

Tarmac Cement  
 National Laboratory  
 Yelsway Lane  
 Waterhouses  
 Staffordshire  
 ST10 3AZ

18/02/2025

### Composition of Fly ash

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

Based on the **November 2024** monthly composite sample: 4378

| Property                                                                           |                     |                   | Value | BS EN 450-1 Limit                                                             |
|------------------------------------------------------------------------------------|---------------------|-------------------|-------|-------------------------------------------------------------------------------|
| Fineness (Residue)                                                                 | 45µm                | %                 | 10.1  | Declared Value 15% ± 10%<br>(Tested in accordance with BS EN 450-1 cl. 5.3.1) |
| APD                                                                                |                     | g/cm <sup>3</sup> | 2.53  | < 200kg/m <sup>3</sup> from declared value                                    |
| 28 Day Activity Index – Oct sample                                                 |                     | %                 | 83    | >75%                                                                          |
| 90 Day Activity Index – Sep sample                                                 |                     | %                 | 91    | >85%                                                                          |
| Sulfate                                                                            | SO <sub>3</sub>     | %                 | 1.22  | ≤ 3.0%                                                                        |
| Loss on Ignition                                                                   | LOI                 | %                 | 3.03  | ≤ 7.0%                                                                        |
| Chloride                                                                           | Cl <sup>-</sup>     | %                 | 0.01  | ≤ 0.1%                                                                        |
| Calcium Oxide                                                                      | CaO                 | %                 | 7.89  | ≤ 10.0%                                                                       |
| SiO <sub>2</sub> + Al <sub>2</sub> O <sub>3</sub> + Fe <sub>2</sub> O <sub>3</sub> | -                   | %                 | 80.79 | ≥ 70.0%                                                                       |
| Free Lime                                                                          | -                   | %                 | 0.40  | ≤ 1.5%                                                                        |
| Alkalis                                                                            | Na <sub>2</sub> Oeq | %                 | 1.02  | ≤ 5.0%                                                                        |
| Declared Mean Alkali Content                                                       | Na <sub>2</sub> Oeq | %                 | 1.50  | -                                                                             |
| Declared Maximum Chloride Content                                                  | Cl <sup>-</sup>     | %                 | 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**

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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: November 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)  | 19.5 |
| 28 Day Strength (MPa) | 46.5 |

Based on equivalent results obtained for the last **12** 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                         | 14                  | 35  |
| 42,5N                         | 6                   | 25  |

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

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**Tudela EN 450-1 Fly Ash**  
**0086-CPR-756089**

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

| Constituent          | Source                              |
|----------------------|-------------------------------------|
| EN 450-1 Fly Ash     | Tudela                              |
| EN 197-1 CEM II A-LL | Aberthaw (limestone content 10-14%) |

The results of compressive strength testing (in accordance with BS EN 196-1)  
on a 70:30 blend of CEM II A-LL with fly ash were:

|                       |      |
|-----------------------|------|
| 2 Day Strength (MPa)  | 17.8 |
| 28 Day Strength (MPa) | 46.0 |

Based on equivalent results obtained for the last 2 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                  | 46  |
| 42,5N                         | 6                   | 28  |

| BS 8500-2 Combination Designation | Fly Ash Content (%) |     |
|-----------------------------------|---------------------|-----|
|                                   | Min                 | Max |
| CIIB-M                            | 6                   | 29  |
| CIIC-M                            | 16                  | 44  |

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Based on the composite samples for the month of: November 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)  | 22.5 |
| 28 Day Strength (MPa) | 49.2 |

Based on equivalent results obtained for the last **12** 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                         | 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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Based on the composite samples for the month of: November 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)  | 18.7 |
| 28 Day Strength (MPa) | 47.7 |

Based on equivalent results obtained for the last **12** 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                   | 25  |

| 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: November 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)  | 19.0 |
| 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 B of BS 8500-2 are:

| Strength Class of Combination | Fly Ash Content (%) |     |
|-------------------------------|---------------------|-----|
|                               | Min                 | Max |
| 32,5N                         | 17                  | 35  |
| 42,5N                         | 6                   | 25  |

| 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: November 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)  | 18.0 |
| 28 Day Strength (MPa) | 43.7 |

Based on equivalent results obtained for the last **12** 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: November 2024

| Constituent         | Source                            |
|---------------------|-----------------------------------|
| EN 450-1 Fly Ash    | Tudela                            |
| EN 197-1 CEM II A-L | Platin (limestone content 12-16%) |

The results of compressive strength testing (in accordance with BS EN 196-1)  
on a 70:30 blend of CEM II A-L with fly ash were:

|                       |      |
|-----------------------|------|
| 2 Day Strength (MPa)  | 18.9 |
| 28 Day Strength (MPa) | 44.8 |

Based on equivalent results obtained for the last 2 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                         | 14                  | 41  |
| 42,5N                         | 6                   | 24  |

| BS 8500-2 Combination Designation | Fly Ash Content (%) |     |
|-----------------------------------|---------------------|-----|
|                                   | Min                 | Max |
| CIIB-M                            | 6                   | 29  |
| CIIC-M                            | 16                  | 44  |

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| 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)  | 19.6 |
| 28 Day Strength (MPa) | 50.4 |

Based on equivalent results obtained for the last **12** 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                   | 28  |

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

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| 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)  | 18.5 |
| 28 Day Strength (MPa) | 51.7 |

Based on equivalent results obtained for the last **12** 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                         | 23                  | 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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