

Rocla Concrete Poles Bushfire Resilience Statement

Bushfires can generate temperatures over 1000 degC and radiant heat fluxes can exceed 100 kW/m². 800 degC and 60 kW/m² are typical or expected maximums in a severe bushfire. Fortunately, these maximum temperatures and heat fluxes in bushfires are sustained for only a few minutes.

Concrete poles are expected to perform well in bushfires as concrete is non-combustible, non-flammable, ember resistant, does not emit toxic fumes and has excellent thermal properties. Conformity to AS3600 and field evidence confirm that Rocla concrete poles meet this expectation.

Rocla has been supplying concrete power poles throughout Australia for over 45 years and many of these poles have been exposed to bushfires. The visual evidence is that Rocla concrete poles are generally unaffected by bushfire. Damaged surfaces are rarely seen after a bushfire.

The ability of concrete poles to withstand high temperatures was highlighted when the heat from a severe bushfire was seen to have caused a few minor “pop-outs” (the size of a coin) on the surface of the pole whilst the attached aluminium cable had melted (aluminium melts at 660 degC). This shows that concrete poles can withstand at least 660 degC without significant damage, as “pop-outs” do not affect the strength of a pole.

The worst damage to a Rocla pole after a bushfire was spalling of the surface layer. A portion of the external layer of aggregate (stone) spalled and other areas “popped-out” but the cover layer below remained intact. The exposed concrete remained grey in colour indicating the temperature at the exposed surface did not reach 300 degC which means the concrete below retained high strength and the pole was therefore structurally unaffected. A simple repair of the surface was required to ensure a long service life.

Maintaining structural strength during a bushfire is important as high winds (creating high loads on poles) are common in bushfires. Poles can collapse due to the complete loss of structural strength or from wind loads acting on poles that have partially lost structural strength during the bushfire.

With Rocla concrete poles maintaining structural strength, electricity supply during and after a bushfire can be maintained.

Other evidence. A Rocla concrete pole was reported to have been exposed to a 250 degC fire for 4.5 to 6 hours and was subsequently load tested. The pole achieved the normal 115% bending strength. This test proved that the fire did not affect the structural strength of the pole.

From an AS3600 design perspective, standard concrete poles have a fire resistance period (FRP) for structural adequacy = 30 mins. The standard test has a maximum temperature range of 700 to 840 degC over a 20 minute period. Although these temperatures may be similar to severe bushfire temperatures, the 20 minute test period is approximately 10 times the typical 2 minute period of peak temperatures in a forest bushfire.

The AS3600 test that is relevant to concrete poles is far more extreme than the typical severe bushfire.

Although concrete poles have relatively thin walls, the continuous outer surface prevents fire from attacking the inside surface. The thermal conductivity of concrete quickly reduces the temperature profile through the wall, especially under short duration heat fluxes associated with maximum bushfire radiation and temperatures.

The AS3600 FRP=30 mins for insulation requires a minimum slab thickness = 60mm. Rocla concrete poles typically have wall thicknesses of 60mm or more. Therefore, electrical cables inside Rocla concrete poles are expected to be protected from the heat of bushfires.

Rocla poles with joints include galvanized steel components. To prevent possible damage to the galvanized coating of the threaded components from temperatures exceeding 450 degC, the inside void of the joint lugs could be coated with a fire-retardant material such as vermiculite or filled with a cementitious grout. The external joint lug surface is not sensitive to losing the zinc coating and could be repaired if damaged.

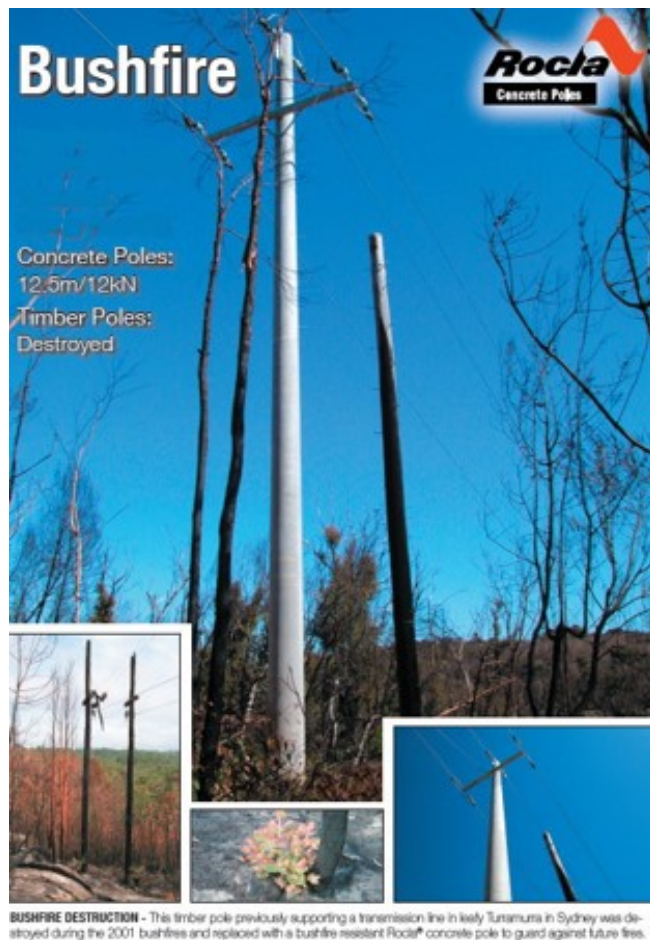
Pole joints near ground level are most susceptible to fire. Joints higher up the pole are less likely to be exposed to the heat intensity and duration found near the ground.

If the surface of a concrete pole is damaged, as described above, the surface can be readily repaired. A cementitious, non-shrink mortar can be applied to the surface after any loose or damaged concrete is removed. The rough, exposed surface created by high temperatures provides an excellent surface for bonding the repair mortar to the pole concrete.

In summary, Rocla concrete poles have been seen to perform extremely well in bushfires for over 45 years. Very few poles have been damaged and, for those that have, the damage is limited to the outer surface and can be categorized between insignificant to minor. ie. Non-structural damage.

The high temperatures from bushfires are effectively limited to the outer surface layer of the concrete. The surface layer acts as a sacrificial layer, protecting the concrete and reinforcement below. Any surface damage can be readily repaired.

Rocla concrete poles are bushfire-resistant, remain fit-for-purpose after being subjected to a bushfire and are suitable for use in all bushfire prone areas.



Chris Carter
Applications Engineering Manager, Rocla Poles
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