



Service lifts in Wind Turbines

“How engineered according the safety rules”

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Participate in Notified Body meetings:
Horizontal Committee
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Notified Body (number 0400):

- Machine Directive (2006/42/EC): lifting of persons and logic controllers
- Lift Directive (95/16/EC)

USA: AECO for lifts



0842

Agenda

- development of service lifts in Wind Turbines
- regulation in EU
- Recommendation For Use: technical specifications
- in practice
- future developments

Why service lifts in Wind Turbines

Fossil fuels are limited



Why service lifts in Wind Turbines

Mankind is looking for alternatives:



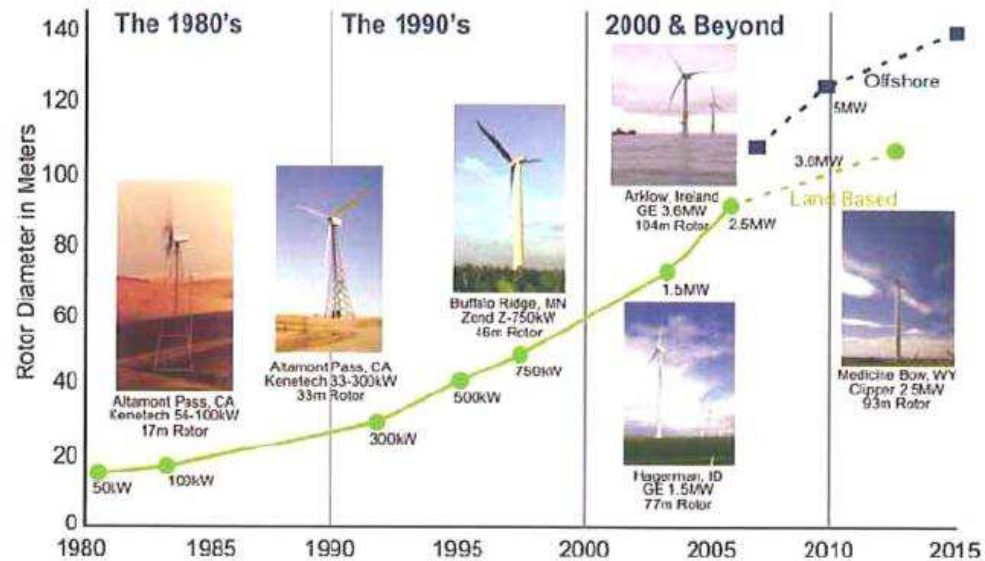
Why service lifts in Wind Turbines

Mankind is looking for alternatives:



Why service lifts in Wind Turbines

Wind Turbines:



Why service lifts in Wind Turbines

Nowadays:

On shore:

- up to 3MW, height turbine up to 100m

Off shore:

- up to 8MW, height turbine up to 130m

Why service lifts in Wind Turbines

For safe access turbine:

Early days:



Why service lifts in Wind Turbines

For safe access turbine:

Nowadays:

- climbing
- climb assist



Why service lifts in Wind Turbines

For safe access turbine:

Nowadays:

- lift



Safety demands

Lift in a wind turbine is a machine:

Therefore Machine Directive (2006/42/EC) is applicable, article 24:

Lifting appliances connected to machinery and intended exclusively for access to workstations including maintenance and inspection points on the machinery

Safety demands

Before putting into service:

- ensure that it satisfies the relevant essential health and safety requirements set out in Annex I;
- technical file is available;
- provide, in particular, the necessary information, such as instructions;

Safety demands

Before putting into service:

- carry out the appropriate procedures for assessing conformity:

EC-type examination by a Notified Body or

Full quality assurance certified by a Notified Body

Safety demands

Before putting into service:

- draw up the EC declaration of conformity in accordance with MD and apply



Safety demands

Relevant demands Machine Directive (2006/42/EC) which have to be fulfilled:

- annex I, chapter 1 general, 4 hoisting and 6 hoisting of persons

Safety demands

Main hazards:

- falling from height
- crushing and shearing
- uncontrolled movement carrier
- electrocution
- entrapment

Safety demands

Differences in configurations:

- open carriers, fully enclosed carriers
- hold to run, automatic controls
- no safety devices against crushing underneath or on top of the carrier
- safe access
- safe embarkment during emergency

Safety demands

Differences in configurations:

- opening door only at a landing or always in travel zone

Safety demands



Request by Machine Working Group to the
Notified body's (Vertical group 9) for
Recommendation For Use (RFU)

Safety demands

Proposition VG9: RFU CNB/M/09.318

- landing door can only be opened when carrier is present
- in case of rescue or use of a ladder: an additional mechanism for opening landing door is acceptable

Safety demands

Proposition VG9: RFU CNB/M/09.318



Safety demands

Proposition VG9: RFU CNB/M/09.318

- carrier normally fully enclosed, due to crushing and shearing hazards and possibility of falling objects

Safety demands

Proposition VG9: RFU CNB/M/09.318



Safety demands

Proposition VG9: RFU CNB/M/09.318

- protection of persons in and at the travel zone: relevant when distance is less than 0,5m.
- for example when use ladder and at landings

Safety demands

Proposition VG9: RFU CNB/M/09.318



$\geq 0,5 \text{ m}$

Safety demands

Proposition VG9: RFU CNB/M/09.318

Ladder:

- protection device on carrier: For example a sensitive floor and top (Performance level=d)

RK1

Landings:

- full height door or reduced height (min 1.1m) + sensitive floor and top on carrier (Performance level=c)

Safety demands

Proposition VG9: RFU CNB/M/09.318



RK2

Safety demands

Proposition VG9: RFU CNB/M/09.318

If for maintenance it is necessary to leave the carrier:

- opening door only possible by separate handling device. Normal operation and travelling shall be stopped
- when door is opened: a protection device against falling shall be present in carrier



Safety demands



LiftAcademy

Safety demands

Proposition VG9: RFU CNB/M/09.318

Rescue conception: is relevant and therefore to be considered

- person in carrier is not able to assist
- opening door carrier from in- and outside
- basically a carrier shall have a device for lowering the carrier in case of emergency.

Safety demands

Proposition VG9: RFU CNB/M/09.318

Rescue conception: is relevant and therefore be considered

- crossing from the carrier to the ladder shall be possible in a safe way,
- adequate anchoring device for PPE to be available in carrier
- ergonomic solutions shall be preferred

Safety demands

Proposition VG9: RFU CNB/M/09.318

- a communication system has to be foreseen or prescribed (e.g. two-way radio, telephone or intercom).
- the suspension system is part of the machine

Safety demands

In practice

Often the C-standard EN 1808 is used as guidance:

- traction hoist
- safety devices
- strength and fatigue demands system

Safety demands

In practice:

- powering: traction hoist
- suspension: 2, hoisting rope and safety rope
- guidance: steel ropes
- uncontrolled movement: Safety gear tripped by overspeed

Safety demands

In practice:

- falling: fully closed carrier, doors or fences at landings, PPE for rescue
- crushing and shearing: fully enclosed carrier, protection devices top and bottom carrier, doors or fences landings
- entrapment: emergency lowering, safe access to carrier and procedures

Safety demands

In practice:

- controls: general hold to run and emergency stop
- lightning and emergency lightning in carrier and tower wind turbine
- radios or mobile telephone

Safety demands

Status RFU:

RFU updated during the VG9-meeting in Berlin May 2013.

RFU will be sent to the Horizontal Commission and Machinery Working Group for endorsement: Dec. 2013 and/or first quarter 2014

Safety demands

Status RFU:

RFU can already be used as state of the art by manufacturers and the Notified Bodies.

Future developments

Lot of different safety views around the world for this kind of machinery.

Request for a standard by Europe

USA/CAN have developed a standard. Part of ASME A17.1-2013 CSA B44-13

Future developments

Technical committees: CEN-TC10, ISO-TC178 (both lifts) and CLC-TC88 (wind turbines) are co-acting in developing a harmonised standard.

This will be included in the EN 50308

Timetable: so far unknown

Questions



Thank you for your attention

