

A I R W O R K
& Heliseilerei GmbH



Engineering - Equipment – Services - Experts



Who we are ...

Production Organisation (A&H EQU)

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

CS 27/29.865 External Loads / PCDS

Regulation (EU) 2016/425 PPE

Manufacturing of

- Personnel Carrying Device System PCDS, complex
> 2 persons / 300 kg
- Special equipment Annex I Aircraft > CH-53
> 10 SOF/KSK/GSG9 / 1600 kg
- PPE against fall from a high
> in the EASA World called as **simple PCDS (max. 2 pers.)**

cPCDS for H135-M (EC135), BELL 429, CH-53

Current Project ... nearing completion



EASA Cerification of a HEC_5_H125 complex PCDS

to Boost Human External Cargo Systems, Canada
without complex PCDS for EASA market



Contract with Boost HEC-Systems for development and sales



Defintion I

simple PCDS



1 or 2 persons
1 person in the cabin

complex PCDS



more than 2 persons
more than 1 person in the cab.



simple PCDS

AMC no 3 to CS-27.865

**External loads operations using
simple personnel-carrying device systems**

- (a) it meets an EN standard under ~~Directive 89/686/EEC~~, or **Regulation (EU) 2016/425**, as applicable, or subsequent revision;
- (b) it is designed to restrain **no more than a single person** (e.g. hoist or cargo hook operator, photographer, etc.) inside the cabin, or to restrain **no more than two persons outside** the cabin;

Everything else is complex



simple PCDS

AMC no 3 to CS-27.865

Converse conclusion

The PPE according to R (EU) 2016/425 must meet the AMC 3 to CS-27.865.

This means (example):

- EN 354:2010 Lanyard
- $UL_{\min} 22 \text{ kN} : 14 [-] = 1.57 \text{ kN} / 160 \text{ kg}$ WLL HEC

Or

- EN 362:2004 Carabiner
- $UL_{\min} 15 \text{ kN} : 7 [-] = 2.14 \text{ kN} / 218 \text{ kg}$ WLL HEC



Defintion III

Certification Specifications (Design) for complex PCDS



CS-27.865(c)

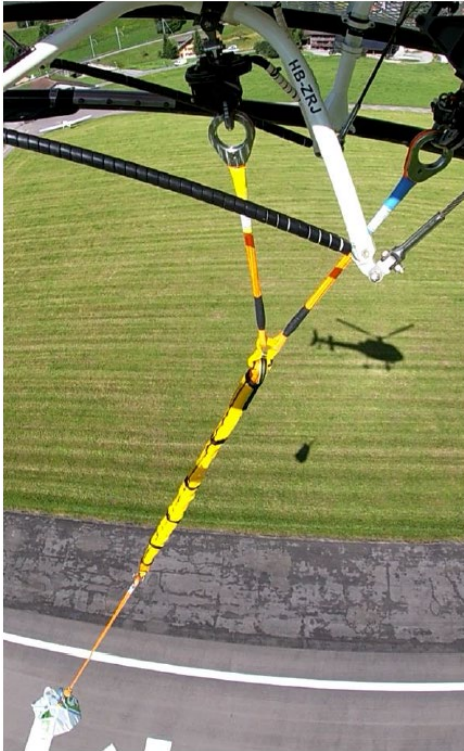
For rotorcraft-load combinations to be used for human external cargo applications, the rotorcraft must:

CS-27.865(c)(2)

- (ii) it does not meet a European Norm (EN) standard under Regulation (EU) 2016/425 [...]
- (ii) it is designed to restrain more than a single person (e.g. a hoist or cargo hook operator, photographer, etc.) inside the cabin, or to restrain more than two persons outside the cabin; or
- (iii) it is a rigid structure such as a cage, a platform or a basket.



Test, test, test ...



For the approval (STC) of the HEC_5_H125, in accordance with CS-27.865, we had to provide the following evidence:

- that the HEC ropes do not hit the rotor
- that the maximum rope length is proven in a flight test (in Switzerland 220 m)
- Dropping the load of 500 kg in forward flight at 66 kts
- documented fatigue endurance test (3 tests, 1 week per piece)
- the static test for UL_{min} , 3 minutes and break (reserve must be available)
- Aging, waer, abrasion, production tolerances
- a comprehensive risk assessment
- ...

Next steps ...

For a new project we need to provide new evidence:

- environmental test (fungus, heat/cold, humidity, UV radiation, sand, salt, ice, etc.)
- contamination by Carbons (hydraulic oil, grease, cleaning agents)
- damage tolerance 10% of the diameter
- **Cutting test**

The latter question leads to a first experiment (pre-test)



Question (27.08.2034)

How long

do we need

to cut 3 different ropes?

(with ropes that are comparable in diameter)

Note:

empirical test, no measurement of the pressure force knife > rope and no measurement of turn-up behavior



Pre-test at HSLU Horw (27.08.2024)



We prepare 3 different ropes:

- 3 x EN 1891 A, d 11 mm, BL 27 kN, year 2020, new, PA, core and sheath load-bearing
- 1 x EN 1891 A, d 12 mm, BL 36 kN, year 2005, PA, core and sheath load-bearing
- 1 x HEC_4, d 12 mm, BL 56 kN, year 2014, Material load-bearing core 8 mm Dyneema, sheath non-load-bearing PES

Pre-test at HSLU Horw (27.08.2024)



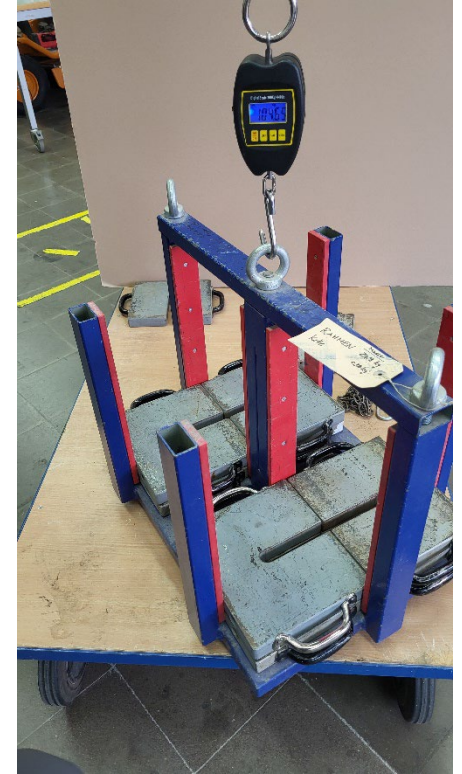
a3

b

c

Equipment:

- 3 kinds of ropes
- 5 test specimen
- 1 cran
- 1 Ruler with mm scale
- with tape and black marker
- 1 Handle with knife
- Test load mass 104.65 kg



Rope lengths 190 cm +/- 2 cm

all ropes pre-loaded (setting the knots, stretching)

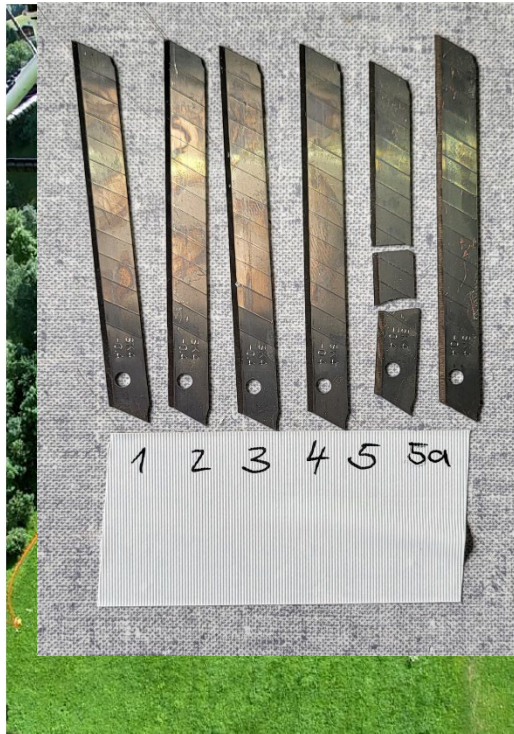
rest time 30 minutes

then two marks with a distance of 400 mm

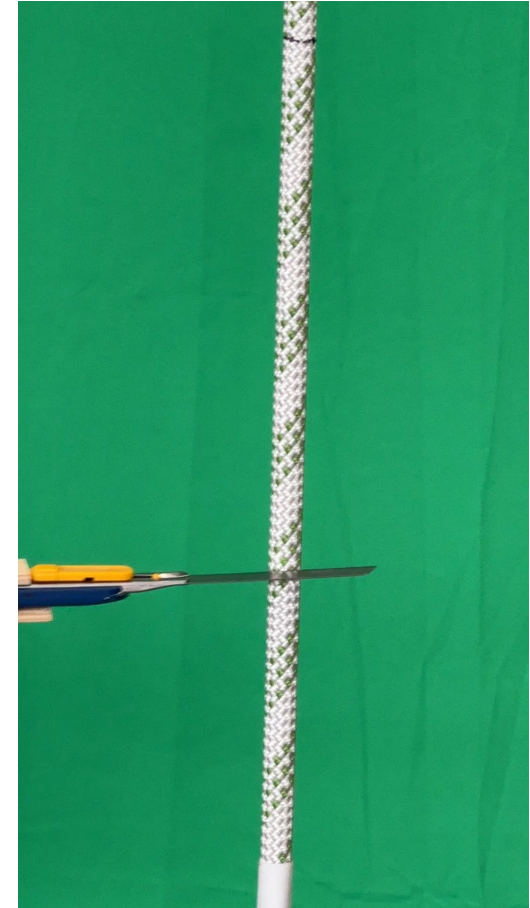
Pre-test at HSLU Horw (27.08.2024)

Operation:

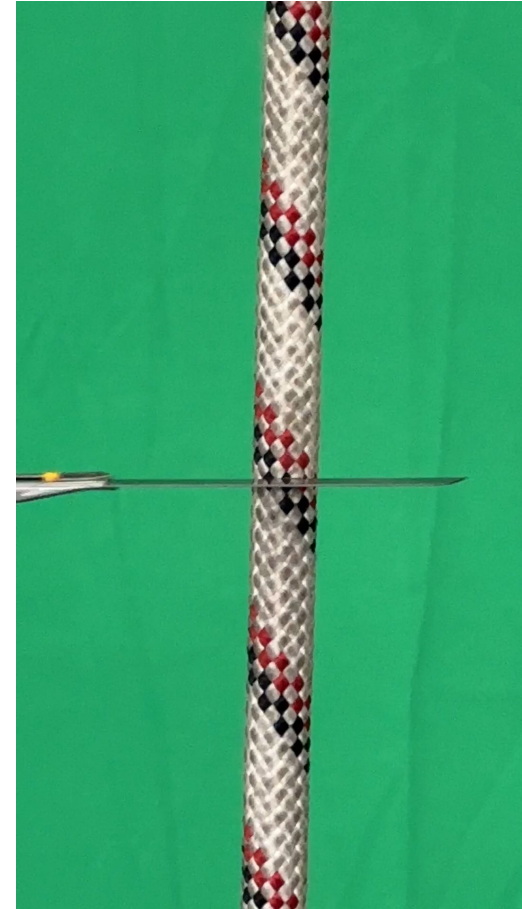
- The load is raised just a few centimeters above the ground.
- The stretch is measured
- The rope is cut between the two markings
- The handle with the knife is only guided over the left thumb.
- The blade has no defined pressure, the horizontal movement is not calibrated.



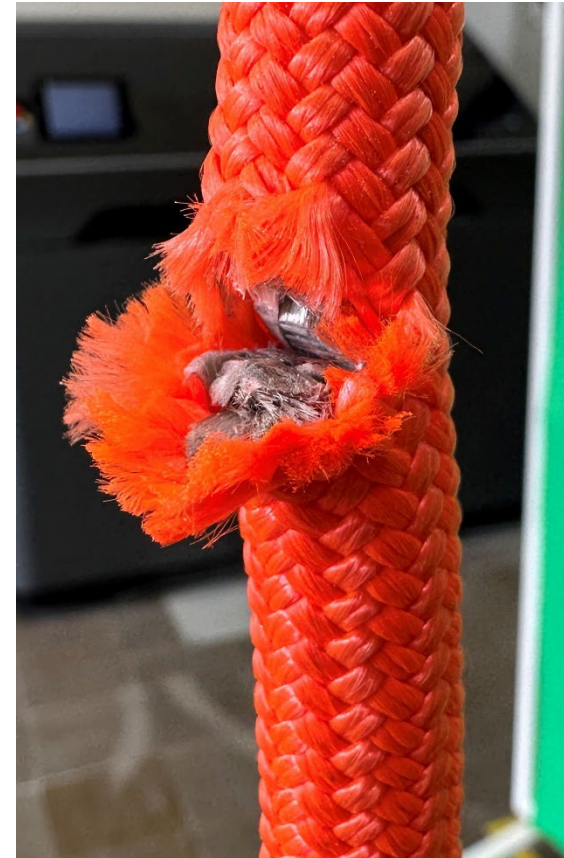
Rope a3
EN 1891 A
11 mm
BL 27 kN
new
2020



Rope b
EN 1891 A
12 mm
BL 36 kN
used
2005



Rope c
CS-27.865
12 mm
BL 56 kN
used
2014



Pre-test at HSLU Horw (27.08.2024)

Results:

Rope	1	2	3	4	5
Standard/d	EN 1891 A d 11	EN 1891 A d 11	EN 1891 A d 11	EN 1891 A d 12	CS-27.865 d 12 (8)
Year of prod.	2020	2020	2020	2005	2014
Materials	PA	PA	PA	PA	DY/PES
Break load kN ⁽¹⁾	27	27	27	36	56
Elongation mm ⁽²⁾	31	34	32	50	7
Elongation % ⁽³⁾	7.7	8.5	8	12.5	1.75
Time +/- sec	9	13	6	6	144
Ranking ⁽⁴⁾	1.5	2.15	1	1	24

Notes:

(1) Manufacturer's information

(2) the measurement is not comparable with EN 1891, Art. 5.6

(3) $E = (L_B - L_A) \times 100 : L_A$

(4) time ratio to 6 sec





Coming soon ... also in CAN and USA

Approved up to 220 m Super LongLine
P/N: HEC_5_H125



AIRWORK
& Heliseilerei GmbH

Our Company



In the heart of Europe

