



KOMO[®]

Attestation with product certificate

13270/07



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Expires on Indefinite Dated 01/07/2016
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Ferrocement products

Micro Beton

DECLARATION BY KIWA

This attestation with product certificate is based on BRL 2811 'Ferrocement products', dated 20/09/2019, issued in accordance with the Kiwa Regulation for Certification.

The quality system and product characteristics applicable to the ferrocement products are controlled periodically. Based on this, **Kiwa declares that:**

- it has every reason to believe that, upon delivery, the ferrocement products supplied by the certificate holder will meet:
 - the technical specification(s) set out in this attestation with product certificate
 - the product requirements set out in this attest with product certificate and in the BRL provided that the ferrocement products bear the KOMO[®] mark as described in this attestation with product certificate
- the building elements made from these ferrocement products will perform as described in this attestation with product certificate and that the building elements conform to the Building Decree specified in this attestation, provided that:
 - the technical specifications and conditions set out in this attestation with product certificate are met
 - the construction process is performed in accordance with the regulations and/or processing methods described in this attestation with product certificate

No control of the construction and/or installation in the building elements nor the production of the other products for the construction of the building elements are checked in connection with this attestation with product certificate.

Ronald Karel
Kiwa

*The certificate has been added to the list on the website of Stichting KOMO: www.komo.nl.
Advice: go to www.kiwa.nl to find out whether this certificate is valid.*

Kiwa Nederland B.V.
Sir Winston Churchillaan 273
PO box 70
2280 AB RIJSWIJK
Tel 088 998 44 00
Fax 088 998 44 20
info@kiwa.nl
www.kiwa.nl

Certificate holder
Micro Beton
Lelyweg 23
4612 PS BERGEN OP ZOOM
Tel. 0164 27 42 75
www.microbeton.nl
info@microbeton.nl



The following have been assessed:

- quality system
- product
- product performance in application

Periodic check

Ferrocement products

1. TECHNICAL SPECIFICATION

Ferrocement products for use in construction works.

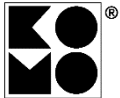
Ferrocement products can be divided into thin solid elements (see figure 1) and thin-walled lightweight elements, which are internally fitted with fill elements to reduce weight and save material (see figure 2).

Examples of thin solid elements are: stair treads, planks, balcony slabs, balcony/gallery raised floor panels.
 Examples of thin-walled elements are: balcony slabs, gallery slabs, decorative elements and canopies.

2. MARKS AND INDICATIONS ON THE PRODUCTS / PACKAGING / DELIVERY DOCUMENTS

Depending on the size of the ferrocement product, the products or packaging (pallets) are marked with:

- The designation KOMO® or the KOMO® mark followed by the certificate number. The mark is applied as follows:



- Factory mark or factory name
- Production code or production date

The delivery documents contain at least the following:

- The designation KOMO® or the KOMO® mark, followed by the certificate number
- The name of the manufacturer/supplier
- The production site
- The product name

3. PERFORMANCE IN USE

Building Decree section No. and title	Limit value / Determination method	Performance in accordance with quality declaration	Comments related to application
Chapter 2 – Safety regulations			
2.1 General strength of the structure	Extreme limit situation determined according to NEN-EN 1992-1-1 or NEN-EN 1990.		To be determined per project.
2.2 Strength in case of fire	Duration of fire resistance with respect to collapse according to article 2.9 of the Building Decree, determined according to NEN 6069.	The fire resistance of the standard balcony and gallery slabs is 30 minutes.	For other products, to be determined per project.
2.9 Limitation of the development of fire and smoke	For ferrocement products, the fire classes are as shown in table 2.66 of the Building Decree.	Ferrocement products meet the requirements of fire class A1 _(fl) .	

3.1 General strength of the construction, Building Decree section 2.1

Whether the balconies and galleries made with the ferrocement balcony and gallery slabs comply with the aforementioned section of the Building Decree will have to be determined per project.

The balcony/gallery raised floor panels, as specified in section 1.2.4 (table 1) of this attestation with product certificate, meet the requirements of the aforementioned section of the Building Decree.

3.2 Strength during fire, Building Decree section 2.2

The duration of the fire resistance of the standard balcony and gallery slabs as specified in article 1.2.4 (table 2) is 30 min.

For the determination of a higher fire resistance of the balcony and gallery slabs with regard to collapse, use may be made of the determination methods specified in NEN-EN 1992-1-2 or NEN 6069.

3.3 Limitation of the development of fire and smoke, Building Decree section 2.9

Ferrocement products meet the requirements of fire class A1_(fl).



Ferrocement products

4 Product characteristics

4.1 Shape and composition

The ferrocement products are made of cement mortar, fitted with a wire mat and/or wire mesh. If necessary, the ferrocement products are made with reinforcing steel for strength and stiffness.

The ferrocement products are delivered in accordance with the production drawings approved by the buyer or certified by the manufacturer with consent from the buyer.

4.2 Cement mortar

The cement mortar is composed of cement conforming to NEN-EN 197-1 and sand conforming to NEN-EN 12620.

The minimum quantity of cement is 600 kg/m³.

The minimum characteristic cube compressive strength ($f_{ck,cube}$) is 45 N/mm² (C35/45).

The maximum water/binder ratio is 0.4.

4.3 Reinforcement

The ferrocement products are fitted with wire mat and/or wire mesh that conform to NEN-EN 10218-2.

If necessary, the ferrocement products are made with reinforcing steel conforming to NEN-EN 10080 and NEN 6008 for strength and stiffness.

Wire mat

Mat made of two layers of spot-welded smooth steel wire (3.0 - 4.0 mm) at right angles to each other, with a maximum mesh size of 50 mm.

Wire mesh

Mesh made of thin smooth steel wire (1.0 - 2.0 mm) and a maximum mesh size of 15 mm.

The mesh consists of one layer of interwoven steel wire.

The wire mesh is hot-dip galvanized in accordance with NEN-EN ISO 1461.

Where the thickness of the solid element or the shell or dam of a lightweight element exceeds 50 mm, both sides of the solid element or the shell or dam respectively shall incorporate a wire mat and/or wire mesh.

The entire top and bottom shell of the lightweight elements and all dams must include wire mats and wire mesh if necessary.

4.4 Dimensions and tolerances

The dimensions of the balcony/gallery raised floor panels are shown in table 1 and those of the standard balcony and gallery slabs in table 2.

Table 1 – Dimensions of balcony/gallery raised floor panels

	Nominal diameter	Tolerance
Length	Variable	± 2 mm
Width	500 mm	± 2 mm
Thickness	25 mm	± 1 mm

Table 2 – Dimensions of standard balcony/gallery slabs

	Nominal diameter
Length	Variable
Width	Variable
Thickness	150 mm

Any dimensional deviations of the balcony and gallery slabs conform to NEN 2889.

Thin solid elements

For thin solid elements, the maximum thickness is 100 mm.

For elements with a slope, the maximum average thickness is 100 mm.

This does not apply to upstands and gutters.

For the length and width tolerances, NEN 2889 applies.

The thickness tolerance is ±3 mm.

Thin-walled lightweight elements

The maximum shell thickness is 50 mm.

The dam width is at least 30 mm and at most equal to the thickness of the shell.

When the filling elements are rounded at the sides, the shell thickness can be greater than 50 mm in those places.

For the tolerances of the main dimensions, NEN 2889 applies.

Tolerance for the shell thickness and dam width: ±5 mm.

For elements whose main dimensions are determined at project level, the nominal dimensions must be established on drawings approved by the buyer.

4.5 Coverage

The minimum coverage of reinforcing steel is \varnothing_k when the reinforcement consists of reinforcing steel with $\varnothing_k \leq 10$ mm.

If the main reinforcement consists of reinforcing steel with $\varnothing_k > 10$ mm, the minimum coverage is 1.5 \varnothing_k .

The minimum coverage of wire mats with \varnothing_k is equal to \varnothing_k .

The tolerance for the nominal coverage (as shown in the drawing) is -5 / +10 mm.

The wire mesh used, if any, may be inserted into the cover concrete with a minimum cover of 2 mm.



Ferrocement products

5. PROCESSING INSTRUCTIONS

5.1 Lifting, storage and transport

Lifting, storage and transport actions may not damage and/or crack the ferrocement products. The elements must be stored off the ground on battens. Handling and the use of lifting equipment must be done in accordance with the supplier's instructions.

5.2 Bearing

Balcony and gallery raised floor panels must be installed with construction felt underlayment with low compressive resistance or similar, which can be compressed in accordance with the weight.

5.3 Recesses

No recesses may be made in the ferrocement products at the construction site without the manufacturer's express permission.

6. Tips for the buyer

6.1 Inspect upon delivery of the products listed in the 'Technical specification' whether:

- you have received the product you ordered
- the mark and the way the mark is applied are correct
- there are no visible defects to the products as a result of transport and the like

6.2 On delivery of the products listed under 'Processing', make sure they meet the specification mentioned in that section.

6.3 In case of rejection of the products on the basis of the above, please contact:

- Micro Beton
- and, if necessary:
- Kiwa Nederland B.V.

6.4 Store, transport and process in accordance with the stipulations mentioned under 'Processing'.

6.5 Observe the application conditions mentioned under 'Performance'.

7. DOCUMENTS MENTIONED*

BRL 2811	Ferrocement products
NEN 915	Hot-dip galvanized coatings on round steel wire – Requirements and test methods.
NEN 2889	Concrete components – Maximum permissible dimensional deviations.
NEN 6008	Reinforcing steel.
NEN 6069	Testing and classification of resistance to fire of building products and building elements.
NEN-EN 197-1	Cement – Part 1: Composition, specifications and conformity criteria for common cements.
NEN-EN 1990	Eurocode – Basis of structural design.
NEN-EN 1992-1-1	Eurocode 2: Design of concrete structures – Part 1-1: General rules and rules for buildings.
NEN-EN 1992-1-2	Eurocode 2: Design of concrete structures – Part 1-2: General rules – Structural fire design.
NEN-EN 10080	Steel for the reinforcement of concrete – Weldable reinforcing steel – General.
NEN-EN 12620	Aggregates for concrete.
NEN-EN 10218-2	Steel wire and wire products – General – Part 2: Wire dimensions and tolerances.
NEN-EN ISO 1461	Hot-dip galvanised coatings on fabricated iron and steel articles – Specifications and test methods.

Building Decree The Dutch Building Decree.

* For the correct version of the aforementioned documents, please refer to the latest amendment to BRL 2811.



