

Lafarge Cement S.A.  
ul. Warszawska 110  
28-366 Małogoszcz  
Cementownia Kujawy  
Doradztwo Techniczne  
www.lafarge.pl

tel.: (52) 58 65 000, fax: (52) 58 65 011  
tel.: (41) 24 87 533, fax: (41) 24 87 531

## KUJAWY CEMENT PLANT IN BIELAWY

### Quality Certificate of cement

Type of cement: **CEM I 42,5N-SR3**  
**CEM I 42,5N-SR3/NA**

Requirements acc. to: PN-EN 197-1:2012  
Requirements acc. to: PN-B-19707

Values obtained for the period of: **May**

**2018**

|  | Unit | Results | Requirements<br>acc. to: PN-<br>EN 197-<br>1:2012 | Requirements<br>acc. to:<br>PN-B-<br>19707:2013 | Additional<br>requirements |
|--|------|---------|---------------------------------------------------|-------------------------------------------------|----------------------------|
|--|------|---------|---------------------------------------------------|-------------------------------------------------|----------------------------|

#### 1. Properties (by standards)

|                                                                   |     |       |                           |             |             |
|-------------------------------------------------------------------|-----|-------|---------------------------|-------------|-------------|
| Compressive strength                                              |     |       |                           |             |             |
| Early strength, after 2 days                                      | MPa | 21,1  | $\geq 10$                 | -           | -           |
| Standard strength, after 28 days<br>(results from previous month) | MPa | 51,0  | $\geq 42,5$ i $\leq 62,5$ | -           | -           |
| Initial setting time                                              | min | 214   | $\geq 60$                 | -           | -           |
| Expansion of cement                                               | mm  | 0,8   | $\leq 10$                 | -           | -           |
| Sulfate content (as SO <sub>3</sub> )                             | %   | 2,17  | $\leq 3,0$                | -           | -           |
| Chloride content Cl <sup>-</sup>                                  | %   | 0,035 | $\leq 0,10$               | -           | -           |
| Na <sub>2</sub> O <sub>eq</sub>                                   | %   | 0,45  | -                         | $\leq 0,60$ | -           |
| Loss on ignition <sup>a)</sup>                                    | %   | 0,88  | $\leq 5,0$                | -           | -           |
| Insoluble residues <sup>a)</sup>                                  | %   | 0,60  | $\leq 5,0$                | -           | -           |
| C <sub>3</sub> A <sup>b)</sup>                                    | %   | 1,11  | $\leq 3,0$                | -           | -           |
| C <sub>3</sub> S <sup>c)</sup>                                    | %   | 55,61 | -                         | -           | $\leq 60,0$ |
| C <sub>4</sub> AF+2C <sub>3</sub> A <sup>c)</sup>                 | %   | 18,29 | -                         | -           | $\leq 20,0$ |
| Al <sub>2</sub> O <sub>3</sub> <sup>d)</sup>                      | %   | 3,79  | -                         | -           | $\leq 5,0$  |

#### 2. Additional information

|                       |                    |      |   |   |   |
|-----------------------|--------------------|------|---|---|---|
| Specific surface area | cm <sup>2</sup> /g | 3021 | - | - | - |
|-----------------------|--------------------|------|---|---|---|

a) only for CEM I and CEM III

b) C<sub>3</sub>A clinker calculated from chemical analysis acc. to Bogue, only for common cements resistant to sulphates „SR”

c) Regulation of the Minister of Transport and Maritime Economy

d) Technical Recommendation of the Research Institute of Roads and Bridges

Kierownik Jakości

Jolanta Zdunowska

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stamp/signature

 A member of  
**LafargeHolcim**

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