Appendices

Wall Protection Options – Public Spaces

Option 3 – Bespoke Timber Solution to both sides of corridor

Bespoke timber contact protection rail as utilised at The Alex.

IMAGE – as installed.

N10/170J TIMBER HANDRAILS TO CORRIDORS
- Wall protection to corridor walls,
- Material: Texwood whole stave panels, maple
- Panel size: 3000 x 1220mm
- Edges: 3mm rounded
- Size: 200x40mm
- Species/Finish: Maple with clear satin acid catalyst lacquer
- Joints: Timber dowel fixings
- Fixings:
  - Alternative 1: circular timber spacer plate, 30mm thick, fixed to partition studwork; handrail fixed to spacer plate with countersunk screws and pelleted to match
  - Alternative 2: interlocking stainless steel brackets - one bracket fixed to partition studwork, second bracket fixed to back face of handrail.

Timber handrail to both sides of corridor where space allows
Detailing taken directly from The Alex

Typical Elevation

Bespoke timber solution to both sides of corridor where space allows
Wall Protection Options – Public Spaces

Option 4 – Standard Timber Handrail with low level bumper rail to both sides of corridor

IMAGE – Installation photo - Pembury

Features
• Solid timber or bamboo handrail on stainless steel mounting brackets
• Accessories: stainless steel return to wall End Caps and External/Internal Corners
• Available in: Ash, Oak, Beech, Maple and Bamboo (NEW)
• Supplied in natural finish (clear lacquered), Bamboo is also available in a honey finish.

Dimensions
Fix at max. 800mm centres
Stock lengths 2.0m

Typical Elevation

Standard timber handrail with low level bumper rail to both sides of corridor where space allows

Features
• Acrovyn cover over continuous aluminium retainer
• Free-floating design flexes on impact
• Continuous Acrovyn shock-absorbing bumper
• Three mounting options for varying stand-offs
• Accessories: Acrovyn End Caps, External Corners and return to wall End Caps for extended option (ECR50M)
• Available in all Acrovyn Profile colours
Comparison Table - Patient Spaces

<table>
<thead>
<tr>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>HR6C SCRSM</td>
<td>HR6C SCRSM</td>
</tr>
<tr>
<td>Description</td>
<td>Combined timber handrail for support with acrovyn crashrail for impact protection to both sides of corridor where space allows</td>
<td>Combined timber handrail for support with acrovyn crashrail for impact protection to both sides of corridor where space allows. Lower level bumper rail provided.</td>
</tr>
<tr>
<td>Manufacturer</td>
<td>Construction Specialties (UK) Ltd, 1010 Westcott Venture Park, Westcott, Bucks, HP18 0XB</td>
<td></td>
</tr>
<tr>
<td>Projection</td>
<td>116mm</td>
<td>116mm</td>
</tr>
<tr>
<td>Depth</td>
<td>117mm</td>
<td>217mm</td>
</tr>
<tr>
<td>Pros</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cons</td>
<td>No lower protection achieved</td>
<td>New special design (work in progress) potential for additional lead times</td>
</tr>
<tr>
<td>HBN 00-04</td>
<td>Compliant</td>
<td>Compliant</td>
</tr>
</tbody>
</table>

NOTE: Corner protection would be required in these spaces

Wall Protection Options – Patient Spaces
Option 1 – Combined handrail & crashrail to both sides of corridor

HBN 00-04 Compliant

Dimensions
Fix at max. 800mm centres
Stock lengths 4.0m
Wall Protection Options – Patient Spaces

Option 2 – Combined handrail & crashrail to both sides of corridor. Lower level crashrail provided.

Dimensions
Fix at max. 800mm centres
Stock lengths 4.0m

Typical Elevation

Combined handrail and crashrail to both sides of corridor where space allows
Wall Protection Options – Patient Spaces
Option 3 – Combined timber handrail and crashrail to both sides of corridor

IMAGES – Mock-up of sample (work in progress)

Combined handrail and crashrail to both sides of corridor where space allows.
Lower level crashrail also provided to both sides.
### Comparison Table - Support & Service Spaces

**High risk of impact damage**

<table>
<thead>
<tr>
<th>OPTION 1</th>
<th>OPTION 2</th>
<th>OPTION 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>SCR50M</td>
<td>SCR50M</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Acrovyn heavy duty crashrail at several heights to provide protection to both sides of corridor where space allows</td>
<td>Acrovyn heavy duty crashrail at mid height to provide protection Acrovyn sheeting to lower half of wall, to both sides of corridor where space allows</td>
</tr>
<tr>
<td><strong>Manufacturer</strong></td>
<td>Construction Specialties (UK) Ltd, 1010 Westcott Venture Park, Westcott, Bucks, HP18 0XB</td>
<td></td>
</tr>
<tr>
<td><strong>Projection</strong></td>
<td>27mm</td>
<td>27mm</td>
</tr>
<tr>
<td><strong>Depth</strong></td>
<td>127mm</td>
<td>127mm</td>
</tr>
<tr>
<td><strong>Pro’s</strong></td>
<td>Provides low height</td>
<td>Gives the acrovyn sheeting a stop point</td>
</tr>
<tr>
<td><strong>Con’s</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Corner protection would be required in these spaces
Wall Protection Options – Support Spaces
Option 1 - Heavy duty crashrail to both sides of corridor

IMAGE – Installation image – Pembury

Typical Elevation

Heavy duty crashrails to both sides of corridor where space allows
Wall Protection Options – Support Spaces
Option 2 - Heavy duty crashrail with acrovyn sheeting to both sides of corridor

IMAGE – Product brochure image.

Typical Elevation

Heavy duty crashrails with acrovyn sheeting below to both sides of corridor where space allows.
Wall Protection Options – Support Spaces
Option 3 - Sheet wall protection to both sides of corridor

Typical Elevation

Acrovyn sheet wall protection to both sides of corridor where space allows
### Comparison Table - Corner Protection

<table>
<thead>
<tr>
<th>OPTION 1</th>
<th>OPTION 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>BL400 / BL400M Acrovyn Sheeting</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Cover duty vertical bed locators</td>
</tr>
<tr>
<td><strong>Manufacturer</strong></td>
<td>Construction Specialties (UK) Ltd, 1010 Westcott Venture Park, Westcott, Bucks, HP18 0XB</td>
</tr>
<tr>
<td><strong>Projection</strong></td>
<td>75mm - 300mm max</td>
</tr>
<tr>
<td><strong>Width</strong></td>
<td>140mm at 600mm centres</td>
</tr>
</tbody>
</table>

**Product**
- SCG

**Description**
- Medium duty corner protection for 90/135 degree angles. For irregular angles colour choice may be limited.

**Manufacturer**
- Construction Specialties (UK) Ltd, 1010 Westcott Venture Park, Westcott, Bucks, HP18 0XB

**Projection**
- 4mm

**Width**
- 50mm

---

### Comparison Table - Bed Locators

<table>
<thead>
<tr>
<th>OPTION 1</th>
<th>OPTION 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>BL400(76) and BL400M</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>600 Typical centres</td>
</tr>
</tbody>
</table>

**IMAGE** - Product brochure image. Colour to match base wall colour.

**Product**
- BL400(76) and BL400M

**Description**
- Severe duty vertical bed locators

**Manufacturer**
- Construction Specialties (UK) Ltd, 1010 Westcott Venture Park, Westcott, Bucks, HP18 0XB

**Projection**
- 75mm - 300mm max

**Width**
- 140mm at 600mm centres
Design Recommendation

The following design options will create the most cohesive approach to the wall protection.

<table>
<thead>
<tr>
<th></th>
<th>DESIGN OPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUBLIC SPACES</td>
<td>Option 2</td>
</tr>
<tr>
<td>PATIENT SPACES</td>
<td>Option 1</td>
</tr>
<tr>
<td>SUPPORT SPACES</td>
<td>Option 2</td>
</tr>
<tr>
<td>BED LOCATORS</td>
<td>Option 1</td>
</tr>
</tbody>
</table>
### 2.2 Main Entrance Flooring Proposed Options

#### 1.0 Comparison Table

<table>
<thead>
<tr>
<th></th>
<th>Limestone</th>
<th>Porcelain Tile</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Description</strong></td>
<td>Jura Limestone – grey/blue C220 honed finish and beige C220 honed finish</td>
<td>JURA range in colours: DJC 01, DJC 02 UNIQUE range (one colour only)</td>
</tr>
<tr>
<td><strong>Manufacturer</strong></td>
<td>Vetter UK Limited Archway 3, Birley Fields, Hulme, Manchester, M15 5QU Contact: Christine Ellis T: 0161 227 6422</td>
<td>Domus Tiles Ltd. 3 Molesey Business Centre, Central Avenue, West Molesey, Surrey KT8 2DZ Contact Sean Wisdom M: 07712 675030</td>
</tr>
<tr>
<td><strong>Slip Rating</strong></td>
<td>Grey/blue - R9 when tested to DIN 51330 Beige – R10 when tested to DIN 51330</td>
<td>40 in the wet pendulum test = low potential R9 when tested to DIN 51330</td>
</tr>
<tr>
<td><strong>Lifecycle</strong></td>
<td>100 years plus</td>
<td>50 years plus 10 years on floor build up</td>
</tr>
<tr>
<td><strong>BREEAM</strong></td>
<td>No rating but Limestone is a natural Product</td>
<td>Jura range B Unique range A+</td>
</tr>
<tr>
<td><strong>Tile Size</strong></td>
<td>400-500mm width 200-800mm random lengths</td>
<td>300x300 / 300x600 / 450x450</td>
</tr>
<tr>
<td><strong>Tile Pattern</strong></td>
<td>Random dappled effect/ brick bond/ plank format</td>
<td>Random dappled effect/ brick bond/ plank format</td>
</tr>
<tr>
<td><strong>Under Floor Heating</strong></td>
<td>suitable</td>
<td>suitable</td>
</tr>
<tr>
<td><strong>Cherry Picker</strong></td>
<td>can withstand weight with correct movement joints and build up beneath</td>
<td>can withstand weight with correct movement joints and build up beneath</td>
</tr>
<tr>
<td><strong>Suitable for cafe area</strong></td>
<td>suitable with correct sealant</td>
<td>suitable</td>
</tr>
<tr>
<td><strong>Movement Joints</strong></td>
<td>Required every 8x8m</td>
<td>Required every 8x8m</td>
</tr>
<tr>
<td><strong>Water Absorption</strong></td>
<td>1%</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>Cleaning &amp; Maintenance</strong></td>
<td>Resealing required every 4 years, heavy traffic areas may require touching up yearly. See appendix 4.2</td>
<td>Porcelain tiles do not require any post or pre-installation sealers. See Appendix 4.1</td>
</tr>
</tbody>
</table>

### 2.0 Extent of application

*Extent of limestone / porcelain flooring (indicative colour)*
3.0 Samples
Images are indicative, actual samples to follow.

3.1 Limestone
Variation of stone to be within an agreed range.

3.2 Porcelain Tile
JURA, DCJ 01, DCJ 02
UNIQUE

CLEANING & MAINTENANCE RECOMMENDATIONS FOR UNGLAZED FULLY VITRIFIED PLAIN PORCELAIN FLOOR TILES TO LARGE FLOOR AREAS

The condition of the floor after cleaning will depend greatly on the correct use of the machinery and materials by TRAINED staff.

The number of machines and manpower required to achieve the best possible cleaning results is the sole responsibility of the cleaning and management contractors.

It must, therefore, be assumed that, following the 'Builder's Clean', the floor will be in an entirely acceptable condition for the hand-over to the Cleaning & Maintenance Contractors, and they themselves should make sure that the floor is acceptable, in order to ensure that they do not inherit any 'problems' caused by incorrect or inefficient cleaning which, in the long term, will create problems for them.

The general sequence of events is that the floor is laid in sections; it is then grouted, the tiles are then washed off to remove the surplus grout but taking care not to wash out the joints. When the grout has cured, a further rinse is necessary before protection. The floor is then protected by a cover of either taped soft board or an equivalent, and this should then be left in place, until all the other trades people have completed their work and the floor is not at risk.

BUILDERS CLEAN

This procedure is by far the most important clean the floor is likely to receive. Failure to execute this correctly WILL CAUSE PROBLEMS particularly where anti-slip tiles are concerned. All grouting processes leave an invisible film of cement residue which, if not completely removed, will act as a key for all other types of grime, thereby causing a build up which will reduce the slip resistance of the tile.

The Builders Clean should be carried out as follows:

1. The floor must be swept and vacuumed and all dust and debris removed.
2. Using a Scrubbing machine, with green pads for plain surface tiles and brushes for anti-slip tiles together with an acid-based detergent – Cement Away*: normally diluted 1:5 or 1:10 with water (this can vary according to the degree of builders/cement residue). This will remove existing build ups of existing cement grout (lime scale found particularly in hard water areas), rust stains, scum film, uric acid salts, airborne, and shoe foot dirt. The procedure is to be carried out in areas of approximately 50m² at a time, the solution is placed on the said area and must be left for 3 to 5 minutes to allow the chemical to work - but not allowed to dry. The scrubber/drier using green pads or brushes should be used to work the floor in one direction continuously and then in the other direction, for approximately 15 minutes, ensuring that the floor is not allowed to dry. The dilution of the detergent and water is dependent on the cleaning materials suppliers’ recommendations.

3. Use a vacuum wet pick up to remove the soiled water.

4. Rinse the floor twice, using clean warm water.

5. Vacuum up the soiled water, ensuring that all traces of the acid have been removed.

6. The machine and its pads should be cleaned thoroughly after each use.

The rinsing is an integral part of the cleaning process, as any chemicals left on the tiles will harden and attract dirt.

7. If the floor does not look clean then a neutral PH liquid abrasive (liquid Jiff) can be used. This can be applied directly to the floor and the machine then passed backwards and forwards making sure that no areas are allowed to dry out.

8. Repeat the rinsing process as already outlined above.

The area should now be in an acceptable condition for the Cleaning & Maintenance Contractors to take over the daily cleaning regime.

DAILY CLEANING & MAINTENANCE

There are several general purpose neutral cleaners which must be PH7, one of which is Lithofin ‘FZ Conditioning Cleaner’ and are effective for the regular cleaning and maintenance of tiles; however, it is vital that they do not contain: animal fats, oils, wax, or polymers as a base. If used, cleaners containing these substances will cause problems, as they leave behind a residue that attracts dirt.

1. Sweep or vacuum all the areas thoroughly.

2. Using the scrubber/drying machine with green pads for plain surface tiles with the FZ Conditioning Cleaner diluted at approximately 2 litres per 800m² of flooring.

3. Apply the detergent to the floor using the scrubbing machine, scrubbing and drying in one operation.

4. There are Scrubber/driers on the market, either GANSOW or WETROK, which do not recycle the dirty water. Scrubber/driers with full traction batteries should last 4/6 hours, new battery sets take a while to attain this norm. Therefore, the cleaning shift period can be monitored each evening by the daily inspection of the hour meter on the machine, to ensure that the cleaner complies with the recommended procedures.

5. Newly laid floors need as much cleaning as possible, and repeated cleaning will make the next shift clean easier.

Period Deep Clean (Dry)

Depending on the degree of soiling and foot traffic levels or in hard water areas, a deep cleaning procedure should be carried out monthly or at least quarterly. This is particularly necessary where white or light coloured tiles are in use. For the periodic deep clean, use the same process as the builder's/initial clean, but use an alkaline cleaner should be used FZ Intensive Cleaner and then thoroughly rinse with clean warm water.

Monitoring the tile condition and the general cleanliness is essential for routine cleaning, so as to amend the frequency of the deep clean, taking particular notice of heavily trafficked areas or food court environments.

ISOLATED SURFACE STAINS

1. For isolated stains such as grease, oil, beetroot, or fats, a spot stain remover such as Wexa should be used in conjunction with a Scotchbrite pad.

2. Felt tip pen marks or paint should also be treated with a spot stain remover such as Wexa and Scotchbrite Pad.

3. Ramp areas where textured surfaces have been used can be treated as above, but with a single blade rotary machine with a brush - polyprop and nylon composition.
4.2 Cleaning & Maintenance regime for Jura limestone

Vetter UK Ltd recommend their preferred, tried and tested sealant supplier, Lithofin. Attached below are three technical sheets which explain in more detail the products: Lithofin MN Stainstop (solvent based), Lithofin MN Stainstop ECO (water based) and Lithofin Easycare (for regular cleaning).

**LITHOFIN**

Lithofin MN Stain-Stop >ECO< penetrates into absorbent natural stone surfaces and coats the capillaries with an extremely thin and invisible film of polymers. This film alters the surface tension of the surface, causing a repelling effect. The treatment prevents the immediate penetration of water based dirt as well as oil and grease, and it provides an effective protection against staining.

Lithofin MN Stain-Stop – for invisible protection against staining and for facilitating maintenance of all natural stone surfaces, including polished marble.

Lithofin Easy Care – for regular maintenance cleaning of all marble and natural stone surfaces.

The cleaning procedures have been taken as a guide from one of our recently completed project O&M Manuals.

### GENERAL MAINTENANCE PROCEDURES

**Cleaning:**
- Fine grit brought into the building on the soles of shoes are a primary cause of the scratching that occurs over time. Natural floor that is cleaned regularly will maintain its original surface finish longer than one that has not been cleaned regularly. Special attention must be given to high foot traffic areas, example – doorways, lift lobbies, reception area and turnstile areas.
- Limestone flooring – use Lithofin Easy Care with lukewarm water and a mop, cloth or cleaning machine for daily cleaning of flooring.

**Maintenance:**
- Limestone flooring – use Lithofin Easy Care with lukewarm water and a mop, cloth or cleaning machine for daily cleaning of flooring.

**NOTE regarding touch up:**
The surface must be completely dry, clean and free of stains. Shake the bottle before use. Apply generously and evenly using a lambswool applicator, roller, lint free cloth or sponge. Ensure that all surface residues are removed within 15 minutes by towelling them off, do not allow residues to dry on the surface. On highly absorbent surfaces, apply several coats wet-in-wet. Allow to dry for 3 hours. Treatment is fully effective after 48 hours. Do not cover surface before then and wipe up any spills immediately.

**NOTE:**
Stains/spills/soil needs to be cleaned immediately to prevent staining even when stones are sealed.
Lithofin MN Stain-Stop

**Durability**

The durability depends on the care products used. Strong degreasing or layer forming products are unavailable to use. Nearby used surfaces such as kitchen countertops should be retreated once a year.

**Activities**

- Remove stain causing materials from impregnated surface.
- For regular maintenance of kitchen counter tops we recommend Lithofin MN Easy-Clean.

**Storage**

Closed, cool and dry up to 3 years. Open containers should be used without delay.

**Environmental Protection**

Contains solvents, free of chlorinated hydrocarbons. Do not flush down drains.

- **Dispensed**
  - Liquid product is classified as special waste.
  - Containers are made of environmentally friendly plastic.
  - Clean containers can be recycled through collection systems.

**Safety**

Active ingredients pose no health concerns once dry. Lithofin MN Stain-Stop is UV-resistant and does not yellow.

**Warning**

- **Keep out of the reach of children.**

**Field of Use**

Suitable for indoor and outdoor use. Can be used as a grout release and as a pre-treatment.

**Surfaces:**

- Suitable for polished, honed, or rough.
- Lithofin MN Stain-Stop [ECO] is made of environmentally friendly polymers (PE and PE) and are recyclable. Clean containers can be recycled through collection systems.

**Important Notes**

In case a deep clean is required, use Lithofin MN Power-Clean diluted 1:20 and a white pad. Rinse well with plenty of water, since residues of cleaners may affect the effectiveness of the protective treatment. Impregnators do not protect the surface against acid.

**Touching up the Protective Effect**

Surfaces subject to increased wear (such as surfaces in kitchen and bathroom) should be touched up at least once per year. This re-treatment can be done with Lithofin MN Stain-Stop >ECO< or with the solvent based Lithofin MN Stain-Stop. First give the surface a deep clean and allow it to dry for 3 days. Then apply an even film of the impregnator and rub it into the surface.

**Storage**

Closed, cool and frost free Shelf life of up to 3 years. Open containers should be used up without delay.

**Environmental Protection**

Free of toxic and other environmentally harmful hydrocarbons. The contained polymers are dissolved in water and not once dry. Lithofin MN Stain-Stop [ECO] is therefore ecologically sound (>ECO). Lithofin MN Stain-Stop [ECO] are made of environmentally friendly polymers (PE and PE) and are recyclable. Clean containers can be recycled through collection systems.

**Safety**

No health concerns once dry. Please keep out of reach for children.

**Contents:**

- Aqueous solution.
- For regular maintenance of kitchen counter tops we recommend Lithofin MN Easy-Clean.

**Technical Information**

**Art.-No.166-**

**For more information please visit our website:**

www.lithofin.com

**Agents for Great Britain:**

CADDISON Enterprises Ltd. - Alresford, Hampshire SO24 9QF - Phone: +44 (0)1962 732 26 - Fax: +44 (0)1962 735 373

Manufactured in Germany by: LITHOFIN AG - 73240 Wandelingen - e-mail: info@lithofin.de

**Art.-No.198-**

**For more information please visit our website:**

www.lithofin.com

**Agents for Great Britain:**

CADDISON Enterprises Ltd. - Alresford, Hampshire SO24 9QF - Phone: +44 (0)1962 732 26 - Fax: +44 (0)1962 735 373

Manufactured in Germany by: LITHOFIN AG - 73240 Wandelingen - e-mail: info@lithofin.de

**Please Note:** some materials may appear slightly darker after treatment. If no prior product exposure and in case of doubt, we recommend a trial application. Immediately remove spills on wood, glass, plastic, lacquered surfaces, etc. with a damp cloth. Clean application tools with water after use. Apply in a temperature of 10°C and not over 25°C. The product must be treated once a year or in case of heavy use.
5.0 Design Recommendations

Due to the fact that porcelain tiles do not require any post or pre-installation sealants, and also are less 'absorbent' than natural stone, we think that porcelain maybe a more suitable flooring material for the main entrance of the hospital.

Lithofin EASY-CARE

**Description**
Lithofin EASY-CARE is a high-yielding cleaning and maintenance concentrate, which contains active maintenance components and mildly alkaline cleaning agents based on natural soaps.

**Technical Data**
- Density: 1.0 g/cm³
- pH Value: approx. 10 (concentrate)
- Appearance: viscous, yellowish
- Odour: pleasant
- Solubility in Water: complete

**Properties**
Lithofin EASY-CARE contains agents that take up the dirt and make them easy to remove by wiping. The remaining extremely thin care film is free of wax and does not build any layers. With continued use, the surface’s appearance will improve in colour and structure. Lithofin EASY-CARE leaves a pleasant odour.

**Field of Use**
For regular maintenance cleaning of all marble and natural stone surfaces.

**Surfaces:**
All natural stones such as carrara, faverne, jura marble, porphyry, serizzo, sandstone as well as engineered stone. Unglazed ceramics, terracotta, quarry tiles, wood and plastics, etc.

**Directions for Use**
Lithofin EASY-CARE is added to lukewarm water. One squirt (approx. 20ml) per 10 litres of water. In case of absorbent, dirty surfaces use a bit more. After wiping, allow the residues to dry on the surface, do not rinse with clear water. Use either a floor mop, cloth or cleaning machine for wiping.

**Coverage:**
Lithofin EASY-CARE is a high-yielding concentrate and very economical. On large areas which are machine cleaned daily approx. 3 litres per 100m² will be needed per month.

**Advise:**
In areas subject to heavy wear and tear or on very dirty surfaces, it may be necessary to occasionally use Lithofin WEXA or Lithofin MN Power-Clean.

**Storage**
Keep closed and cool. Not above 25°C. Shelf life of up to five years.

**Environmental Protection**
The contained surfactants are biologically degradable according to EU-regulations. Does not contain any phosphates.

**Disposal:**
Diluted product may be added to waste water. Containers are made of environmentally friendly polyethylene (PE). Clean containers can be recycled through collection system.

**Safety**
- Contents: anionic surfactants; auxiliary agents.
- General Information: keep out of reach of children.
- No health concerns once dry.
- First Aid Procedures: remove contaminated soaked clothing immediately. No special measure necessary. In case of contact with eyes rinse thoroughly with plenty of water and seek medical advice. In case of ingestion, do not induce vomiting. If swallowed by mistake drink plenty of water and seek medical treatment.

**Emergency Procedures:**
In case of spill or other release, take up with absorbent material (e.g. sand, sawdust, general-purpose binder). In case of fire formation of dangerous gases possible. Product does not burn, fire-extinguishing activities according to surrounding.

**Additional Information:**
Listed on the Material Safety Data Sheet.

**Packaging**
- 1 litre bottle with child-proof cap (10 per box)
- 5 litre carister (2 per box)

Please note: statements concerning environmental and safety issues refer to the product delivered concentrated. This information should be considered to be informal and non-binding. The products must be used according to local conditions and materials. Where no previous experience is available, or in cases of doubt, test the product in an inconspicuous area. (GB11.04gps/3.03)

**Agents for Great Britain:**
CASDRON Enterprises Ltd.
Alresford, Hampshire SO24 9QF
Phone: +44 (0)1962 732 266
Fax +44 (0)1962 735 373

Manufactured in Germany by: LITHOFIN AG · 73240 Wendlingen · e-mail: info@lithofin.de · www.lithofin.com
2.3 Reception Desks & Staff Bases Proprietary Systems

Introduction

A variety of reception desks and staff bases will be required throughout the hospital. Materials will need to suit the functionality and reflect the interior design strategy.

This document outlines three suppliers of reception desks and staff bases.

Proprietary desks are limited in their availability of components that will allow for the complexity of shapes and sizes that will be required to fulfill the design requirements across the hospital.

By creating standardised shapes and sizes where possible any ‘bespoke’ system can be manufactured in a modular component form.

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Description</th>
<th>Address</th>
<th>Website</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clarke Rendall</td>
<td>Modular and bespoke solutions.</td>
<td>Clarke Rendall Business Furniture Limited, Unit 12, Denbigh Hall Industrial Estate, Denbigh Hall Drive, Bletchley, Milton Keynes MK3 7QT t: 01908 391600 f: 01908 391601</td>
<td><a href="http://www.clarkerendall.com">www.clarkerendall.com</a></td>
</tr>
<tr>
<td>Receptek</td>
<td>Bespoke solutions.</td>
<td>UK Head Office Receptek Estate Road 2 South Humberside Ind Est North East Lincolnshire DN31 2TG T: 01472 360 111</td>
<td><a href="http://www.embrace.receptek.co.uk">www.embrace.receptek.co.uk</a></td>
</tr>
<tr>
<td>Space oasis</td>
<td>Modular solutions.</td>
<td>Spaceoasis Ltd, Grosvenor House, Central Park Telford, TF2 9TW, UK. T: +44 (0) 1952 210 197 F: +44 (0) 1952 201 363</td>
<td><a href="http://www.spaceoasis.co.uk">www.spaceoasis.co.uk</a></td>
</tr>
</tbody>
</table>

Clarke Rendall - Xpression, Light, Classic
Receptek - Block

DESIGN:
• Modern design
• Clean, fresh minimal and understated
• Easy to clean, no gaps, joins or lips
• Refurbishable
• Repairable
• Bespoke tailored solutions

SPECIFICATION:
ALL SURFACES - Solid surface material bonded to MDF core. All surfaces seamlessly jointed.
PLINTHS - 18mm MDF with brushed aluminium laminate to face. Exposed corners post formed

Space Oasis
Sheet flooring report: LOR-CO-SW-RP-0007

Revision History

<table>
<thead>
<tr>
<th>Revision</th>
<th>Date</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>11/08/11</td>
<td>Initial issue</td>
</tr>
</tbody>
</table>

Contents

1. Introduction
2. Appearance
3. Technical
   3.1. Installation
3.2. Maintenance
3.3. Slip resistance
3.4. Acoustic properties
3.5. Warranties/product life
4. Sustainability
5. Lifecycle
6. Cost
7. Conclusion

Appendix A – Cleaning and maintenance regimes.
Appendix B – Lifecycle cost graph
Appendix C – Report on benefits of Linoleum vs Vinyl for Pembury Hospital

1. Introduction

This study has been undertaken to provide the Trust with a summary review of the various different sheet flooring products available on the market and the suitability of each of these flooring types for use in the 3Ts’ development. The report focuses on a number of different aspects to provide a balanced view on the relative merits of the different options.

The three different flooring types to be investigated are:
1. Rubber
2. Linoleum
3. Vinyl

To enable a detailed review, a manufacturer has been suggested for each product type which is aligned with the Laing O’Rourke supply chain. The manufacturers are not set at this stage and will be subject to review during stage 4.

2. Appearance

Generally there is little to choose between each of the options on appearance grounds. Each of the possible flooring types and manufacturers will have different standard colour ranges, which will need to be developed through the Phase 4 – construction phase.

BDP has selected the ranges from the various manufacturers as follows to develop the internal design intent strategy:

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Rubber</th>
<th>Linoleum</th>
<th>Vinyl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>2mm thick sheet rubber flooring with Topshield coating</td>
<td>2mm thick sheet vinyl with PUR where extra slip resistance required</td>
<td>2mm thick sheet vinyl flooring with PUR wear layer</td>
</tr>
<tr>
<td>Ranges</td>
<td>Signa Stone</td>
<td>Marmoleum Real/Fresco</td>
<td>IQ Natural</td>
</tr>
<tr>
<td></td>
<td>Ultra Grip</td>
<td>Eternal Wood Vinyl</td>
<td>IQ Optima</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eternal Palette Vinyl</td>
<td>Grant MultiSafe</td>
</tr>
</tbody>
</table>

BDP has suggested that the best timber floor for the colour range currently being investigated is from Forbo. There is no timber effect available in the rubber range. Timber effects are available in vinyl.

3. Technical

3.1. Installation
Within the British standards, BS5203, there is guidance on the internal temperature of the space and the relative humidity of the concrete when the flooring can be applied. However, the BS does not distinguish between different flooring types. Investigating requirements from the possible manufacturers noted indicate some minor differences in the requirements. The concrete sub floor needs to have a relative humidity of less than 72% for the vinyl when laying.

Feedback from a number of flooring installers has identified the following:

- In workability terms and wastage, there is a substantial disadvantage to the use of rubber.
- Speed of installation is the best with vinyl.
- Generally the preference for the skirting detail is to provide a coved skirting. We find that this provides the best solution from a cleaning perspective as well as longer term suitability. The easiest material to form the skirting is vinyl.

3.2. Maintenance

The maintenance regimes for the identified manufacturers are attached in appendix A. There appears to be little difference between the different products.

3.3. Extra slip resistance

The Health and Safety Executive (HSE) has identified that the required value for testing the capability of floors to provide extra slip resistance when wet should be governed by the Pendulum Test Value (PTV) rather than the DIN "R" tests.

The test data for the PTV values are generally available for the products which are identified for use in wet rooms as noted below. - Nora Ultra grip – >36 Low slip risk.
- Forbo Safeslip – >36 Low slip risk.
- Tarkett Granit Multisafe – Not available, but the Tarkett range “Softred” has PTV of >36 Low slip risk.

3.4. Acoustic – Impact resistance

- Rubber – 6dB
- Linoleum – <=4dB
- Vinyl – 4dB

Within the acoustic review, a vinyl floor has been considered and the overall construction meets the requirements of the impact resistance.

3.5. Warranties/Product Life

- Rubber – Warranty – 15 years, Possible product life – 20-25 years
- Linoleum – Warranty – 10 years, Possible product life – 20-25 years

Tarkett can supply a warranty for the IQ products for different areas as follows:

- Severe - Bottom of staircases, half landings, lift entrances, main doorways, till areas, kitchens – 15 years.

It should be noted that the warranties/product lives noted above are only possible with the application of the maintenance regimes highlighted in appendix A and the specified installation methods.

4. Sustainability

All products have a BREEAM "A" rating.
- Rubber:
  - Contains natural raw materials and ecologically compatible colour pigments.
  - No PVC, plasticizers or halogens.
- Linoleum:
  - Linoleum is a natural product made from 97% natural raw materials
  - Material efficiency approx 98% making it a ‘closed loop’ product
  - PVC free
- Vinyl:
  - Vinyl contains polyvinyl chloride which is a man made plastic containing chlorine and salt.

Manufacturers of vinyl, linoleum and rubber have statements about their commitment to environmental policies and continue to develop the products within the environmental guide lines.

This is a very brief summary of a very wide ranging area. Further information can be found in Appendix C – the report on the selection of linoleum or vinyl produced at Pembury. It should be noted that this report was produced by Tarkett.

5. Lifecycle

Within appendix B there is a lifecycle graph produced by Forbo. It should be noted that this assumes a replacement of the rubber and linoleum floors after 24 years and the vinyl after 14 years. This should be read in conjunction with the warranty information noted above which highlight different requirements. The graph highlights that the maintenance costs are similar for each flooring type and the lifecycle costs are governed by the length of time for the replacement.

It should be noted that a detailed costing of the lifecycle of the floors proposed is beyond the scope of this report.

6. Summary of Costs

Cyril Swett has provided costs per m² for each of the possible flooring types based on information provided by the possible manufacturers.

- Rubber – £35/m²
- Linoleum - £26/m²
- Vinyl – £25/m²

The base cost plan allowance is £25/m².
7. Conclusion

All the different floor types are similar in terms of appearance, technical and lifecycle. Differences occur in the following areas:

- Cost
- Installation
- Sustainability

nora systems, Inc.

nora® pro clean system
Healthcare Maintenance Guide: General

General Remarks

nora® floor coverings have a production residue. This residue shall be removed (initial maintenance) before the flooring is used, otherwise it will attract dust and dirt.

nora floor coverings have a natural sheen, therefore they do not require any artificial coating.

General Precautions

1. Always use "wet floor" signs and/or caution tape when performing any wet cleaning.
2. Refer to MSDS for proper personal protection requirements before using cleaning products.
3. Use only nora pads on selected nora floor coverings. Do not use nora pads on norament® luxor or round pastille surfaces.
   - Note: The printed side of the pad goes to the machine and the non-printed side of the pad goes to the floor.
4. When using nora pads, do not scrub the floor dry. Rubber flooring must be kept "wet" with clean water or solution.
5. The floor will be slippery when wet or contaminated with foreign materials. To maintain the slip resistant properties of the flooring, promptly clean-up spills and any foreign materials.
6. Never use black or brown stripping pads or brushes.
7. Make sure to maintain a good walk-off area in the entrance of the facility, in addition to regular dust mopping.
8. Spots from petroleum-based products such as grease and tar must be removed with spotting agents containing solvents. Immediately rinse with water after spot removing and allow time to dry.
9. Remove chewing gum with a gum removing spotter. If a solvent is used for removing gum, immediately rinse the floor with clean water and allow time to dry.
10. Do not allow any metal furniture or trash cans to be in contact with the wet floor.
1. Dust mop or vacuum the floor to remove dust and dirt.
2. Remove any adhesive residue.
3. Survey the floor for any areas with construction damage.
4. Wet mop an area using a green seal certified cleaner.
5. Scrub the floor thoroughly with a floor scrubber using nora® pad 1 (see note for areas with construction damage). Do not allow the area to dry during scrubbing.
6. Wet vacuum the soiled solution, rinse the floor with clean water and allow to dry.

Note: Areas with construction damage - scrub first with nora® pad 3, pick up residue with wet vacuum and continue from step 4 above.

For High Shine: Damp mop the floor and immediately, while floor is damp, burnish to a shine with nora pad 1 (do not use burnisher with a speed higher than 1800 rpm).

2. Daily Maintenance

Hallways
1. Dust mop or vacuum the floor to remove dust and dirt.
2. Auto-scrub the floor using nora® pad 1 with clean water.

Patient rooms and all other areas that are not scrubbed daily
1. Dust mop or vacuum the floor to remove dust and dirt.
2. Damp mop with peroxide cleaners or any disinfectant approved by Infection Control.

Note: Mopping with microfiber mops promotes better dirt removal.

3. Periodic Maintenance

Hallways
1. Dust mop or vacuum the floor to remove dust and dirt.
2. If required, remove any chewing gum with a gum removing spotter. If a solvent is used for removing gum, immediately rinse the floor with clean water.
3. Auto-scrub the floor with nora® pad 2 using clean water. Continue using nora pad 2 until all dirt residue is removed.
4. Once all surfaces are clean, repeat cleaning process with nora pad 1.

Note: To increase the shine, the floor can be dry buffed using a 3M™ #4100 white pad or wet burnish with nora pad 1.

Patient rooms and all other areas that are not scrubbed daily
1. Dust mop or vacuum the floor to remove dust and dirt.
2. If required, remove any chewing gum with a gum removing spotter. If a solvent is used for removing gum, immediately rinse the floor with clean water.
3. Wet mop the floor with a diluted green seal certified cleaner or just clean water and, immediately, thoroughly scrub the floor with a floor scrubber using nora pad 1. For rooms that are badly soiled, stained or scratched, start scrubbing with nora pad 2 prior to using nora pad 1.
4. Wet vacuum the soiled solution, rinse the floor with clean water and allow to dry.

Note: To increase the shine, the floor can be dry buffed using a 3M™ #4100 white pad or wet burnish with nora pad 1.
Environmental friendly
Advanced water-based finish
Significantly less cleaning and maintenance required
Lowest whole life costs
Better protection against dirt and scuff marks

Initial site clean
After installation the floor only needs cleaning, applying an initial polish is not necessary. Remove all dirt, dust and debris from the floor. Use a neutral floor cleaner. Pick up dirty water with a squeegee or mop and wet vacuum. Rinse with clean water and allow floors to dry. If required, apply buff with floor with a rotary machine and red pad.

Mechanical floor care (Spray method)
- Regular cleaning
  - Use with a static (dust control) mop
  - Remove spots with a damp mop and neutral detergent
- Periodic cleaning
  - Spray clean with a rotary machine and buffing pad – use spray only where necessary
- Occasional maintenance/refurbishment
  - Scrub with a rotary machine and scrubbing pad
  - Pick up dirty water with a mop or wet vac
  - Rinse thoroughly and allow floor to dry
  - Full spray with a rotary machine and buffing pad

Manual floor care (Monol method)
- Regular cleaning
  - Use with a static (dust control) mop
  - Remove spots with a damp mop and neutral detergent
- Periodic cleaning
  - Clean with a neutral detergent
  - Apply Forbo film with a damp mop
- Occasional maintenance/refurbishment
  - Scrub with a neutral detergent
  - Apply Monel film with a damp mop

Tips
In most situations you can just clean the floor and use. However, where high maintenance is expected, you may wish to switch the cleaning and maintenance program by carrying out a mechanical cleaning or spray buff for mechanical cleaning or apply Monel for manual cleaning.

For machine cleaning and maintenance, 150 to 300 rpm is perfectly suitable. For the spray method, 300 to 500 rpm is the recommended speed for removing grass impurities and restoring the floor’s original appearance.

Forbo Cleaner
Forbo have developed a range of floor care products which, when used with the Forbo-Floor Care System, will help to keep your floor in perfect condition.

Forbo Spray offers ideal performance for local spray cleaning. Forbo Safety will remove localized small quantities such as crayon, grease, etc. excellent buffing properties ensuring the optimum visual appearance of the flooring.

Forbo Cleaner is a pH neutral detergent, which leaves no residue and will remove most common stains and soiling.

Renovation products for Marmoleum & Artoleum
Accidents can happen in the best cared for situations. Should the Top Finish of your Marmoleum accidentally damage Marmoleum comes into its own with its unique renovation products, Top Remover and Top Finish, enabling the restitution of the floor’s original fresh appearance.

Cleaning materials and equipment suppliers
The following suppliers offer suitable products, the list is by no means exhaustive.

<table>
<thead>
<tr>
<th>Supplier</th>
<th>Contact Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Nova Works Ltd</td>
<td>Tel: 01773 596700, Fax: 01773 822548</td>
</tr>
<tr>
<td>Butcher Cleaning Company Ltd</td>
<td>Tel: 01454 056885, Fax: 01454 056863</td>
</tr>
<tr>
<td>DBV Ltd (China)</td>
<td>Tel: 01770 634502, Fax: 01770 626540</td>
</tr>
<tr>
<td>Haskon – Ecolab Ltd</td>
<td>Tel: 01761 551121, Fax: 01761 65552</td>
</tr>
<tr>
<td>Johnson Deyver</td>
<td>Tel: 0194 453011, Fax: 0194 458095</td>
</tr>
<tr>
<td>3M Ltd</td>
<td>Tel: 0161 236 8580, Fax: 0161 236 2032</td>
</tr>
<tr>
<td>Penthex Products Ltd</td>
<td>Tel: 0124 240297, Fax: 0124 248946</td>
</tr>
<tr>
<td>Pochers Ltd</td>
<td>Tel: 0124 240297, Fax: 0124 248946</td>
</tr>
<tr>
<td>Forbo Flooring Systems</td>
<td>Tel: 0124 240297, Fax: 0124 248946</td>
</tr>
</tbody>
</table>

Model Linoleum
- Environmentally friendly
- Advanced water-based finish
- Significantly less cleaning and maintenance required
- Lowest whole life costs
- Better protection against dirt and scuff marks

Best Practice: Tips for effective floor care

General advice

Cleaning
- Regular cleaning is more beneficial and cost-effective than occasional heavy cleaning
- Always follow the health and safety guidelines provided
- Always follow the manufacturer’s instructions for cleaning products
- Use protective feet on chairs and tables to reduce scratching
- Remember that light colours may need to be cleaned more frequently

Use barrier matting
As much as 80% of dirt entering a building is brought in by foot traffic. Correct use of a good quality entrance barrier mat is recommended and can significantly reduce the volume of dirt reaching smooth floors. Reducing maintenance costs and maximising appearance retention. It is generally accepted that a minimum area of 4 – 10 steps is required before it is renewed.

Protect newly laid floors
At newly laid floor surfaces should be covered and protected from all other trades during the contact with a suitable non-scratching protective covering.

Use recommended cleaning products
High quality cleaning products and equipment ensure efficient maintenance and represent only a small proportion of maintenance costs.

Frequently asked questions:

How often should I clean and maintain my floor?
The optimum frequency for cleaning and maintenance is determined by the way the floor is used. When producing a cleaning and maintenance schedule it is good practice to consider the situation of the floor. For example: Is it near an entrance to the building or on an upper floor? Will it collect dry or moist soil? What level of traffic will it be subject to?

How do I remove stains?
Removes stains as soon as they are discovered. Try out removal on a sample piece or in a isolated area. Stain samples can be removed using a dry (paper) towel, water-dispersible white spirit or alcohol (in that order). Do NOT use highly alkaline products (ammonia, soda) or strong solvents such as acetone as they can be harmful to both people and your floor.

Can I use floor care products from other suppliers?
Many floor care products can be safely used on Forbo resilient floorcoverings. Consult with your regular supplier for more information. Try to avoid or minimise the use of high pH products, rinse the floor well after use of such products with clean water.

Can I polish my floor?
The advanced surface finishes applied to Forbo Florbos, do not require the use of polish. However, if you do wish to polish your floor this will not harm it or affect any product warranties. If polish is to be applied do not attempt to remove the surface finish.
2.3a Cleaning & Maintenance regimes for Forbo Vinyl Flooring

Project Vinyl

<table>
<thead>
<tr>
<th>Initial site clean</th>
<th>Mechanical floor care (spray method)</th>
<th>Manual floor care (monel method)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remove all debris, dirt and dust off the floor and clean the floor with a neutral floor cleaner. For larger areas a scrubber dryer or a rotary machine with a suitable cleaning pad may be used. Pick up dirty water with a wiper or mop or wet vacuum, rinse with clean water and allow floor to dry.</td>
<td>Regular cleaning - Wipe with a static (dust control) mop - Remove spots with neutral detergent</td>
<td>Regular cleaning - Wipe with a static (dust control) mop - Remove spots with neutral detergent</td>
</tr>
<tr>
<td>Periodic cleaning - Spray clean with a rotary machine and buffing pad - use spray where necessary.</td>
<td>Periodic cleaning - Clean with neutral detergent - Apply monel film</td>
<td>Periodic cleaning - Clean with neutral detergent - Apply monel film</td>
</tr>
<tr>
<td>Occasional maintenance/refurbishment</td>
<td>Occasional maintenance/refurbishment - Scrub with cleaner, rotary machine and scrubbing pad</td>
<td>Occasional maintenance/refurbishment - Scrub with neutral detergent - Pick up dirty water with a mop or wet vac - Rinse thoroughly and allow floor to dry - Full Spray with a rotary machine and buffing pad</td>
</tr>
</tbody>
</table>

PU/PUR low maintenance finishes
- Competitive whole life costs
- Protection against dirt and scuff marks

Initial Treatment
1. Allow at least 2 days for sheet and 5 days for tiles from the completion of the installation of the floorcovering, prior to carrying out any wet cleaning.
2. Ensure that all trace of adhesive is removed from the surface of the floorcovering.
3. Clean floor area with a broom or preferably a dust control mop.
4. Depending on the level of site soiling after the installation is complete, it may be necessary to scrub the floor clean, prior to adopting the daily maintenance regime. Please find the following options.
   a) Mop clean with diluted Johnson Diversey Carefree Stride 1000 or an equivalent neutral detergent with a pH7.
   b) Scrub floor clean with Stride 1000 using a standard-speed rotary machine fitted with a red pad or scrub with a scrubber dryer (combination machine) fitted with a red pad.
   c) Scrub floor clean with Stride 1000 using a standard-speed rotary machine (150 – 250rpm fitted with a red pad) or scrub with a scrubber dryer (combination machine) fitted with a red pad. If the surface is dull, dry burnish with an ultra high-speed rotary machine (best results 1000rpm) fitted with a red pad.

Daily Cleaning
Non-Mechanical Method
1. Clean floor area with a broom or preferably a dust control mop.
2. If soiled: Damp mop the area clean with diluted Stride 1000. Use a hand held red pad or an edging pad to remove heavier soiling.

It is important to ensure that only the smallest amount of moisture is deposited onto the floorcovering when cleaning, so that the floorcovering surface will dry within 15 – 20 seconds.

Mechanical Method
1. Clean floor area with a vacuum, broom or preferably a dust control mop.
2. If soiled: Spray clean with diluted Stride 1000 using an ultra high-speed rotary machine fitted with a red pad.
Interim Cleaning

Non-Mechanical Method
1. Clean floor area with a broom or preferably a dust control mop.
2. Wet mop the area clean with diluted Stride 1000 using a double bucket system. Use a hand held red pad or an edging pad to remove heavier soiled areas.

It is important to ensure that only the smallest amount of moisture is deposited onto the floorcovering when cleaning, so that the floorcovering surface will dry within 15 – 20 seconds.

Mechanical Method
1. Clean floor area with a vacuum, broom or preferably a dust control mop.
2. Spray clean with diluted Stride 1000 using an ultra high – speed rotary machine (1,000rpm) fitted with a red pad.

Periodic Cleaning & Maintenance
1. Clean floor area with a vacuum, broom or preferably a dust control mop
2. Scrub floor clean with Stride 1000 using a standard-speed rotary machine (150 – 250rpm) fitted with a red pad or scrub with a scrubber dryer (combination machine) fitted with a red pad. If the surface is dull, dry burnish with an ultra high-speed rotary machine (best results 1000rpm) fitted with a red pad.

Dry burnishing is an efficient method for limiting scuffmarks and also restores the floors surface (if light scratching has become visible). It is best to dry burnish immediately after the floorcovering has been machine scrubbed. Dry burnishing greatly reduces renewed soiling. Use an ultra high-speed rotary machine (best results 1000rpm) fitted with a red pad.

Cleaning & Maintenance of Stairs
1. Clean risers with a broom or dust control cloth.
2. Clean treads by vacuuming or use a soft broom to sweep across the width of the stair.
3. Damp mop the area clean with diluted Stride 1000 using a double bucket system. Use a hand held red pad or an edging pad to remove heavier soiled areas.

Life Cycle costing

Please note this graph is taken from literature produced by Forbo, so it is likely to favour Forbo’s products. The three suppliers selected in this document are the market leaders and so all claim to have the best life cycle costs with the latest technologies. It is therefore very difficult to determine a leader in this area.
Appendix 3 – Report on Vinyl/Linoleum from Pembridge Hospital

Vinyl or Lino a Guide to Selection

This document compares vinyl and linoleum floor coverings, highlighting their differences and similarities and the benefits and drawbacks of each product type:

Summary

This document compares the manufacture, installation, use and disposal of vinyl and linoleum based floor coverings. It attempts to compare them on a rational basis and give guidance on the best floorings for different applications.

Both modern vinyl and linoleum based floorings will give good performance in the tough environments found in hospitals, offices and shops. In general areas there is little to choose between linoleum and vinyl as far as technical performance is concerned. There are some advantages seen with vinyl as far as installation costs are concerned and there is a wider choice of aesthetic effects available. In areas where there is no likelihood of water getting on the floor it is possible to lay linoleum without a weld which can mask the visual effect of the join which results from the weld line. If specialised fire performance is required, such as in a corridor used as a fire escape, then vinyl based products can give a higher level of performance.

Once the installation moves away from the general purpose corridor, ward or office where there are no extra requirements then vinyl will normally start to show technical advantages. It is easier to produce specialised effects such as anti-static, slip resistance and acoustic properties with vinyl.

Much has been made of the environmental credentials of linoleum. It does use materials that can be considered as coming from a sustainable source. The majority of the materials used to manufacture PVC are derived from salt which makes it the polymer with the lowest resource and energy consumptions. However the raw materials used are only a small part of the environmental impact of a flooring. The major impact actually originates from the cleaning process and where the floorings are compared in similar situations there is little to choose between them.

At the end of the floorings life it could in theory be recycled. With vinyl you can regain the use of the material either back into flooring or other products. With linoleum it can be ground up and used as a filler. At present no mechanism exists to return the end of life materials to the manufacturer so the vast majority of both sorts of flooring is disposed of to either landfill or incineration. Provided they are managed correctly both linoleum and vinyl can be disposed safely by either process.

The Raw Materials

Vinyl

"Vinyl" is short for polyvinyl chloride, also called PVC, which is manufactured by the chemical industry from a petroleum based raw material and salt. The process makes it the most energy efficient of all plastics. The salt, which makes up 57% of the weight of PVC, while not being renewable in the strict sense is one of the most common materials available on the planet. PVC is an extremely versatile polymer and by blending it with mineral fillers and plasticisers a wide range of finished properties can be obtained. A wide range of technologies can be used to process vinyl floorings which give the possibility of tailoring the properties of the flooring to the requirements of the application.

The production of PVC like any chemical process requires careful controls to avoid pollution and harm to the environment. The PVC industry has spent a large amount of money ensuring that its production facilities have a continually reducing impact on the environment. The European PVC industry has drawn up a charter which imposes tighter controls on its members than are called for by legislation. This has been recognised by independent studies which say, provided PVC is bought from and processed by responsible organisations then there is no greater harm than the use of any alternative product.

Many vinyls are produced using a dimensionally stable carrier. This is one method of eliminating strains in the product from the manufacturing process.

Linoleum

Lino and Linoleum were originally trade marks for a product made by impregnating material with linseed oil and allowing it to oxidise in the air. The name is however now used by the general public for any smooth sheet flooring. For the sake of this document we will however use it in its original form and apply it to all floorings based on the oxidation of linseed oil.

Linseed oil is a vegetable oil produced by the crushing of the seeds from flax, which is widely grown in temperate climates, notably in Canada the UK and Argentina. Some of the other components are also produced from vegetable sources. The rosin which is mixed in with the linseed oil during manufacture is extracted from pine trees, the wood flour, a fine sawdust comes from managed softwood plantations, cork which is taken from the bark of trees on a seven year cycle without killing the tree and which usually comes from Portugal.

Linseed oil is a vegetable oil produced by the crushing of the seeds from flax, which is widely grown in temperate climates, notably in Canada the UK and Argentina. Some of the other components are also produced from vegetable sources. The rosin which is mixed in with the linseed oil during manufacture is extracted from pine trees, the wood flour, a fine sawdust comes from managed softwood plantations, cork which is taken from the bark of trees on a seven year cycle without killing the tree and which usually comes from Portugal.
The traditional backing is canvas woven from jute grown in India or Bangladesh. Jute production must be carefully supervised to ensure that it is grown under conditions that do not cause major environmental degradation or harm to the local workers. This could be in the form of exploitation of the workers, poor Health and Safety or the use of child labour.

Both vinyl and linoleum contain a percentage of a mineral filler such as chalk or whiting. In addition to the cost reductions that these can bring, their use in vinyl can alter the behaviour of the finished product and make it more suitable for certain applications.

The pigments found in both products tend to be safe formulations provided by the chemical industry. The linoleum industry is predominately based around inorganic pigments as the base colour of linoleum makes the use of the cleaner brighter organic pigments non viable

Manufacturing Process

Vinyl

The manufacturer of vinyl flooring has a wide range of processes available for the production of the finished flooring. The two fundamental processes are calendering and spreading. In both cases there are many differences which can influence both the finished properties and appearance of the final product.

In calendering the basic raw materials are heated up and blended together in some form of high intensity mixer. The material from this mixer is converted into either granules or strips for feeding to the next stage. To produce a homogeneous product 2 or more different colours are produced at the same time and fed into a calender, which is a series of heated rollers running against each other. This compacts the material and produces the blended design. The heat and pressure of the calender serves to fuse the materials into a uniform product with good strength and resistance.

It is normal for the design of a calendered flooring to be directional due to the manufacturing process. The pattern will remain throughout the thickness of the product.

An alternative process feeds the material into a continuous press which results in a non-directional product with similar properties to a conventionally calendered product.

A heterogeneous product can be produced by manufacturing thin layers of different materials and then laminating them together. The layers would normally be, an unfilled wearing surface which gives extremely high abrasion resistance, a high quality print effect such as a wood or stone effect and a backing to give strength and stiffness to the overall product. These products are usually supplied in planks or tiles and offer a choice of design that is only limited by the imagination of the designer.

Modern plants have sophisticated control systems that allow the strains produced by the process to relax out. This results in products that have excellent dimensional stability without the need for a glass fibre carrier.

The technique of spreading involves the selection of a suitable grade of PVC such that it makes a paste when blended with plasticisers and fillers. This paste is then impregnated into a glass substrate and different layers built up. The paste used can be modified to produce the desired properties for each layer.

In many cases the process is used to modify the surface of the flooring to make a product that is slip resistant. This is done by incorporating materials with different hardnesses into the surface of the flooring. These could be very hard such as Silicon Carbide or softer such as cork.

A further use of the spreading technique is to produce foamed materials which can give better insulation against both heat and sound.

The flexibility of formulation provided by PVC allows the addition of additives into the finished flooring to alter its physical properties. Examples are antistatic materials to produce floorings suitable for areas where controlled conductivity of the flooring is essential such as operating theatres, electronic assembly plants or even explosive factories. Biocides can be added to give extra protection against both bacteria and fungi especially in damp areas.

Vinyl floorings remain thermoplastic which allows them to be welded together. The disadvantage of being a thermoplastic is that they can be damaged by cigarettes being stubbed out on them.

Linoleum

Linoleum manufacturers have to polymerise the raw materials themselves so start a step further back in the production process. Like some vinyl manufacturers they then use a calendering process to press blended granules together into a sheet. This sheet has little strength at this stage and has to be matured in a large chamber for several weeks at a relatively low temperature for the oxidation and cross linking to occur to give the product its toughness. The jute backing can withstand this curing temperature without degrading and is used to support the linoleum during this process. In the past the curing of linseed oil gave off a distinctive odour similar to that found with glaziers putty.

Linoleum is a thermostetting material and once cured will not melt or soften, though a warm temperature will make it more flexible.

Performance Differences

The performance characteristics vary between different types of vinyl flooring.

Because PVC is such a versatile product it is possible to manufacture a wide range of different types of vinyl flooring all of which will have their own characteristics. For this comparison we will consider 2mm Homogeneous Vinyl unless an alternative is specifically mentioned. All comparisons will be made with a 2.5mm linoleum...
Both products perform well in normal use, vinyl's cope better with extremes

**Dimensional Stability**

Due to the curing process linoleum leaves the factory with very little moisture. Being an absorbent material it will absorb moisture from the atmosphere and the adhesive. This causes the flooring to expand. A special adhesive is required to prevent this expansion causing a peaking at the seams.

This expansion in standard linoleum means that it cannot be used as tiles as they would be out of square before being laid. Special tile products have to be made with different carriers.

The initial stiffness and slightly greater thickness of linoleum gives slightly better initial hiding of defects in the screed and trowel marks from poorly spread adhesive, however in time the linoleum will mould itself to the marks and telegraph them to the top surface.

Modern vinyl production units allow built in dimensional stability. This means that not all modern floorings require a glass fibre carrier to achieve good dimensional stability.

**Welding**

To achieve the highest wear classifications with both linoleum and vinyl floorings they should be welded. This ensures that they are not only well bonded but also have a water resistant seal. The weld in vinyl can be carried out with the use of a PVC welding rod while the weld in linoleum requires the use of an EVA hot melt adhesive. The EVA adhesive is in general a more difficult material to use for the welding process. If Linoleum is abutted to Vinyl then the EVA welding rod will minimise moisture ingress through the seam. The use of inserts of this type would not be recommended in either product where the flooring was continually subjected to surface water.

Both Products require welding to achieve a seam free, water resistant surface

**Wet Areas**

The surface of linoleum is water resistant and unaffected by water spillages. In its unpollished state it will meet some slip resistance standards. However once it is polished and maintained it becomes slippery in the wet and care must be taken to avoid the possibility of water remaining on the surface as this can be a considerable slip hazard.

If water is allowed to remain in contact with the flooring it is possible for water to penetrate to the backing at either a seam or at the perimeter. This moisture will wick along the hessian backing and break the bond with the adhesive. This is particularly the case within the first 2 or 3 days after installation.

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**Indentation Resistance**

Linoleum suffered badly from the onslaught of stiletto heels in the 1960s and as a result has been reformulated and developed so that today the residual indentation from stiletto heels in good condition is minimal. However as a thermoset material once indented it will not recover.

Most contract grade vinyl’s have excellent indentation resistance. Under the European indentation test BS EN 433 the residual indentation has to be less than 0.1mm whereas for linoleum of 3.2mm thickness or less 0.15mm is permitted. Some linoleums claim to meet the 0.1mm figure required for vinyl but in general vinyl’s will indent less under heavier than standard loadings.

One of the major reasons for indentation problems with either material is the subfloor. A soft material will not resist the point loadings involved and will allow any flooring to be distorted. In general if high point loadings are expected then an acrylic underlayment will perform better than a latex based one.
Vinyls are impervious to water and water vapour and are therefore excellent in wet areas. It is possible to install a flooring and self cove it up the walls. Smooth vinyl’s give excellent slip resistance in the dry, however they show considerably reduced slip resistance in wet conditions. The versatility of vinyl floorings makes it possible to overcome this problem by producing materials that have enhance slip resistance under wet conditions. By altering the composition of these floorings it is possible to produce floorings suitable either for very heavy traffic areas or barefoot areas such as showers and bathrooms.

Vinyls are more tolerant of excessive moisture than linoleum

Damp Subfloors
There are two primary causes of damp floors. Lack of a damp proof membrane and construction moisture. The former must be rectified before installation as no floorcovering will be resistant to this type of long term moisture. The latter can be a major problem for any floorcovering in fast track new build or where construction is behind schedule.

Within BS8203, the code of practice for the installation of resilient floorcoverings, the level of moisture permitted for the installation of both products is the same. Similarly they can both be installed over surface damp proof membranes.

There have traditionally been some products that could be laid with less risk of the floor failing due construction moisture but BS8203 does not distinguish between types of resilient flooring.

BS 8203 however makes no distinction between product types and should be followed. Linoleum and vinyl have the same subfloor requirements.

Fire Properties
British Building Regulations do not call for a floorcovering to pass any particular test as it was thought at the time that this was drawn up that the floorcovering was not significantly involved until the fire was well developed. The floorcovering therefore was felt not to contribute to the fire spread in the early stages of a fire that is most relevant to the safety of occupants. This is however not a view that is shared in most other parts of the world and a wide range of small scale fire tests have been devised to assess the flammability of floorcoverings.

Both vinyl and linoleum meet the majority of these fire tests. Work carried out on large scale fires have shown considerable differences.

Because PVC is inherently self extinguishing it provides only a limited fuel source for a fire. Most of this comes from the plasticisers and other additives that are used. This means that a vinyl floor will not carry on burning in the absence of the primary source of heat.

With Linoleum however there is a large amount of heat energy contained in the materials such as the linseed oil, rosin, wood flour and hessian. There is evidence that in a large fire there is sufficient energy released from the linoleum to cause the fire to flash over and ignite the entire floor area.

In any large scale fire the level of carbon monoxide generated by the initial fire will normally be fatal before the flooring catches fire. When vinyl burns it produces a mixture of gases which include carbon monoxide and hydrogen chloride. Hydrogen Chloride is a problem due to corrosion of exposed metal surfaces but it can serve as a warning signal that there is a fire starting. This arises from the fact that it can be generated in small quantities at an early stage, and is detected by smell well before it becomes harmful.

With linoleum as with many materials containing vegetable matter it is possible to produce low levels of Hydrogen Cyanide. These are unlikely to add to the toxicity produced by the other combustion products

Once a fire has been extinguished the major toxic hazard will be from the polycarboxylic hydrocarbons which are produced by any large fire. These are deposited as part of the soot and smoke deposits and are potentially carcinogenic. The presence of very low levels of dioxins which can occur in any fire do not add significantly to the toxic hazard.

If it is required to use linoleum on a wall there are restrictions on the areas of applications as it will normally only achieve a Class 2 or 3 rating on BS476 Part 7. This restricts it to smaller rooms or limited areas in larger ones

As many vinyl floorings achieve a Class 1 result on BS476 Part 7 it is possible to use them in an unrestricted manner. This is especially important in hospitals and other areas where it is important to be able to produce a tough surface for the walls while maintaining integrity and freedom from open joins. Under special circumstances a clean room can be completely covered, floors, walls and ceilings with the same vinyl floorcovering.

While neither product requires a fire certificate under Building Regulations most vinyl’s are able to meet the European requirements.

Cigarette Burns
Vinyl due to its thermoplastic nature is more susceptible to the effect of cigarette burns. In conventional homogeneous flooring the mark will usually be superficial and can be removed by the use of an abrasive. Linoleum is not thermoplastic and therefore the burned area does not distort. The burned area can be abraded away and re-polished

Linoleum has greater recovery from cigarette burns, it is unlikely that abrasion will compromise the ‘polish-free’ cleaning regime.

Acoustic properties
Resilient floorcoverings have a major effect on the impact sound created by footfall or other impacts with the flooring. The first is within the room where the floor is laid and the second is in the area below that room. The standard method of test is to measure the noise produced from a concrete floor using a hammering machine and then covering the floor with the material under test and assessing the reduction in the noise. The difference is quoted as the Impact Sound Improvement. Impact sound improvement for typical vinyl’s will be in the range of 3 to 6dB while linoleum is typically 5-6dB.

Within the building regulations there is a
INSTALLATION

Linoleum

Linoleum has a reputation for being difficult to lay due to its weight and stiffness. Newer products are more flexible and lighter. However it still cannot be bent as sharply without cracking and therefore needs to be handled carefully on site. Because of the production process rolls are more variable than vinyl but can be up to 32 linear metres. This can lead to handling problems especially in restricted areas. Each full roll of linoleum contains a slight hump, called the “bight mark” this can be a problem to install though again the more flexible materials make this easier.

Linoleum has a natural tendency to expand in the width and shrink in the length. This has to be controlled by the use of special adhesives that can restrict this movement.

Vinyl

The flexibility of sheet vinyl allows for rapid installation of large areas over both permeable and impermeable substrates. Similar additives can be more difficult to cut than other floorings but the use of the correct tools can minimise any problems. In normal circumstances a range of water based adhesives are available. In areas which may be subjected to continuous water an epoxy adhesive can be used.

Modern linoleum is easier to install than it was but it is still not as easy to obtain a fully sealed installation as it is with vinyl.

AESTHETICS

Contract vinyl floorcoverings are available in a wide range of decorative effects ranging from the simple directional flash to the most sophisticated reproductions of woods and other natural materials. The lack of inherent colour in vinyl means that virtually any colour can be obtained including whites, pastels and metallic effects. Solid plain colours can be used although this is normally discouraged because of maintenance problems.

Linoleum’s traditional strength has been in marbled decorations, where the pigments in the raw materials blend to give many subtle intermediate hues. Large areas of light colours will show up coloured soiling and in general for heavy traffic areas a mid colour with some contrast and movement in the design would be preferred to minimise any problems of soiling.

Both vinyl’s and Linoleum can be obtained in sophisticated bespoke inlaid designs and both linoleum and certain vinyl manufacturers offer standard border designs and feature strips.
Recyclability.

PVC can be recycled and with homogeneous and unsupported heterogeneous products all production waste is reused back into the same product where its full value is obtained. Theoretically the installation offsets can also be put back into the process and the problems of doing so are logistical and economic rather than technical.

Once the flooring has been installed it becomes more problematic to recycle due to contamination with adhesive and cement. This can be achieved at a cost and will be more problematic than the initial recycling of the waste PVC. Studies have shown that the presence of PVC in the waste stream of a properly controlled and managed incinerator does not give any increase in the levels of harmful emissions. However, in terms of the relative cost, it is the cheapest component. Once the floor has been installed the same problems are found as with Vinyl with the added disadvantage that the value of the reclaimed material is low.

In use effects

Once the product is installed there are again much bigger differences between individual products than between vinyl as a family and linoleum as a family. A major environmental concern is emissions from the product. The majority of homogeneous vinyl’s have very low emissions and can be safely used in areas such as clean rooms and with people suffering from allergies. However some vinyl’s especially cushioned vinyl’s, can give off a considerable level of VOC’s (Volatile Organic Compounds) which can be detected by various means. There have been a lot of papers which blame these compounds for various problems including sick building syndrome. There is little evidence however that they are a primary cause of SBS which in most commonly caused by poor ventilation, dampness and mould growth. If very low emissions are needed for specific applications i.e. hermetically sealed rooms with a low number of air changes, then calendared or chipped homogeneous vinyl’s can be used.

They cannot however be looked on to cure other more fundamental causes of problems such as dampness and inadequate ventilation.

Linoleum has a different set of organic compounds that are found in its emissions. Once again incorrect installation can give rise to excessive levels of emissions.

Throughout the life cycle of the flooring there is little to choose environmentally between the products provided they are properly specified and installed.

Maintenance

In general modern smooth vinyl and linoleum floors are supplied with a factory applied PUR finish. This forms the basis of a low maintenance regime which does not require the regular application of coats of polish and its subsequent removal. The flooring will then be maintained using a mixture of spot mopping and dry buffing. This results in a reduction of energy and resource consumption. In some cases where traffic is very heavy the use of a scrubber dryer may be indicated.

The use of PUR lacquers dramatically reduces the need for maintenance of modern flooring coverings. It does not make them “no maintenance” floorcoverings. The use of a regular maintenance schedule will ensure the maximum life and best appearance of the flooring.

Safety floorings have had a reputation as difficult to clean but current materials have a PUR coating which makes them much easier to clean. In general they should normally be maintained by a wet method using a brush rather than attempting to spray buff them. The other important thing to remember is to remove the dirty water from the flooring not just let it dry as this will re-deposit the dirt not only making the floor look dirty but also severely reducing its slip resistant properties.

Both vinyl and linoleum floors can be severely damaged by the use of incorrect cleaning materials. The use of pine gel cleaners on vinyl can result in the leaching of Plasticizer and subsequent shrinkage, while strongly alkaline strippers will permanently soften linoleum. If wet cleaning methods are going to be utilised then it is important that the flooring is properly welded both at the joints and at the perimeter. This will avoid the ingress of water under the flooring.

After the initial period linoleum and vinyl floors can be maintained using the same spray buffing methods.

Environmental Factors

Impacts

All manufactured products have an environmental impact. This results from the production of the raw materials, their transport, the manufacturing process itself, the transport of the finished product, the installation of the product, its actual use and the eventual disposal of the product.

Life cycle studies have shown that individual differences in energy and material impacts caused by different product constructions have a much greater influence than the differences between “Linoleum” and “Vinyl”. The major factor relating to the overall impact is the actual life achieved from the flooring. Thus the environmental impact of the flooring is much greater if it is changed more frequently.

However the differences caused by the material choice are swamped by the effect of maintenance during the floorings life.