

TECHNICAL BULLETIN – TB028

ARDEX PRODUCTS FOR HIGH STRESS APPLICATIONS

Date: August 19th 2020

INTRODUCTION & SCOPE

Floors can be subjected to high stress environments, and so the levelling compound and floor coverings must be able withstand these conditions.

Supermarkets, hospitals and other institutional buildings, storage areas etc are subjected to forklift and pallet jacks with heavy loads which often require high quality flooring. The resultant damage to floor coverings may be scratches, pits, indentations (vinyl tiles and sheet), roller marks or telegraphing through of cracking or break up of the material.

In buildings adjacent to major highways and railways, or with moving machinery, vibration can be a consideration, so the addition of a polymeric additive is recommended.

Systems based around ARDEX K15 Microtec or ARDEX K12 *New* mixed with ARDEX E25 Resilient Emulsion, or, products mixed only with water such as ARDEX K80 or ARDEX K55 produce a levelling compound with improved flexural and ball impact hardness suitable for installations where high point loadings, heavy rolling loads and where subfloors may be subjected to vibrations.

The fast track system enables floor coverings to be installed in 1-2 hours for K55 and 16 – 18 hours for K15 Microtec, K12 *New* or K80, with forklift traffic after only 48 hours.

K80 is used at a minimum thickness of 5-6mm and has a slightly rougher surface which is not ideal for vinyl.

SURFACE PREPARATION

Concrete floors must be structurally sound with all previous coatings removed, clean and free of oil, grease, wax, latex compounds, curing compounds, efflorescence, laitance, dust and all foreign matter. The surface must be prepared back to an open porous matrix of the concrete and professional cleaning by mechanical means in line with sound building industry practices is advised.

Suggested cleaning & preparation methods in line with AS1884-2012 need to be performed prior to the installation of any underlayment.

ARDEX Technical Bulletin TB041 gives details on surface preparation, and recommendations therein are based on the “International Concrete Repair Institute” Guideline No. 310.2R-2013 and include shotblasting, scarifying or diamond grinding to provide a surface profile of between CSP3 to CSP7.

PRIMING

Prime the porous concrete with ARDEX P51 Primer. Mix ARDEX P51 1:2 with water and apply evenly with a soft pushbroom. Do not leave any bare spots and remove all puddles and excess primer. Allow to dry to a clear, thin film (min. 3 hours max. 24 hours).

The levelling compound shall not be applied until primer is dry.

Other surfaces may require the use of ARDEX P82 primer, ARDEX P9 primer, ARDEX WPM368 moisture barrier or ARDEX WPM300 moisture barrier with broadcast sand. Contact Technical Services for more information on these primers and their uses with specific products.

MIX DESIGNS

The ARDEX K15, or K12 New shall be mixed with ARDEX E25 Resilient Emulsion in the following mix ratio:

K15 Microtec

4 litres of water plus 1.6 litres ARDEX E25
per 20 kg ARDEX K15.

K12 New

4 litres of water plus 1.6 litres ARDEX E25
per 20 kg ARDEX K15.

K55

5.25 litres of water
per 20 kg ARDEX K55.

K80

4 litres of water
per 20 kg ARDEX K80.

Application is by normal methods for ARDEX floor levelling compounds.

Drying time

At 23°C, the product can be walked on in about 60 minutes for K55 or 2 to 3 hours for the K15 Micro, K12 New or K80. They can accept floor covering material after 60-90 minutes for K55, 16 – 18 hours for K15 Micro, K12 New or K80

Ready to receive traffic

ARDEX K55 and K80 alone, or ARDEX K15 Microtec and K12 New mixed with ARDEX E25 with applied floor coverings are intended for moderate forklift traffic, hand pallet trucks and similar uses. The products can accept these traffic conditions after approximately 48 hours at 23°C.

FLOORING ADHESIVES

ARDEX recommends the use of ARDEX AF 171 for;

- sheet vinyl
- vinyl planks
- Damtec Standard (2mm cork containing soundproofing). Use a V12 trowel
- Damtec Multi (4 mm rubber). Use a V2 trowel
- Regupol 4515
- ARDEX DS 40 (internal only)

Note : This adhesive has a fast grab and is also suitable for vertical applications.

ARDEX recommends the use of ARDEX AF 271 for;

- Vinyl backed carpet tile
- Non-vinyl backed carpet tile
- Vinyl composite tile
- For other carpet tile backing consult ARDEX

NEXUS flooring adhesives, when used in accordance with the product data sheets, are compatible and warrantable with ARDEX products so please visit <https://www.nexusadhesives.com.au/>. High quality tools, trims, profiles and profile accessories can be found at **DTA Australia** <https://www.dta-aus.com.au/>.

DISCUSSION OF ROLLING WHEEL TYPES

The types of wheels that rolling loads are moved on influences the actual point loading applied.

The static or dead load is the force exerted by an object resting on the floor – expressed in Newtons. The force is the weight of the object multiplied by force exerted due to gravity. Dynamic loads are moving loads, whilst rolling loads are a combination of dead load and shear forces. Objects that exert rolling loads produce a point dead load from the contact, and sideways shear load from the roller wheel.

Steel formed wheels are inelastic and transfer all the dead and dynamic loads to the floor, plastic wheels are less severe but still rigid, whereas rubber wheels have some give and absorb some of the stress.

The wider and longer the wheel contact patch, the lower the applied pressure that the flooring system has to withstand. The dead and rolling loads applied to a floor are usually divided between all the wheels in contact, albeit there may be some asymmetry where heavy weights are placed over some wheels and not evenly across the entire load.

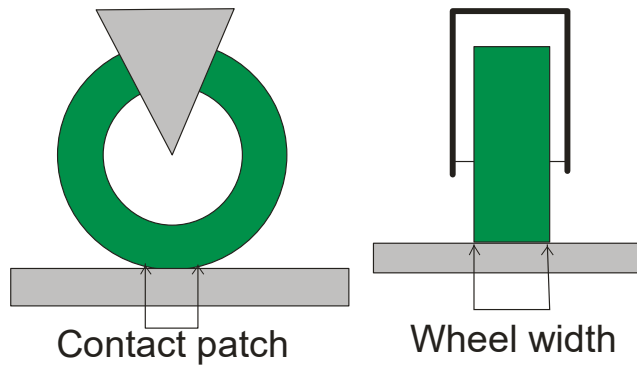
The usual questions we received about pressure involves roller wheels, usually pallet jacks. The contact area for a roller wheel is related to width and contact angles. Wheel diameter is not important in the general sense other than larger diameter wheels have larger contact widths.

Steel and hard plastic wheels

- transfer more effectively the entire load to the floor
- have less friction and less shearing
- are more likely to groove the surface

Rubber wheels

- deform and take up some of the load in the deformation
- increase the contact patch
- but may increase shearing.



These schematics show the features of a roller which need to be known.

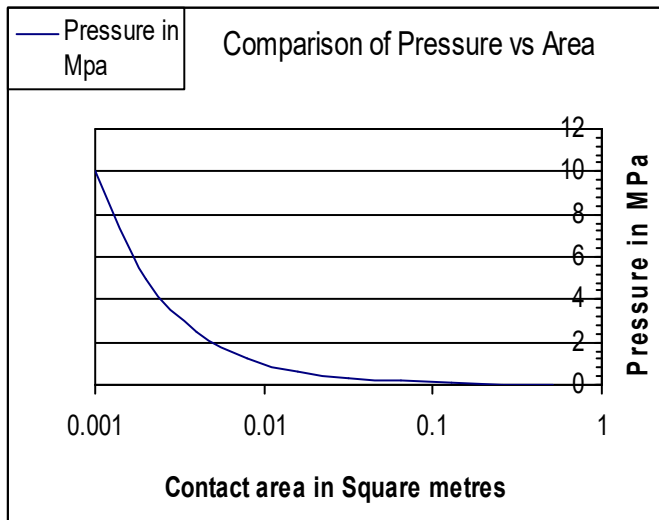
Area for load calculation is-

Wheel width x Contact patch with both dimensions in metres

Examination of the product datasheets show that compressive strength results are expressed in MPa (or N/mm²), that is in pressure units. Pressure is defined as force applied over a unit area where force is in Newtons and area is in square metres - 1MPa ~ 140psi ~ 10 atmospheres.

- A typical situation is where a piece of equipment sits on a floor
 - For example what is the exerted pressure for a set load?
 - A 4000kg piece of equipment has 4 legs with contact surface area 50 x 50mm per leg. How much pressure is exerted on each leg?
- There are three bits to problem..

1. What is the force exerted?
 - a) Force is weight x gravity
 - b) $4000 \times 10 = 40\text{kN}$
2. What is the surface area?
 - c) $50\text{mm} = 0.05\text{m}$ so area for each leg is
 - d) $0.05 \times 0.05 = 0.0025\text{m}^2$
3. The force is divided over the four legs
 - e) $40\text{kN} \div 4 = 10\text{kN per leg}$
4. Pressure per leg is force / area
 - f) $10000 \div 0.0025 = 4 \times 10^6 \text{ Pa or } 4 \text{ MPa}$



- Reference to the graph shows how for a 10kN load as contact area decreases the pressure increases rapidly
- This means that small contact areas will develop high point loads

PRECAUTIONS

The above calculations are a discussion point only. In reality, equipment feet are not smooth and wheels on trolleys almost never roll straight and true.

The above systems are not recommended for floors in sports areas or gymnasiums that are subjected to high impact loadings such as dropping of weights. An impact load is significantly higher in applied force than a standing weight because the change in velocity of the dropped weight.

Always install test areas to determine the suitability of the product for the intended purpose.

IMPORTANT

This Technical Bulletin provides guideline information only and is not intended to be interpreted as a general specification for the application/installation of the products described. Since each project potentially differs in exposure/condition specific recommendations may vary from the information contained herein. For recommendations for specific applications/installations contact your nearest Ardex Australia or Ardex New Zealand Office.

DISCLAIMER

The information presented in this Technical Bulletin is to the best of our knowledge true and accurate. No warranty is implied or given as to its completeness or accuracy in describing the performance or suitability of a product for a particular application. Users are asked to check that the literature in their possession is the latest issue.

REASON FOR REVISION – ISSUER

PERIODIC UPDATE AND INCLUSION OF NEXUS AND DTA INFORMATION

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