



Finance Technical Guideline

TG002 Moisture Content in Concrete Slabs

1 Purpose

This guide sets out the Department of Finance's (Finance's) mandatory requirements for the preparation and installation of a moisture vapour barrier to all new and existing concrete slabs to receive resilient floorcoverings¹. These requirements are to apply to all Finance projects, irrespective of the moisture content of the concrete slab and any AS 1884:2021 threshold requirements.

Previously, this guide set out Finance's requirements for the vapour barrier treatment of concrete floor slabs under resilient flooring finishes *only* where the tested moisture content of those slabs failed to meet AS 1884:2021 requirements. Finance's requirements now exceed AS 1884 (refer to Section 4 of this Technical Guideline).

This guide should be circulated as appropriate to design consultants and quantity surveyors.

2 Background: Floor Covering Failures

Concrete floor slabs at several recent Finance projects have failed the revised moisture testing requirements in AS 1884:2021. Non-compliant floor slabs require additional vapour barriers to be installed before vinyl and other resilient flooring can be installed. This can lead to Contractor claims for variations and extensions of time to install a vapour barrier.

Moisture-related floor covering failure is a worldwide problem, with floor covering failures in the US alone costing in excess of \$1 Billion annually. The majority of these moisture-related complaints appear to be due to insufficient or incorrect moisture testing methods before installing resilient floor coverings. Moisture-related floor covering failures have increased due to a number of factors, including:

- changes in concrete construction and admixtures,
- burnishing of concrete surfaces,
- fast tracked construction, and

¹ Resilient floorcoverings include flexible PVC, semi-rigid PVC, hybrid modular, linoleum, rubber. Also applies to self-adhesive tiles. This Guideline does not apply to the laying of synthetic or natural fibre carpet, carpet tiles, timber or cork products.

- requirements for adhesive manufacturers to produce low-VOC adhesives, thus removing most or all solvents from their products.

Resilient floor covering failures are not only costly to rectify, but also cause significant disruption to the operation of a particular facility or environment, especially in critical areas such as Health Campuses and remote regional facilities.

In order to safeguard against the potential for failure and the resulting cost and disruption, Finance requires a moisture vapour barrier to be installed on all new and existing concrete slabs to receive resilient floorcoverings. This is a requirement for all Finance projects.

3 Finance Requirements

3.1 Treatment of Moisture Content in Floor Slabs

Finance requires that all projects incorporate in the contract specification, and where applicable the Bill of Quantities, the requirement to provide a moisture barrier, including concrete slab and joint treatment, to all concrete floor areas designated to receive resilient floor coverings.

The specifications should cover moisture barrier treatment for the slab and joints inclusive of all preparatory works and, where applicable, treatment of joints abutting and within existing slabs, such that the slab is ready to receive the specified finishes.

Where a Bill of Quantities is used, the Lead Consultant and Quantity Surveyor are required to ensure appropriate measured items are included. The measured items to be included in the Bill of Quantities for treatment of moisture content in concrete slabs should include, at a minimum:

- Square metre rate for treatment of the concrete slab, inclusive of all preparatory works, and
- Lineal metre rate for treatment of slab joints.

Refer below to Section 4 Concrete Slab Preparation, Levelling and Moisture Barrier Specification for Resilient Flooring Applications.

3.2 Alterations to Existing Buildings

Where a project involves placing or replacing resilient flooring on an existing concrete slab, ensure that a vapour barrier is installed in accordance with Section 4 below.

3.3 Contractor Compliance

The Contractor is to undertake all practical measures necessary to ensure the concrete has sufficiently dried for the installation of floor finishes in accordance with the construction program, AS 1884:2021, and any material warranty conditions. Note that the requirements in AS 1884 are a minimum standard, and Finance's requirement for the installation of a moisture barrier to all new and existing concrete slabs to receive a resilient floor finish shall take precedence over the thresholds permitted by AS 1884:2021 Appendix A & B, regardless of the moisture content of the slab. Manufacturers of adhesives, coatings, levelling compounds and floor coverings may also have different specifications listed in their installation guidelines.

Where the manufacturer's requirements are more stringent than Section 4 of this Technical Guideline, the manufacturer's guidelines, installation instructions, and data sheet requirements shall take precedence for the purpose of maintaining warranties. Where the manufacturer's requirements are less stringent than Section 4 of this Technical Guideline, the Technical Guideline requirements shall take precedence.

Moisture content test results need to be confirmed and provided to the Superintendent's Representative in writing. Refer also to Section 4.

It is essential that multi-layer systems such as polymeric membranes, levelling compounds, adhesives and resilient flooring materials are all compatible with each other and function as an integrated system. Product systems must be selected such that full system performance is assured and the installed system will be covered by a back-to-back 10 year workmanship and product performance warranty from the installer and the product manufacturer.

The Contractor is to provide a back-to-back installation and materials warranty, covering the substrate preparation, vapour barrier system, adhesive system, and flooring finish as applicable. The warranty is to be for a minimum of 10 years. One integrated warranty is required from the Contractor, covering all aspects of the installation including all installed products. The warranty is to be in the name of the Agency responsible for the building's operation, or the Principal to the contract (the Minister for Works).

4 Specification: Concrete Slab Preparation, Levelling and Moisture Barrier Specification for Resilient Flooring (Sheet Vinyl) Applications

This specification is applicable to all new and existing concrete slabs to receive resilient floor finishes, regardless of the moisture content of the slab, on all Finance projects. Amend the NATSPEC clauses for Concrete to include this wording (including materials like Ardex, specified by example) or a similar product equivalent

in function, quality, compatibility, etc to the approval of the Superintendent's Representative.

4.1 Applicable Standards

Resilient flooring installations must comply with the requirements of AS 1884:2021 (as qualified above under Section 3 for moisture content levels), and all referenced sub-standards and test methods including ASTM F2170-19A and ASTM F1869.

4.2 Preparation

4.2.1 New Concrete Surfaces

All new concrete surfaces must be cleaned and mechanically ground to ensure they are free from dirt, grease, oil, curing compounds, loose particulates, and other surface contaminants.

4.2.2 Existing Concrete Surfaces

All existing concrete surfaces upon which floorcoverings were previously installed must be cleaned and diamond ground back to sound clean substrate to ensure they are free from any old, loose materials, adhesives, and old membranes.

4.2.3 Chased Floor Joints

Where chased floor joints are present in both new and existing concrete floor slabs, accurately locate the edges of the chase on all sides.

Determine the moisture content of the main slab and the infill sections by testing to ASTM F2170-19A. If results show RH readings <90% then proceed with preparation as specified below. If results show RH readings >90% then report to the Superintendent's Representative for further investigation, and do not proceed.

If infill joints exhibit no evidence of moisture differential and no cracking, then proceed without further preparation treatment.

If infill joints exhibit only minor cracking, diamond saw cut along the infill joint to a minimum width of 5mm and a minimum depth of 10mm, then thoroughly clean and vacuum the cut to remove any loose particles. Fill the joint with a suitable one-component, polyurethane based flexible joint sealant such as Ardex RA040 or a similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative.

If infill joints exhibit elevated moisture and/or substantive cracking, diamond saw cut along the infill joint to a nominal width of 10mm and a nominal depth of 20mm, then thoroughly clean and vacuum the cut to remove any loose particles. Insert a 10mm foam backing rod into the cut leaving a gap of approximately 10mm from the top of the foam to the top of the concrete. Fill the joint with a suitable one-component, polyurethane based flexible joint sealant, such as Ardex RA040 or similar product

equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative.

4.2.4 Construction Joint Details

Where construction joints and cold joints are present in both new and existing concrete floor slabs, ensure proper detailing and preparation of these joints prior to resilient flooring installation. These joints may be a potential avenue for moisture ingress, and as such, will need to be detailed to limit the passage of moisture.

Construction and cold joints shall be cleaned out to a depth of 30mm. A foam backing rod is then fitted into the joint leaving a gap of approximately 10-20mm from the top of the foam to the top of the concrete. The joint should then be filled with a suitable one-component, polyurethane based flexible joint sealant, such as Ardex RA040 or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative.

4.3 Moisture Barrier Application For Non-Wet Areas

This stage of works should only commence once all preparation works have been completed, and all construction and cold joints have been suitably treated.

HOLD POINT: Moisture barrier application is not to commence until preparation works have been completed, inspected and approved by the Superintendent's Representative.

Determine the moisture content of the concrete floor slabs by testing to ASTM F2170-19A. If results show RH readings <90% then proceed with moisture barrier application. If results show RH readings >90% then report to the Superintendent's Representative for further investigation, and do not proceed.

To provide protection against capillary and hydrostatic moisture, a water-based single component acrylic copolymer polymeric membrane product, such as Ardex WPM368 or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative is then to be applied to the whole of the floor slab, including at least 100mm up masonry walls, which have had all floor to wall joints sealed with a neutral-cure silicone or a suitable one-component, polyurethane based flexible joint sealant, such as Ardex RA040 or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative.

The polymeric membrane must be installed PRIOR to the application of levelling compounds and the installation of resilient floorcoverings.

Membrane application and coverage must comply with the product manufacturer's recommendations, and typically requires at least 2 coats of roller application in cross directions with a period of at least 2-4 hours between coats.

Application of levelling cements or compounds can only take place once the polymeric membrane surface is scratch hard, which typically takes approximately 24 hours @ 20 degrees Celsius. Membranes should not be left for longer than 72 hours before applying levelling products.

4.4 Moisture Barrier Application For Wet Areas Including Ensuites

This stage of works should only commence once all preparation works have been completed, and all construction and cold joints have been suitably treated.

HOLD POINT: Moisture barrier application is not to commence until preparation works have been completed, inspected and approved by the Superintendent's Representative.

Determine the moisture content of the concrete floor slabs by testing to ASTM F2170-19A. If results show RH readings <90% then proceed with moisture barrier application. If results show RH readings >90% then report to the Superintendent's Representative for further investigation, and do not proceed.

To provide protection against capillary and hydrostatic moisture, a water-based single component acrylic copolymer polymeric membrane product, such as Ardex WPM368 or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative is then to be applied to the whole of the floor slab, including at least 100mm up masonry walls, which have had all floor to wall joints sealed with a neutral-cure silicone or a suitable one-component, polyurethane based flexible joint sealant, such as Ardex RA040 or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative.

Cementitious screeds to create the necessary falls to drains can then be installed and allowed to cure.

Within shower and bathroom areas, the screed must be top coated with a water-based single component acrylic copolymer polymeric membrane product, such as Ardex WPM002 or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative, which is to be applied to the whole of the screed area including at least 100mm up masonry walls, which have had all floor to wall joints sealed with a neutral-cure silicone or a suitable one-component, polyurethane based flexible joint sealant, such as Ardex RA040 or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative.

HOLD POINT: Levelling compound application is not to commence until topcoat membrane works have been completed, inspected and approved by the Superintendent's Representative.

The screed topcoat polymeric membrane must be installed PRIOR to the application of levelling compounds and installation of resilient flooring.

Membrane application and coverage must comply with the product manufacturer's recommendations, and typically requires at least 2 coats of roller application in cross directions with a period of at least 2-4 hours between coats.

Application of levelling cements or compounds can only take place once the polymeric membrane surface is scratch hard, which typically takes approximately 24 hours @ 20 degrees Celsius. Membranes should not be left for longer than 72 hours before applying levelling products.

4.5 Relative Humidity Result Readings >90%

If the results of the moisture content testing show readings >90%, the Superintendent's Representative is to refer the matter to the Finance Project Manager for direction. The Superintendent's Representative is to advise on the circumstances in which the readings of >90% have been encountered.

Circumstances may include:

- It is new concrete that is not yet cured and dry enough.
- It is in localised areas only showing >90% because they contain in-filled utility trenches or other slab modifications, and the in-fill concrete is not yet cured and dry enough.
- It is an aged concrete floor slab, typically >30 years old which presents as >90% everywhere.
- It is an aged building where the floor slab is mostly dry, but perimeter readings are >90%.

The Project Manager will then determine the course of action after seeking expert advice.

Where the programme of works does not allow additional time for the concrete to dry further and be re-tested, the application of additional waterproofing may be required at the discretion of the Project Manager after obtaining expert advice. Any additional waterproofing shall be selected and installed to ensure the use in that particular application is within the product's capabilities and its performance is warranted to the extent as noted in Section 4.8 Product Compatibility And System Performance Warranty.

4.6 Levelling Compounds Application

HOLD POINT: Levelling compound application is not to commence until moisture barrier works have been completed, inspected and approved by the Superintendent's Representative.

Levelling compound is to be applied to level the concrete floor, protect the membrane, and allow a porous substrate for the vinyl adhesive, and must be installed as per the adhesive manufacturer's recommendations.

A cementitious levelling compound layer, such as Ardex Feather Finish or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative, is to be applied in accordance with the manufacturer's recommendations, and nominally should be at least 2.0mm thick to allow the flooring adhesive to dry correctly.

Where levelling is required to floors with variations greater than 2.0mm, preferred alternative compounds such as Ardex K15, K12, K220 or K55 levelling cement, or similar products equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative, can be used.

Ensure all levelling and smoothing compounds are dry prior to the installation of resilient floor coverings.

4.7 Resilient Flooring Installation

It is important that resilient flooring is installed in strict accordance with the manufacturer's recommendations and warranty requirements.

For non-wet area sheet vinyl installations, acrylic-based adhesives such as Ardex AF171 or Nexus N810 sheet vinyl adhesive, or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative, can be used.

For wet area installations, a waterproof adhesive such as Ardex AF180MS, or similar product equivalent in function, quality, compatibility, etc to the approval of the Superintendent's Representative, must be used.

4.8 Product Compatibility And System Performance Warranty

It is essential that multi-layer systems such as polymeric membranes, levelling compounds, adhesives and sheet vinyl / resilient flooring materials are all compatible with each other and function as an integrated system.

Product systems must be selected such that full system performance is assured and the installed system will be covered by a back-to-back 10 year workmanship and product performance warranty from the installer and product manufacturer.

5 References

NATSPEC TECHnote DES 008 Preparation of Concrete Substrates NATSPEC amended April 2015 <http://www.natspec.com.au/index.php/resources/technotes>

Moisture in Concrete and Moisture-Sensitive Finishes and Coatings Data Sheet April 2007 Cement Concrete and Aggregates Australia.
https://www.ccaa.com.au/imis_prod/documents/Library%20Documents/CCAA%20Datasheets/DS2007MoistureTBR.pdf

6 Document Control

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7 Document Approval

Document approval

This guideline was endorsed and approved for use on 16/08/2023 by:

Dean Wood, Principal Architect

Department of Finance

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