



United Kingdom

Fly ash Test Report

Technical Department

Portland House
Bickenhill Lane, Solihull
Birmingham. B37 7BQ

Telephone: 0845 812 6400
Facsimile: 0845 812 6200



0086

Date: **06 November 2009**

Cottam

Fly ash BS EN 450-1

Fineness category:S, Loss on ignition category:B

Monthly average data for

August 2009

A) Physical and chemical properties of the fly ash sample

| Test Property | Test result | BS EN 450-1 |
|--------------------------------------------------------------------------------------|-------------|-------------|
| Fineness (%) | 9.0 | max 12.0 |
| Sulfuric anhydride (%) | 0.9 | max 3.0 |
| Loss on ignition (%) | 4.8 | 2.0 to 7.0 |
| Chloride (%) | 0.00 | max 0.1 |
| Calcium oxide (%) | 3.10 | max 10.0 |
| SiO ₂ +Al ₂ O ₃ +Fe ₂ O ₃ (%) | 86.7 | min 70.0 |
| Free Lime (%) | 0.1 | max 1.0 |
| Acid soluble alkali (%) | 3.38 | max 5.0 |

Additional information:

| | |
|------------------------------------------------|-------------|
| Colour index | 4 |
| Declared particle density (kg/m ³) | 2255 |

B) Physical properties of a 25:75 blend of the fly ash with a reference Portland cement

PC Source:

Ribblesdale

PC Initial setting time (min): **115**

PC 28 day strength (MPa) **54.4**

| Test Property | Test result | BS EN 450-1 |
|----------------------------|-------------|-------------------------|
| Water requirement (%) | 93 | max 95 |
| Activity index @ 28 days | 88 | min 75 |
| Initial Setting Time (min) | 180 | max 120min more than PC |

Note: This report has been produced from data supplied by the manufacturer, Processing Ash LLP

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



United Kingdom

Certificate of Conformity to BS 8500-2 Annex A

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Cauldon PC-RM, BS EN 197-1 CEM I 52.5N

prepared by Lafarge Cement UK

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 18.0 | MPa |
| 28 day strength | 41.1 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 17 | 39 |
| 42,5 N | 6 | 26 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



Certificate of Conformity to BS 8500-2 Annex A

United Kingdom

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Dragon Alpha

prepared by the manufacturer

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 19.8 | MPa |
| 28 day strength | 43.3 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 9 | 41 |
| 42,5 N | 6 | 21 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



Certificate of Conformity to BS 8500-2 Annex A

United Kingdom

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Dunbar PC-RM, BS EN 197-1 CEM I 52,5N

prepared by Lafarge Cement UK

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 16.6 | MPa |
| 28 day strength | 40.7 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 18 | 37 |
| 42,5 N | 7 | 26 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



United Kingdom

Certificate of Conformity to BS 8500-2 Annex A

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Hope PC-RM, BS EN 197-1 CEM I 52,5N

prepared by Lafarge Cement UK

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 20.5 | MPa |
| 28 day strength | 47.2 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 16 | 41 |
| 42,5 N | 6 | 26 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



United Kingdom

Certificate of Conformity to BS 8500-2 Annex A

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Castle Ketton

prepared by the manufacturer

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 18.1 | MPa |
| 28 day strength | 41.0 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 19 | 46 |
| 42,5 N | 6 | 29 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



United Kingdom

Certificate of Conformity to BS 8500-2 Annex A

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Castle Padeswood

prepared by the manufacturer

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 17.8 | MPa |
| 28 day strength | 41.9 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 11 | 36 |
| 42,5 N | 6 | 21 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



United Kingdom

Certificate of Conformity to BS 8500-2 Annex A

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Paragon Chatham

prepared by the manufacturer

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 19.8 | MPa |
| 28 day strength | 46.6 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 24 | 45 |
| 42,5 N | 10 | 33 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



United Kingdom

Certificate of Conformity to BS 8500-2 Annex A

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Castle Ribblesdale

prepared by the manufacturer

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 21.6 | MPa |
| 28 day strength | 43.1 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 18 | 43 |
| 42,5 N | 6 | 27 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



United Kingdom

Certificate of Conformity to BS 8500-2 Annex A

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Cemex Rugby

prepared by the manufacturer

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 20.4 | MPa |
| 28 day strength | 43.4 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 15 | 38 |
| 42,5 N | 6 | 24 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager



United Kingdom

Certificate of Conformity to BS 8500-2 Annex A

Technical Department

Portland House
Bickenhill Lane
Solihull
Birmingham
B37 7BQ

Telephone: 0845 812 6400

Facsimile: 0845 812 6200

Date: **06 November 2009**

For a composite sample of

Cottam fly ash to BS EN 450-1

Fineness category:S, Loss on ignition category:B

prepared by Processing Ash LLP

and a composite sample of

Cemex South Ferriby

prepared by Lafarge Cement UK

each relating to product supplied during

August 2009

the results of test carried out in accordance with
BS 196-1 on a 70:30 blend of the CEM I with the
fly ash were

| | | |
|-----------------|-------------|-----|
| 2 day strength | 19.1 | MPa |
| 28 day strength | 40.6 | MPa |

Based on equivalent results obtained for the last **12** months
the permitted proportion of combinations conforming with the requirements
of Annex A of BS 8500-2 are

| Strength class of combination | fly ash content (as a percentage) | |
|----------------------------------|--------------------------------------|-----------|
| | min | max |
| 32,5 R | 13 | 37 |
| 42,5 N | 6 | 22 |

For and on behalf of Lafarge Cement UK :

National Commercial Technical Manager