circulatory problems, medication, alcohol consumption, etc. reduce user safety).
 - understood and accepted the possibilities, restrictions and risks of using the protective equipment.
- The rescue of persons involved in an accident must be ensured at all times by the workers' own means.

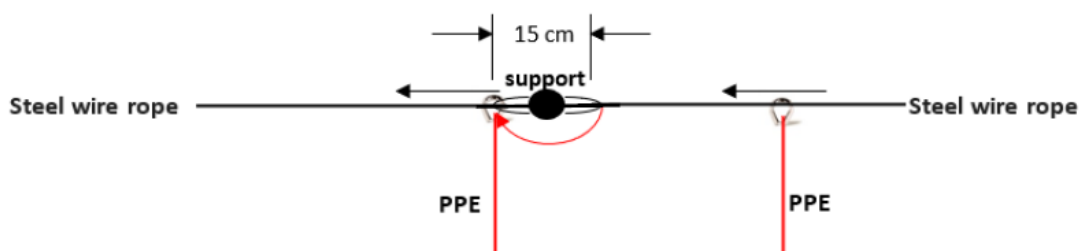
- Before works begin, measures must be taken to ensure that no objects can cause a fall down from the workspace. The area under the workspace (pavement, ...etc.) is to be kept clear and enclosed.
- If after the acceptance of the safety system, renovation work is undertaken in its immediate vicinity, it must be established that this renovation has no impact on the safety of the installed safety system! In case of doubt, the installer or the manufacturer must be consulted to clarify the case.
- It is forbidden to use the system until its inspection and complete or partial replacement, if the system has fulfilled its fall arrest function!
- After being subjected to the stress of fall, then the system may only be used again after a thorough check and a complete or partial replacement. Any use before the checks is forbidden.
- It is prohibited to carry out unauthorized modifications of the fall protections.
- It is prohibited to use the systems as lightning protection systems. The components of the lightning protection must not statically load the DiaSafe systems. The fall protection systems must not be used as air-termination systems; corresponding lightning protection standards must be complied with.
- Never hang loads on the safety system that are not approved in this manual, and never use it as an alpinist suspension point.
- The system is never to be used as alpinist anchoring points. The system shall not be loaded with any further weight different from its original purpose.
- We strongly recommend for the users' safety: The installation, inspection, and maintenance of the fall protection systems should only be carried out by a competent installer qualified to carry out the installation and inspection. This also includes system-related, completed testing. Alternatively, the examination can be carried out by an expert of the authorized authorities or examination institutions.
- A basic tenet of the effective operation of the fall protection anchoring system in the long term is regular maintenance - **at least every 12 months** in the manner prescribed by the manufacturer.
- If the maintenance work is not carried out, is incomplete or not carried out in time, the system may be used exclusively at the responsibility of the owner/operator.
- The timing of inspections recommended by the manufacturer in the instructions of the installed system (in individual cases) may also depend on the local legal requirements, on the frequency of use, and on local conditions (e.g. chemical damage, frequent lightning, etc.).
- The DiaSafe® system may be extended only through the use of original accessories, developed by the manufacturer of the system. The installation and use of parts or products from other manufacturers, even if their appearance is very similar, is strictly prohibited.
- The installer should make sure that the receiving structure is able to bear the load what comes with the system installation. If there is any doubt, consult with a structural engineer.
- The DiaSafe® fall protection anchoring system may be installed and used only according to the manufacturer's guidelines in the Technical Manual.
- If the system has fulfilled its fall arrest function, following a fall, the system must be immediately withdrawn from use. An immediate inspection must be performed before the system is used again. The system must be replaced entirely or partially depending on the findings of the inspection.
- If all pages of yearly checks in the Service Book are full, or the Service Book seriously damaged, or the Technical Manual is lost, get in touch with your distributor / dealer.

3.2 Application

- The Technical Manual should be read carefully, and the included manufacturer's notices and instructions must be observed before the use of the system. The Service Book does not replace the Technical Manual. You should thoroughly study the Technical Manual before starting to use the system.
- The minimum free space necessary under the edge is calculated as follows: **Deformation of the anchor device in case of stress + manufacturer's specification of the PPE (Personal Protective Equipment) used, including deflection of the cable + body height + 1m safety margin.**
- For installations higher than 1000 m above sea level, the distance between the posts will decrease by 30%, while the wire-rope sagging will increase by 30%.
- **Cable sag:** The cable sag may not reach higher than 3.0 cm above the roof surface. The lateral mobility of the rope shall be ensured at all times, and shall be checked before each use! Care must also be taken to ensure that the cable is not tensioned during installation.



- In heavy snowfall, the roof surface in the area of the fall protection system must be kept clear, so that the snow cannot affect the undisturbed functioning of this system.
- Proper use of the individual components, including the PPE must be ensured, since the effectiveness of the fall prevention system is otherwise not guaranteed.
- System checks should be carried out **at least once in every 12 months**. Check interval durations depend on relevant regional regulations, system use frequency, as well as local conditions (e.g. chemical hazards).
- Attachment to the fall protection system is completed with a carabiner (EN 362) and must be used with a PPE in accordance with standards EN 361 (safety harness) and EN 363 (fall arrest system).



- If the system will be used with a direct connection (a carabiner) or a traveller made by another manufacturer according to EN 362 as long as the traveller doesn't run through the column head-special care must be taken during the coupling. The required distance for the couplings is max.15 cm.
- In case of using personal protective equipment according to EN 360 or EN 365-2 special care must be taken, and the properties are the equipment needed to be taken into account in the calculations.
- **ATTENTION!** For horizontal use, only such connecting elements can be used which are designed for this purpose and tested for the respective edge type (sharp edges, trapezoidal sheet, steel grinders, concrete, etc.).

- The national regulations of the employers' liability insurance association must be observed. In case of unsuitable weather and wind forces exceeding the "usual" level (approx. 5.5 to 8.0 m/s = fresh breeze), fall protection devices must NOT be used. The relevant data should be obtained from the responsible weather service.
- DiaSafe® systems should only be used in a frosted environment if they have been installed in unfrosted conditions or if at least one unfrosted period has elapsed between installation and first use. If safe use of the system in frost is not guaranteed, it must not be used.
- The fall protection system must not be used by children or pregnant women.
- In the EN795 standard an installation document has needed to be made since 2012, for every anchoring system. This documentation must include detailed information about the following: location, company carrying out the installation, installer responsible, system installed. Also there must be a Delivery/receipt record completed (it is found in the Service Manual), which verifies that the installation has been performed professionally in accordance with standards. Furthermore, there must be drawn up construction plan, which shows the places of the anchoring points and the steps of installation must be photographed as well. Special care must be taken with elements of the anchoring system which are going to be covered after the installation. If, on a given location, there are separate roof areas and different types of anchoring systems are installed, a distinct documentation must be made for each roof area and each system.

4 Manufacturer's warranty

- The Manufacturer's warranty covers only the product failures that were generated during production. In such a case, the manufacturer shall replace faulty or damaged components in the frames of a justified warranty claim. The following are not the subject of a so-called manufacturer's warranty: natural wear and tear, improper use, environmental influences, and complaints resulting from aesthetic changes.
- Because of the unknown site conditions, the manufacturer assumes no responsibility for the warranty about damage caused by diversion from the Technical Manual (improper use, incorrect installation or other reasons).
- A major prerequisite of long-term fall protection system operation is regular maintenance as prescribed by the manufacturer and the standards. Should maintenance steps fail to be executed in due time, then the system can only be used for own risk. Should any damage or accident happen on an unchecked system, the manufacturer's responsibility shall terminate.
- DiaSafe® systems can be extended using original accessories developed exclusively by the manufacturer. Should any components or products of any other manufacturer be installed or used in the system, manufacturer's responsibility and guarantee terminate immediately.
- Should the system not be installed or assembled by the manufacturer instructions or a contractor authorised for installation, the manufacturer shall accept no claims, other than for faulty products.
- Should a fall occur, the system must be discarded, and it is PROHIBITED to use it any longer! System use can only be resumed after an official interim inspection. In accordance with the inspection, relevant system components or the whole system must be overhauled or replaced. As long as the distraint or the inspection is not carried out, the manufacturer is not liable for the use of the system any longer.
- Manufacturer shall cease to take any further warranty for the system in the following cases: damage and alterations due to environmental conditions, normal wear and tear, misuse and an aesthetic alteration.
- Particular attention has been paid to producing these instructions. However it is not possible to show all the potential versions and these instructions do not therefore claim to be exhaustive. DIADEM® APP GmbH shall not be liable for any usage or application error, which may arise from the misinterpretation of the methods shown here.



4.1 General terms of warranty

For the DiaSafe® fall protection anchoring systems range, we undertake a General Manufacturer's warranty of **60 months**, valid from the day of the sale of the product by Manufacturer.

The warranty does not cover:

- Any loss of time, inconvenience, administrative costs or any other consequential damages suffered by the owner/maintainer as a consequence of a malfunction under warranty.
- Repair or replacement of spare parts, due to the following causes:
 - Wear and tear from normal use.
 - Damage or alteration due to negligence or improper use.
 - Activated fall arrest function, requiring replacement or any modification of the system, or of any part thereof, without the manufacturer's approval.
- Any modification of the system, or of any part thereof, without the manufacturer's approval.
- Uses not intended or expressly prohibited by the manufacturer.
- Damage caused by the user's physical condition or health (with special regard to the weight limit: 130kg/person) and thus improper use.
- Damage caused by the owner/maintainer's failure to adequately maintain, service or repair any part of the system.
- Other causes, such as: damage due to extreme environmental impact; natural wear and tear, aesthetic alteration, etc.

Loss of warranty rights, including, among others:

- Damage occurring following incorrect installation of the product, or installation not following the guidelines.
- Loss of function and other faults due to improper use.
- Deterioration, structural damage, loss of function of the installed product due to external impact.
- Loss of function or structural damage due to natural causes (lightning strike, snow, or ice stress, earthquake etc.).
- Evidence of damage caused by unauthorised and/or non-professional repair, mounting, or impact.

4.2 Expected lifetime

The DiaSafe® safety systems maximum lifetime is **25 years** from the date of correct installation – In case of the intended use, optimal condition, and without any visible damage.

The actual life expectancy - under proper use - is expected to be longer than the specified period if it is not affected by natural wear and tear that influences proper operation. These provisions are based on the current state of the art, and on previous findings and experience.

Although this is not a guarantee, it is an important argument from an economic point of view regarding the expected service life of the system.

A prerequisite for compliance with the specified life expectancy is annual maintenance of the system by qualified personnel in accordance with regulations.

This must be verifiably demonstrated by a complete, detailed registration. For this purpose, it is recommended to use the manufacturer's registration system.

This is another prerequisite for any warranty claims.

If this is not done, the manufacturer shall be relieved from any liabilities. In this case, the liability remains with the executing contractor.

5 System design, components

5.1 DiaSafe® Line Multi wire-rope system



5.1.1 DiaSafe® Line Multi



Post structure: DS Multi anchor post + DS amoeba-shaped damping plate late with ballasting mat (3x3 m)

Properties: no need to break through the layering sequence of the roof to perform the installation

Load direction: : 360° (horizontal)

Material: Stainless steel 1.4404 (anchor post), glass-fibre reinforced plastic (amoeba-shaped damping plate)

Fixation: specified ballast material (detailed in Point 6)

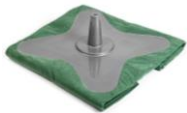
Min. distance of posts: 1,5 m

Optimal distance of posts: 7,5 m (max. 8 m)

Standard height: 300 mm

Custom sizes can be ordered (300-1200 mm)

5.1.2 DiaSafe® Multi / Wire-rope system components:



DS amoeba-shaped damping plate with ballasting mat (3 x 3 m)

Product No.: 100560

Material: glass-fibre reinforced plastic and polypropylene

Size: 3 x 3 m



DS Multi anchor post

Product No.: 100316

Material: stainless steel 1.4404

Size: Ø250 mm x 300 mm



DS Multi fixing head oval

Product No.: 100322

Material: stainless steel 1.4408

Size: Ø28 x 60 mm

Included: DIN 912 M10 x 20 mm grub screw



DiaSafe-Loop

Product No.: 100596

Material: stainless steel 1.4408 e-polished

Size: 29 x 29 x 29 mm



DS stainless steel wire-rope

Product No.: 100268

Material: stainless steel 1.4404

Diameter: Ø8 mm (7 x 19)

Tensile strength: F = 33.4 kN



DS Wire-rope terminating shrinkable tube

Product No.: 090845

Size: Ø9 mm

5.1.3 Recommended carabiner to connect to the system



Applied standard: EN 362:2013
Max. diameter: Ø12 mm

5.2 DiaSafe® system accessories



DS amoeba-shaped damping plate with ballasting mat (5x5m)
Product No.: 320324
Material: Glass-fibre reinforced plastic



DS Auxiliary rising attachment
Product No.: 100304
Material: Glass-fibre reinforced plastic



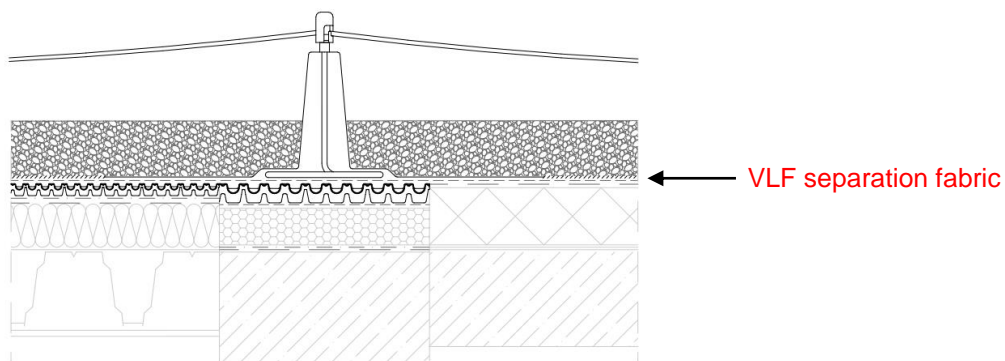
DS Signal cone
Product No.: 100373
Material: Glass-fibre reinforced plastic

6 Load bearing structure and ballast layer



6.1 Load bearing structure

DiaSafe® systems were tested and examined on a number of surface types and structures (roofs with steel, reinforced concrete and wooden structure). Their performance is controlled on the most prevailing waterproofing materials (bituminous, PVC, TPO or EPDM) and roof panes. The system is applicable on any roof system which is able to bear the extra load originating from the installation and use of the system.



Warning!

The system cannot be installed on substructure with uncompressed grained or rolling structure (e.g.: gravel or planting medium).

6.2 Ballast material

The stability of the system is ensured by the ballast layer which can be a planting medium for a green roof, otherwise gravel surfacing or other bulk material. DiaSafe® anchoring points can be used on roofs with a maximum 5° slope angle.

It shall be ensured that the surface weight of the ballast layer in a dry state on the entire surface of the ballasting mat:

by 1+1 persons:

- should be 80 kg/m² at least when applying DS amoeba-shaped damping plate (3x3 m)
- or minimum 720 kg per post
- thickness of the ballast layer is minimum 3 cm in any case

NUMBER OF USERS	1+1
standard mat size	3 x3 m
surface weight	80 kg/m ²
total weight per post	720 kg

Standard mat sizes belonging to the anchor points are 9,0 m² (3×3 m). The specified minimum ballast layer thickness of a minimum 3 cm shall always be ensured. When applying custom mat sizes, the minimum ballast surface weight shall be determined according to the Technical Manual to which assistance is provided by the table series below. The given mass is to be understood in dry condition!

1+1 users

Mat size	Total weight	Surface weight	Layer thickness: gravel, sand $\gamma = 1600 \text{ kg / m}^3$	Layer thickness: planting medium $\gamma = 1000 \text{ kg / m}^3$	Layer thickness: planting medium $\gamma = 800 \text{ kg / m}^3$
m ² (m × m)	kg	kg/m ²	cm	cm	cm
4.0 (2 × 2)	720	180	10.5	18.0	22.5
6.0 (3 × 2)	720	120	7.0	12.0	15.0
9.0 (3 × 3)	720	80	5.0	8.0	10.0
12.0 (3 × 4)	720	60	min. 3.5	6.0	7.5
16.0 (4 × 4)	720	45	min. 3.0	4.5	6.0
20.0 (4 × 5)	800	40	min. 3.0	4.0	5.0
25.0 (5 × 5)	875	35	min. 3.0	3.5	4.0
30.0 (5 × 6)	900	30	min. 3.0	3.0	3.5
35.0 (5 × 7)	1050	30	min. 3.0	3.0	3.5
40.0 (5 × 8)	1200	30	min. 3.0	3.0	3.5

The given γ gross densities (specific weights) must be checked on site!

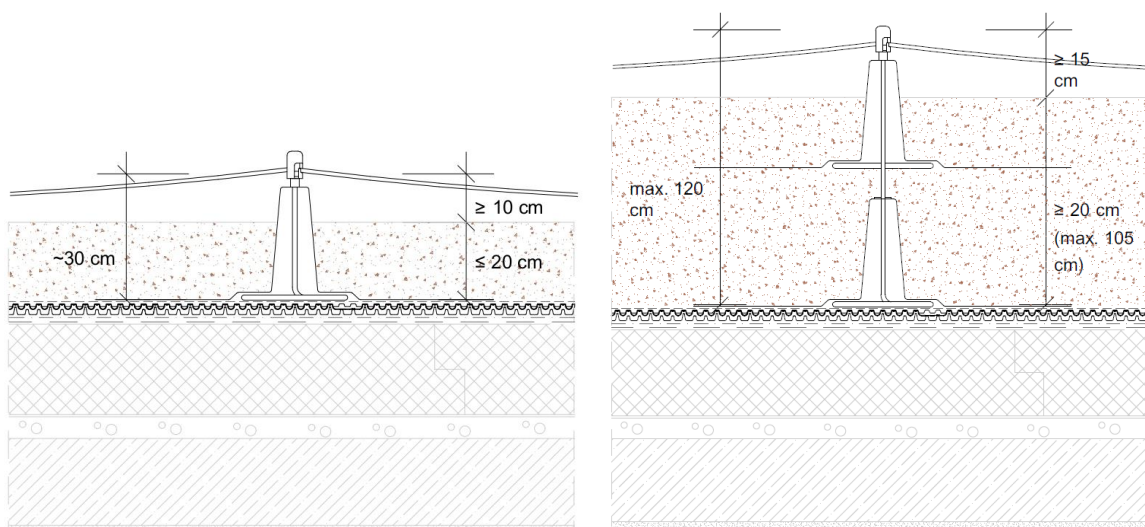
If the surface of the ballasting mat shall be increased, application of an auxiliary ballasting mat is required. If the surface of the ballasting mat shall be reduced for geometric reasons, the standard ballasting mat must be folded back to the appropriate size or cut, but in this case, the minimum distance of the mat measured from the centre point of the damping plate cannot be smaller than 50 cm at any

point, and special attention shall be paid to the existence of the appropriate ballast weight. It is prohibited to cut or damage the glass-fibre reinforced plastic in any way.

Warning!

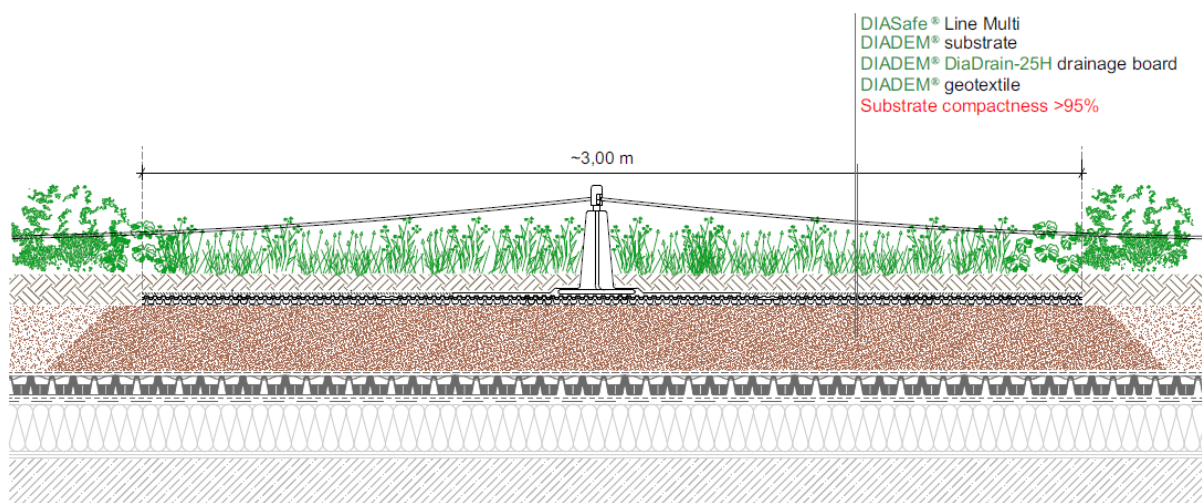
Because the thickness of the ballast layer may change over time (people walk on it, it is eroded by wind or rain etc.), the actual layer thickness must be controlled before each use by visual inspection at least. The ballast layer must always cover the ballasting mat on the entire surface. In case of inadequate layer thickness, additional ballast material is required. The various types of ballast materials (substrate, gravel etc.) can be combined within one system; in such a case uniform weight distribution of the mixed ballast materials shall be ensured. This help is provided by the marking placed on the anchor post of the damping plate, which is described in detail in the Installation Guide.

6.2.1 Installation of the system in the case of ballast materials with various layer thicknesses



Thickness of ballast material ≤ 20 cm

Thickness of ballast material ≥ 20 cm



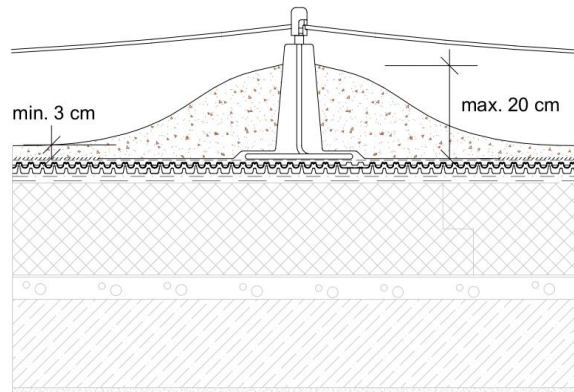
Layer thickness of the ballast materials on green roofs can be different. If thickness of the ballast layer is maximum 20 cm or less, the system can be installed in the regular way. For larger layer thickness, the system can be installed as shown in the picture above. This applies both for the wire-rope and single systems.

6.2.2 Uniform layer thickness

Basically, the uniform weight distribution of the ballast materials shall be ensured. Only the minimum layer thickness shall be ensured. The top of the post of the DiaSafe® systems shall be at least 10 cm above the surface of the ballast layer.

6.2.3 Varying layer thickness

Uneven ballast layer is permitted under observance of the load parameters.



7 Information on system installation and usage

- The system guarantees full-scale safety for the user, regardless of the sag of the wire.
- The sag of the wire may change during the lifetime of the system, e.g. due to the mounting actions, thermal expansion or other dynamic effects. It is important that the DiaSafe® systems are not preloaded systems, the wire does not need to be entirely tight, on the contrary, overtight wires originating from the incorrectly adjusted sag of the wire disadvantageously affect the efficiency and durability of the anchoring system.
- If posts of the system are distorted due to the incorrect wire tension during or after the installation, it means that the system was overstretched.
- Such bending of a post due to mounting, thermal expansion or other dynamic effects means solely an aesthetic change to the system, it cannot be subjected to manufacturer's warranty procedure.
- The system is capable to accomplish its function even in the above cases.
- When using according to the respective intended use, the fixing element of the post head of the Multi system can be used - released and then fixed again - safely so many times on the occasion of the mandatory check before maintenance, inspection and use, until no tear of a filament on the wire can be experienced and the clamping bolt can be operated as intended.

8 System installation and annual inspection information

8.1 System installation and annual inspection

- For the commissioning of the system, the Service book and the handover protocol shall be completed in compliance with the test criteria. The validating sticker shall be placed on the control label.
- The annual inspection shall be documented in writing. The test criteria and detailed information are included in the Service book. Based on the international guidelines and the manufacturer's instructions, the inspection shall be performed without a test load.
-



8.2 Information regarding required free fall height

To appropriately fulfil the fall arresting function of the system it is required to consider the correct free fall height both for planning and before being put into service. To consider this, assistance is provided by the respective existing provisions.

Warning!

The system shall not provide a fall arrest function if the free fall height is below the min. 6,25 m. Displacement of the anchorage point and elongation of the safety rope must be taken into account in all cases.

9 Documentation

The manufacturer provides documentation for each **DiaSafe®** system attached and in digital, downloadable form. The installed falling arrest system can be registered on the **DIADEM® Online** (reg.diadem.com) registration interface. The Service Manual is prepared during registration.

Parts of the documentation:

- Technical Manual (printed or downloadable)
- Installation Guide (printed or downloadable)
- Service Manual (furnished with individual serial number) (printed):
 - Handover protocol
 - Checking protocol
 - Validating decal
- Control label (printed)

At the annual inspection, the expert performing the inspection is obliged to place the sticker validating the appropriate state of the installed fall arresting system on the control label of the system.

Warning!

In lack of a validly filed and logged Service Manual and/or Online System Registration the state of the system becomes uncontrolled and its functionality becomes uncontrollable. This completely excludes the Manufacturer's responsibility for eventual damages, faults or injuries.

10 Technical data

Maximum forces and displacements (Temperature: 20 °C):

System	Type	Test	Deflection [mm]	Max. Force Post [kN]	System build-up
DiaSafe®	Multi	Dynamic	2452	6,81	Line Multi (8m LINE)
DiaSafe®	Multi	Static	-	13,76	Line Multi

Sufficient clearance under the usage area shall be ensured in any case! Depending on the length of the wire, the displacement may highly deviate from the data specified by the manufacturer.

11 Disposal

Do not dispose of the used safety system in the house waste. Local regulations should be followed in all cases.

12 Manufacturer certification



The **DiaSafe®** fall protection systems have been tested and certified by TÜV Austria Services GmbH.



Copyright:

DIADEM®, DiaSafe® and RoofX® are registered trademarks! This technical manual is the intellectual property of the manufacturer, the use of its content in any form for business purpose, without the previous authorization of the manufacturer is strictly forbidden.

Manufacturer and distributor of the DiaSafe® and RoofX® systems:

A.P.P. Kft.
H-9028 Győr
Fehérvári út 75.
T: +36 96 512 910

www.diadem.com

APP Dachgarten GmbH
Jurastrasse 21
D-85049 Ingolstadt
T: +49 841 370 9496

www.grundach.com
info@diadem.com

Diadem CH AG
Riedstrasse 7.
CH-6330 Cham
+41 79 516 20 62

www.diadem.ch