PRODUCT DATA SHEET

CEM III/A 42,5 N – LH/HSR/NA

Metallurgical cement with low hydration point, sulphate resistant, low alkaline

reduced CO₂

emissions



with low hydration heat

sulphate-resistant

HSR

low-alkali

NA



Metallurgical cement CEM IIA 42.5 N - LH/HSR/NA is a general purpose cement with low hydration heat (LH) According to EN 197-1 1, it additionally meets the requirements of PN-B 19707 as a sulphate resistant (HSR) and low-alkaline (NA) cement. It is a cement with normal early strength (N) and strength class 42.5.

Metallurgical cement is produced at Cemex Polska's Rudniki cement plant. The main components of this cement are Portland cement clinker and granulated blast furnace slag (share 50%). The National Certificate of Constancy of Performance for CEM III/A 42.5 N - LH/HSR/NA cement was issued by the Łukasiewicz Research Network - ICiMB under the number **008-UWB-014**. The National Declaration of Performance and the Safety Data Sheet are also available for the cement.







Thermal Physics, Acoustics and Environment Department 02-656 Warsaw, Ksawerów 21

CERTIFICATE № 240/2023 of TYPE III ENVIRONMENTAL DECLARATION

Products: CEM III/A 42,5 N - LH/HSR/NA Rudniki

Manufacturer:

Cemex Polska Sp. z o.o.

ul.Krakowiaków 46, 02-255 Warszawa, Poland

confirms the correctness of the data included in the development of Type III Environmental Declaration and accordance with the requirements of the standard

EN 15804

Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

This certificate, issued on 10^{th} March 2023 is valid for 5 years or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department *Juliulus - Jualus* Agnieszka Winkler-Skalna, PhD



Deputy Director for Research and Innovation

ysztof Kuczyński. PhD

Warsaw, March 2023

PRODUCT EMISSIONS

The Environmental Type III Declaration (EPD) for cement CEM III/A 42.5 N - LH/HSR/NA was issued and verified in March 2023 by the Building Research Institute (ITB) under No. 240/2023 and is available in Polish and English.

The net CO_2 emission per tonne of cement CEM IIIA 42.5 N - LH/HSR/NA is 231 kg CO_2 /onnet of cement (gross emission = **305** kg CO_2 /tonne of cement).

A net emission reduction of 72% with respect to the standard rate according to the GCCA (Global Cement and Concrete Association) of a net 822 kg CO₂/tonne of CEM cement and allows CEM III/A 42.5 N - LH/HSR/NA to be classified as **Vertua® Supreme** cement.

The gross value includes CO₂ emissions from process emissions, hard coal combustion, electricity, transport and the combustion of alternative (waste) fuels, excluding the biomass fraction.

The net value does not include CO₂ emissions from the combustion of alternative (waste) fuels.



CEM III/A 42,5 N - LH/HSR/NA

gross valuenet valuenet value

* Calculation basis: GCCA default value for cement clinker emissions (global average value weighted without indirect emission of cement clinker)from 'Geting the Number Right'(GNR) in 2000: 865kg CO₂/t clinker cement. Preference Value Cement(CEM I with 95% cement clinker content): 822 kgCO₂/t cement (GWP figures calculated according to recognised standards available upon request).



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PRODUCT FEATURES





TOTAL ALKALI CONTENT

CEM III/A 42,5 N - LH/HSR/NA

HYDRATION HEAT

PN-EN 196-9

- CEM III/A 42,5 N - LH/HSR/NA Characteristic value (after 41 h)





SULPHATE RESISTANCE

CEM III/A 42,5 N - LH/HSR/NA extension limit

CEMENT COMPEHENSIVE STRENGHT DEVELOPMENT

CEM III/A 42,5 N - LH/HSR/NA

Presented results are average values of au-tocontrol tests from 01.01.2023 - 30.06.2023. These values are not guaranteed by the manufacturer, do not constitute an offer within the meaning of the Civil Code and cannot constitute the basis for any claims

CEMEX

PHYSICOCHEMICAL PROPERTIES

| R Feature | Requirement | Test results * | Test acc. to standard | Notes |
|--|---------------------------|----------------|-----------------------|------------------------|
| Heat loss [%] | ≤5.0 | 1.45 | PN-EN 196-2 | |
| Residual insoluble solids [%] | ≤5.0 | 3.13 | PN-EN 196-2 | |
| Sulphate content (as SO ₃) [%] | ≤4.0 | 2.03 | PN-EN 196-2 | |
| Chloride content [%] | ≤ 0.20 | 0.089 | PN-EN 196-21 | |
| Start of binding time [min] | ≥60 | 195 | PN-EN 196-3 | |
| End of binding time [min] | - | 246 | PN-EN 196-3 | Requirements |
| Constant volume [mm] | ≤10 | 1 | PN-EN 196-3 | acc. to PN-EN 197-1 |
| Water holding capacity [%] | - | 31.0 | PN-EN 196-3 | |
| Specific surface area [cm²/g] | - | 4990 | PN-EN 196-6 | |
| Compressive strength [MPa] | | | | |
| - after 2 days | ≥10.0 | 14.2 | PN-EN 196-1 | |
| - after 28 days | \geq 42.5 i \leq 62.5 | 59.2 | | |
| Hydration heat after 41 h [J/g] | ≤ 270 | 217 | PN-EN 196-9 | |
| Alkali content Na ₂ O _{eq} [%] | ≤ 1,10 | 0.71 | PN-EN 196-2 | Dentingent |
| | | 1 | 1 | - Requirements |

| Alkali content Na ₂ O _{eq} [%] | ≤ I,IO | 0.71 | PN-EN 196-2 | Dequiremente | |
|---|--------|------|---------------------|--------------|--|
| Share of granulated blast furnace slag (S) [%] | ≥50 | 56 | PN-B-19707, Annex B | acc. to | |
| Expansion value in the Na_2SO_4 solution after 52 weeks [%] | ≤ 0.5 | 0.10 | PN-B-19707, Annex A | PN-B-19707 | |

* The presented test results are the average values of self-controlled tests from 01.01.2023 - 30.06.2023. These values are not guaranteed by the manufacturer, do not constitute an offer within the meaning of the Civil Code and cannot constitute grounds for any claims.

PERFORMANCE PROPERTIES

| Concret mix | good compatibility with additives and mineral modifiers very good workability of concrete mixtures and consistency retention over time high resistance to segregation, high cohesiveness of the mix and water retention extended setting time |
|----------------------|--|
| Hardened concrete | low heat of hydration reducing the risk of thermal cracks very high resistance to environmental chemical aggression, including sulphate aggression minimises the risk of concrete deterioration as a result of the alkaline reaction of reactive aggregates with alkalis slow build-up of early strength high standard strength after 28 days good and stable strength development over an extended curing period (over 28 days) very good volume stability and very low shrinkage |



CEMENT APPLICATION CEM III/A 42,5 N - LH/HSR/NA

Special properties of metallurgical cement CEM III/A 42.5 N - LH/HSR/NA such as:

- Low heat of hydration LH LH
- High resistance to chemical aggression, mainly sulphate HSR HSR
- Low alkali content NA NA

allow concretes to be produced that are highly impermeable and durable in aggressive and corrosive environments.

The use of CEM III/A 42.5 N - LH/HSR/NA reduces the environmental load by significantly reducing the carbon footprint of the concrete.

Thanks to its properties, this cement has a wide range of applications, such as:

- For the production of concrete in all classes of environmental compatibility in accordance with the European standard EN 206 and the Polish supplement PN-B-06265, especially:
 - Concrete for elements exposed to chemically aggressive environments (sewage treatment plants, industrial areas, waste disposal sites, water reservoirs)
 - o Concrete for airtight slabs and foundation structures (e.g. white bath technology)
 - o Concrete for solid elements (foundations, walls, ceilings)
 - o Concrete for special geotechnical works (piles, slurry walls);
 - o Concrete for underground construction (tunnels, garages, mining construction)
 - o Concrete for hydraulic engineering works (dams, water reservoirs, sluices, canal lining, culverts)
 - o Concrete for bridges (foundations, massive bridge piers, abutment bodies), including those exposed to Exposure Class XF4
 - o Concrete for road, pavement and parking areas
 - Concrete for structures in marine and environmental engineering (quays in sea and river harbours, breakwaters, docks, filter screens, immobilisation of heavy metals)
 - o Concrete for structures in flue gas desulphurisation plants, coking plants and cooling towers
 - o Concrete of liquid or very liquid consistencies, including self-compacting concretes (SCC) and almost self-compacting concretes (ASCC)
- For the production of non-reinforced and reinforced precast concrete products, especially massive precast products such as: footings, ballasts, retaining blocks
- For the production of dry mixtures with special properties

CEMENT APPLICATION

For the production of concretes of all environmental classes in accordance with the European standard PN-EN 206 and the Polish supplement PN-B-06265

| Exposure classes | hal rrosion | | | (| Corros | ion of reinforcement | | | | | Aggression against concrete | | | | | | | | <u> </u> | | | |
|-------------------------------------|-------------------------|-----|---------------------|-----|--------|----------------------|----------------------------|-------|-------------------------------|-----|-----------------------------|------------------|-----|-----|---|-----|--------|--------------------------------|------------------|-------------|-----|---|
| ✓ accepted | isk of Imen or co | | | | | | Korozja wywołana chlorkami | | | | | _ | | | | | n fron | | n fron 19 ste | | | |
| application | No r viroi ssion | Сог | Corrosion caused by | | | not | origing | itina | originating from sea water | | | Freezing/thawing | | | Chemically aggressive environment | | | Abrasion-induced aggression | | Interaction | | |
| × required confirmation suitability | er aggre: | | | | | from sea water | | | | | | | | | | | | | | | | |
| | XO | XC1 | XC2 | XC3 | XC4 | XD1 | XD2 | XD3 | XS1 | XS2 | XS3 | XF1 | XF2 | XF3 | XF4 | XA1 | XA2ª) | XA3°) | XM1 | XM2 | XM3 | |
| CEM III/A 42,5 N - LH/HSR/NA | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ | ~ |

a) In exposure classes XA2 and XA3 - in the case of chemical aggression caused by sulphates (with the exception of their marine origin) - sulphate resistant cement (SR) complying with the requirements of PN-B-19707 shall be used.



When using type II mineral additives (e.g., silica fly ash), it is possible to fully use the standard provision regarding the application of the *k* factor concept





CEMENTY O OBNIŻONEJ EMISJI CO₂

TO PIERWSZY KROK DO ZRÓWNOWAŻONEJ PRZYSZŁOŚCI





Cemex Polska Sp. z o.o. ul. Krakowiaków 46 02-255 Warszawa

Centrum Obsługi Klienta

tel.: +48 800 700 077 cok@e-cemex.pl



Jeżeli jesteście Państwo zainteresowani dodatkowymi materiałami dotyczącymi kart EPD i certyfikatów oraz chcecie uzyskać więcej informacji o cementach niskoemisyjnych dostępnych w ofercie Cemex Polska zachęcamy do odwiedzenia strony <u>www.cemex.pl</u> lub zeskanowanie kodu QR.

