

Tarmac Cement
National Laboratory
Yelsway Lane
Waterhouses
Staffordshire
ST10 3AZ

01/08/2024

Composition of Fly ash

**Tudela Fly Ash
EN 450-1 LOI Cat. B, Fineness Cat.N
0086-CPR-756089**

Based on the **May 2024** monthly composite sample: 1838

| Property | | | Value | BS EN 450-1 Limit |
|--|---------------------|-------------------|-------|--|
| Fineness (Residue) | 45µm | % | 9.50 | Declared Value 15% ± 10% <i>(Tested in accordance with BS EN 450-1 cl. 5.3.1)</i> |
| APD | | g/cm ³ | 2.49 | < 200kg/m ³ from declared value |
| 28 Day Activity Index – Apr sample | | % | 76 | >75% |
| 90 Day Activity Index – Mar sample | | % | 87 | >85% |
| Sulfate | SO ₃ | % | 1.13 | ≤ 3.0% |
| Loss on Ignition | LOI | % | 3.55 | ≤ 7.0% |
| Chloride | Cl ⁻ | % | 0.01 | ≤ 0.1% |
| Calcium Oxide | CaO | % | 4.83 | ≤ 10.0% |
| SiO ₂ + Al ₂ O ₃ + Fe ₂ O ₃ | - | % | 84.66 | ≥ 70.0% |
| Free Lime | - | % | 0.14 | ≤ 1.5% |
| Alkalis | Na ₂ Oeq | % | 1.20 | ≤ 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:



Simon Chudley

**National Commercial Technical Manager
Tarmac Cement**

TARMAC.COM

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Tarmac Cement Limited Registered in England and Wales. Company No. 66558
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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 B
Tudela EN 450-1 Fly Ash
0086-CPR-756089**

Based on the composite samples for the month of: May 2024

| 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) | 20.1 |
| 28 Day Strength (MPa) | 43.5 |

Based on equivalent results obtained for the last 10 months, the permitted proportions of combinations conforming to the requirements of Annex B 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: May 2024

| 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) | 14.9 |
| 28 Day Strength (MPa) | 38.3 |

Based on equivalent results obtained for the last 10 months, the permitted proportions of combinations conforming to the requirements of Annex B of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 12 | 35 |
| 42,5N | 6 | 24 |

| 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: May 2024

| 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) | 18.8 |
| 28 Day Strength (MPa) | 42.0 |

Based on equivalent results obtained for the last 10 months, the permitted proportions of combinations conforming to the requirements of Annex B of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 17 | 35 |
| 42,5N | 6 | 24 |

| 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: May 2024

| 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) | 18.8 |
| 28 Day Strength (MPa) | 42.3 |

Based on equivalent results obtained for the last 10 months, the permitted proportions of combinations conforming to the requirements of Annex B of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 18 | 35 |
| 42,5N | 6 | 26 |

| 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: May 2024

| 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) | 18.4 |
| 28 Day Strength (MPa) | 42.8 |

Based on equivalent results obtained for the last 10 months, the permitted proportions of combinations conforming to the requirements of Annex B of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 15 | 35 |
| 42,5N | 6 | 24 |

| 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: May 2024

| 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) | 18.7 |
| 28 Day Strength (MPa) | 44.6 |

Based on equivalent results obtained for the last 10 months, the permitted proportions of combinations conforming to the requirements of Annex B of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) | |
|-------------------------------|---------------------|-----|
| | Min | Max |
| 32,5N | 15 | 35 |
| 42,5N | 6 | 26 |

| 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: May 2024

| 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) | 19.4 |
| 28 Day Strength (MPa) | 47.8 |

Based on equivalent results obtained for the last 10 months, the permitted proportions of combinations conforming to the requirements of Annex B of BS 8500-2 are:

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

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

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