

# **Marmoleum sport**

## **Technical Support information on Sports Flooring Systems**

**October 2009**

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## Introduction

The sports floor surface is probably the most important item of equipment in any sport facility. It should be carefully considered in a project when the overall specifications are being set. Not one sports surface will suit all indoor sports – a careful compromise is required between safety, performance and operational factors.

In this Technical Support Information a lot of information is given about the prerequisites for an indoor sports flooring. It is largely based on information from specialised resources. This information gives you a good overview of the topics related to indoor sport flooring and is a basis for further information gathering to make profound decisions.

For years Forbo Flooring supplies a special linoleum product for indoor sports flooring. Marmoleum Sport is especially designed to function as a top wearing surface in an indoor sports flooring system. More information on Marmoleum Sport can be found at page 13.



# 1. Sports flooring standards

There are many indoor sports flooring systems in the market which all are made for certain sports. Which sports flooring is the right choice depends on the criteria set by the owner and user of the sports facility. The movements of the sporters, which are different for every sports discipline, have consequences for the requirements of the sports flooring. In contradiction with flooring in Fitness or Aerobic centres, a sports hall flooring must have defined requirements in order to facilitate the appropriate sports exercise

As a guideline the requirements of sports flooring are defined in international sport standards and are tested accordingly. The two most applied sports flooring standards are:

## 1. EN 14904

Surfaces for sports areas - Indoor surfaces for multi-sports use – Specification

This European Standard specifies requirements for surfaces for indoor facilities for multi-sports use:

- Vertical deformation
- Shock absorption
- Friction
- Vertical ball behaviour
- Specular reflection
- Resistance to a rolling load
- Specular gloss
- Resistance to wear
- Resistance to indentation
- Reaction to fire
- Resistance to impact
- Formaldehyde emission
- Degree of evenness
- Content of pentachlorophenol

## 2. DIN 18032: part 2

This German industrial standard is also 'co-existent' with the EN 14904. Although the EN 14904 is the European standard the DIN 18032 is still considered important in the sports flooring industry.

It governs the performance and quality control of sports floors. The standard is derived from a construction point of view rather than from the sports' requirements and there can be problems with interpretation.

However, the standard does aim to ensure high levels of athletic performance, injury prevention and durability.

Furthermore, many countries have their own performance specifications in addition to the above mentioned standards.

The main requirements set in the EN 14904 and DIN 18032:2 are:

1. **The surface deformation, shock absorbency, and the energy** returned to the player and the ball are critical characteristics: they influence the risk of injury to an athlete, the extent of fatigue and the fundamental playing qualities of a surface.



2. **Ball reflection:** The levels of vertical and angular rebound and spin characteristics must be appropriate for the proposed sport(s).



3. **Friction:** For most sports the degree of friction between the player's shoes and the surface needs to be high enough to prevent slipping, but not so high as to restrict foot movement either in a continuous direction or when turning, or prevent the controlled sliding of the foot that is required in some sports.



4. **Flatness:** All sports require the surface to be sufficiently flat, level and consistent so that play is unaffected by floor surface.

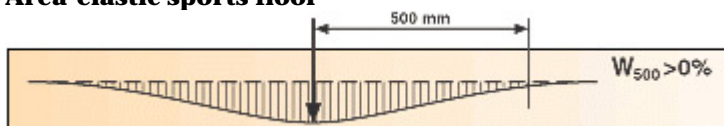


## 2. Sports flooring systems

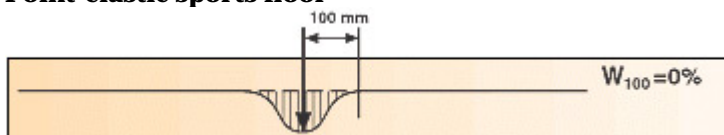
In the sports flooring standards 4 different types of sports flooring systems are described:

	Type of sports flooring			
	Area elastic	Point elastic	Combined elastic	Mixed elastic
<b>Construction</b>	<ul style="list-style-type: none"> <li>▪ elastic construction (sprung system) or elastic layer</li> <li>▪ bend stiff load distribution panel</li> <li>▪ top surface layer</li> </ul>	<ul style="list-style-type: none"> <li>▪ elastic layer</li> <li>▪ top surface layer</li> </ul>	<ul style="list-style-type: none"> <li>▪ elastic construction (sprung system) or elastic layer</li> <li>▪ bend stiff load distribution panel</li> <li>▪ elastic layer</li> <li>▪ top surface layer</li> </ul>	<ul style="list-style-type: none"> <li>▪ elastic layer</li> <li>▪ surface</li> <li>▪ reinforced surface components</li> <li>▪ top surface layer</li> </ul>
<b>Typical Characteristics</b>	Establishes a wide deforming surface area at point pressure	Establishes a small deforming surface area at point pressure	Establishes a wide deforming surface area but directly at the point pressure only a small deforming area	Size of the deformation coefficient is positioned between an area elastic and a point elastic system
<b>Advantages</b>	Meets position stand security, friction, indentation and load bearing requirements; suitable for cycle and roll sport	Quick reaction at low compression	Combines advantages of area elastic and point elastic system	Reduces the disadvantages of area elastic and point elastic systems
<b>Disadvantages</b>	Hard feeling surface; slow reaction	Harder feeling at wider surface pressure; difficult transport of rolling loads	A separate suitability test is required for cycle and roll sports	

### Area-elastic sports floor



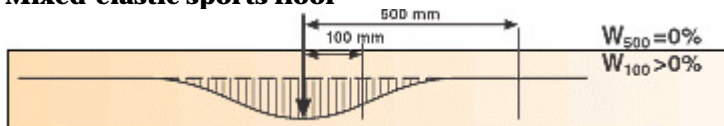
### Point-elastic sports floor



### Combined- elastic sports floor



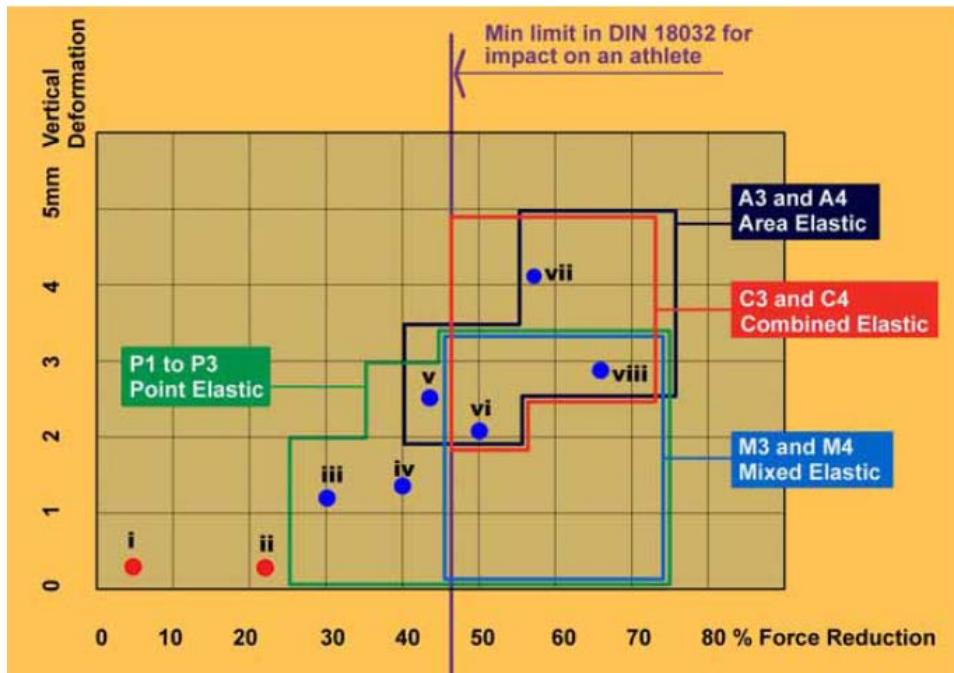
### Mixed-elastic sports floor



creating better environments



FLOORING SYSTEMS



The graph of Force Reduction (%) against Vertical Deflection shows four interlocking coloured boxes representing the value limits for Point Elastic (P), Mixed Elastic (M), Area Elastic (A), and Combined Elastic (C) floor systems as defined in the EN 14904 Standard.

### 3. Key Issues in selecting the ideal sports flooring surface

- ▶ Potential Non-Sporting Use  
Social or commercial activities in a sports hall may also need to be considered and care must be taken to ensure that sporting requirements are not compromised to an unacceptable level.
- ▶ Internal Visual Environment  
The floor surface is a major visual element in the sports facility and will have a significant impact on the internal environment. The colour, reflectance and other characteristics of the surface material need to be carefully considered in order to create an attractive internal environment that gives maximum enjoyment to all users.
- ▶ Load Bearing and Wear Requirements  
Sports floors must be capable of safely withstanding the loadings from users and equipment.
- ▶ Risk of Physical Injury  
Contact with the floor surface can cause a range of physical injuries - bruising, friction burns, bone fracture as a result of severe body impact - muscle fatigue, strain from repeated foot impact, - twisting of joints from restricted foot movement.
- ▶ Stable Environmental Conditions  
Many sports flooring systems are susceptible to changes in temperature and relative humidity, and it is essential that any environmental variations likely to occur in the facility are identified and controlled to prevent possible irreparable damage or changes in the playing characteristics of the floor surface.
- ▶ Operational Issues/ Health & Safety  
The composition, construction requirements and the lifecycle implications of flooring products needs to be understood. In addition, analysis and discussion of the 'in use' health and safety implications of various sports floor products will be required with end users, operators and the client.  
For example: The importance of establishing the correct maintenance regime and using appropriate cleaning products.  
  
Additionally, the floor must be:
  - Hygienic and free from dust or vapour
  - Easy to clean and maintain
  - Resistant to accidental damage.
- ▶ Environmental Sustainability  
It is important to ensure that the flooring product and the cleaning and maintenance requirements do not involve harmful materials and generally have a 'green' profile.  
For example:
  - Use materials that are non hazardous and can be recycled.
  - Use timber from traceable and sustainable sources (European PEFC certificate or FSC).
  - Minimise the use of hardwoods with engineered boards with hardwood veneers.
  - Use naturally occurring materials such as linoleum .
  - Minimise transport distances.
  - Consider the energy profile for the product through its life cycle.



## 4. Materials Used For Floor Surface

### Timber

Timber is often used in the construction of sports floor surfaces. It is available in a variety of 'area elastic' systems with hardwood strips, veneers on engineered softwood boards, or composite tiles bedded on composite sheets all suspended on various forms of resilient pads.

### Linoleum

Because of the use of natural materials linoleum perfectly fits in the health and safety requirements of sport facilities. Linoleum gives a comfort feeling to the sporting area. The characteristics of linoleum provide an excellent base for the performance as a sports flooring

### Vinyl

Vinyl offers a wide choice in design for sports flooring surfaces

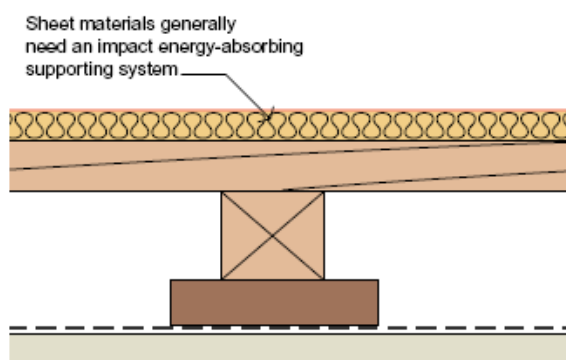
### PUR coatings

A group of polymeric materials is available that can be mixed on-site and form a continuous playing surface without joints. The underlay can be a cellular plastic, prefabricated sheet or in situ resin-bonded material.

### Textile Flooring

Textile floor surfaces are available in a range of material including:

- Heavy woven fabric
- Felt
- Flock
- Velour
- Fibre-bonded, needle-punched and fine pile carpet
- Knitted, woven or tufted carpet.



## 5. Colour of the sport flooring

The colour of the sports floor must be chosen in the context of the overall colour scheme and lighting requirements. The light reflectance value should be between 40-50% and visual contrast with the wall surface and court markings is required. A matt finish is preferable to avoid glare from light fittings.

## 6. Court Markings

Court marking lines are painted on most sports floors. PVC tape is not usually used, except for temporary courts, whilst inlaid lines are an option for a limited number of sports floor products. These techniques can be combined, with permanent inlaid or painted marks being used as guides for tape markings or, alternatively, permanent markings can be applied for the facility's most popular sports activities.

Paint should be selected and tested to suit the type of floor. Manufacturers will supply or recommend a proven paint and give guidance on its use. Two-part polyurethane is often used because of its durability. All lines should be masked out to a high standard prior to painting. Line widths must be  $\pm 2$ mm and overall dimensions within 0.1 %. Most sports require white lines for major competitions although yellow is used for handball and, sometimes, hockey and basketball. For multi-sports halls a range of colours is required to avoid confusion. There is no international standard colour scheme for court markings. However, there are recognised colour schemes that are widely used.

Sport	Line Colour	Width
Hockey	Blue or Other	50mm
Indoor Hockey	Light Blue	50mm
Netball	Red	50mm
Volleyball	Green or Other	50mm
Five-a-side football	Other	50mm
Basketball	Black	50mm
Tennis	Yellow	50mm
Badminton/ Short Tennis	White	40mm

Recommended court marking line colours & widths.

## 7. Installation of sport flooring systems

Before the sports floor is installed it is essential to ensure the building is weather-tight, ventilated and all wet trades, including plumbing, have been completed and tested. As a general guide, the following conditions should be in place:

The temperature must be stabilised at not less than 13°C.

- The moisture content of walls must not exceed 8%.
- The moisture content of the sub-floor must not exceed 2.5% (CM Test) or 75% RH (Hygrometer Test)

Sub-floors must incorporate an effective damp proof membrane (DPM) laid in accordance with local standards. The building programme must ensure sufficient drying time to achieve a level of relative humidity less than 75% or as required by the sports flooring manufacturer.

Dependent on the thickness of the screed or slab, a concrete floor can take from two months to one year to dry out sufficiently. At the design stage, consider the use of a surface DPM if timescales do not allow sufficient drying time or when the use of a sandwich DPM is inappropriate.

Marmoleum sport is installed on a sub floor system. The installation is carried out just like normal linoleum, using the right adhesives.



## 8. Cost of sport flooring systems

Typically, the sports floor surface construction will be small proportion (approx 3-5%) of the total construction costs of the sports hall (excluding floor structure). However, it is one of the most important elements in a sports hall and can influence the overall economics of a facility.

## 9. Why Forbo Floorings' Marmoleum Sport is the best choice

Developed especially for the field of sport and fitness, this beautiful yet practical top surface can be combined with a sprung undercarriage or special underlay to deliver excellent sporting properties. Great to play on, simple to care for and durable, Marmoleum Sport has proved itself in thousands of indoor sports facilities around the world.

Marmoleum Sport is a linoleum surface sports flooring available in both 3.2 mm and 4.0 mm thicknesses. The 12 colours in the range have been developed to complement popular sports hall colours, making it possible to create integrated designs that take into account wall reflectance, the type of lighting and its positioning. The patterns featured in Marmoleum Sport also help to conceal dirt.

The colours in the Marmoleum Sport collection can be combined to add accented shapes in the floor for certain sports applications.

<b>Construction</b>	A mixture of linseed oil, woodflour, lime stone and pigments
<b>Thickness</b>	3.2 or 4.0 mm
<b>Surface finish</b>	None. On Marmoleum Sport different type of finishes can be applied at wish. Monel, a polymer or a PU coating can be applied. See page 14.
<b>Colours</b>	12. Other colours can be made to order as from 1800 m2
<b>Seams</b>	Welded every 2 meter width. Matching, multi-coloured welding rods, which are available for all colours, not only ensure that seals are invisible, but also that the floor is as hygienic as can be
<b>Climate conditions</b>	No requirements
<b>Hardness of material</b>	Medium
<b>Cleaning and maintenance</b>	Mechanical or by hand. It is also depending on the type of finish used
<b>Recommended installation</b>	With area elastic and mixed elastic sports flooring systems For point elastic systems Marmoleum Sport Elastic is available. Marmoleum Sport Elastic consists of a 7 mm thick shockpad underfloor, made of recycled rubber and foam particles, bound with polyurethane. The top surface is Marmoleum Sport.
<b>Recommended use</b>	Sport and multi purpose use
<b>Rolling load</b>	Till 1500 N no change
<b>Friction</b>	Unchanged when proper cleaned

Because Marmoleum sport is a part of a complete system it only needs to be tested according to EN 14904 and DIN 18032:2 on the following characteristics:

- Friction
- Indentation
- Specular gloss
- Specular reflectance
- Emission

## 9.1 Marmoleum Sport Elastic

Marmoleum Sport Elastic is a point elastic (type P) resilient floor covering system to be used in indoor sports.

The system consists of two layers which combined deliver a perfect base for sporting. The 7 mm shockpad underfloor (Regupol® 5608) is made of selected recycled rubber and foam particles, bound with polyurethane. The top wearing surface is Marmoleum Sport. Both products are supplied separately in rolls and as a consequence must be installed independently.

Marmoleum Sport Elastic is designed to provide a degree of comfort to players. It can be used in a wide variety of applications in the lowest and mid sports performance according to the specifications of EN 14904. The underfloor can directly be adhered to the subfloor, making it a simple and cost effective sports floor system.



Marmoleum Sport Elastic is suitable for many applications: gymnastics; aerobics; rehabilitation centres; indoor play areas of children; fitness centres.

	Marmoleum Sport on sprung system	Marmoleum Sport Elastic
Application Area	Area elastic system	Point elastic system
School gyms	✓	✓
Indoor club sports	✓	✓
Recreation sports	✓	✓
Multi-sports facility	✓	
Professional sports	✓	

Please be aware that Marmoleum Sport Elastic is a combined system of a hard surface and a softer underfloor and should only be used in gymnastics areas. For multipurpose use, as for example in kindergartens, it should be ensured that the tables, chairs, appliances, and shoes (high heels) of the visitors do not damage the surface. Sharp objects can cause damage to the floor.

## 9.2 Marmoleum sport in summary

High level sports flooring performance:

- flexible and elastic
- extremely durable
- resistant to slipping
- withstands heavy rolling loads
- cigarette resistant
- no squeaking noises
- warm to the touch
- complies with the European EN 14904 standard
- complies with the German DIN V 18032-2 standard
- complies with the AgBB requirements (emission)

Unique collection

- available in both 3.2 mm and 4.0 mm thicknesses
- direction-free, unique marbled design
- 12 colours for wide design freedom
- invisible multicoloured welds

Natural and hygienic

- made from natural raw materials
- proven to be permanently bacteriostatic
- easy to clean and maintain

## 9.3 Sustainable

Forbo Flooring linoleum is an environmentally friendly product. Manufactured from sustainable natural raw ingredients – linseed oil, rosin, wood flour, limestone, natural pigments and jute – it is fully biodegradable. This ensures that Forbo linoleum is a top performer in life-cycle assessments: it's simply the preferred floor covering, from raw materials to end of life.

The natural ingredients used in our linoleum ensure it achieves an exceptionally good Life Cycle Assessment score. LCA is an environmental impact analysis over the lifecycle of a product and is the best way to measure the environmental impact of a floor covering. An LCA covers all elements, from “cradle to grave”, and Forbo Floorings uses them to chart the impact of its products in the world around us.

Forbo Flooring is committed to complying with leading environmental standards. As a result, Forbo Flooring has more environmental quality marks or eco-labels for linoleum than any other floor-covering manufacturer in the world.

## 10. Marmoleum Sport Sealing System, Forbo Bonding

Marmoleum sport is an uncoated linoleum on which sport lines and a complete sealing can be applied. The sealing provides a protective layer with excellent properties for sporting. Forbo Bonding has especially developed a system solution for the sealing of installed Marmoleum Sport.

### 1. Preparation Cleaning

- Cleaning with **891 Aqua Basic cleaner** e.g. with a green pad Art.Nr. 74207
- neutralise 2x with clean water
- floor covering should dry overnight

### 2. Line painting

- Apply tape to mark the line area
- Apply 1x **809 2-C Game line marking colour** using the Forbo Applicator 6 cm Art. Nr. 75093
- Consumption : ca. 100 ml/ ltr/ 5 cm line width
- Drying time : ca. 5 hrs

### 3. Sealing

- Apply **863 Aqua Lack Easy Future Sport** 1 x full with Forbo Applicator 61 cm . Art.Nr. 75091
- Consumption : 120 - 150g/m<sup>2</sup>
- Drying time : ca. 4 hrs
- Accessible : ca. 24 hrs
- Full use : after ca. 7 - 10 days

### 4. Cleaning and Maintenance

Apply **897 Sports Floor** to 2 times undiluted for initial and maintenance cleaning using Forbo wiper Art. 78247

Consumption : 1ltr/ for ca. 30 m<sup>2</sup>

Regular cleaning with Forbo 896 Universal cleaner Anti slip

*The system meets the requirements of the sports flooring standards DIN 18032, Ö Norm 2608 as well as the ÖISS Guideline.*



### **891 Basic Cleaner**

Water-based basic cleaning agent for alkali-resistant floors (pH value <10) for removing old maintenance agent residues, freshly spilled adhesive residues, old fixing agent residues. The floor has to be cleaned with 891 before using 898 Basic Protection, especially on old floor coverings.

GISCODE GG 20

consumption as required, wiper, cloth

Unit-size 750 ml, 10 l



### **809 2-C Game line marking colour**

High abrasion resistant, very good covering quality game line marking colour on a PU base, very good bonding strength onto Linoleum.

Colours: red, orange, yellow, enzian blue, light blue, green, white, black

Unit-size 0,5 l combi



### **863 Aqua Lack Easy Future Sport**

High quality, matt, anti-slip, 1-component Aqua parquet lacquer on PUR base with very good flowing properties for the abrasion resistant, durable sealing of all types of standard sports flooring parquet.

In connection with 897 Sports Flooring Maintenance suitable for sports floors acc. to DIN 18032 German standard and Austrian norm 2608.

Meets the requirements concerning ÖISS Austrian Guide Line regarding glide friction value and gloss degree.

GISCODE W3

consumption. 150 g/m<sup>2</sup>, Techno Sealing roller

Unit-size 10 l



### **897 Sports Floor**

Maintenance agent for the initial and regular care of elastic sports floors or parquet sports floors acc. to DIN 18032 German standard. Anti-slip, skid-proof, dirt-repellent.

GISCODE GU 50

Unit-size 10 l










## 11. Cleaning and maintenance

Keeping a sports flooring clean is one of the most important factors in how long it will last. Dirt and dust are enemies of any sports flooring. Dirt from the bottom of shoes will act like a fine abrasive and wear away the flooring with every step taken.

Ideally, a sports floor is cleaned on a daily basis. It should be dry mopped between each activity. This will help to remove the dirt and dust. The daily cleaning should be done each evening with a wet mop. The wet mop will clean up all the fluids that can collect on a sports floor -- think sweat and drinking liquids. The wet cleaning should use warm water and a floor cleaner made specifically for cleaning sports flooring. These are water-based concentrates that clean the floor without leaving behind any residue. Wet cleaning the floor will keep the surface traction nice and tight. Injuries because of improper maintenance should be avoided in any case.

The floorcare of Marmoleum sport is very simple and effective. You can either use the product of the System Solution of Forbo Bonding or use the following method:

	<p><b>Cleaning after installation</b></p> <ul style="list-style-type: none"> <li>. Clean with <b>Monel</b> and a mop</li> <li>. Pick up dirty water with a wiper and a mop or a water vac</li> <li>. Rinse with clean water and a mop</li> </ul> <p>allow floor to dry</p> <p>After this stage the lines can be put on the floor</p> <p><b>Now start the Monel-method as follows:</b></p> <ul style="list-style-type: none"> <li>. Apply a soap film using a <b>Monel</b> solution and a mop</li> <li>. <b>Allow the floor to dry</b></li> </ul>	<p>0,25 l. <b>Monel</b> / 10 l water</p> <p>0,5 l <b>Monel</b> / 10 l water</p>
 	<p><b>Regular cleaning</b></p> <ul style="list-style-type: none"> <li>. Vacuum clean the floor</li> <li>. Remove spots with a damp mop</li> </ul>	
 	<p><b>Periodic cleaning</b></p> <ul style="list-style-type: none"> <li>. Vacuum clean the floor</li> <li>. Clean with <b>Monel</b> and mop</li> <li>. Apply a Monel film using a <b>Monel</b> solution and a mop</li> <li>. Allow the floor to dry</li> </ul>	<p>0,25 l. <b>Monel</b> / 10 l water</p> <p>0,5 l <b>Monel</b> / 10 l water</p>
 	<p><b>Occasional maintenance</b></p> <ul style="list-style-type: none"> <li>. Scrub with <b>Monel</b> and scrub brush</li> <li>. Pick up dirty water with wiper and mop or water vac</li> <li>. Rinse with clean water and mop</li> <li>. Apply a soap film using <b>Monel</b> solution and mop</li> <li>. Allow floor to dry</li> </ul>	<p>0,25 l. <b>Monel</b> / 10 l water</p> <p>0,5 l <b>Monel</b> / 10 l water</p>

## 12. Specification Clauses for Marmoleum sport

Below an example text is described for Marmoleum Sport 3,2 and 4 mm.

### **Marmoleum sport 3,2mm**

Linoleum Floor covering EN 548,  
Classification EN 685 Class 34 Commercial application, very heavy use  
Anti static, Body voltage according to EN 1815 max. 2 kV,  
Contact noise reduction EN ISO 140-8 4 till 6 dB, suitable for Sport halls DIN V 18032-2,  
Fire classification EN 13501-1 Cfl-S1  
Resistant to chemicals EN 423  
Thickness 3,2 mm,  
Sheet material, Sheet width 200 cm,  
Marmor design, uncoated  
Colour according to standard collection  
Product name **Forbo Marmoleum sport**  
Colour .....  
or equal

Welding of the surface flooring, sports flooring-Linoleum, Sheet width 200 cm,  
with dessin and colour matching Multicolor- welding rod,  
Calculation on basis of the total surface area

### **Marmoleum sport 4,0mm**

Linoleum Floor covering EN 548,  
Classification EN 685 Class 34 Commercial application, very heavy use  
Anti static, Body voltage according to EN 1815 max. 2 kV,  
Contact noise reduction EN ISO 140-8 4 till 6 dB, suitable for Sport halls DIN V 18032-2,  
Fire classification EN 13501-1 Cfl-S1  
Resistant to chemicals EN 423  
Thickness 4 mm,  
Sheet material, Sheet width 200 cm,  
Marmor design, uncoated  
Colour according to standard collection  
Product name **Forbo Marmoleum sport**  
Colour .....  
or equal

Welding of the surface flooring, sports flooring-Linoleum, Sheet width 200 cm,  
with dessin and colour matching Multicolor- welding rod,  
Calculation on basis of the total surface area

## 13. Installation advice Marmoleum Sport Elastic

### Before Installation:

Marmoleum Sport Elastic could be installed on every surface that is properly prepared for the installation. The surface should be clean, even, solid, burst and crack free, load bearing ready and absolutely dry. Wooden under floors and other dense and non-absorbing under floors must be leveled with sufficient screed (min. 2 mm).

1. The installation conditions are at least 15 ° C ground temperature, 18 ° C room temperature, relative humidity lower than 75%. It is recommended to keep it lower than 65% to guarantee a correct binding of the components.

Marmoleum Sport and Regupol 5608 should be acclimatized to installation conditions. Both products should be rolled out completely first before installation.

2. Prepare the under floor according to the standard applicable in your country . Priming (Forbo **044 Europrimer Multi**) and filling (Forbo **960 Europlan Super**) depending on the existing underground structure.
3. Adherence of the elastic underlayer, type Regupol 5608, with very low emissions (EMICODE EC1) **Forbo 640 Euro Star Special** using the adhesive spreader B1 (TKB), consumption of about 350-400g / m<sup>2</sup>. Drying time about 10 minutes.

The installation of Regupol 5608 is done in parallel, but in cross direction to the later to install Marmoleum Sport. Regupol 5608 is cut and laid half back in the open adhesive. The edges of the sheet are laid against each other but not too tight. Immediately after laying Regupol 5608 in the adhesive it is recommended to roll press with a linoleum roller (min. 50 kg) . The roll pressing must be repeated after about 30 -45 minutes.

The installation of Marmoleum Sport can be done the next day.

4. Adherence of Marmoleum Sport on Regupol 5608 with very low emissions (EMICODE EC1) **Forbo 614 Eurostar Lino Plus** using the adhesive spreader B1 (TKB), consumption of approximately 320g / m<sup>2</sup>. Open time approximately 5-20 minutes under the same installation conditions, as described in Section 2 above.

The installation is done in parallel, but cross direction ,with a minimum of 30 centimeters and preferably centered on the previously installed Regupol 5608. Marmoleum Sport is cut and laid half back in the open adhesive . Roll press immediately after laying and again after about 30 -45 minutes, with a linoleum roller. The installation is done head to head.

After installation and drying of the adhesive (min. 24 hrs) the initial cleaning can be executed. Welding, if necessary, should be done after 48 hours.

### **Precaution**

*Our information is based on experiences in laboratory and practice. Because of the different materials, processing methods and local conditions, which we have no influence on, we can not guarantee - even in patent law - installation. We therefore recommend adequate self-tests.*

## 14. Sources

- EN 14904
- DIN 18032: part 2
- Sport England
- Institut Für Sportbodentechnik
- HARO Sports Flooring

Design Guidance note: Floors for indoor sports  
Sportböden in Sport- und Mehrzweckhallen  
Qualitätsparameter und Nutzungskriterien