Wind turbine blade inspection checklist

What to check, by access method and by area of the blade. Every finding needs a location (blade serial, surface, radius in metres), a measurement, a category on the agreed scale, a cause where it can be read, and an action with a timeframe.

Before the inspection: the scope

- [ ] Damage categorisation scale named explicitly, and the same one as the previous campaign
- [ ] Resolution at the blade surface in mm per pixel, and the standoff distance it assumes
- [ ] Coverage: all four surfaces, or suction and pressure side only; trailing edge and tip imaged separately?
- [ ] Blade-referenced: every finding located by radius from the root and by surface
- [ ] Serial numbers of every blade, read from the blade, not from the turbine record
- [ ] Same-day call triggers: which findings are reported immediately, not in the report

External inspection

Leading edge

- [ ] Coating loss, pinholes and pitting, with the radius where it starts and ends
- [ ] Exposed laminate: the point where erosion stops being cosmetic
- [ ] Leading edge protection: lifted edges, missing sections, the transition where it ends
- [ ] Erosion depth where measurable, not only area

Trailing edge

- [ ] Bond line cracks as a length and a radius, crack tips photographed
- [ ] Any continuous opening, and whether light passes through
- [ ] Damage at maximum chord, where edgewise strain is highest
- [ ] Previous repairs, their extent, and any crack restarting at the repair boundary

Tip

- [ ] Lightning receptors: present, secure, unburnt, and the surface around them
- [ ] Tip cap condition and any sign of the tip being open
- [ ] Burn marks, delamination and puncture holes away from the receptors
- [ ] Drain holes present and clear

Shell surfaces, suction and pressure side

- [ ] Transverse cracks over the spar cap: structural until shown otherwise
- [ ] Longitudinal coating cracks in a line along the spar cap edges
- [ ] Blisters, wrinkles visible through the coating, local changes in surface profile
- [ ] Impact damage, hail marks and debris strikes
- [ ] Bond line witness marks along the shell joints

Root end

- [ ] Root face and bolt circle, where visible
- [ ] Water staining, corrosion product, any sign of standing water inside
- [ ] Cracks radiating from the root transition

Internal inspection

- [ ] Shear web bond lines, both sides, full accessible length: voids, cracks, adhesive that never wetted the laminate
- [ ] Leading and trailing edge bond lines from inside
- [ ] Spar cap surfaces: wrinkles, ply drops, dry fibres, resin-starved areas
- [ ] Root insert area: adhesive coverage, cracks around inserts, any insert that has moved
- [ ] Standing water: depth and where it has been sitting
- [ ] Lightning down conductor continuity and the condition of its connections
- [ ] Repair records against what is visible: an unlogged repair is a finding

Post-event inspection

- [ ] **After a lightning strike:** receptors, down conductor continuity measured, internal inspection at the tip, delamination and puncture away from the receptors
- [ ] **After overspeed, emergency stop or grid event:** root bolts, root transition, suction-side spar cap for compression damage, the SCADA record
- [ ] **After transport, lifting or installation:** sling and support contact areas, root face, trailing edge
- [ ] **After a blade failure anywhere in the fleet:** neighbouring blades and blades from the same plant, mould and production window, by a method that can see the suspected defect

What the report has to contain, per finding

- [ ] Location: blade serial, surface, radius in metres, chordwise position
- [ ] Measurement: length, area, depth, not only a photograph
- [ ] Category on the agreed scale, with the reasoning where it is not obvious
- [ ] Cause, or a statement that it cannot be determined from the image
- [ ] Recommended action and timeframe: before next winter, or monitored until when

Companion article with the method and the interpretation behind each item: apexwind.dk/articles/blade-inspection-checklist

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