



BRANZ Appraised

Appraisal No. 722 [2020]

KOROK® EXTERNAL WALL SYSTEMS

Appraisal No. 722 [2020]

This Appraisal replaces BRANZ Appraisal No. 722 [2011]



BRANZ Appraisals

Technical Assessments of products for building and construction.



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Product

- 1.1 KOROK® External Wall Systems incorporate KOROK® panels that are used to construct non-loadbearing, standard, fire and acoustically rated vertical straight external walls without penetrations.
- 1.2 The KOROK® panel forms the exterior cladding of the KOROK® EX1 and EX2 systems. The KOROK® EX3, EX4 and EX5 systems require protection with a suitable cladding system as specified in the Technical Literature for KOROK® External Wall Systems.
- 1.3 KOROK® panels are available in two panel profiles (KOROK® Gen 1 panel and KOROK® Gen 2 panel) and are made from lightweight aerated concrete encased in profiled galvanised sheet steel. For the KOROK® Gen 1 panel profile, paint-coated steel coil may also be used for one or both faces.

Scope

- 2.1 KOROK® External Wall Systems have been appraised for use as vertical straight, single-skin flat walls (EX1 and EX2 systems) including walls requiring overcladding (EX3, EX4 or EX5 systems). All of these wall systems may be used as non-loadbearing, standard and fire rated external walls for all buildings of importance levels 1 to 5 as defined by AS/NZS 1170, except that housing and communal residential buildings are excluded and for walls with no penetrations.
Note: Exterior cladding systems used for the KOROK® EX3, EX4 and EX5 systems have not been assessed and are outside the scope of this Appraisal.
- 2.2 KOROK® EX1 and EX2 systems have been appraised for weathertightness and structural wind loading when used as a cladding solution for buildings situated in specific design wind zones with maximum differential ultimate limit state (ULS) air pressure of up to 1.76 kPa.
- 2.3 When used with KOROK® External Wall Systems, the KOROK® panels are installed in a vertical orientation. The maximum unsupported span for the panels between structural supports is 8 m. The overall height or length of a KOROK® External Wall Systems wall will be determined by the structural support. When used as part of a fire rated system, the maximum unsupported spans of the KOROK® panels in vertical orientation are:
 - 4 m for the EX1 and EX2 systems; and
 - 6 m for the EX3, EX4 and EX5 systems.*Note: Greater spans are subject to specific engineering design and/or fire engineering assessment and are outside the scope of this Appraisal.*
- 2.4 KOROK® External Wall Systems are suitable for use in NZS 3604 Exposure Zones B, C and D. Refer to Table 2 for more detailed durability information.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, KOROK® External Wall Systems, if designed, installed, used and maintained in accordance with the statements and conditions of this Appraisal, will meet the following provisions of the NZBC:

CLAUSE B1 STRUCTURE: Performance B1.3.1, B1.3.2 and B1.3.4. KOROK® External Wall Systems meet the requirements for loads arising from self-weight, wind, fire, impact and creep and shrinkage [i.e. B1.3.3 (a), (h), (i), (j), and (q)]. See Paragraphs 8.1-8.4.

CLAUSE B2 DURABILITY: Performance B2.3.1 (b), 15 years and Performance B2.3.1 (c), 5 years. KOROK® External Wall Systems meet these requirements. See Paragraphs 9.1-9.3.

Clause C3 PROTECTION FROM FIRE: Performance C3.4 (a), C3.5 and C3.7 (a). KOROK® External Wall Systems meet or contribute to meeting these requirements. See Paragraphs 12.1-12.6.

Clause E2 EXTERNAL MOISTURE: Performance E2.3.2, E2.3.3 and E2.3.7. KOROK® EX1 and EX2 systems meet this requirement. See Paragraphs 14.1-14.2.

CLAUSE F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. KOROK® External Wall Systems meet this requirement.

Technical Specification

General

4.1 KOROK® External Wall Systems are non-loadbearing external wall panels attached to the structural frames of buildings to provide external walls.

4.2 KOROK External Wall Systems covered by this Appraisal, and as described in the Technical Literature are:

- EX1
- EX2
- EX3
- EX4
- EX5

Note: Exterior cladding systems used for the KOROK® EX 3, EX4 and EX5 systems have not been assessed and are outside the scope of this Appraisal.

KOROK® Panels

4.3 KOROK® panels are available in two panel profiles [KOROK® Gen 1 panel and KOROK® Gen 2 panel]. These are manufactured from lightweight aerated concrete encased in a steel permanent formwork. The permanent formwork is roll-formed from zinc-coated steel strips with a base metal thickness of 0.4 mm with ZM275 zinc coating. For the KOROK® Gen 1 panel profile, paint-coated steel coil may also be used for one or both faces.

4.4 KOROK® panels are supplied in lengths of up to 9 m. Both panel profiles are 78 mm thick and the long edges are tongue and grooved so the pitch of the panels when installed is 250 mm.

4.5 KOROK® panels are available with a nominal fill-density of 400 kg/m³. Other fill-densities between 400 kg/m³ and 1,000 kg/m³ can be provided upon request.

Accessories

4.6 Accessories and materials used with KOROK® External Wall Systems that are supplied by KOROK Building Systems NZ Limited are:

- **KOROK® C-track** - 60 x 80 x 60 x 1.15 mm [bmt] C-section available in galvanised steel and powder-coated to match the paint-coated steel coil.
- **KOROK® angle** - 50 x 60 x 1.15 mm [bmt] angle available in galvanised steel and powder-coated to match the paint-coated steel coil.
- **Fasteners** - for panel to panel connection, panel to C-track and angle connection, C-track and angle to concrete and C-track and angle to steelwork.



- **NORSEAL V776** – black, closed cell, PVC, single-sided foam tape, 18 mm wide x 4.8 mm thick in various lengths. Manufactured by Norseal.
- 4.7 Accessories used with KOROK® External Wall Systems that are supplied by KOROK Building Systems NZ Limited or the building contractor are:

Framing:

- Light gauge steel framing.

Plasterboard:

- 10 mm GIB® Fyreline® Plasterboard.
- 13 mm GIB Fyreline®.
- 19 mm GIB Fyreline® or acceptable Winstone Wallboards alternatives.

External Cladding:

- The KOROK® EX3, EX4 and EX5 systems are designed to be covered by an absorbent building underlay with an external cladding system.

Note: Exterior cladding systems used for the KOROK® EX 3, EX4 and EX5 systems have not been assessed and are outside the scope of this Appraisal.

Fire rated sealants:

- Hilti CP606.
- Sika 400 PU.
- Promat Promaseal A.
- Promat Promaseal Grafitec Graf 4T.

Other Accessories

- 130 x 40 x 3 mm galvanised L-section steel angle or 3 mm galvanised steel plate for the base of the wall.
- 6.5 mm x 75 mm countersunk Bluetip screw bolts.
- 19 mm washers.
- 10 g - 16 mm x 16 mm Class 3 wafer head tek screws.
- 10 g - 16 mm x 30 mm Class 3 wafer head tek screws.
- 14 g x 115 steel tite screws.

Packaging, Handling and Storage

- 5.1 KOROK® panels are delivered to site in packages. They must be handled with care to avoid physical damage, particularly to the bottom edges and the finished exposed faces, and must be stored so that they are protected from the weather under clean, dry and ventilated conditions. They should be stored on bearers no more than 2 m apart.
- 5.2 Accessories used with KOROK® External Wall Systems must also be handled with care to avoid damage. Components such as sealants must be stored in dry locations protected from the weather. Other components should be stored so that they are protected from the weather.

Technical Literature

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

Design Information

General

- 7.1 KOROK® External Wall Systems Technical Literature contains design information and procedures required to allow building designers to design structures incorporating KOROK® External Wall Systems. This includes incorporating fire rated systems. Any variations from the systems contained in the Technical Literature are outside the scope of this Appraisal.
- 7.2 KOROK® panels used with the KOROK® External Wall Systems are erected vertically.
- 7.3 The maximum unsupported span of KOROK® panels allowed between structural supports is 8 m. Where the system is being used as part of a fire rated system, the maximum unsupported spans of the KOROK® panels in vertical orientation are:
- 4 m for the EX1 and EX2 systems; and
 - 6 m for the EX3, EX4 and EX5 systems.
- [Note: Greater spans are subject to specific engineering design and/or fire engineering assessment and are outside the scope of this Appraisal.]*
- 7.4 The KOROK® External Wall Systems are designed to be used for buildings situated in specific design wind pressures as follows:
- EX 1 and EX 2 systems: 1.76 kPa; and,
 - EX3, EX4 and EX5 systems: up to 2.5 kPa where a suitable exterior cladding system is installed over the KOROK® panels.
- Note: Exterior cladding systems used for the KOROK® EX 3, EX4 and EX5 systems have not been assessed and are outside the scope of this Appraisal.*
- 7.5 For selection of finishes for durability refer to section 9.1 and KOROK® Building Systems NZ Limited.

Structure

General

- 8.1 KOROK® External Wall Systems are for use within concrete-framed structures that have been designed in accordance with NZS 3101 and/or steel-framed structures that have been designed in accordance with NZS 3404.

Design

- 8.2 Design of KOROK® External Wall Systems must be in accordance with the information and methods given in the Technical Literature and must be carried out by a suitably qualified design engineer considering all loading types.
- 8.3 KOROK® EX1 and EX2 systems are installed against the concrete foundation using the KOROK® angle whilst the EX3, EX4 and EX5 systems sit in the KOROK® C-track on the bottom of the wall.
- 8.4 Any variation to the design of the KOROK® External Wall Systems must be carried out by a suitably qualified design engineer. These variations are outside the scope of this Appraisal.

Durability

- 9.1 Table 2 gives the expected serviceable life of the KOROK® EX1 and EX2 systems. Washing and regular maintenance is essential to achieve the expected durability.

Table 2: KOROK® External Wall Systems Serviceable Life

External Material Type	NZS 3604	Zone B	Zone C	Zone D	Geothermal
	ISO 9223	C1 & C2	C3	C4 only	Geothermal
Galvsteel G2	Not recommended				
COLORSTEEL G2	15 years	Not recommended	Not recommended	Consult with a local BCA	
COLORSTEEL ENDURA	15 years	15 years			
COLORSTEEL MAXX	15 years	15 years	15 years		

- 9.2 Where the internal faces of the KOROK® panels will experience regular use of chemical cleaning agents, or be in the presence of vapours that may attack galvanised steel components during service, then KOROK Building Systems NZ Limited should be contacted to determine the correct panel coating selection is made to ensure the required service life of the system is achieved.

Maintenance

- 10.1 Where KOROK® panels are exposed, an inspection should be carried out at least annually to ensure that no undue degradation is occurring. Where items such as corrosion are identified, then the cause must be determined, and repairs must be made to restore the system.

Prevention of Fire Occurring

- 11.1 Where required, separation or protection must be provided to the KOROK® panels from heat sources such as fireplaces, heating appliances and chimneys. Part 7 of NZBC Acceptable Solution C/AS1 and C/AS2, and NZBC Verification Method C/VM1 provide methods for separation and protection of combustible materials from heat sources. Whilst KOROK® panels are manufactured from non-combustible materials, all components of the system have to be considered.

Fire Affecting Areas Beyond the Fire Source

Internal Surface Finishes

- 12.1 KOROK® panels have been independently assessed to achieve a Group Number of 1-S. This assessed performance is based on testing to ISO 9705 of another KOROK® panel of identical composition.
- 12.2 Where KOROK® panels are finished with a water-borne or solvent-borne paint coating of not more than 0.4 mm in thickness, the steel used for its manufacture is deemed to have a Group Number of 1-S in accordance with NZBC Verification Method C/VM2, Table A1.
- 12.3 When an applied finish other than those specified above is used on EX1 or EX3, or an internal lining is used, as is the case for EX2, EX4 or EX5, the Material Group Number must be obtained from the manufacturer or supplier of the finish product or system, for the complete lining system.

Fire Resistance Ratings (FRRs)

- 12.4 The KOROK® EX1 and EX3 systems have a fire resistance rating of -/120/120. The KOROK® EX2, EX4 and EX5 systems have a fire resistance rating of -/180/180. KOROK® External Wall Systems can be used to provide FRRs as required by NZBC Acceptable Solution C/AS2 and NZBC Verification Method C/VM2.
- 12.5 When used as part of a fire rated system, the maximum unsupported spans between structural supports of the KOROK® panels in vertical orientation are:
- 4 m for the EX1 and EX2 systems; and
 - 6 m for the EX3, EX4 and EX5 systems.
- [Note: Greater spans are subject to specific engineering design and/or fire engineering assessment and are outside the scope of this Appraisal.]*
- 12.6 In order to satisfy the requirements of NZBC Clause C6 Structural Stability, designers must ensure that fire rated elements, i.e. KOROK® External Wall Systems, are supported by building elements having at least the same FRR as the fire rated elements they are supporting.

Control of External Fire Spread

- 13.1 KOROK® panels are manufactured from non-combustible materials. When KOROK® panels are finished with a paint coating of not more than 1 mm in thickness, the exterior surface finishes requirements of NZBC Acceptable Solution C/AS2, Paragraph 5.8.1 do not apply in accordance with NZBC Acceptable Solution C/AS2, Paragraph 5.8.2 a).



External Moisture

- 14.1 KOROK® External Wall Systems have been found suitable up to an ULS wind loads of 1.76 kPa for the EX1 and EX2 systems and up to 2.5 kPa for the EX3, EX4 and EX5 systems where suitable exterior cladding systems are installed over the KOROK® panels.

Note: Exterior cladding systems used for the KOROK® EX 3, EX4 and EX5 systems have not been assessed and are outside the scope of this Appraisal.

- 14.2 KOROK® External Wall Systems, if installed and maintained in accordance with the requirements of the Technical Literature and this Appraisal, will provide an external wall that will prevent the penetration of moisture that could cause undue dampness or damage to building elements.

Airborne and Impact Sound

- 15.1 The Technical Literature gives a Sound Transmission Class [STC] rating of 36-42, depending on the KOROK® External Wall System. If a greater STC is required from the wall then KOROK Building Systems NZ Limited should be consulted.

- 15.2 The KOROK® External Wall Systems noise control system given in the Technical Literature is based on KOROK® panels with concrete density of 400 kg/m³.

Installation Information

Installation Skill Level Requirement

- 16.1 All design and building work must be carried out in accordance with the KOROK® External Wall Systems Technical Literature and this Appraisal by competent and experienced designers trades-people conversant with the KOROK® System.

General

- 17.1 KOROK® External Wall Systems must be installed in accordance with the specifications contained in the Technical Literature and the relevant Technical Literature for the selected external cladding system for the KOROK® EX3, EX4 and EX5 systems.

Note: Exterior cladding systems used for the KOROK® EX 3, EX4 and EX5 systems have not been assessed and are outside the scope of this Appraisal.

Inspections

- 17.2 For inspection, reference must be made to the specific building design documentation and the Technical Literature.

Cutting Panels

- 17.3 KOROK® panels can be cut to length with the use of a circular saw or evacuated grinder to minimise dust. Where KOROK® panels are trimmed to width, the cut section of the panel is fitted with track and is always the last panel abutting the wall or column.

Health and Safety

- 17.4 Suitable safety glasses, ear muffs and face masks must always be worn when cutting KOROK® panels.
- 17.5 Where powder-actuated fasteners are used, WorkSafe guidelines on the use of powder-actuated hand-held fastening tools must be followed.

Framing

- 17.6 The structural frame to which the KOROK® External Wall Systems will be attached must be as per the designer's specifications, and must be plumb, level and in true alignment.

Fixing

- 17.7 The fixing of all KOROK® panels, channels and angles must be strictly in accordance with the Technical Literature.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

- 18.1 Fire testing has been carried out to determine the performance of the KOROK® External Wall Systems under fire conditions. The test methods and results have been reviewed by BRANZ and found to be satisfactory.
- 18.2 Testing to ISO 5660-1 and ISO 5660-2 for the galvanised steel component of the KOROK® External Wall Systems has been reviewed by BRANZ and found to be satisfactory.
- 18.3 Sound insulation testing has been carried out to determine the acoustic performance of the KOROK® External Wall Systems. The test methods and results have been reviewed by BRANZ and found to be satisfactory.
- 18.4 BRANZ expert opinion on NZBC E2 Code Compliance for the KOROK® External Wall Systems was based on testing carried out in accordance with AS/NZS 4284 by an accredited testing laboratory.

Other Investigations

- 19.1 The KOROK® External Wall Systems Technical Literature has been examined by BRANZ and found to be satisfactory.
- 19.2 Site inspections were carried out by BRANZ to assess the practicability of the installation of the systems, and to view completed installations.
- 19.3 An assessment was made of the durability of the systems by BRANZ technical experts and found to be satisfactory.
- 19.4 Assessments were made of the structure and fire for the KOROK® Gen 2 panel profile by BRANZ technical experts and found to be satisfactory.

Quality

- 20.1 KOROK Building Systems NZ Limited's manufacturing process and details of the quality and composition of the materials have been examined by BRANZ and found to be satisfactory.
- 20.2 KOROK Building Systems NZ Limited is responsible for the quality of the product supplied.
- 20.3 Quality on site is the responsibility of the installer.
- 20.4 Designers are responsible for incorporating KOROK® External Wall Systems into the design of their buildings.
- 20.5 Building owners are responsible for the maintenance of KOROK® External Wall Systems in accordance with the instructions of KOROK Building Systems NZ Limited.

Sources of Information

- AS/NZS 1170 Structural design actions.
- ISO 5660-1:2002 Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Heat release rate [cone calorimeter method].
- ISO 5660-2:2002 Reaction-to-fire tests - Heat release, smoke production and mass loss rate - Smoke production rate [dynamic measurement].
- ISO 9705-1: 2002 Reaction-to-fire tests - Room corner test for wall and ceiling lining products - Part 1: Test method for a small room configuration.
- NZS 3101.1 & 2:2006 Concrete structures standard.
- NZS 3404.1 & 2: 2009 Steel structures standard.
- NZS 3604: 2011 Timber-framed buildings.
- NZS 4284: 2008 Testing of building facades.
- Ministry of Business, Innovation and Employment Record of amendments - Acceptable Solutions, Verification Methods and handbooks.
- The Building Regulations 1992.



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KOROK® EXTERNAL WALL
SYSTEMS



In the opinion of BRANZ, **KOROK® External Wall Systems** are fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided they are used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **KOROK Building Systems NZ 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. **KOROK Building Systems NZ 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 **KOROK Building Systems NZ 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 **KOROK Building Systems NZ Limited** or any third party.

For BRANZ

Chelydra Percy

Chief Executive

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