

Composition of Ground Granulated Blastfurnace Slag

**Tudela EN 15167-1 GGBS
(0099/CPR/B34/0001)**

Based on the **August 2023** monthly composite sample: 2339

| Property | | | Value | BS EN 15167-1 Limit |
|-------------------------------------|---------------------------------|--------------------|-------|--------------------------|
| Magnesia | MgO | % | 7.32 | ≤ 18.0% |
| Sulfate | SO ₃ | % | 0.16 | ≤ 2.5% |
| Sulfide | S ²⁻ | % | 0.84 | ≤ 2.0% |
| Chloride | Cl ⁻ | % | 0.01 | ≤ 0.1% |
| Alkalis | Na ₂ O _{eq} | % | 0.50 | - |
| Alumina | Al ₂ O ₃ | % | 11.37 | ≤ 14%* |
| Fineness | SSA | m ² /kg | 541 | ≥ 275 m ² /kg |
| 7 Day Activity Index – July Sample | | % | 54 | >40% |
| 28 Day Activity Index – July Sample | | % | 80 | >65% |
| Declared Mean Alkali Content | Na ₂ O _{eq} | % | 0.70 | - |
| Declared Maximum Chloride Content | Cl ⁻ | % | 0.05 | - |

***Upper limit in BS 8500 for use in '+SR' combinations**

For and on behalf of Tarmac Cement:

S. Chudley

Simon Chudley

**National Commercial Technical Manager
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**Conformity of Ground Granulated Blast Furnace Slag to BS 8500-2: Annex A
Tudela EN 15167-1 GGBS
(0099/CPR/B34/0001)**

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

| Constituent | Source |
|-----------------|----------|
| EN 15167-1 GGBS | Tudela |
| EN 197-1 CEM I | Aberthaw |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 50:50 blend of CEM I with GGBS were:

| | |
|-----------------------|------|
| 7 Day Strength (MPa) | 26.8 |
| 28 Day Strength (MPa) | 52.3 |

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 | GGBS Content (%) | |
|-------------------------------|------------------|-----|
| | Min | Max |
| 32,5L | 50 | 80 |
| 42,5L | 18 | 71 |
| 52,5L | 6 | 32 |

| BS 8500-2 Combination Designation | GGBS Content (%) | |
|-----------------------------------|------------------|-----|
| | Min | Max |
| CIIS | 6 | 35 |
| CIIIA | 36 | 65 |
| CIIB | 66 | 80 |

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**Conformity of Ground Granulated Blast Furnace Slag to BS 8500-2: Annex A
Tudela EN 15167-1 GGBS
(0099/CPR/B34/0001)**

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

| Constituent | Source |
|-----------------|---------|
| EN 15167-1 GGBS | Tudela |
| EN 197-1 CEM I | Cauldon |

The results of compressive strength testing (in accordance with BS EN 196-1)
of a 50:50 blend of CEM I with GGBS were:

| | |
|-----------------------|------|
| 7 Day Strength (MPa) | 27.9 |
| 28 Day Strength (MPa) | 51.0 |

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 | GGBS Content (%) | |
|-------------------------------|------------------|-----|
| | Min | Max |
| 32,5L | 55 | 80 |
| 42,5L | 6 | 75 |
| 52,5L | 6 | 31 |

| BS 8500-2 Combination Designation | GGBS Content (%) | |
|--------------------------------------|------------------|-----|
| | Min | Max |
| CIIS | 6 | 35 |
| CIIIA | 36 | 65 |
| CIIB | 66 | 80 |

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**Conformity of Ground Granulated Blast Furnace Slag to BS 8500-2: Annex A
Tudela EN 15167-1 GGBS
(0099/CPR/B34/0001)**

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

| Constituent | Source |
|-----------------|--------|
| EN 15167-1 GGBS | Tudela |
| EN 197-1 CEM I | Dunbar |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 50:50 blend of CEM I with GGBS were:

| | |
|-----------------------|------|
| 7 Day Strength (MPa) | 22.4 |
| 28 Day Strength (MPa) | 51.9 |

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 | GGBS Content (%) | |
|-------------------------------|------------------|-----|
| | Min | Max |
| 32,5L | 50 | 80 |
| 42,5L | 30 | 50 |
| 52,5L | 6 | 41 |

| BS 8500-2 Combination Designation | GGBS Content (%) | |
|-----------------------------------|------------------|-----|
| | Min | Max |
| CIIS | 6 | 35 |
| CIIIA | 36 | 65 |
| CIIB | 66 | 80 |

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**Conformity of Ground Granulated Blast Furnace Slag to BS 8500-2: Annex A
Tudela EN 15167-1 GGBS
(0099/CPR/B34/0001)**

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

| Constituent | Source |
|-----------------|--------|
| EN 15167-1 GGBS | Tudela |
| EN 197-1 CEM I | Hope |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 50:50 blend of CEM I with GGBS were:

| | |
|-----------------------|------|
| 7 Day Strength (MPa) | 31.6 |
| 28 Day Strength (MPa) | 55.2 |

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 | GGBS Content (%) | |
|-------------------------------|------------------|-----|
| | Min | Max |
| 32,5L | 61 | 80 |
| 42,5L | 6 | 72 |
| 52,5L | 6 | 23 |

| BS 8500-2 Combination Designation | GGBS Content (%) | |
|-----------------------------------|------------------|-----|
| | Min | Max |
| CIIS | 6 | 35 |
| CIIIA | 36 | 65 |
| CIIB | 66 | 80 |

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**Conformity of Ground Granulated Blast Furnace Slag to BS 8500-2: Annex A
Tudela EN 15167-1 GGBS
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Based on the composite samples for the month of: August 2023

| Constituent | Source |
|-----------------|-----------|
| EN 15167-1 GGBS | Tudela |
| EN 197-1 CEM I | Lagerdorf |

The results of compressive strength testing (in accordance with BS EN 196-1) on a 50:50 blend of CEM I with GGBS were:

| | |
|-----------------------|------|
| 7 Day Strength (MPa) | 33.1 |
| 28 Day Strength (MPa) | 55.5 |

Based on equivalent results obtained for the last 5 months, the permitted proportions of combinations conforming to the requirements of Annex A of BS 8500-2 are:

| Strength Class of Combination | GGBS Content (%) | |
|-------------------------------|------------------|-----|
| | Min | Max |
| 32,5L | 58 | 80 |
| 42,5L | 13 | 68 |
| 52,5L | 6 | 44 |

| BS 8500-2 Combination Designation | GGBS Content (%) | |
|-----------------------------------|------------------|-----|
| | Min | Max |
| CIIS | 6 | 35 |
| CIIIA | 36 | 65 |
| CIIB | 66 | 80 |

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

| Constituent | Source |
|-----------------|----------|
| EN 15167-1 GGBS | Tudela |
| EN 197-1 CEM I | Limerick |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 50:50 blend of CEM I with GGBS were:

| | |
|-----------------------|------|
| 7 Day Strength (MPa) | 29.9 |
| 28 Day Strength (MPa) | 54.1 |

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 | GGBS Content (%) | |
|-------------------------------|------------------|-----|
| | Min | Max |
| 32,5L | 53 | 80 |
| 42,5L | 6 | 71 |
| 52,5L | 6 | 31 |

| BS 8500-2 Combination Designation | GGBS Content (%) | |
|-----------------------------------|------------------|-----|
| | Min | Max |
| CIIS | 6 | 35 |
| CIIIA | 36 | 65 |
| CIIB | 66 | 80 |

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

| Constituent | Source |
|-----------------|---------|
| EN 15167-1 GGBS | Tudela |
| EN 197-1 CEM I | Mannock |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 50:50 blend of CEM I with GGBS were:

| | |
|-----------------------|------|
| 7 Day Strength (MPa) | 31.6 |
| 28 Day Strength (MPa) | 53.3 |

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 | GGBS Content (%) | |
|-------------------------------|------------------|-----|
| | Min | Max |
| 32,5L | 61 | 80 |
| 42,5L | 6 | 72 |
| 52,5L | 6 | 39 |

| BS 8500-2 Combination Designation | GGBS Content (%) | |
|-----------------------------------|------------------|-----|
| | Min | Max |
| CIIS | 6 | 35 |
| CIIIA | 36 | 65 |
| CIIB | 66 | 80 |

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| Constituent | Source |
|-----------------|--------|
| EN 15167-1 GGBS | Tudela |
| EN 197-1 CEM I | Platin |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 50:50 blend of CEM I with GGBS were:

| | |
|-----------------------|------|
| 7 Day Strength (MPa) | 28.0 |
| 28 Day Strength (MPa) | 52.4 |

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 | GGBS Content (%) | |
|-------------------------------|------------------|-----|
| | Min | Max |
| 32,5L | 49 | 80 |
| 42,5L | 6 | 67 |
| 52,5L | 6 | 36 |

| BS 8500-2 Combination Designation | GGBS Content (%) | |
|-----------------------------------|------------------|-----|
| | Min | Max |
| CIIS | 6 | 35 |
| CIIIA | 36 | 65 |
| CIIB | 66 | 80 |

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

| Constituent | Source |
|-----------------|----------|
| EN 15167-1 GGBS | Tudela |
| EN 197-1 CEM I | Tunstead |

The results of compressive strength testing (in accordance with BS EN 196-1) of a 50:50 blend of CEM I with GGBS were:

| | |
|-----------------------|------|
| 7 Day Strength (MPa) | 26.4 |
| 28 Day Strength (MPa) | 55.4 |

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 | GGBS Content (%) | |
|-------------------------------|------------------|-----|
| | Min | Max |
| 32,5L | 62 | 80 |
| 42,5L | 6 | 72 |
| 52,5L | 6 | 42 |

| BS 8500-2 Combination Designation | GGBS Content (%) | |
|-----------------------------------|------------------|-----|
| | Min | Max |
| CIIS | 6 | 35 |
| CIIIA | 36 | 65 |
| CIIB | 66 | 80 |

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