



SRO1271 Concrete Repair and Façade Restoration ARDEX BR 340 and ARDEX BR 345 Structural - Hand Pack

Scope

This document details how to use Ardex products to reinstate concrete that has been damaged by spalling via chemical and mechanical means. The key products involved are:

[ARDEX BR 340](#) and [ARDEX BR 345](#) are fibre-reinforced, polymer-modified, structural concrete patching and repair mortars. Both are high-build patching mortars capable of being applied from 10mm up to a thickness of 80mm on vertical, horizontal and overhead surfaces. They are designed to be used in conjunction with an appropriate ARDEX bonding bridge or primer.

[ARDEX BR 340](#) is a 'low resistivity' mortar that can be used with the [ARDEX BRX 60 LO](#) Low Output Anodes for ultimate corrosion control and cathodic prevention.

[ARDEX BR 340](#) – Low Resistivity (<15,000Ω cm)

[ARDEX BR 345](#) – High Resistivity (>15,000Ω cm)

Applications

These repair mortars are designed for reinstating concrete surfaces damaged through concrete spalling and other chemical or mechanical causes.

Substrates

Suitable substrates for repair mortars include:

- Firmly compacted and properly cured concrete
- Steel reinforcement that has been prepared with [ARDEX BR 10 ZP](#) Zinc Primer

Substrate Preparation

The substrate must be clean, sound and free from all grease, oil, dust and other surface contaminants such as curing compounds. Damaged or contaminated concrete must be removed to obtain a good bond to the substrate.

The extremities of the repair locations should be saw cut or cut back to a depth of at least 10 mm to avoid feather-edging and to provide a square edge. Break out the complete repair area to a minimum depth of 10 mm up to the sawn edge and 20mm behind any exposed reinforcement steel.

Exposed reinforcing steel should be cleaned to remove all residual rust and concrete residue. Concrete should be removed from around and behind all corroding steel reinforcement to avoid future contamination of the repaired area.

Priming - Concrete

The prepared substrate should be pre-soaked for at least 2 hours but preferably 24 hours with clean water. Any excess should be removed before applying the one of the ARDEX priming systems described below. The surface should be saturated surface dry (SSD) without the presence of standing water. The surface should then be primed by employing one of the following methods:



Create a slurry bond coat using [ARDEX WR Prime](#) and [ARDEX BR 340 / ARDEX BR 345](#). It should be made to a stiff, brushable consistency and applied to the dampened surface.

Alternatively [ARDEX WR Prime](#) should be applied and worked into the substrate. Once the [ARDEX WR Prime](#) has cured to be 'dry', [ARDEX BR 340 / ARDEX BR 345](#) can be applied.

[ARDEX BRP 30 EP](#) can be used in situations where the substrate is likely to remain damp or wet. It is generally used as a bonding coat for the concrete repair mortars for repairs on bridges, roads, wharves, loading docks, warehouses and factories.

Note: It is recommended that the Safety Data Sheets for both Part A and Part B of this epoxy primer be read and understood before commencement.

Priming - Steel Reinforcement

Use [ARDEX BR 10 ZP](#) Zinc-rich Primer (in a continuous film) as the primer for steel reinforcement in concrete. A second coat should be applied if needed. [ARDEX BR 10 ZP](#) should be cured prior to applying the repair mortar.

Mixing

Note: *Safety precautions must be taken. i.e., eye protection, chemically resistant gloves and a dust mask must be worn.*

Use approximately 3.2 – 3.5L water per 20kg bag of [ARDEX BR 340](#) and 3.0 – 3.L water per 20kg bag of [ARDEX BR 345](#). Measure the water into a clean suitably sized pail (20 Litre) and then add approximately half to two-thirds of the powder to the water. This should be done while mixing with a heavy duty electric drill and spiral mixing paddle on slow-medium speed (approx. 400-600 rpm).

Mix to fully wet-out the initial powder addition. The remaining one third of the powder can then be added then mixed to fully disperse. Continue mixing for approximately 2 to 3 minutes to fully homogenise. Let the mixed mortar sit for 1 – 2 minutes, then briefly mix the mortar again (20 seconds) prior to placement.

Application

Note: *Safety precautions must be taken. i.e., chemically resistant gloves must be worn.*

[ARDEX BR 340 / ARDEX BR 345](#) should be applied onto the prepared and primed substrate in the following manner:

- Whilst the 'slurry coat' priming layer is still wet (wet-on-wet) or:
- When the [ARDEX WR Prime](#) has dried.

Apply using a trowel or by hand (**wearing chemically resistant gloves**). Make sure that the material is sufficiently forced and compacted into cracks and holes to ensure that all voids are filled.

Note: Minimum application thickness is 10mm. If the repair mortar slumps at greater thicknesses, it must all be removed then re-applied (at a reduced thickness) after re-priming of the substrate.



Finishing

Once the mortar has set, and the surface is hard enough, work can begin on the surface finish. The surface finish can be made dense and smooth by using a wooden or plastic float, or coarse and sandy by using a sponge to give the required effect.

Curing

The ARDEX curing compound [ARDEX BA 70 CC](#) should be used immediately after the surface of the mortar has been 'finished'. It should be sprayed onto the surface of the finished repair mortar in one coat at an even coverage rate of 5 m²/litre.

Note: If over-coating is required there are two options regarding curing of the mortars. They are:

- The curing compound (applied as above) must be removed from the surface of the repair by mechanical means. E.g. grinding.
- The use of a curing compound could be negated by covering the repaired areas with plastic for a period of seven days before either applying a fairing coat such as [ARDEX BR 120 FC](#) or a render or façade membrane.

Over-coating

If a fine finish is required, the Repair Mortars can be over-coated with [ARDEX BR 120 FC](#) as a Fairing Coat.

The repaired patch may also be rendered over with a suitable **ARDEX** render or **ARDEX** protective coating. Refer to relevant Technical Datasheets for application of overcoats.

Note: If over-coating is required the Curing compound must be removed from the surface of the repair by mechanical means. E.g., grinding.

Anode Installation **([ARDEX BR 340](#) only)**

Overview

When an anode is connected to a reinforcing grid, it throws current to all the steel around it that it is electrically connected to, not just the bars that need protection. All this steel drawing current will deplete the anode and reduce its life. The zinc strip is cast in a high performance grout that provides resistive current control. The dimensions of the [ARDEX BRX 60 LO](#) anodes are 125mm x 50mm x 25mm.

Terminology

Level of Protection (Definitions)

Corrosion Prevention: Mitigates initiation of new corrosion activity.

Corrosion Protection: Reduces ongoing corrosion activity.

Cathodic Protection: Reduces or eliminates ongoing corrosion activity

The [ARDEX BRX 60 LO](#) anodes can be installed for either corrosion prevention or corrosion protection. Cathodic protection can be created with these anodes in patch areas where impressed current or sacrificial anode cathodic protection is being applied. In these cases the anode system is designed to fully protect all the embedded corroding reinforcement and so only loose concrete is removed.



Corrosion Prevention and Protection

In order to conserve the anodes, exposed steel should be coated with [ARDEX BR 10 ZP](#) Primer. This insulates the steel so that current will not flow to it, and the anode will only protect the reinforcement that has not been coated. This affects mainly steel outside of the patch but may also be at holes in the coating.

Steel outside of the patch might be in two different states. It may have been protected from corrosion by the more active reinforcement in the patch areas. This un-corroded steel is treated as corrosion prevention. Only a small polarisation is required to achieve protection. If, however, this steel has started to corrode, but has not caused damage (determined by breakout at a few locations), then anode design should be based on corrosion control.

Substrate Preparation

1. Remove all deteriorated concrete, dirt, oil, grease, and all bond-inhibiting materials from the surface. Ensure that the repair area is not less than 10mm in depth.
2. Preparation work should be done using high pressure water blasting or other appropriate mechanical means to obtain an exposed aggregate surface with a minimum surface profile of 2mm for proper mortar adhesion.
3. Steel reinforcement should be thoroughly prepared by 'mechanical' cleaning to remove all traces of rust. Where corrosion has occurred due to the presence of chlorides, the steel should be high pressure washed with clean water after mechanical cleaning.

Location of the Reinforcement

The best and most convenient way to locate the reinforcement is by using a rebar locator. i.e cover-meter or ground penetrating radar (GPR).

Checking the Electrical Continuity of the Reinforcement

The electrical continuity of the reinforcement is measured using a digital multi-meter. Contact is made using alligator clips. The central knob of the multimeter is switched to the resistance position (W) and the resistance is then measured. The requirement for continuity is a measurement of less than 1 Ohm (DC-) resistance.

Determination of the Degree of Corrosion

Electrical potential mapping of all concrete (spalled and un-spalled) should be considered in areas where spalling has occurred.

The concrete surfaces around active corrosion sites on steel reinforcement are generally coated to prevent further contaminant ingress. It is understood that some areas will still corrode despite being coated. The installation of [ARDEX BRX 60 LO](#) Low Output Anodes is intended to slow the corrosion rate.

Installation of the Anodes

The anode units and repair material should be installed immediately following preparation and cleaning of the steel reinforcement.



When the area is prepared and clean, appropriate locations are found on the bars with an anode distribution described in the table (below).

Steel Ratio	Prevention	Control
	ARDEX BRX 60 LO	ARDEX BRX 60 LO
<0.3	750 (600)	450 (375)
0.3 - 0.6	600 (500)	400 (325)
0.6 - 0.9	500 (400)	350 (275)
0.9 - 1.2	450 (350)	300 (225)
1.2 - 1.5	400 (250)	275 (200)
1.5 - 1.8	350 (200)	250 (175)
1.8 - 2.1	300 (175)	225 (150)

Increasing Polarisation →

Increasing Steel Area to Polarise ↓

Increasing Polarisation

The first number stated (Prevention/Control) is the maximum Anode Spacing (mm) for Low to Moderate Corrosion Risk (Chloride Content < 0.8% or Carbonated Concrete).

The second number stated (Prevention/Control) is Maximum Anode Spacing (mm) for High Corrosion Risk (Chloride Content 0.8% to 1.5%).

For extremely high corrosion risk applications (> 1.5% Chloride), contact ARDEX for assistance.

Note: Chloride content is based on percent by weight of cement.

Maximum grid dimensions are based on typical conditions. Spacing should be reduced as appropriate for severe environments or to extend the expected service life of the anode.

Increasing Size of the Steel Area to Polarise

The number and spacing of anodes is determined by the steel density ratio. The ratio is a calculation of the surface area of the reinforcing steel to the area of repair. The protective current supplied by [ARDEX BRX 60 LO](#) Low Output Anodes will decrease slowly with time as zinc corrosion products accumulate.

Securely fasten the anode units from the side or beneath the exposed rebar as close as practical to the surrounding concrete (preferably within 100 mm) while ensuring that enough space remains to fully encapsulate the unit in the repair. Placement should be midway between bars to be protected for corrosion control.

The minimum cover of the repair material over the units should be 20 mm.

Place and fasten the anodes securely on the steel bars so electrical contact will not be lost during the repair mortar application or concrete casting. Build the patch repair in such a way that the anode surface is fully in contact with the patch repair material. Be aware of enough spacing between the anode and the existing concrete. In that way the



repair mortar or concrete can easily force its way around the anode and create good adhesion with the paste for sound electrolytic continuity between the anode and the concrete structure.

Electronic Connections (Reinforcement – Anode)

Metallic or galvanized tie wraps, cable ties, hose clamps or 'tac' welding can be used to connect the anode to the rebar to create a secure and durable electric connection.

Check Electric Connections (Resistance Meter)

The electric connection of the anode with the rebar is checked in a similar way as described above. Instead of making the contact with alligator clips directly on the connections, it could be checked by making contact directly with the current distributor bar of the anode and the reinforcement.

Patching of the Concrete

Finish the application by patching the concrete with [ARDEX BR 340](#) Repair Mortar. Before applying the mortar, saturate the surface with clean water. Substrate should be saturated but surface dry (SSD) with no standing water. The mortar will make good contact with the anode's paste all the way around and between the anode and the rebar.

Repair System

The ARDEX system can also be applied to patch areas where impressed current or sacrificial anode cathodic protection is being applied. In these cases the anode system is designed to fully protect all the embedded corroding reinforcement and so only loose concrete is removed. Sound contaminated concrete from behind/along the reinforcement does not need to be removed. [ARDEX BR 10 ZP](#) zinc-rich primer may be applied to the reinforcement to reduce the area over which the anode has to work but commonly this is not required.

Disclaimer:

The recommendation selected is based upon questions answered on the ARDEX Australia website. This recommendation is designed as a general application for your described situation and should not be considered site specific documentation for general distribution. Always consult the latest relevant ARDEX Technical Bulletins and information on the product packaging and/or product data sheets (available on the ARDEX Website). Australian and other relevant standards should be followed during installation. If you have any further questions or would like further clarification please contact the ARDEX Technical Services Hotline on 1800 224 070 (9am to 5pm Monday to Friday).