

Instructions for use and maintenance, part 4

(Translation of the original instructions for use and maintenance AWA, part 4)

Shock absorber Mod. VM-DP



EC machinery directive 2006/42/CE

§ 1 (1) d, annex I, 1.7, 1.7.4, 1.7.4.2

EASA CS-27./29.865 / ED Decision 2014/018/R, E1 AMC/GM to Part-SPO - Amendment 9, AMC1 SPO.SPEC.HESLO.100

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Revision E1 - what is new or has been modified? E1 editorial changes

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Use

Correct use (normal operation mode)

The shock absorber is used to compensate for hard percussion which occurs during lifting, transport and depositing of loads by helicopter. The force is absorbed by means of a 4-fold laid elastic polyamide rope, 1 – 1.5 m in length and with an elongation under stress of approximately 10 – 15% (see figure E1 on the right).

It is designed to be used only and exclusively as a shock absorbing device for the transport of loads by helicopter.

Polyamide (PA) has relatively high elongation properties which, however, can diminish quite rapidly due to use, fatigue of material, and/or external influences such as dirt, UV radiation, etc. Such material ageing and wear is the reason why the service life of the ropes in shock absorbers is limited:

General rule:

- Daily use for logging operations: 200 – 300 max flying hours
- Regular use for mounting and construction work: 300 flying hours
- Occasional use with thorough documentation (exact indication of number of work cycles or flight minutes): 300 x 1.5 flying hours.

If users should assess that the shock absorber ropes are scrubby, hard and stiff or that single strands have loosened and protrude, the shock absorber must be immediately replaced, even before the indicated expiry date.

NB: With regard to their construction, shock absorbers are classified in accordance with their designated use:

- ELO = transport, no logging;
- LOG = Logging. Logging operations require higher safety margins = higher rope diameter values.

The VM-DP shock absorbers can be used in combination with any rope type. For their use with E1 Short and Long Lines with electric cargo hook release, the shock absorbers can be equipped with an electric conductor.

Diagram: Effect of shock loads with and without shock absorber

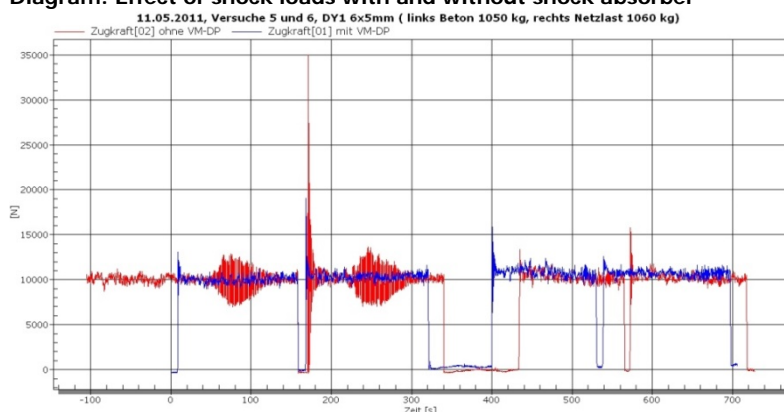


Fig.: 2 measurement flights with 4 lifting operations each (twice blocks of concrete and twice cargo nets filled with sandbags).

- RED: without VM-DP,
- BLUE: with VM-DP

Source: BG-Verkehr & A&H 2011 ©





For more detailed information on the use of shock absorbers see "A&H-SB_2013-1", www.air-work.com, Equipment/Products

Your VM-DP (Description of single components)

Design, construction and technical data

The VM-DP is designed and built to carry the maximum external load possible for the type of intervention and/or for the type of helicopter used, that is, for its corresponding weight class, for example:

- Helicopter mod. AS 350 B3 = max. carrying capacity 1400 kg
- Intended use: all types of use (HESLO 1 - 4 ; annex VII Part-SPO; AMC1 SPO.SPEC.HESLO.100)
- Calculation based on: DGUV Information 214-911, EASA CS-27./29.865 External Loads
- [...]
- Service life:
 - Daily use for logging operations: 200 –300 max. flying hours
 - Regular use for mounting and construction work: 300 flying hours
 - Occasional use with thorough documentation (exact indication of number of work cycles or flight minutes): 300 x 1.5 flying hours
 - Service life of accessories: see label and technical documentation; must be replaced immediately when deformed or damaged.

Each individual component of the structure is certified and undergoes regular checks (quality assurance) by the producer on delivery and during manufacturing.

The bearing elements consist of 3-strand laid polyamide (PA), which is endlessly spliced and parallel laid (4 strands). The shock absorber can be equipped with a wide range of accessories and endowed with an electric conductor. The requirements of the cargo hook manufacturer must also be checked (primary lifting hook of the helicopter).

For safety reasons, the producer uses only and exclusively self-locking safety hooks.



Bends in PA ropes which form at the accessories are not sufficiently protected and thus subject to wear. Inadequate accessories can destroy ropes.



Fig.: Shock absorber with electric conductor



Fig.: Shock absorber without electric conductor



Fig.: Shock absorber with protective sheathing around bends and entire rope



Fig.: Splice



Fig.: Label

Special properties

- Shock absorbers can be employed as so-called "Masterlinks". In this case, their upper end is equipped with a special design fitting for the helicopter's primary cargo hook and the bottom features a safety cargo hook acting as interface to any type of rope. The advantage of this type of configuration is that the special design fitting for the connection with the primary cargo hook must be procured only once.
- For the use by third parties, e.g. fire brigades performing firefighting assignments by helicopter, the interface for the attachment of a Bambi bucket (water container) and the plug connection can be placed at the lower end of the shock absorber in order to avoid third parties causing damage to the helicopter's mechanisms (electrical connections).



For other configurations and connections see www.air-work.com, Equipment



- Also in the case of equal diameters, the accessories' load bearing capacity may vary considerably. At the same diameter, quality class 10 accessories have an approximately 15 - 25% greater bearing capacity than accessories of quality class 8.
- Do not change any accessory without consulting the producer first.



Prolongations of the maximum life can only be granted after an inspection by the producer. To achieve prolongation, the operator must provide thorough documentation on the runtimes of every rope/low-torque swivel/cargo hook indicating each product's serial number (S/N), the number of minutes/work cycles and, if any, incidents that have occurred.



Labels must not be removed. A product without label cannot be considered safe. If you have any questions, please contact the producer.

Interface between shock absorbing rope and accessories



In proportion to the rope diameter, the slinging ring's radius is too small (see definition below). This type of use leads to considerable wear on the rope.

Critical application!

Fig.: Shock absorbing rope 2 x 12 mm equipped with oval ring AW 13 (∅ 13mm) = critical application

Protective sheathing around rope bend

A protective sheathing at the rope bend protects the rope from abrasion and improves the deflection angle. Furthermore, it prevents the overturning of the single legs.



Protective sheathing around upper rope bend (attached to primary fitting)



Protective sheathing around lower rope bend



Correct application!

Fig.: Shock absorber rope 2 x 18 mm equipped with CARW-10



Wrong application!

Fig.: Shock absorber rope equipped with CW-13

The connex links must conform to the model shown in the left figure (CARW; so-called round sling connex). Even if chosen of a higher WLL, CW type connex links offer too little space for the shock absorber ropes; hence, the ropes might be damaged by contusion.

Interface with the protective sheathing

4-strand laid shock absorbers made of 3-strand laid PA can be endowed with a protective sheathing. This prevents the single legs from flapping and protects the device from excessive pollution. The protective sheathing's inner diameter must be sufficiently large as to grant the shock absorber free space for movement, even at its largest point (splice).



Fig.: Protective sheathing with sufficient space for the electric conductor (P/N E-SPI_3 x1.5).

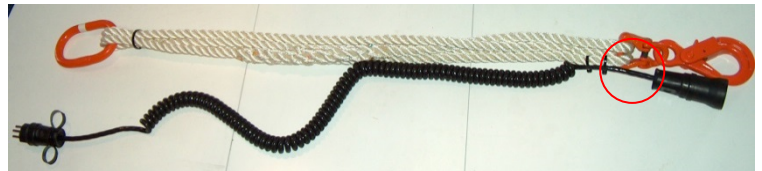


Fig.: Fixation of the electric conductor

Cable connection, electric contacts:

Strain relief on the spiral cable can be obtained by using cable straps.

Attention: Please fix the cable only to one leg of the shock absorber. When tying more than one leg, extensive elongation might damage the rope (abrasion, heat).

Parts list

No spare parts (except fittings, which are on request).

Parameters, limit conditions, interfaces

Configurations allowed

Shock absorbers manufactured by AirWork & Heliseilerei GmbH (A&H) are specifically designed for external load transport by helicopter.

The shock absorber must be connected between the helicopter's primary cargo hook and the first transport rope.



Load element (SLE1_x) Safety hook with Connex link

Rope (symbolic illustration)

Thimble

Shock absorber (VM-DP_xx_1.5)



A&H strongly recommends the use of a shock absorber. See also A&H-SB_2013-1 on www.air-work.com



For the lifting and transport of loads, it is compulsory to place a low-torque swivel between the rope and the cargo (rule of technology). Without a low-torque swivel, due to load rotation, the rope can be already irreparably damaged during one flight cycle.



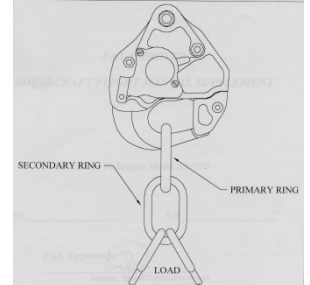
The use of other components by other producers, mainly secondary or remote cargo hooks, can compromise the aforementioned characteristics or lead to dysfunctions (see also AWA part 1, "Disclaimer" and "Warranty").

Helicopter service for professional load transport

In order to obtain a licence for intervention helicopters, for load hook-up systems and flight parameters, one must apply to the aircraft navigation authority concerned.

Interface between primary lifting hook and shock absorber

Please abide by the requirements of the cargo hook manufacturer regarding geometry and configuration, e.g. Eurocopter ASB 01.00.66 or other specific helicopter manuals.



A&H strongly recommends the use of a shock absorber. Provided the primary fitting of the shock absorber is compatible with the cargo hook, the shock absorber is connected between the primary cargo hook of the helicopter and the ropes in use. See also DB TLL-TLP_ASSY.

Interfaces to other systems and/or components of a load lifting device

Interface between shock absorber and rope

The dimension of the fittings of the transport ropes must be chosen according to the dimension of the fitting on the shock absorber. Excessively small thimble radii can lead to thimble or hook damage (notch effect). The clamp effect, resulting from excessively small radii, can lead to an increase in force transmission and thus damage the hook.



Electric power supply of the helicopter

In order to operate the secondary lifting hook via a longline with a low-torque swivel/Goggel casing, sufficient power must be guaranteed. Generally, lifting hooks need from 10 to 15 ampere, exceptionally up to 24 ampere. Pay careful attention to the fact that the helicopter's on board power system is sufficiently protected and that it has sufficient power (e.g. 29 V DC x 25A).

Loads allowed; usable limits

The working load limit (WLL) is only valid when the device is rigged using the "straight lift" slinging technique. If used according to the regulations, the device is designed to withstand the indicated maximum load (WLL) even in the worst case (Worst Case: all of the calculated weight factors appear at the same time).



The calculations may vary according to the user's needs and assignment type. Specific calculations can be found in the documents issued by the producer.



Like the ropes, the shock absorbers must also be adjusted, depending on the intended use (design, safety margins). Logging operations require higher safety margins than transport and mounting work.

Make sure that the shock absorber's label is provided with the ELO (external load operation) or LOG (logging) indication.

In the absence of further indications, the shock absorber can be used for both types of applications.



For more information, also check AWA part 1, technical definitions

Preliminary and start-up procedures

Before starting flying operations, the single components must be assembled and checked to make sure they are perfectly functional (mechanics, electrical system).

Cargo hook: attach the cargo hook to the swivel joint (permanent connection) and secure the bolt.

Rope: connect the rope end holder to the Goggel protective casing (permanent connection).

Rope extensions: make sure that the rope extensions are provided with suitable plug connections.

Shock absorber: make sure that the shock absorber fittings are compatible with the upper rope end and with the primary cargo hook of the helicopter (see ASB issued by the producers)

☒ [...] ☒

Check list for first-time operation

- Do all components have the same performance values (WLL in kN or kg)?
- Are the performance values (WLL in kN or kg) of all components compatible with the helicopter's carrying capacity?
- Do all the connecting links fit with their appropriate connection point (bolt with swivel joint/rope end, safety hook with thimbles, etc.)?
- Do all connections (especially when using double cargo hooks) fit into each other)?
- Is there sufficient power and voltage to guarantee safe opening of the cargo hook under load?

- Do all accessories of the slinging equipment meet the requirements of the cargo hook manufacturer?
- Are all people involved in the operation adequately instructed regarding the use of the product?

Start-up procedure

Lay out the shock absorber on the ground, then connect the accessories. During this procedure, make sure that the rope is not tense and that sharp bends cannot be formed during lifting. Do not drag the rope over the ground more than necessary.

Connect the shock absorber to the rope in accordance with the rope's instructions for use and maintenance (depending on rope type). Before hoisting the rope, please make sure that the cargo hook is placed vertically on the ground by a marshaller who should also guide the rope until the cargo hook leaves ground contact.

Avoid sharp bends, knots or overtorquing of the rope.

End of operation procedure

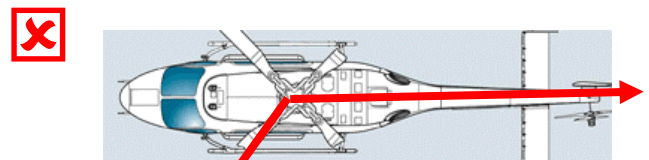
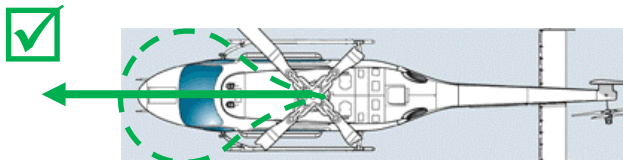
On ending the flying operation, an instructed person must help the pilot to deposit the rope on the ground. Usually the rope is deposited in a forward direction, within the pilot's field of vision.

In case the pilot is obliged to deposit the rope without the help of an instructed person, make sure that the landing site is big enough (or sufficiently sloping in a rearward direction) to avoid the rope getting caught under the helicopter (skids, wheels, tail rotor).

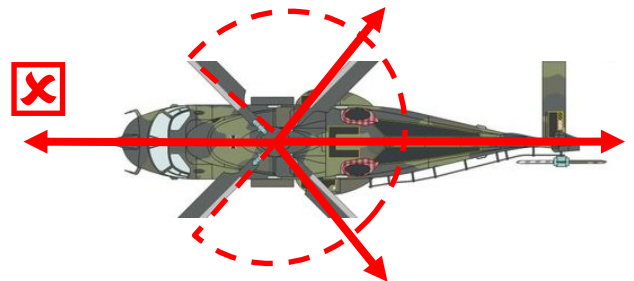
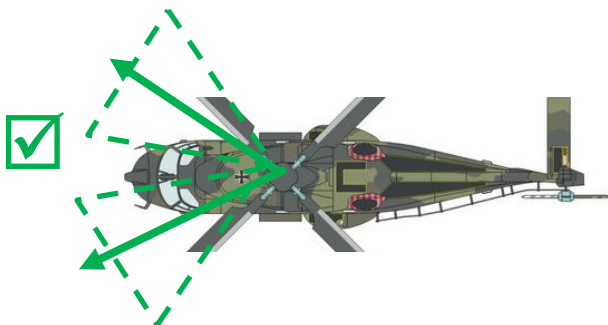
Depositing the rope and landing the helicopter on the rope:

- danger caused by rope nooses when the tail rotor draws near the rope;
- rope movement caused by down wash.
- be careful with skids and landing gear/undercarriages

E ☒



Helicopter with skids: Depositing of rope on take-off or landing area (symbolic illustration of a BELL 429, free picture from the web)



Helicopter with undercarriage: Depositing of rope on take-off or landing area (symbolic illustration of a NH90, free picture from the web)

Avoid sharp bends, knots or overtorquing of the rope. ☒

Restoration / repackaging of the VM-DP

Before return transport, first check the shock absorber, then wind it up and store it in a bag, case or hang it up on a hook.

Never stow shock absorbers on the loading platform of a truck under other objects, since the pressure and oscillations would cause contusion or damage to the load-bearing ropes.

General prohibitions

Complement to the section of the same title contained in the Instructions for use and maintenance (AWA), part 1 (Definitions):

- Pulling of other loads, e.g. the helicopter, by a traction engine.
- E ☒ Application of any kind of adhesive tapes around the splice or the spliced end of the shock absorber.
- Pulling out and/or cutting off strands of the splice. ☒

Possible inappropriate uses

(Ways of using the VM-DP that are inappropriate and for which it is not designed)

Any use that is not in conformity with the regulations (inappropriate use) of the VM-DP or its individual components can lead to evident or hidden damages to the same and, therefore, compromise its safety characteristics. In the event of inappropriate use, the producer disclaims all responsibility.

Several examples of inappropriate uses:

- Hooking up at any point that is not the authorised slinging point;
- The so-called "Tying" slinging technique;
- Incomplete attaching of all of the sling ropes or all of the hooks present;
- Attaching of a mass that is greater than the total maximum allowed or the maximum allowed for each hook;
- Rigging of ropes or accessories that are tangled;
- Replacing accessories with products that are not certified;
- Throwing the sling from the helicopter > 2m from the ground;
- Lengthening the sling ropes with unauthorised or inappropriate components, e.g. lashing straps or dynamic ropes;
- Use of the rope for logging operations, exceptions: see " Loads allowed; usable limits";
- Removal or covering of labels or other identification marks;
- Heat > 50° C (be careful when working on TARMAC-, asphalt-covered or other similar locations, on freight vehicle loading ramps, etc.);
- Storage in soiled places or underneath other equipment;
- Application of shrink hoses, if not carried out by the producer;
- Lifting of loads without the use of a low-torque swivel placed at the bottom of the rope or of several ropes connected together;
- Sudden, violent hoisting of the rope with cargo hook and shock absorber attached;
- Attachment of a load exceeding 3 times the maximum payload for transport or 4 times the maximum payload for logging operations;
- Rigging the shock absorber to the lower extremity of the transport rope.



In the above-mentioned cases, the carrying capacity of the working tools can be annulled and, therefore, prevent the component/components in question from functioning.



This list is incomplete. Therefore, avoid similar situations that deviate from the appropriate use.

Be careful to avoid other possible risks

The following factors could lead to dangerous situations and, therefore, must absolutely be avoided or supervised by a marshaller or another skilled person:

- Knots in the ropes;
- Tying an object to a rope;
- The sling getting caught in rocks, walls, trees, etc.;
- Wrong positioning of the accessories during the working phase;
- Pressing and rubbing against cutting edges, sharp corners or other materials;
- Contact with power lines;
- Sparks caused by induction or electrostatic discharges;
- Shock load forces exceeding the dynamic safety factor of 2.5 (CS 27.865, Marshaller Syllabus, chapter 3.2.4 et seqq.)
- Dysfunctional swivel joints, which do not rotate when a load is attached (without lubricant, with polluted lubricants, etc.);
- Depositing of rope and landing of the helicopter on the rope; danger caused by rope nooses and rope movement caused by down wash when the tail rotor draws near the rope.



In the above-mentioned cases, the carrying capacity of the working tools can be annulled and, therefore, prevent the component/components in question from functioning e. g.



This list is incomplete. Therefore, avoid similar situations that deviate from the appropriate use.



Also check AWA part 1, pages [E5](#) and [6](#)

Residual risk

Shock absorbers may influence the flying up of ropes. Especially in the case of short ropes (< 20 m), the loss of cargo can lead to the residual risk of flapping up of the rope with the cargo hook still attached, which then may hit the helicopter.

Maintenance and repair

Complement to the sections of the same title contained in the Instructions for use and maintenance (AWA), part 1 (Definitions), page 7, part 2 (Maintenance: steel) and part 3 (Maintenance: textiles):

- The shock absorber rope can be substituted with a new one by a qualified person.
- The protective sheathing around the rope and the rope bends, as well as the fittings, can be reused provided that they are perfectly functional.

Criteria for the removal from service of a shock absorber

Component	Component				Rating	Measures to be taken	Priority
	K1	K2	M	N			
Bearing element, minimum diameter –10% or in case of visible taper	x				K1 damage to structure causing total rope/accessory failure K2 damage to structure not causing total failure, but operation must be suspended M possible suspension of operation, safety is not immediately compromised N no risk, safety is not compromised		
Bearing element: strands (1 strand out of 3)	x						
Strand threads (a few threads in each strand)			x				
Single strands retract into the splice	x						
Single strands protrude and curl up.	x						
Thimble (if any)		x					
Tackle yarn (if any)				x			
Label carrier / Label protection				x			
Abrasion protection on sheathing (optional)				x			
Connex links / safety hooks / oval ring / other	x						



Also check AWA part 2, MRO of steel components/ropes and AWA part 3, MRO of textile components.

Spare parts

The connex links' bolts with clamping sleeves, as well as the hooks' safety catches and springs can be disassembled or assembled by an experienced technician following the producer's instructions. also check AWA SKA-CBHW



The use of self-made parts or wrong assembly leads to immediate warranty exclusion and the disclaimer of any responsibility.

Engineering & manufacturer

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ISO 9001:2008, SQS N° 32488

EASA Part 21 G POA (CH.21.G.0022)



Conditions for product use

This product has been manufactured in compliance with EC-machinery directive 2006/42/EC, § 1 (1) d) and e).

These instructions (AWA), in accordance with machinery directive 2006/42/EC, annex I, sections 1.7.4.1 and 1.7.4.2, as well as the EC declaration of conformity in accordance with 2006/42/EC, annex II, are an integral part of this product and must be compiled in the user's language. However, only the original German version is legally binding. In absence of valid instructions for use and maintenance (AWA) or without adequate training prior to use of the product, the latter cannot be considered safe.

Gaining a good knowledge of the present AWA must be part of user training carried out by the producer, its authorised representative (qualified person) or the person responsible for training in the user's company.



In the case of lending, demonstration, display, sale, discount trading or user training, these instructions for use and maintenance (AWA) must be enclosed/attached.

Picture credits

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Question to the persons responsible for training and work materials

Have you read, understood and given instructions on parts 1 to 4?



A&H Services offers an extensive inspection and testing service for all its in-house products.



A1 Appeal

If you have questions, if a component is damaged, seems to have changed or might be damaged, whenever you have any observations or suggestions to make, please take a photograph and send it to us via email, MMS or SMS (no messages via WhatsApp, Facebook or similar).

In 90% of all cases we can answer immediately, thus saving you time and postal charges. Having an image will help us greatly and, together with your short description of the problem, it can usually be identified very quickly. 