

Tarmac Cement
 National Laboratory
 Yelsway Lane
 Waterhouses
 Staffordshire
 ST10 3AZ

28.09.2023

Composition of Fly ash

**Tudela Fly ash
 EN 450-1 LOI Cat. B, Fineness Cat.N
 0099-CPR-A95-0019**

Based on the **July 2023** monthly composite sample: 2067

| Property | | | Value | BS EN 450-1 Limit |
|--|---------------------|-------------------|-------|---|
| Fineness (Residue) | 45µm | % | 13.1 | Declared Value 15% ± 10% (Tested in accordance with BS EN 450-1 cl. 5.3.1) |
| APD | | g/cm ³ | 2.51 | < 200kg/m ³ from declared value |
| 28 Day Activity Index – Jun sample | | % | 80 | >75% |
| 90 Day Activity Index – May sample | | % | 89 | >85% |
| Sulfate | SO ₃ | % | 0.81 | ≤ 3.0% |
| Loss on Ignition | LOI | % | 3.68 | ≤ 7.0% |
| Chloride | Cl ⁻ | % | 0.01 | ≤ 0.1% |
| Calcium Oxide | CaO | % | 6.15 | ≤ 10.0% |
| SiO ₂ + Al ₂ O ₃ + Fe ₂ O ₃ | - | % | 82.22 | ≥ 70.0% |
| Free Lime | - | % | 0.21 | ≤ 1.5% |
| Alkalis | Na ₂ Oeq | % | 1.03 | ≤ 5.0% |
| Declared Mean Alkali Content | Na ₂ Oeq | % | 1.50 | - |
| Declared Maximum Chloride Content | Cl ⁻ | % | 0.05 | - |

*BS EN 933-10:2009 method replacing the 63 µm sieve with a 45 µm sieve

For and on behalf of Tarmac Cement:

S. Chudley

Simon Chudley

**National Commercial Technical Manager
 Tarmac Cement**

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 Tarmac Services Limited Registered in England and Wales. Company No. 8197397
 Registered address for all companies: T3 Trinity Park, Bickenhill Lane, Birmingham, B37 7ES

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**Conformity of Fly Ash to BS 8500-2: Annex A
Tudela EN 450-1 Fly Ash
0099-CPR-A95-0019**

Based on the composite samples for the month of: July 2023

| Constituent | Source |
|------------------|----------|
| EN 450-1 Fly Ash | Tudela |
| EN 197-1 CEM I | Aberthaw |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 70:30 blend of CEM I with Fly Ash were:

| | |
|-----------------------|------|
| 2 Day Strength (MPa) | 21.4 |
| 28 Day Strength (MPa) | 46.7 |

Based on equivalent results obtained for the last 12 months, the permitted proportions of combinations conforming to the requirements of Annex A of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 19 | 35 |
| 42,5N | 6 | 28 |

| BS 8500-2 Combination Designation | Fly Ash Content (%) | |
|-----------------------------------|---------------------|-----|
| | Min | Max |
| CIIA-V | 6 | 20 |
| CIIB-V | 21 | 35 |

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**Conformity of Fly Ash to BS 8500-2: Annex A
Tudela EN 450-1 Fly Ash
0099-CPR-A95-0019**

Based on the composite samples for the month of: July 2023

| Constituent | Source |
|------------------|---------|
| EN 450-1 Fly Ash | Tudela |
| EN 197-1 CEM I | Cauldon |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 70:30 blend of CEM I with Fly Ash were:

| | |
|-----------------------|------|
| 2 Day Strength (MPa) | 21.7 |
| 28 Day Strength (MPa) | 47.2 |

Based on equivalent results obtained for the last 12 months, the permitted proportions of combinations conforming to the requirements of Annex A of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 12 | 35 |
| 42,5N | 6 | 27 |

| BS 8500-2 Combination Designation | Fly Ash Content (%) | |
|-----------------------------------|---------------------|-----|
| | Min | Max |
| CIIA-V | 6 | 20 |
| CIIB-V | 21 | 35 |

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**Conformity of Fly Ash to BS 8500-2: Annex A
Tudela EN 450-1 Fly Ash
0099-CPR-A95-0019**

Based on the composite samples for the month of: July 2023

| Constituent | Source |
|------------------|--------|
| EN 450-1 Fly Ash | Tudela |
| EN 197-1 CEM I | Dunbar |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 70:30 blend of CEM I with Fly Ash were:

| | |
|-----------------------|------|
| 2 Day Strength (MPa) | 19.0 |
| 28 Day Strength (MPa) | 44.9 |

Based on equivalent results obtained for the last 12 months, the permitted proportions of combinations conforming to the requirements of Annex A of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 21 | 35 |
| 42,5N | 6 | 28 |

| BS 8500-2 Combination Designation | Fly Ash Content (%) | |
|-----------------------------------|---------------------|-----|
| | Min | Max |
| CIIA-V | 6 | 20 |
| CIIB-V | 21 | 35 |

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**Conformity of Fly Ash to BS 8500-2: Annex A
Tudela EN 450-1 Fly Ash
0099-CPR-A95-0019**

Based on the composite samples for the month of: July 2023

| Constituent | Source |
|------------------|----------|
| EN 450-1 Fly Ash | Tudela |
| EN 197-1 CEM I | Limerick |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 70:30 blend of CEM I with Fly Ash were:

| | |
|-----------------------|------|
| 2 Day Strength (MPa) | 20.1 |
| 28 Day Strength (MPa) | 45.8 |

Based on equivalent results obtained for the last 12 months, the permitted proportions of combinations conforming to the requirements of Annex A of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 9 | 35 |
| 42,5N | 6 | 21 |

| BS 8500-2 Combination Designation | Fly Ash Content (%) | |
|-----------------------------------|---------------------|-----|
| | Min | Max |
| CIIA-V | 6 | 20 |
| CIIB-V | 21 | 35 |

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**Conformity of Fly Ash to BS 8500-2: Annex A
Tudela EN 450-1 Fly Ash
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Based on the composite samples for the month of: July 2023

| Constituent | Source |
|------------------|--------|
| EN 450-1 Fly Ash | Tudela |
| EN 197-1 CEM I | Platin |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 70:30 blend of CEM I with Fly Ash were:

| | |
|-----------------------|------|
| 2 Day Strength (MPa) | 19.3 |
| 28 Day Strength (MPa) | 43.9 |

Based on equivalent results obtained for the last 12 months, the permitted proportions of combinations conforming to the requirements of Annex A of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 12 | 35 |
| 42,5N | 6 | 23 |

| BS 8500-2 Combination Designation | Fly Ash Content (%) | |
|-----------------------------------|---------------------|-----|
| | Min | Max |
| CIIA-V | 6 | 20 |
| CIIB-V | 21 | 35 |

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**Conformity of Fly Ash to BS 8500-2: Annex A
Tudela EN 450-1 Fly Ash
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Based on the composite samples for the month of: July 2023

| Constituent | Source |
|------------------|--------|
| EN 450-1 Fly Ash | Tudela |
| EN 197-1 CEM I | Rugby |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 70:30 blend of CEM I with Fly Ash were:

| | |
|-----------------------|------|
| 2 Day Strength (MPa) | 19.2 |
| 28 Day Strength (MPa) | 44.4 |

Based on equivalent results obtained for the last 12 months, the permitted proportions of combinations conforming to the requirements of Annex A of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 18 | 35 |
| 42,5N | 6 | 27 |

| BS 8500-2 Combination Designation | Fly Ash Content (%) | |
|-----------------------------------|---------------------|-----|
| | Min | Max |
| CIIA-V | 6 | 20 |
| CIIB-V | 21 | 35 |

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Based on the composite samples for the month of: July 2023

| Constituent | Source |
|------------------|----------|
| EN 450-1 Fly Ash | Tudela |
| EN 197-1 CEM I | Tunstead |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 70:30 blend of CEM I with Fly Ash were:

| | |
|-----------------------|------|
| 2 Day Strength (MPa) | 19.9 |
| 28 Day Strength (MPa) | 48.4 |

Based on equivalent results obtained for the last 12 months, the permitted proportions of combinations conforming to the requirements of Annex A of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 24 | 35 |
| 42,5N | 6 | 35 |

| BS 8500-2 Combination Designation | Fly Ash Content (%) | |
|-----------------------------------|---------------------|-----|
| | Min | Max |
| CIIA-V | 6 | 20 |
| CIIB-V | 21 | 35 |

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