
WINGRIP
BY LATCHWAYS
Fall protection for the
Boeing C-17

The C17 Wingrip®
Fall Protection System

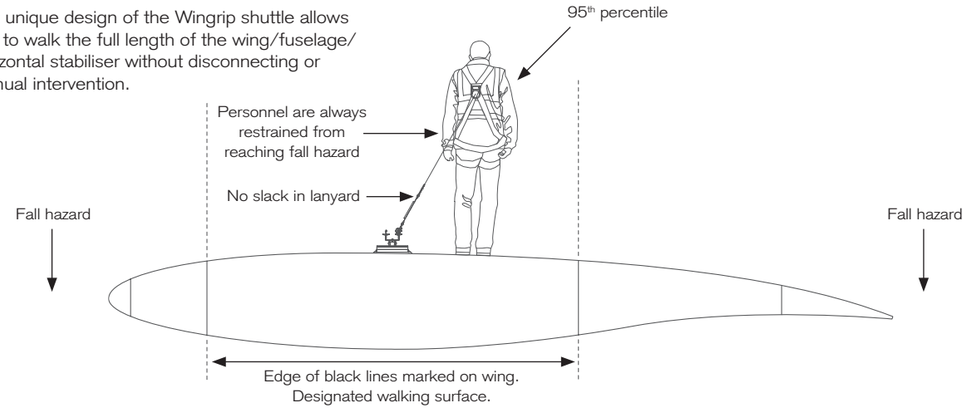
The Latchways Wingrip System has been selected by Boeing as the method of fall protection for the C17.

- Wingrip exceeded the required performance parameters in all test conditions.
- Wingrip is a truly versatile system allowing safe access to all areas of the aircraft.
- Wingrip is quick and easy to install.
- Wingrip is designed and manufactured by Latchways, the world leader in the field of engineered fall protection.

Wingrip in use

The performance criteria of the Wingrip system on the C17 are:

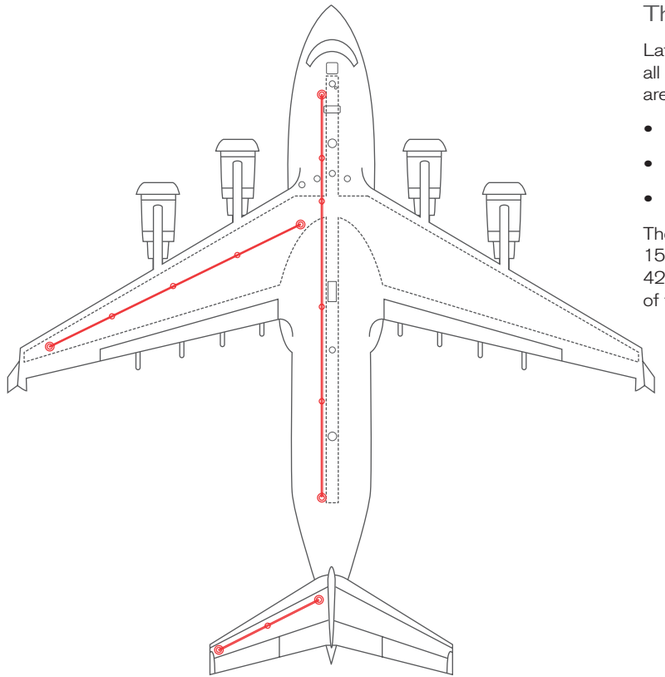
- The horizontal lifeline system (HLL) is certified for fall arrest however best practice dictates that it should be used as fall restraint.
- The system should be positioned to ensure that users are not exposed to a fall hazard.
- The system capacity is four users, two people on each of the twin cables.
- The unique design of the Wingrip shuttle allows you to walk the full length of the wing/fuselage/horizontal stabiliser without disconnecting or manual intervention.



The installation process

The installation process for the system is quick and easy.

- Attach the air or nitrogen supply to the vacuum module and position it at either ground level or on the maintenance stand depending on which section of the aircraft needs to be accessed.
- Install the first end anchor pad, perform vacuum check, then using the flying pad and twin lanyard, use the ‘three pad loop method’ (see installation manual) to install remaining intermediates and end anchor, i.e. use the flying pad to remain attached to the aircraft at all times, leapfrogging the pads in the line system. Perform a vacuum check on each pad as you go.
- Connect the turnbuckle and energy absorber to end anchor pads and insert cable into the intermediate pad bracket.
- Tension each cable with turnbuckle until disc spins freely (indicating the correct tension has been achieved).



The Wingrip system and the C17

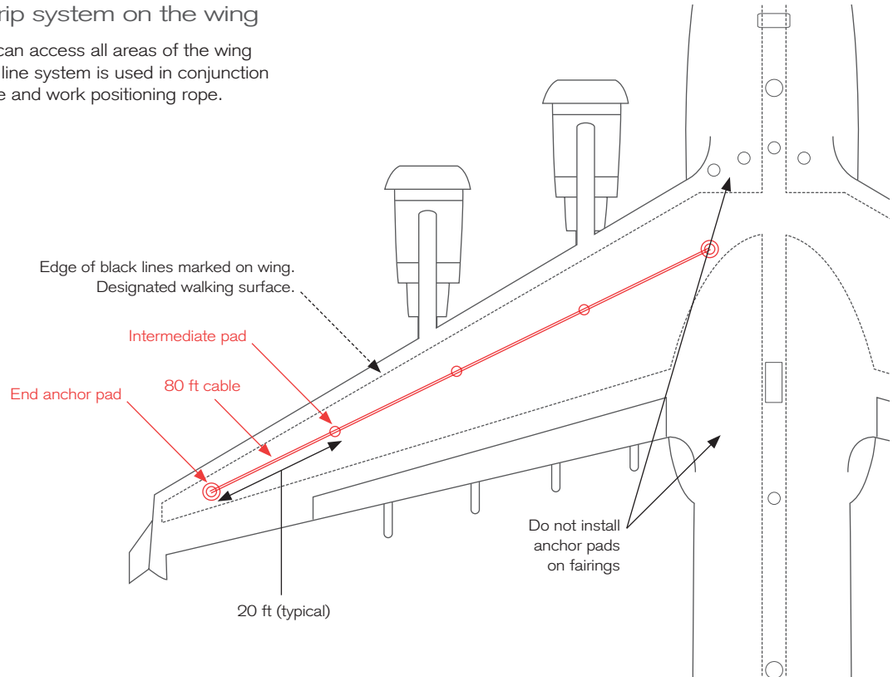
Latchways have worked with Boeing to formulate an all encompassing system kit that covers the three main areas of maintenance on the C17:

- An 80ft system for the main wing surface
- An 80ft system for the top of the fuselage
- A 30ft system for the horizontal stabiliser.

The Latchways part number for the system is 15917-00 and the NSN reference is 4240-99-275-5283. This kit allows any one of the three configurations to be set up at a time.

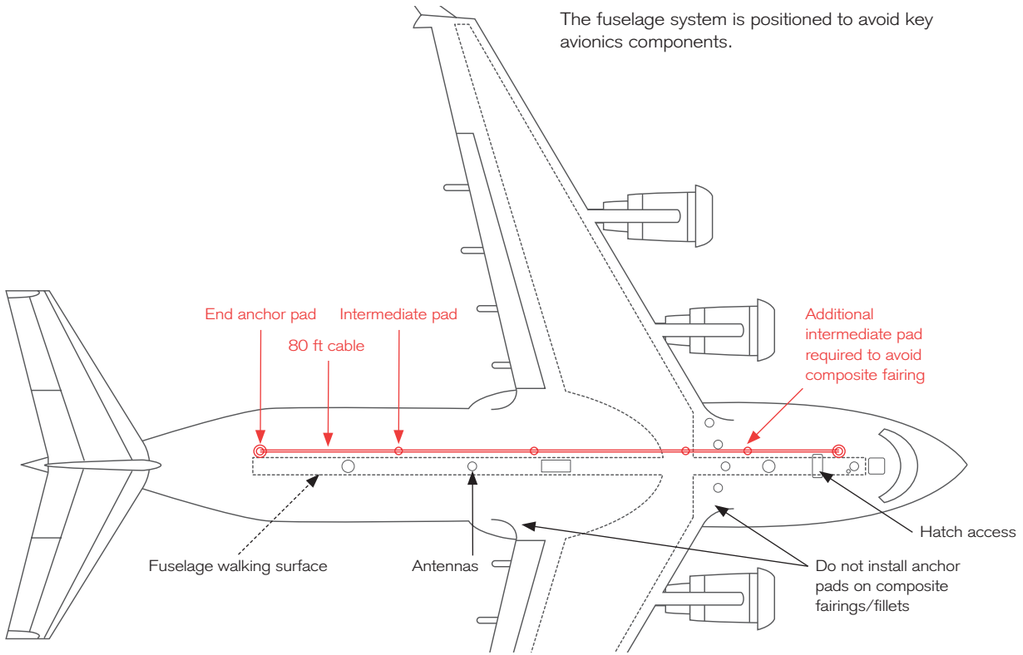
The Wingrip system on the wing

Four workers can access all areas of the wing when the twin line system is used in conjunction with the shuttle and work positioning rope.



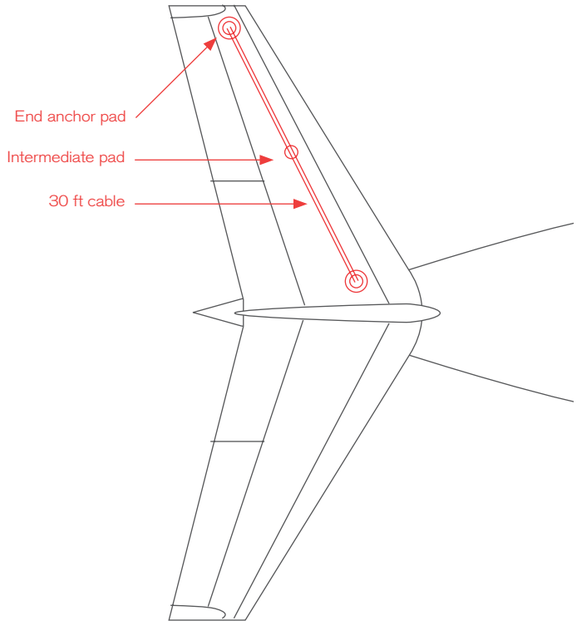
The Wingrip system on the fuselage

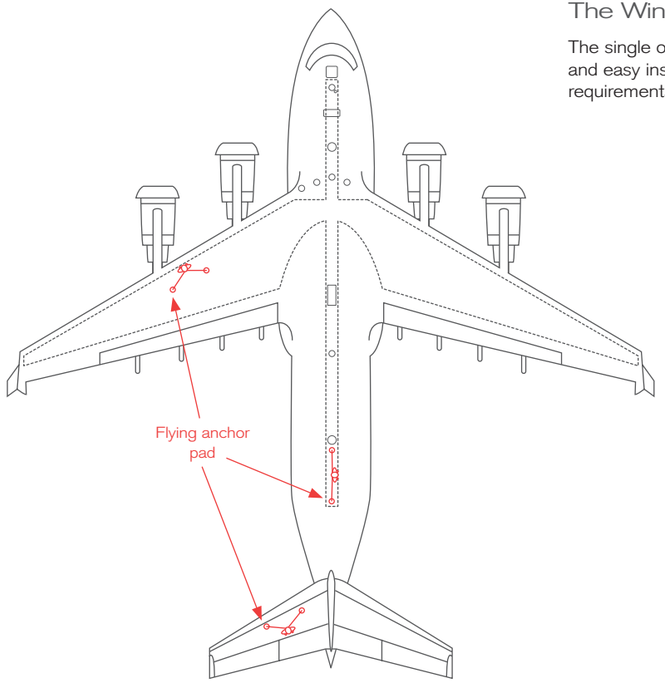
The fuselage system is positioned to avoid key avionics components.



The Wingrip system on the stabiliser

The Wingrip system on the stabiliser is used in a similar way to the wing system.





The Wingrip flying pad system

The single or twin pad system allows for quick and easy installation for temporary maintenance requirements.

Wingrip assurance

- Latchways plc, the manufacturer of Wingrip, builds strong working relationships with its customers.
- Latchways provides a complete service package; from design, testing and certification of the Wingrip system through to installation/user training and long-term global service and support.
- The Wingrip system is independently tested and rated for fall arrest with a safety factor of two.
- The Wingrip system is OSHA/ANSI and EN 795 compliant. CE certification and full test reports are available.

The Inventory of Componentry under 15917-00 and NSN reference 4240-99-275-5283

Vacuum Module	1
End Anchor Pad	2
Intermediate Pad	4 (3 for wing & 4 for fuselage)
Flying Anchor Pad	1
80 ft HLL Cable Assembly	2 (For Wing/Fuselage)
30 ft HLL Cable Assembly	2 (For Horizontal Stabiliser)
Line Tenser	2
50 ft Vacuum Hose	1
20 ft Vacuum Hose	6
HLL Energy Absorber	2
Shuttle with Shock Absorber	4
Single Lanyard	4
Twin-Lanyard	1
Case	2
Nitrogen Cart Adaptor	1

Vacuum module

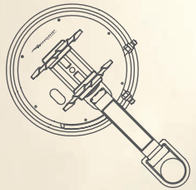
The vacuum module is powered by compressed air or nitrogen with no requirement for electricity and so is intrinsically safe for 'open fuel tank' environments. It generates a vacuum and monitors the incoming air pressure and the vacuum level. If the vacuum or air pressure levels drop below the minimum a warning air horn sounds, however the pad will remain securely attached for twenty minutes.

Flying anchor pad

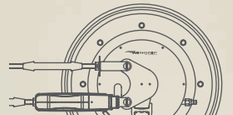
The Wingrip flying pad or single pad can be used as a single point anchor (for one person) or for the set up or removal of the twin cable system. The pad takes seconds to reach full vacuum so is perfect for quick maintenance tasks.

Intermediate pad

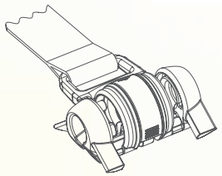
A distinctive bracket is attached to the intermediate pad which allows the cables to be retained securely whilst allowing the shuttle to pass through it without having to disconnect.



End anchor pad



The end anchor pad used in the twin line system has to withstand the greatest loads. It therefore has a larger surface area than both the intermediate and flying anchor pads (these smaller pads are the same size but with different attachments).



Shuttle

The shuttle connects to the Wingrip cable and glides through the intermediate pads avoiding the hazard of having to disconnect and reconnect at each intermediate. An energy absorber is attached to the shuttle which reduces the load to the operative in case of a fall.

Cable and spooler

The stainless steel cable is coated which removes any metal on metal contact with the aircraft. It is swaged into a threaded section so it can be connected to the system, the integrity of the swage being easily checked via a swage slip indicator.

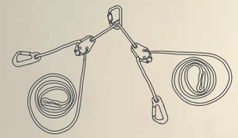
The cable spooler stores the cables neatly allowing simple deployment.

Single lanyard

The Wingrip lanyards are a unique design and should only be used for connecting to Wingrip devices. The attachment karabiner is rubber coated eliminating any metal on metal contact with the aircraft. The lanyard ensures the user is ‘restrained’ by lengthening or shortening the rope using the rocker device.

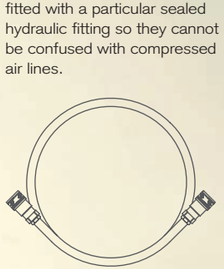
Twin lanyard

The twin lanyard has two ropes enabling the ‘three pad loop’ (see installation manual) method to be employed during set up or removal of the twin cable system. Similar to the single lanyard it has an adjustable rocker device and a rubber coated attachment hook eliminating metal on metal contact and any potential damage to the aircraft.



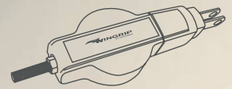
Vacuum hose

The vacuum hoses are bright red to aid visibility and are also anti-crush so if compressed in any way the flow of air is unaffected. The hoses are fitted with a particular sealed hydraulic fitting so they cannot be confused with compressed air lines.



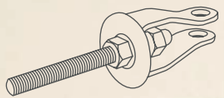
Energy absorber

The energy absorber is designed to reduce the load to the end anchor during a fall. The load experienced will be less than half of the capability of the end anchor giving a safety factor of 2.



Turnbuckle

The turnbuckle is used to put tension into the cables using a left and right hand thread.

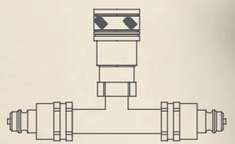


Line tenser

The line tenser is used in the cable system, spinning freely when the cables are correctly tensioned. This is important to ensure the cable deflection is controlled.

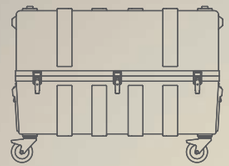
T adaptor

The T adaptor is fitted to all pads in a line system allowing a spare attachment point for the flying pad which is required during the set up and removal of the system.



Cases

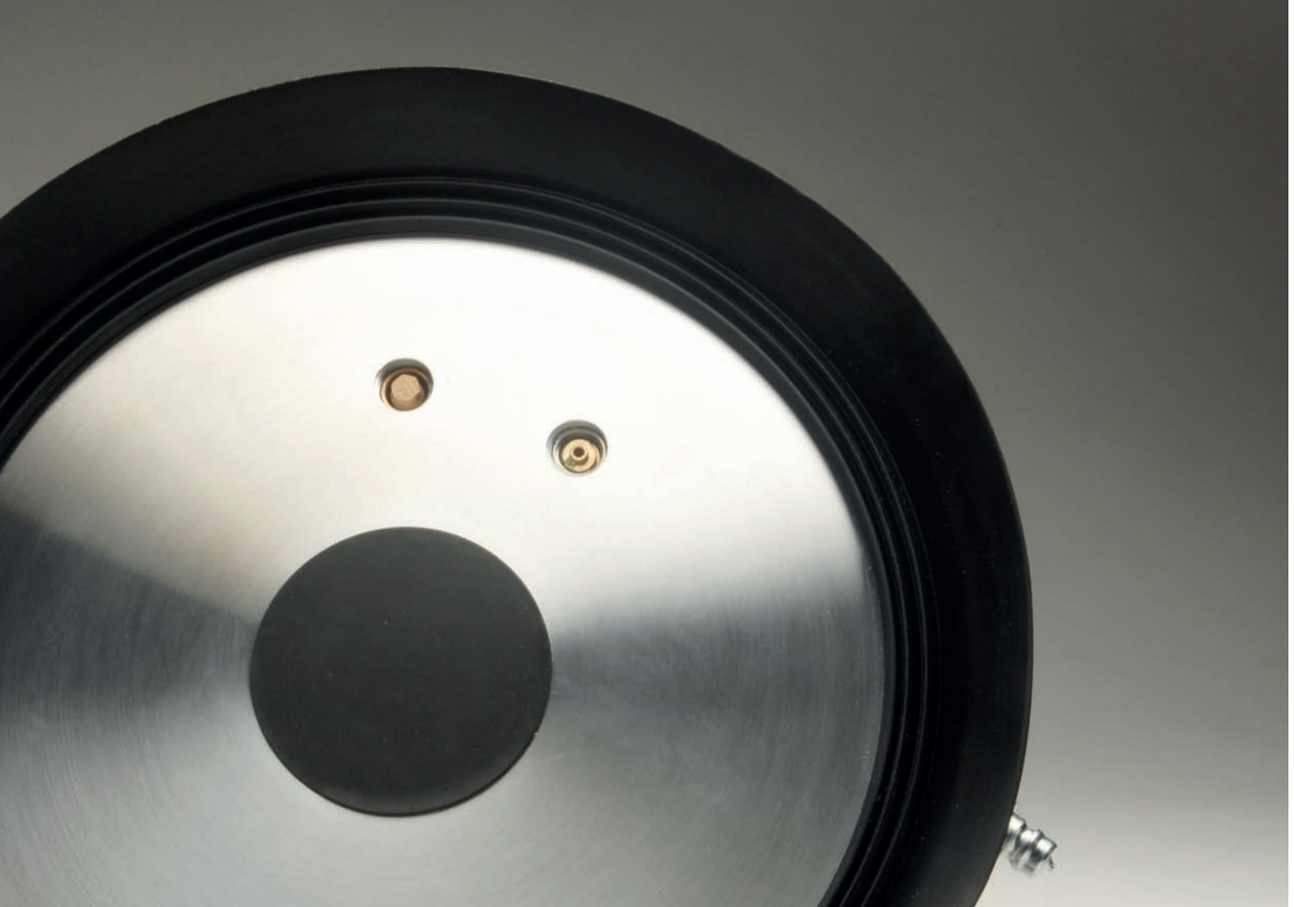
The Wingrip cases are purpose built with pressure relief valves and certified for air transport. The cases also protect the Wingrip systems when not in use.



Why do you need a system?

Employers are becoming increasingly vigilant in protecting those employees who are exposed to the hazards of working at height. The increasing number of injuries and fatalities from falls are equally a concern of legislators.

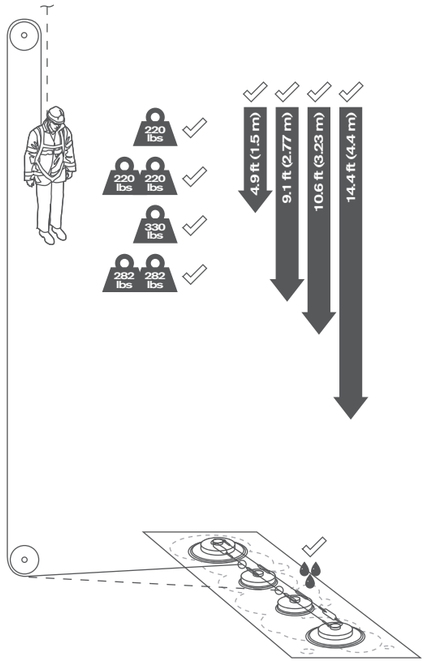
- There are two main sections of legislation that cover Europe and North America which are The Temporary Working at Height Directive and OSHA respectively.
- The legislation covers; where fall protection is needed, which systems are acceptable and who is responsible.
- EN 795, OSHA 29 CFR 1910.66 Appendix C, Section I, (c)(9) and ANSI Z359-2007 are key pieces of legislation that directly govern the performance of fall protection systems and should be familiar to all those responsible for maintenance at height (Latchways can provide detailed advice on the legislation).
- Whilst the best way to prevent an accident is to eliminate working at height this is rarely possible/practical.



System development and testing

Latchways works with all major aircraft manufacturers. An example of this is the relationship with Boeing. Over a period of five years Latchways has—together with Boeing—worked on an extensive development and test programme.

- All systems have been tested in wet and dry conditions simulating different free fall heights from various positions on the system.
- A range of distances from the centre/edge of the wing were tested.
- The systems were tested beyond the standards detailed in the legislation. The results showed that the system was capable of withstanding 'extreme conditions'. For example a free fall distance of 14.4 ft and an extreme weight of 564 lbs (dropped sequentially) were well within the systems capability.

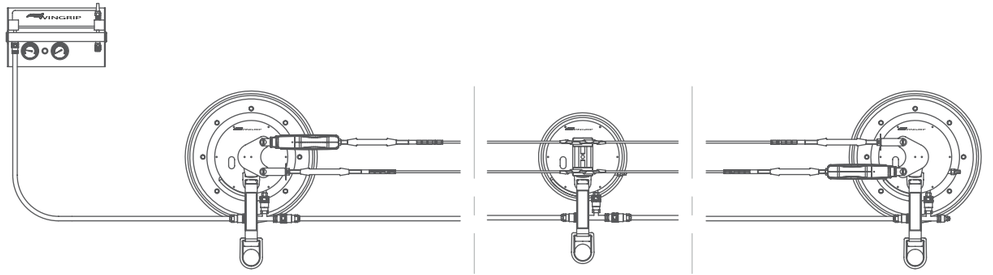


Key benefits of the Wingrip system

- System is rated for 4 people.
- Wingrip is an engineered system with all components having a safety factor of two, the system being rated for fall arrest as well as fall restraint on both wet and dry surfaces.
- Wingrip systems are suitable for both heavy and light maintenance, inside or outside the hanger and will cover all sections of the aircraft.
- The module creates the vacuum within the pads by using compressed air/nitrogen and is completely non-electrical therefore suitable for use in an ‘open fuel tanks environment’.
- A Wingrip system is quick and easy to install and provides a cost effective alternative to mobile docking.
- The Latchways shuttle gives hands free movement along the full cable length.

Multi-user system

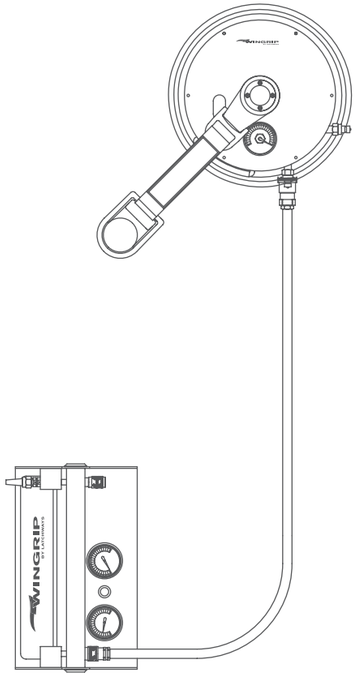
- The system consists of two end anchor pads with intermediates between them.
- The intermediate pads are placed at 20 ft intervals.
- Two cables (coated to prevent any metal on metal contact) are strung between the pads.
- Four workers can connect to the system.



Single user system

A single Wingrip vacuum anchor pad provides fall protection on wings, fuselage or stabilisers.

- The single pad is particularly suited to line maintenance and other short term temporary work.
- The system is quick and easy to install.
- Can be supplied with a small re-chargeable gas bottle making it completely portable.
- The adjustable work positioning rope creates a safe working radius of 10 ft.
- Where necessary, two vacuum pads can be used to triangulate and fix the workers position.



Latchways — The World Leader in Engineered Fall Protection

- Latchways is an international public company designing, manufacturing and marketing a range of fall protection systems to a variety of industries around the world.
- Latchways has designed systems for a range of industries — telecoms, utilities, industry, construction and aerospace. Applications include transmission towers, wind farms, roofing systems, crane rails and telecoms masts. In fact anywhere there is danger of a fall.
- Latchways offers a worldwide design, service and maintenance package.

Wingrip—the system of choice for the aircraft industry

- Airbus specify Wingrip as the only tool on all aircraft types for working at height as detailed in their maintenance manuals. During production at Airbus, Wingrip is the only tool used on A300, A380, A340, A330, A318,19, 20, 21 and also on the A400M.
- Boeing extensively use Wingrip during production of the Dreamliner as well as other aircraft types. Boeing AOG teams exclusively use Wingrip on their fleet including B737, B767, B777, B747.
- Lockheed Martin have a specific system which they use for the F-117 Nighthawk and Lockheed also use the system during production of the C-130.
- The Royal Air Force use Wingrip for different aircraft types including Tristar, Nimrod, VC-10, and C-130. Other military organisations that use the system include the USAF, RAAF, Armee D'Lair, Spanish Air Force, Danish Air Force and the German Air Force. Worldwide we have systems on many military aircraft, some of which are the C5, B52, P3, Tornado and Casa 295.
- A large number of commercial airlines and MROs use the system, including Lufthansa, BA, Qantas, Singapore Airlines, KLM, American Airlines, Air France, Emirates, Qatar and Delta.

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