

# BRE Test Report

## EN252 Postsaver ground contact test 20 year data

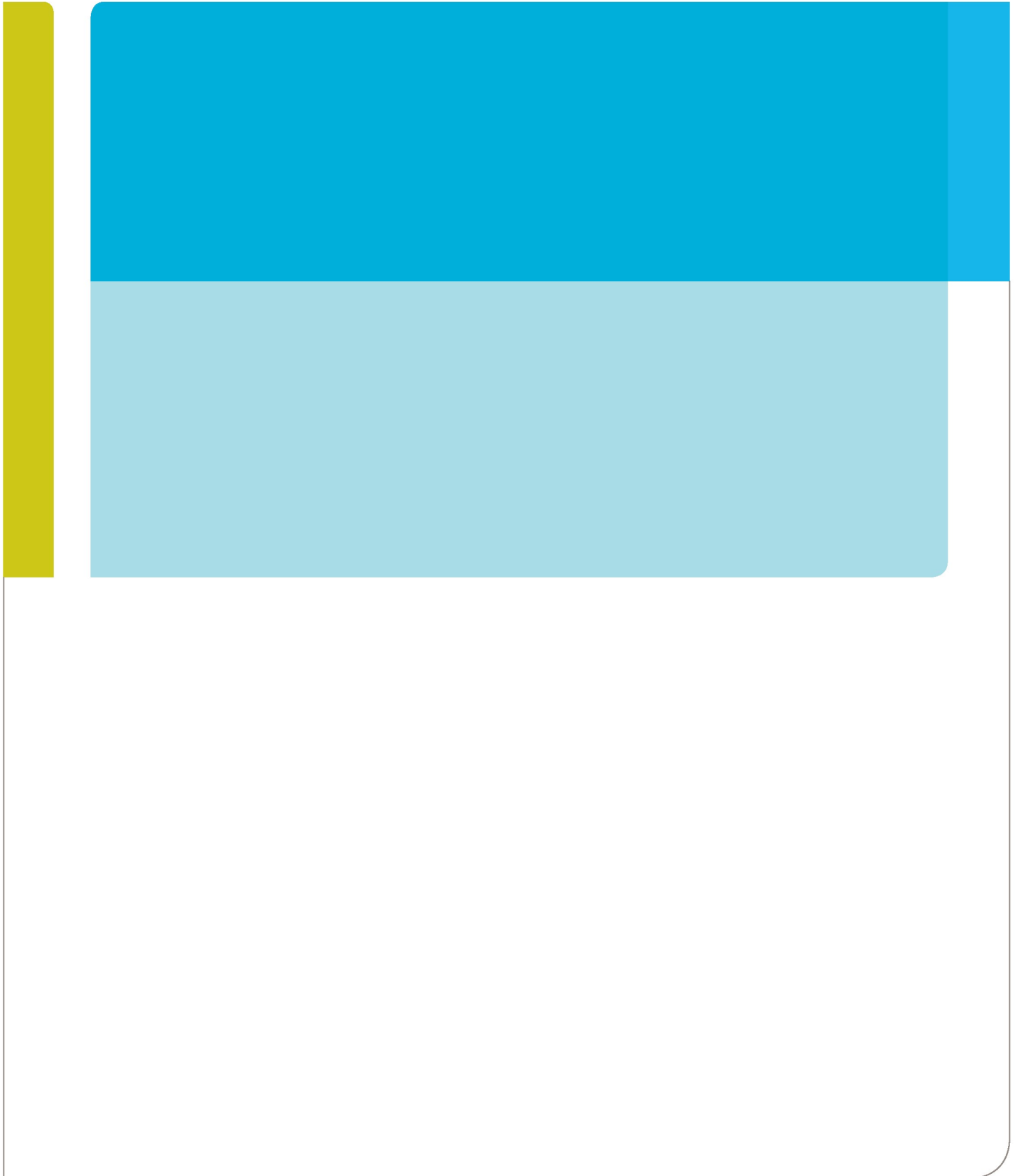
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## 1 Introduction

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This report was commissioned by Mr R George of Postsaver Europe Ltd and presents assessments of the durability performance of a pole wrapping protection system after nearly 20 years exposure in ground contact. This report provides an update of the previous report (BRE report P103639-1000) compiled after 15 years exposure.

The test method was based on that described in European Standard EN252: 1989, 'Field test method for determining the relative protective effectiveness of a wood preservative in ground contact.'

The performance of a protective wrapping system combined with a 'mild' wood preservative treatment. This report records the results of the inspection of the test stakes after nearly 20 years exposure in ground contact. The performance of the protection systems is expressed as notional mean decay ratings (NMDR) calculated from grading the stakes during a visual inspection using the scheme described in EN252.

All the untreated control stakes (average life 5.8 years) and all the control stakes treated by dipping in a 3% solution of copper chromium arsenate (average life 15.3 years) have failed. The complete set of treated stakes with ground-line wrap is intact.



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## 2 Test programme

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### Materials

The test was conducted using a modified version of EN252 to evaluate the field performance of wood preservative products.

The wrapping system was applied to EN252 size stakes by Fenson & Co. Ltd (subsequently Postsaver Europe Ltd), at Castlemorton, Worcs. to a batch of stakes (10 replicates) dip treated for 30 minutes in a solution of CCA (to provide a so-called 'mild' preservative treatment). Further batches of stakes were tested without wrapping as controls (Table 1).

All stakes were prepared at BRE from Scots pine (*Pinus sylvestris*) sapwood as specified in EN252, to a planed finish.

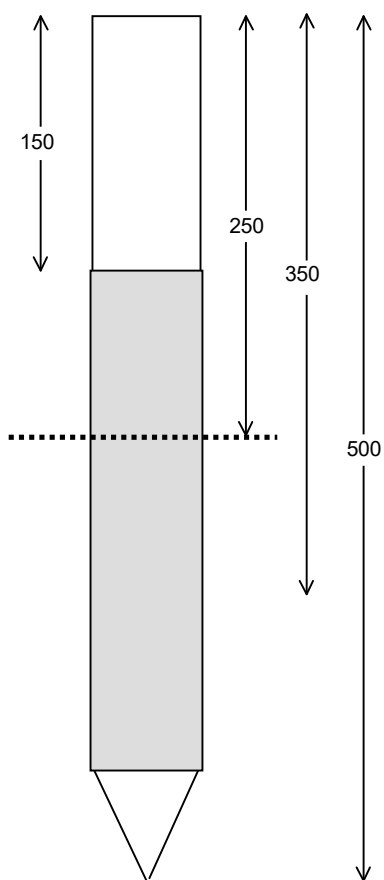
The reference preservative was Copper/Chromium/Arsenic (CCA) as specified in EN252.

### Method

Sets of stakes were dip treated for 30 minutes in a 3% solution of CCA wood preservative. This represents a 'mild' treatment as Scots pine sapwood is commercially vacuum/pressure impregnated with CCA wood preservative solutions. In addition, sets of untreated stakes were prepared by dipping in water as controls.

After preservative treatment, the stakes were dried by close stacking for two weeks and then air dried in an open stack for 10 weeks in a well aerated dark store room. The batch of dried stakes for wrapping together with an untreated set was then forwarded to Postsaver Europe Ltd for application of their wrapping system. On return, the prepared test stakes were installed in BRE's test site at Princes Risborough, a site of medium loam soil type overlaying chalk, 105 metres above sea level. The date of installation was the 8 April 2000.

Approximately six years after installation, on 18 August 2006, each individual stake was tapped with a wooden mallet to assess integrity using the technique described in EN252 to determine whether they would break on impact. The standard method requires those stakes that do not break to be removed from the ground individually and graded for deterioration. The grading of the ground-line wrapped stakes was based on the condition of the below ground tip of the stake. The stakes were graded on a scale of 0 to 4 using the criteria described in EN252 (see Table 2). After examination, all stakes were transported to BRE Garston and re-installed in the ground at a new test site. This re-installation took place on 22 January 2007. A further assessment of the condition of the stakes was made on 28 May 2020 (representing a total of approximately 19 years and 9 months exposure in ground contact).



Approximate dimensions of a test stake, showing wrapping (shaded area) and ground-line (dotted).

Table 1. Designation of the stakes in ground contact testing.

System	Treatment	Stake No.
Control	Untreated	1341-1350
	CCA treated	1351-1360
Ground-line wrap	CCA treated	1371-1380



Table 2. Classification of the evaluation of fungal attack in ground contact testing in accordance with EN252.

Rating	Classification	Definition of condition
0	No attack	No change perceptible by the means at the disposal of the inspector in the field
1	Slight attack	Perceptible changes, but very limited in their intensity and their position or distribution.  - changes which only reveal themselves externally by a change in colour or by very superficial degradation, softening of the wood being the most common symptom, to an apparent depth of the order of 1 mm.
2	Moderate attack	Clear changes to a moderate extent according to the apparent symptoms:  - changes which reveal themselves by softening of the wood to depth of approximately 2 to 3 mm over all or part of the test piece from the ground level zone and below.
3	Severe attack	Severe changes.  - marked decay in the wood to depth of 3-5 mm over a wide surface (for example soft rot or other type of decay over a wide surface of the specimen at the ground line zone or below) or by softening to a greater depth (10-15 mm) over a more limited surface area, e.g. white rot over a few square millimetres.
4	Failure	Impact failure of the stake in the field.
By adding up the ratings for all stakes in each group and dividing by the number of stakes a notional mean decay rating for each group can be obtained.		





### 3 Test results

The results of the assessments are summarised in Table 3.

All of the untreated control stakes have failed by decay the notional mean decay rating (NMDR) is therefore 4.0. The average life of this set of 10 stakes was 5.8 years with a range of 3.8 to 7.7 years. This average life for Scots pine sapwood is typical and indicates that conditions at the test sites present a reasonable challenge to the protection system.

All the remaining control stakes treated by dipping in 3% CCA solution have failed by decay at this inspection. The NMDR for this set of stakes is 4.0 (Table 4) with a 15.3 year average life and a range of 7.7 to 19.7 years.

None of the treated stakes additionally protected by ground-line wrap have yet to fail. The NMDR of 0.6 is based on a slight softening of the wood at the un-wrapped point of three stakes (Table 5).

Table 3. Summary of results of the Postsaver wrapping system on untreated and treated Scots pine stakes after nearly 20 years exposure in ground contact

System	Stake numbers	Preservative treatment	Mean absorption of solution (kg/m <sup>3</sup> )	Mean retention of CCA salts (kg/m <sup>3</sup> )	Notional mean decay rating (NMDR)
Control	1341-1350	None 3% CCA	0	0	4.0
	1351-1360		51	1.53	4.0
Ground-line wrap	1371-1380	3% CCA	45	1.35	0.6



Table 4. Assessment of ground contact stakes according to EN252. Stakes treated with 3% CCA preservative product for 30 minute dip installed 8 April 2000.

Stake no.	Year of test										Life (yrs)
	2001	2002	2003	2004	2005	2006	2008	2012	2016	2020	
1351	0	0	0	0	0	1	1	3	3	4	19.7
1352	0	0	0	1	1	1	4	-	-	-	7.7
1353	0	0	0	1	1	1	4	-	-	-	7.7
1354	0	0	1	1	1	1	1	3	4	-	11.7
1355	0	0	0	0	1	1	4	-	-	-	7.7
1356	0	0	0	0	0	1	1	3	3	4	19.7
1357	0	0	0	1	1	1	1	3	3	4	19.7
1358	0	0	0	1	1	1	1	2	3	4	19.7
1359	0	0	0	0	1	1	1	3	3	4	19.7
1360	0	0	1	1	1	2	2	3	3	4	19.7
<b>Total</b>	0	0	2	6	8	11	20	32	34	40	<b>15.3</b>





Table 5. Assessment of ground contact stakes according to EN252. Stakes treated with 3% CCA preservative product for 30-minute dip with ground-line wrap installed 8 April 2000.

Stake no.	Year of test										Life (yrs)
	2001	2002	2003	2004	2005	2006	2008	2012	2016	2020	
1371	0	0	0	0	0	0	0	0	0	0	
1372	0	0	0	0	1	1	1#	1#	1#	1#	
1373	0	0	0	0	0	0	1#	1#	1#	0#	
1374	0	0	0	0	0	0	0#	0#	0#	0#	
1375	0	0	0	0	0	0	0#	0#	0#	0#	
1376	0	0	0	0	0	0	0#	0#	0#	0#	
1377	0	0	0	0	0	0	0#	0#	0#	0#	
1378	0	0	0	0	0	0	0#	0#	0#	1#	
1379	0	0	0	0	1	1	1#	1#	1#	2#	
1380	0	0	0	0	0	0	1#	1#	1#	2#	
Total	0	0	0	0	2	2	3	3	3	6	

# wrap damaged at bottom edge during extraction/re-installation





The combination of treatment by dipping stakes in a solution of CCA and ground-line wrap is giving the best results with no failures recorded to date.

The remaining stakes were returned to the test field for a possible future inspection.

#### References

EN 252: 1989 (BS 7282: 1990) Field test method for determining the relative protectiveness of a wood preservative in ground contact.