



BRANZ Appraised
Appraisal No. 1144 [2021]

D5 CONCRETE ADMIXTURE



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BRANZ Appraisals

Technical Assessments of
products for building and
construction.

NEocreTE

REDEFINING CONCRETE

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Product

1.1 D5 is a chemical admixture used to reduce the water permeability of concrete.

Scope

- 2.1 D5 is a permeability-reducing admixture used to assist with the waterproofing of concrete for structures of importance level 1-5 as defined by AS/NZS 1170.
- 2.2 Buildings with concrete containing D5 must be the subject of specific design.
- 2.3 Concrete containing D5 must be supplied by a ready-mixed concrete supplier that is certified to the requirements of NZS 3104.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, the D5 Concrete Admixture, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1 [a] not less than 50 years. Concrete incorporating D5 will meet this requirement. See Paragraphs 13.1 and 13.2.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2 and E2.3.3. Concrete incorporating D5 will meet these requirements. See Paragraphs 15.1 and 15.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. D5 meets this requirement.



Technical Specification

General

4.1 D5 is a chemical admixture used to reduce the water permeability of concrete and aid the production of watertight concrete. D5 admixture produces concrete with enhanced durability and improved protection against reinforcement corrosion by providing a physical pore-blocking action that protects the resulting concrete against water ingress via hydrostatic pressure. The use of D5 admixture will therefore produce a concrete with the following properties relative to a control concrete:

- reduced porosity
- increased water resistance
- reduced permeability
- increased corrosion resistance.

The addition of D5 admixture has no detrimental effect on the properties of concrete.

4.2 The D5 admixture is a powder admixture, consisting of natural minerals with a modified plasticiser, and is manufactured by a blending process. It is supplied in 1 kg paper bags, 14 kg biodegradable bags and 1 ton plastic bulk bags. Each bag bears the name of the manufacturer and the product, the batch number and health and safety information.

Handling and Storage

5.1 The D5 admixture must be stored in a dry environment and protected from rain or other sources of moisture. The D5 admixture, if stored in unopened and undamaged in the original factory packaging, will have a maximum shelf life of 24 months.

Technical Literature

6.1 Refer to the Appraisal listing on the BRANZ website for details of the current Technical Literature for D5. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained within the scope of this Appraisal and the Technical Literature must be followed.

Design Information

Use

7.1 Concrete containing D5 must be the subject of specific design when intended to provide resistance to water penetration and/or resistance to water vapour. The building structure design must also incorporate waterstops and other appropriate means to waterproof joints, penetrations and formwork ties. The critical aspects of concrete design containing D5 are:

- minimum cement content
- water/cement ratio
- minimum concrete thickness
- methods of crack control
- curing.

Design must be carried out in association with Neocrete Limited.

Water Penetration

8.1 Concrete containing D5 has greater resistance to water penetration than the equivalent plain concrete. Subject to proper design, concrete containing D5 provides watertight concrete for slab on grade, basements, pools, tanks, tunnels, culverts and the like.

Water Vapour Permeability

- 9.1 Concrete containing D5 has a lower permeability to water vapour than the equivalent plain concrete. Subject to proper design, concrete containing D5 can provide water vapour resistant concrete for slabs and walls in damp-proofing situations.

Additional

- 10.1 D5 admixture may be used in concrete that does not meet the specific design criteria of this Appraisal. Concrete containing D5 may be used as an additional protection should the damp-proof membrane (DPM) fail.

Concrete

- 11.1 Concrete containing D5 must be supplied as ready-mixed concrete in accordance with NZS 3104, NZS 3109, the instructions of Neocrete Limited and this Appraisal. D5 admixture is added to concrete mixes at a rate of 2% or 3% by weight of the total cementitious content.
- 11.2 The concrete must have a minimum cementitious material content of 250 kg/m³. Further details of suitable mixes can be obtained from Neocrete Limited.
- 11.3 Where the control of water vapour is required, it will be necessary to provide a mix with sufficiently low vapour permeability in combination with adequate section thickness.
- 11.4 Concrete mix design must be in accordance with this Appraisal and the Technical Literature. Once mixed further, materials must not be added to the fresh concrete.

Structure

- 12.1 Concrete buildings must be designed in accordance with NZS 3101, NZS 3106 or other suitable design standards.
- 12.2 The reinforcement of structures incorporating D5 for critical applications must be detailed to limit the maximum crack width in the concrete to 0.3mm to 0.4mm.
- 12.3 The mechanical properties of concrete incorporating D5 will not be adversely affected by its inclusion. The final strength of concrete incorporating D5 will be higher than equivalent plain concrete.

Durability

- 13.1 D5 will not adversely affect concrete in which it is incorporated, and concrete containing D5 will have its expected durable life.
- 13.2 Concrete incorporating D5, if properly mixed, placed and cured, will have improved properties that are likely to extend the life of the concrete. Incorporation of D5 admixture in concrete will reduce its permeability relative to an equivalent concrete at the same water/cement ratio. Possible benefits include:
- greater freeze/thaw resistance
 - increased reinforcement protection for the same depth of reinforcement cover
 - increased carbonation resistance.

Maintenance

- 14.1 No maintenance is required to concrete containing D5 provided that significant building movement or cracking does not occur. Regular checks must be made for cracks or damage, and Neocrete Limited must be consulted regarding waterproofing related repairs.

External Moisture

- 15.1 Concrete containing D5 admixture provides watertight concrete for structures and can provide water vapour resistance for concrete slabs and walls when designed and used in accordance with the instructions of Neocrete Limited and this Appraisal.
- 15.2 The building structure design must incorporate details for waterstops and waterproofing of joints, junctions, penetrations and the like. These details have not been assessed and are outside the scope of this Appraisal.

Installation Information

- 16.1 Concrete containing D5 must be batched by ready-mixed concrete plants that are certified to the requirements of NZS 3104.
- 16.2 The D5 admixture must be added into a concrete mixer in dry form and should be mixed for at least 30–60 seconds, to ensure that the admixture is uniformly distributed prior to discharging. When using multiple admixtures in the same batch of concrete, they should be dispensed separately into the concrete to avoid intermixing and possible interference of the admixtures. Trial mixes are recommended to establish the exact water content.
- 16.3 Concrete containing D5 will be a special concrete as defined by NZS 3104, and as such, any testing requirements and compliance tolerances must be defined by the purchaser or designer in collaboration with Neocrete Limited. Methods of sampling must be in accordance with NZS 3109. As concrete containing D5 will be used for watertight or low vapour permeability concrete, special care must be taken during placing, compaction, finishing and curing, and these actions must be in accordance with NZS 3109.
- 16.4 Common defects found in typical concrete cannot be tolerated. Poor consolidation, unplanned cold joints, random cracking, penetrations, contaminations, etc. will all result in a leaking structure if not accounted for in the design and installation
- 16.5 Neocrete Limited must be consulted before concrete is placed regarding the inclusion of cold joints, penetrations and control joints for methods of dealing with these. These methods have not been assessed and are outside the scope of this Appraisal.
- 16.6 Compaction of concrete is best achieved by internal vibration. Where this is not practical, external vibration or vibrating screeds should be used. Compaction is important as improperly compacted concrete is much more likely to leak.
- 16.7 Freshly placed concrete must be protected from extreme temperatures or drying conditions.

Inspections

- 17.1 The contract documents must be referred to during the installation of concrete containing D5 by building consent authorities or territorial authorities. Critical areas of inspection are:
 - D5 admixture is added at the specified dosage.
 - Concrete containing D5 is batched, placed, consolidated, protected and cured according to accepted concrete practices, instructions from Neocrete Limited and the relevant sections of NZS 3109.
 - Construction joints are prepared and waterproofed according to the guidance of Neocrete Limited.
 - Control joints are suitably spaced to prevent random cracking, and are waterproofed as per the guidance of Neocrete Limited.
- 17.2 The D5 Quality Assurance check sheets and supporting documentation must be completed and returned to Neocrete Limited or the Project Manager as appropriate and as required by contract.

Health and Safety

- 18.1 When handling D5, the normal health and safety procedures associated with cementitious materials should be observed.



Basis of Appraisal

The following is a summary of technical investigations carried out.

Tests

19.1 The following is a summary of the testing on D5:

- slump
- air entrainment
- compressive strength
- waterproofing
- chloride ion permeability
- water permeability

Other Investigations

20.1 A durability opinion has been provided by BRANZ technical experts.

Quality

- 21.1 The manufacture of D5 has not been examined by BRANZ, but details of quality, composition and testing were obtained and found to be satisfactory.
- 21.2 The quality of supply to the market is the responsibility of Neocrete Limited.
- 21.3 Installation on-site is the responsibility of the installers.

Sources of Information

- AS/NZS 1170 Structural design actions.
- NZS 3101: 2006 Concrete structures standard.
- NZS 3104: 2003 Specification for concrete production.
- NZS 3106: 1986 Code of practice for concrete structures for the storage of liquids.
- NZS 3109: 1997 Concrete constructions.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



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In the opinion of BRANZ, **D5 Concrete Admixture** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Neocrete Limited**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the Technical Literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Neocrete Limited**:
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions;
 - d) warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
3. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Neocrete Limited**.
4. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
5. BRANZ provides no certification, guarantee, indemnity or warranty, to **Neocrete Limited** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

Date of Issue:

03 June 2021