

Working procedure for pole repair after damage

Step by step process

1. Assessing the extent of the damage

Depth of damage is measured by using a straight edge (Steel /wooden rule, or other suitable straight edge) held vertically on the pole, spanning over the damaged area at the deepest point.

The depth gauge of the vernier is then used against the straight edge, to determine the depth of the damage. Take a range of readings if unsure of the deepest point

The width of the damage is measured horizontally, using a steel /wood rule, at the widest point.

a. Pole Circumference

The circumference of the pole must be measured using a Circumference tape and in metric.

b. Depth of Damage

The depth of any damage must be measured as follows: -

Where the length of cut is around a third of the circumference or outside the limits of the Vernier Calliper the steel rule marked at 6mm; 10mm; 15mm and 30mm must be used. The start and end point of the damage reaching or exceeding the stated depths is marked with the yellow crayon marker. Small amounts of damage must have their depths measured using the Vernier calliper with the aid of the Steel Rule or Spirit level for larger cuts where required. Where long cuts are encountered the depth whilst not reaching 6mm for the 1/3 circumference may have damage meeting the other limits within it. The start and end points of these must be marked with yellow crayon marker and the length measured using the Vernier calliper.

c. Length of damage

Cuts exceeding 75mm must be measured using a Circumference tape. Cuts of 75mm or less are measured using the Vernier calliper. The start and end points of the length to be measured are marked with yellow crayon marker. The length of cut is defined as cuts crossing the vertical grain of the pole.

Where the cut is at an angle, it is only the horizontal part of the cut that affects the strength of the pole. This can be measured using the spirit level to help mark down or up to the horizontal line level to the first point of damage, and then measure the horizontal length.

For sloping cuts, the key aspect is still the depth of damage, and to determine the deepest extent of damage.

2. Determining if repair is possible

The following base criteria apply in all cases:-

The lowest point of the damage area must be no closer to the ground line than 400mm

The highest point of the damage area must be no closer to the first climbing step than 700mm

Table 1 in the Appendix gives the maximum permitted depth of damage, taking account of the pole circumference, and the width of the damaged area.

For multiple damage areas, follow the guidance in Section 2.1

2.1 Areas with multiple points of damage

The guidance on how to assess such damage and to carry out the repair, is detailed below.

Assessment

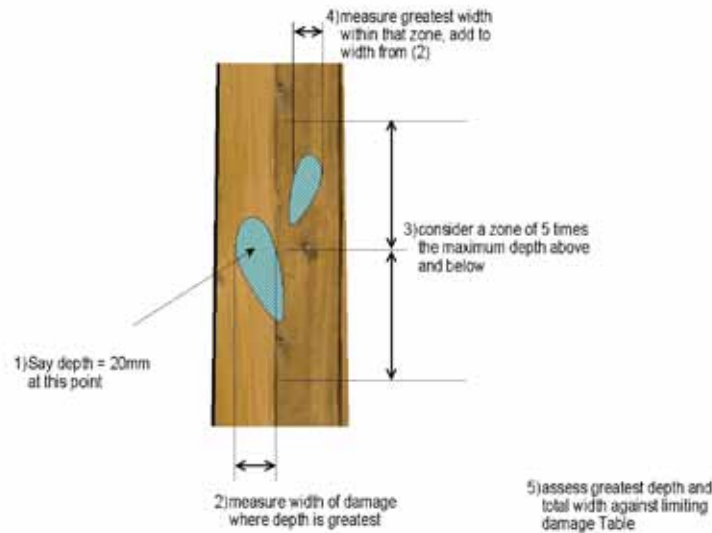
Firstly, it is necessary to determine if the damage areas should be considered as separate areas of damage, or as overlapping.

Overlapping Areas

As detailed below, if the areas fall into this category, then determine if it is repairable by following the steps 1-5 in the diagram below. Fill each damage area with resin, if necessary doing each one separately, but then fit 2 straps, bridging the repaired area, as if it was one area.

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Separate Areas of Damage

If the areas of damage do not fall into the overlapping category, then they can be considered separate. Each area should be measured separately to determine if it is repairable, however, **the maximum number of areas that can be repaired is 2.**

It is also necessary to consider, before starting work, where the repair straps will be fitted. 2 sets of repairs can only be completed if the hole fixings for the coachscrews are directly into wood, do not proceed if the coachscrews for one pair of straps would need to be fixing through the 'resined' part of the other damage area.

2.2 Other considerations

It will generally not be practicable to repair poles that are older than 30 years.

It is important to ensure the pole has no other defects, or that there are no low wire reports or other issues that may lead to a pole renewal requirement in the near future

Before starting work, ensure that you can get access to all areas to complete the repair, and fit both straps.

It is not recommended to carry out the resin repair in periods of heavy rain.

3. Components Required

Resin Kit: which comprises

12 x 250ml tubes of brown epoxy resin, with mixer nozzles
 3 x plastic shields/formers, to mask the pole
 Polythene gloves
 Plugs for 6mm hole in shield

Other Consumables Required

Large Straps Cable Fixing
 Coach screws – 3/8 x 3" – 24 per pole
 Toothplate connectors – 24 per pole
 Suitable (high quality) Mastic Gun 350ml

Tools /Equipment required

Eyeshields /PPE
 2lb Ball Pein hammer
 Brace for coach screw –
 Wire Brush
 15mm Sq socket with 1/2" drive – Local Purchase only
 Ratchet handle from Socket Set
 Suitable Cordless Drill
 6mm brad point wood drill –available from Screwfix (£1.40 each)

Galvanised Repair Straps

Damage Pole Repair Strap

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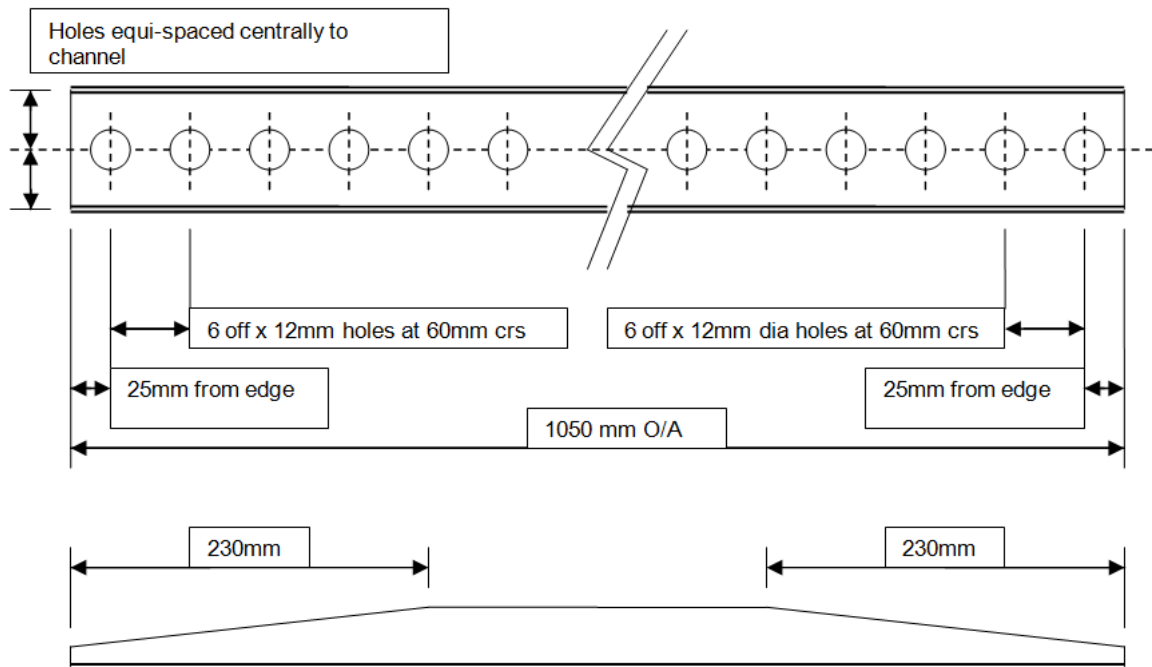


Fig 1 –drawing for pole strap – made from 6mm mild steel (S275 or similar) and galvanised to agreed standards – supplier to specify standard used

For each strap 12 x coachscrews and 12 toothplate connectors are required

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Process (see photos in Appendix 1)

Examine the damaged area, and confirm it complies with dimension limitations above.

Confirm that the pole has no other defects, or any evidence of Internal /External decay.

Once confirmed that pole is suitable for repair, carry out the resin repair.

Steps:-

It is not recommended to carry out the resin repair in periods of heavy rain.

IF the damaged area has any loose material /green verdigris, then brush the whole area with a wire brush, also, if dampness is suspected, press paper towel over the area to absorb any excess moisture.

Fit the plastic shield over the damaged area, with the hole at the lowest point** within the damaged area. Hold the shield in position either with Straps Cable Fixing, Depending on the size of the area it will be necessary to use either 2 or 3 straps. It is essential that the plastic shield fits snugly against the pole, to prevent resin leakage. Use plastic tape on lower edge and plug 'shakes' with paper towel or similar

Ensure the inside area of the shield is dry, wipe with paper towelling if necessary

To help with ensuring a good seal between the shield and the pole, 25mm standard black tape can be used, overlapped 2 or 3 turns round the pole, especially on the lower edge of the shield

Wear poly gloves and eyeshields for the resin stage.

Before starting, have one of the little orange plugs readily to hand.

Fit the resin cartridge to the gun, remove the stopper and fit the nozzle and inject the resin through the hole

Once the area is filled, remove the gun and fit the plug to the hole.

The resin will set very quickly and also generates a considerable amount of heat. The resin will be hard within 20 minutes, and the plastic shield can be removed. Any runs or streaks of resin can be removed from the pole, if necessary cutting with a junior hacksaw /cutters

** Do NOT be tempted to try with the hole at the top, as voids will be created and the damaged area will not fill correctly. By having the hole at the bottom the resin forces upwards and fills the area.

Control Measures for using the resin

1. Take note of any warning symbols, risk and safety phrases on the container.
2. Use in accordance with the manufacturer's instructions.
3. Where appropriate, managers should ensure that their people have received sufficient information and training in the safe use of the materials and any control measures required.
4. Eye protection – e.g. eye shields No3 should be worn.
5. Vinyl gloves provided and should be worn.
6. An approved hand cleaning system must be provided or a supply of warm water must be supplied on site.
7. Do not eat or drink whilst using this product
8. Use only in well ventilated areas
9. Respiratory protection required in inadequately ventilated workplaces.
10. Even though the product is not flammable avoid sources of ignition.

In the event of cartridge breaking open or being damaged, remove it from the vehicle, immerse in water in a well ventilated area. This will harden chemical constituents in both chambers of cartridge. See Appendix 2 below, Broken or Damaged cartridge for further action and for further Health & Safety Information.

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Disposal Guidance

The resin cartridge is not re-usable, as the resin in the nozzle will also set within 20 minutes.

Part used resin tubes must be disposed of appropriately, and should not be placed in general waste.

Mixed resin, once set is completely inert, and can be disposed of in normal waste. However be aware that the resin gets extremely HOT during the curing period, so if the resin is being gunned into a container to wait for curing, do not use a plastic bag or similar, and do not hold it in your hand. Ensure the container is secure whilst curing

Completely expended resin tubes can be disposed of in normal waste

Metal Repair Straps

Position the first metal repair strap so that the repaired area is 'bridged' and with the strap to one side of the repaired area (See photos)– If necessary use a strap cable fixing or similar to hold in place. Drill all 12 fixing holes using a 6mm wood drill. (Do not use HSS drill bits, they are unsuitable for creosoted wood)

Position a tooth-plate connector between the strap and the pole and then hammer home the coach screw for 50-60% of its length. Fit the remaining 11 coach screws and tooth-plate connectors and again hammer home for 50-60% of their length.

Then using a brace or socket spanner, tighten the coach screws. Tighten so that the tooth-plate connectors just start to 'bite' into the pole.

Then fit the second metal repair strap on the opposite side of the repaired area, at the same height as the first, and again fix as above. (See photos).

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APPENDIX 1

Photos of step by step process



A sample damaged pole



All components laid out



Damaged area, with shield fixed in place



Resin components



Applying the resin. Note hole lowermost



Finished resin repair area

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First bolt, with Toothplate connector, ready for tightening



Strap fully bolted



Complete job, with both straps fitted, either side of damaged/resin repaired area
NB –these photos show the old style repair strap

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APPENDIX 2 Hazard & First Aid information

Hazards:

Ventilation	Work should be carried out externally only.
Respiratory Equipment	Only required if working in a very confined space over a long period of time.
Eye Protection	Wear safety glasses or goggles.
Hand Protection	Wear provided vinyl gloves provided
Handling Precautions	Handle with care. Ensure good local ventilation. Do not eat, drink or smoke when handling the material. Clean hands after use.
Storage	Keep away from food and drink. The resin tubes are sealed until use, and should be retained in the original cardboard box or similar. Temperature band -10°C to $+60^{\circ}\text{C}$.
Shelf Life	24 months

Toxicological effects:

The packaging of the two constituents whilst in sealed cartridges poses no risk for either physical contact on the skin or inhalation. However, in the unlikely event of catastrophic fracture or the contents not being used in the recommended manner of the cartridges there could be risks as follows.

Inhalation	Unlikely due to form supplied, and quantities involved. However in such unlikely cases remove to fresh air and allow to rest. Obtain medical attention and keep under observation for up to 48 hours as effects can be delayed.
Skin Contact	Wash contaminated area with soap and water. Use skin cream to prevent dryness. Launder contaminated clothing.
Eye Contact	Flush immediately with water for 10-15 minutes prising eyelids open with fingers. Seek medical attention immediately.
Ingestion	Do not induce vomiting and give nothing by mouth. Seek medical attention.

First Aid Measures in the unlikely event of exposure.

Inhalation	Remove to fresh air, keep warm and if recovery is not rapid, seek medical attention.
Skin Contact	Remove contaminated clothing and wash with plenty of soap and water or an approved hand cleaning system. Do not use organic solvents.
Eye Contact	Immediate and continual flushing of the eye is essential. Seek medical attention.
Ingestion	If large amounts are ingested wash out mouth with clean cold water and seek medical attention immediately.

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Table 1 Revised damage limits for 75% residual strength

	Pole Circumference (mm)	Damage width (mm)															
		50	60	70	80	90	100	110	120	140	160	180	200	220	240	260	280
Maximum permitted depth (mm)	400	45	36	29	25	22	19	17	15								
	450	58	47	38	32	28	25	22	20	16							
	500	74	59	49	41	36	31	28	25	20							
	533		68	56	48	41	36	32	29	24	20						
	566		78	64	54	47	41	37	33	27	23	20					
	600		89	73	62	54	47	42	37	31	26	23					
	633		100	83	70	60	53	47	42	35	29	25	22				
	666			93	78	68	59	53	47	39	33	28	25				
	700			104	88	76	66	59	53	44	37	32	28	25			
	750				103	88	78	69	62	51	43	37	33	29			
	800				119	102	90	80	71	59	50	43	38	33	30		
900					133	117	104	93	77	65	56	49	44	39	35	32	