



F. Ball and Co. Ltd.



# Subfloor *Preparation Guide*

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## INTRODUCTION

Surface preparation is a vital part of any contract. Improper or inadequate preparation can cause premature failure of the system. It is the intention of this Subfloor Preparation Guide to describe the different types of procedures available to produce the most acceptable substrate possible, ready for the installation of one or more of our products.

All aspects of subfloor preparation and floorcovering installation should be in accordance with the appropriate standard. During the laying of the floorcovering a temperature of at least 18°C must be maintained along with a floor temperature of at least 10°C. The type and condition of the subfloor has a direct influence on the installation and performance of a floorcovering and the importance of subfloor preparation cannot be emphasised too strongly. Before the final treatment to bring a subfloor up to the standard required for the application of floorcoverings can begin, the condition of the base must be investigated and any necessary treatments or repairs carried out.



Certain systems may be 'tolerant' to lower standards of preparation, but lower standards should not be accepted without careful consideration of their implications i.e. the increased potential for premature failure which is counter productive and expensive to rectify. Where application involves questionable substrates the installer must exercise extreme caution and advise the client of the attendant risks involved. Old or new substrates contaminated with oil, grease, fat or chemicals, faulty concrete, inferior grades of concrete, floors with large cracks or crevices, poor asphalt and tiles are not satisfactory bases for our products.

Some severe conditions cannot be corrected by normal preparation techniques and the only remedy may well be to uplift and relay the complete subfloor.

Any substrate forming the base on which an F. Ball product is applied should be designed to withstand all structural, thermal and mechanical stresses and loads which will occur during service. A substrate should remain stable and be provided with any expansion, contraction and crack inducement joints necessary. Cracking, unevenness and faults in the substrate may be reflected through the surface treatments and floorcoverings. It must be acknowledged that any shortcomings or failures in a subfloor could lead to a premature failure.

## REFERENCES

The following British Standards should be referred to when specifying and installing F. Ball products or systems: BS8204 code of practice for concrete bases to receive in-situ floorings. BS8203 the installation of resilient floorcoverings. BS5325 the installation of textile floorcoverings BS8201 the installation of timber and timber based products.

## SUBSTRATES

Good design and subsequent installation practices to receive F. Ball products or systems are essential for the success of the finished floor. In order to minimise problems and save possible additional costs, it is essential that specifiers, clients, main contractors or installers of subfloors such as concrete and sand cement screeds, should have tested and be satisfied that the surfaces are to specification and adequate for the intended use.

The company recommends the procedures mentioned in this leaflet for the preparation of concrete, screeds and other surfaces prior to the installation of our products. This information is primarily concerned with floors although general information can be extracted in the case of vertical surfaces but extra consideration should be shown due to possibly greater absorbency of many of the surfaces i.e. brick, blockwork, plaster, etc. Obviously vertical surfaces do not usually have to withstand the same degree of wear and tear that horizontal surfaces are subjected to. Coverage rates of materials may be affected by the selected method of surface preparation and due allowances made for any increase or decrease.

## CONSIDERATIONS – OLD CONCRETE AND SCREED SURFACES

Old or screeded surfaces are often contaminated, worn or degraded. They often present a greater risk than new substrates. BS8204 should be used as a guide to good flooring methods. In order to minimise problems and save additional costs, it is essential that specifiers, clients, main contractors or installers of F. Ball systems on old concrete bases and screeds have the floor tested, and are satisfied that surfaces are adequate for the intended use. A surface tensile pull-off strength of at least 1.5 N/mm<sup>2</sup> onto a prepared subfloor is required before the application of further underlayments and serves as a good guide as to the integrity of the floor.

The depth and type of contamination should be checked to ensure that removal and subsequent adhesion can be ensured. It is often advisable to take cores from the most contaminated areas to be sure of penetration depth of contamination and the soundness of substrate. For instance, oil can penetrate many centimetres into concrete, and although the surface may be cleaned, it can migrate back to the surface. Adhesion of a DPM, underlayment or adhesive may be compromised or in the worst cases be non-existent. If in doubt, do not progress any further without management instructions. Further discussion with our Technical Services Department may be advisable before proceeding.

## LAITANCE

Laitance is always present on new concrete bases and screeds and should be removed. Laitance is formed from a mixture of water, cement and the fine particles of the screed or concrete mix that is brought to the surface when placing and trowelling up. As the concrete or screed cures this mixture dries to form a crust or thin layer, known as laitance on the surface. The wetter the mix, and the more it is worked or trowelled, the thicker and usually the weaker the laitance will be. The thickness of laitance may vary from, in the best cases, barely measurable – to the worst examples, 6mm or more. Scoring the surface with a steel edge (i.e. a screwdriver) until the main aggregate in the mix is reached will determine the thickness of the laitance.

Laitance has relatively poor adhesion to the mass of the aggregate in the mix. It is friable and weak in comparative strength, and can therefore either delaminate under traffic conditions and impact or it may easily dust away under abrasion from traffic. Therefore, the new floor surface needs to be bonded to the mass of the aggregate in the base on which it is laid. The heavier the use of the floor, and the greater the temperature fluctuations that the floor is subjected to, the more important this is. Laitance is a

major cause of dusty and damaged concrete floors. Failure to remove it may lead to failure of the surface treatment smoothing underlayments. Unless it has been removed by previous surface preparation techniques, laitance may still be present on old concrete and screeded floors. Removal is vitally important.

## SURFACE PREPARATION TECHNIQUES

The most frequently used methods of surface preparation of concrete or screeded floors are:

- (i) Dust-free grit blasting
- (ii) Mechanical planing
- (iii) Scabbling
- (iv) Grinding
- (v) Abrading

This leaflet describes the main advantages and disadvantages of each method. Floors and their uses vary enormously. Therefore, each method must be judged on its merits and full account be taken of the working environment in which the preparation has to take place. For example, scabbling may be a perfectly suitable method of preparing a floor in an unoccupied site. However, the resulting dust and noise may preclude it in many other situations.

### DUST-FREE GRIT BLASTING

This is the fastest and most efficient form of old and new floor preparation and laitance removal, available to date. The machines used vary in size and are generally operated by specialist concrete preparation contractors or flooring contractors. Horizontal and slightly inclined surfaces are impacted and abraded by steel abrasive propelled at high velocity by the machine. At the same time the abrasive grit and resultant debris is contained and reclaimed by powerful suction processes. The grit is cleaned and recycled for immediate re-use. The abrasive grit and debris is deposited in environmentally safe containers by the machine whilst it is working. Up to 1000m<sup>2</sup> of flooring may be completed in a day. This is a dry process, and floor laying may often continue whilst preparation is progressing in adjacent areas. In many cases old coatings and other contamination may be removed by this method.

Dust-free grit blasting is far quicker, quieter and cleaner than mechanical planing, scabbling, etc. The disadvantage is the general inability of the machine to remove exceptionally thick, hard or flexible materials i.e. certain epoxy or polyurethane floor surfaces. The specialist contractor using these machines will advise in more detail.

### MECHANICAL PLANING

Often referred to as 'concrete planing' the machines use carry rows of rotating cutters tipped with tungsten. The removal of

laitance and other forms of surface contamination are excellent. The profile left by the machine is dependent on the spacing and type of cutters installed by the operator. The surface may be grooved or flat. Surfaces are more roughened than dust-free grit blasting. Greater thicknesses of the substrate can be removed more quickly and effectively than by grit blasting.

Mechanical planing is slower, noisier and nearly always very dusty. The addition of vacuum suction cleaners to these machines does help to reduce dust, but seldom eliminates it.

### **SCABBLING**

This is a heavy-duty method of preparing concrete frequently seen on concrete motorways. Scabbling tools are driven by compressed air and the tool head is tipped with tungsten. The tool works by vibrating and impacting the surface of the concrete, thus shattering the surface as it works. This system is not suitable for preparation if the floor system being applied is less than 10mm (please consult our Technical Department for further advice).

Scabbling is a slow, very dusty, very noisy and dirty process. On certain surfaces it has the disadvantage that it can damage the concrete or screed to the degree that it weakens the substrate too much. This process is now less frequently used for internal work on floors.

### **GRINDING**

Grinding is usually carried out by machines used for polishing terrazzo floors. It is a useful method of preparing a level floor to remove laitance and expose the aggregate in a substrate.

### **ABRADING**

There are a number of methods of abrading which include the use of STR machines, corundum blocks, or using abrasive papers, etc. These have their limited uses and are not generally used on larger areas.

### **FINAL CHECKS**

Hardeners and surface membranes frequently interfere with adhesion and should have been removed by the surface preparation method used.

Before coating or topping, concrete or screeds must be: free of all contamination and laitance; strong enough to support the coating or topping under the conditions for which the floor is designed. Concrete and sand/cement screeds must be left for construction moisture to dry out before floorcoverings are laid. Readings greater than 75% RH should be treated with STOPGAP F75 or F76 surface damp proof membranes, following preparation of the concrete or sand/cement screed detailed within this document. STOPGAP ISOLATOR can be used in certain situations as a fast track alternative for damp floors.

All laitance and any other form of contamination should be removed by the most appropriate technique.

Immediately prior to applying any coating, topping or adhesive, ensure that dust from any preparation method employed is removed by vacuuming wherever possible. Preparing concrete may be a dusty operation. Masks and good ventilation should be provided. Protection of walls, furniture and equipment should be planned.

Residues or spillages of other trades such as plaster, paint, cement, oil and sometimes roofing tar are frequently present in new constructions, and should be removed. Plaster and cement can be chipped up and wire brushed. Paint should be mechanically removed. Oil must be removed by washing with a water emulsified degreaser. Hot compressed air and epoxy sealing can sometimes be used for badly affected areas, alternatively the substrate should be replaced. Oil will affect adhesion of the floor smoothing underlayment and adhesive. In certain circumstances the presence of oil may stain the new decorative floorcovering. If water flows under partitions, walls, cover mouldings, equipment bases or furniture, these areas will take longer to dry out and may delay the installation. Putting paper or polythene sheet on the floor to keep it clean retards the drying.

If old concrete has never been overlaid or painted it should be treated the same as new concrete. More emphasis must be placed on cleaning, and repairing any cracks, holes or eroded areas. Often the best procedure is to remove all contaminated and unsound concrete.

Oil, fats and grease are best removed by steam cleaning, using a good detergent, or by hot compressed air blasting and further treatment with a special primer. Animal fats cannot be removed by washing. If such contaminants have penetrated into the surface

(which is usually the case) the only way of removing them is mechanically. This means dust-free grit blasting, scarifying, or scabbling or hot compressed air blasting. Remedial work in meat processing and engineering plants, for example,

remains a very difficult problem. Usually removing the contaminated concrete and re-screeding may be the only solution. Cores should always be taken to determine the depth of penetration of the contamination. Cores assist in reaching a



decision whether it is possible or not to prepare a surface for overlaying. It may be necessary to carry out adhesion tests to ensure adequate adhesion to a contaminated surface.



If necessary, repairs to damaged floors should be carried out using products such as STOPGAP 400 prior to applying smoothing compounds (please contact our Technical Services Department for further details). The specific concrete patching material must

be checked for compatibility with the surfacing system and be of suitable strength for the usage of the finished floor.

## NON ABSORBENT SURFACES

Surfaces that will not allow the passage of water to pass through them can be regarded as non-absorbent. Surfaces such as ceramic and quarry tiles, granolithic, terrazzo, paints and to some extent power floated concrete can all come under this heading.

### Coated Surfaces

Traditional floor paints such as those based on oil or acrylic emulsions should be removed. Epoxy or polyurethane paints can be overcoated providing they are in good condition and well adhered to the substrate. Coatings vary considerably in this respect and we would suggest you check adhesion by prior testing to ensure a satisfactory bond is achieved. The coating should be cleaned using Styccoclean C140 then either primed with neat STOPGAP P131 followed by the recommended smoothing underlayment or the adhesive applied direct to the paint (please contact our Technical Services Department for further information on product selection). However, in the majority of cases identifying the type of paint or coating will be difficult and it is most likely it will be brittle, worn, peeling or flaking off the substrate and is therefore not good enough to receive either smoothing underlayment or adhesive. The easiest method of removing old paint is usually dust-free grit blasting. Note certain paints and coatings may allow the passage of moisture to pass through them and checks should be made for moisture before progressing further work.

### Chemical Hardening and Waterproofing Admixtures and Curing Agents

All these products are designed to generally repel water from entering into the concrete or screed or to form a barrier to

prevent moisture escaping. In both cases adhesion will be impaired if a water based smoothing underlayment or adhesive is applied. The substrate should be prepared by mechanical means such as Grit blasting. If a waterproofing admixture is known to have been used, further testing should be carried with the proposed system to ensure complete compatibility and adhesion to the host substrate.

Some acrylic based curing agents may be overcoated with certain STYCCOBOND adhesives and advice should be sought from the Technical Services Department before proceeding. If in doubt always mechanically prepare the surface

### Surface Damp Proof Membranes

Membranes such as STOPGAP F75 or F76 can be overcoated with smoothing underlayments or certain adhesives. When applying a smoothing underlayment onto a damp proof membrane, the surface should be primed with neat STOPGAP P131 and allowed to dry before proceeding with the underlayment. STOPGAP 100 may be applied directly. Adhesives such as STYCCOBOND F41 and F46 can be applied direct to STOPGAP F75 or F76.

Please refer to the data sheets or Technical Services Department for further information on these products.

### Asphalt

Providing the flooring grade asphalt is in good condition, sound, strong enough and has not suffered rutting or any other sign of softening and is free from any form of contamination, then the surface should be cleaned with STYCCOCLEAN C140, rinsed with clean water and allowed to dry. The surface should then be primed with neat STOPGAP P131, allowed to dry followed by 3mm of the appropriate STOPGAP smoothing underlayment.

### Ceramic, Terrazzo and Quarry Tiles

Providing these are sound and no cracks or elevated tiles are present, these should be cleaned to remove all traces of contamination such as polish etc, then primed with neat STOPGAP P131, allowed to dry then skimmed with a minimum 3mm of the appropriate STOPGAP smoothing underlayment. Heavily glazed surfaces should be mechanically prepared by shot blasting, or grinding with a coarse abrasive to aid adhesion before priming.

Terrazzo and Quarry tiles are unaffected by dampness but may be sufficiently permeable to allow the passage of moisture vapour and are often laid in areas which do not incorporate a damp proof membrane. Where this is the case, these bases should be covered with a layer of flooring grade asphalt complying with BS6925. Alternatively the use of a surface DPM such as STOPGAP F75 or F76 can be applied providing the substrate has been sufficiently prepared by mechanical means and the grout lines raked out. In both cases this should be followed by priming with neat STOPGAP P131 and allowed to dry before applying 3mm of the

appropriate STOPGAP smoothing underlayment. If either method is not possible, lift the tiles and relay the floor.

STOPGAP ISOLATOR may also be used under certain situations.

**Note:** Old installations may involve the substrate consisting of Ash, which can become unstable if covered up. Checks should be carried out to establish the integrity and make up of the substrate.



### Power Floated Concrete Slabs

These should be treated in the same way as traditional concrete and sand/cement screeds. In some cases it is possible to use a pressure sensitive or tackifier adhesive such as F46 or F41 direct to the power floated slab providing the moisture content of the slab is below 75% RH. Checks should be made with our Technical Service Department before proceeding.

**Note:** 1. Most power floated slabs will be cured with a curing agent. In most cases this will be acrylic based, however, wax based curing agents or certain silicate based products may be present and will inhibit the bond performance and these should be removed by mechanical means such as grit blasting.

2. Power floated concrete slabs especially those cured with curing agents will take a considerable amount of time to dry and the use of epoxy damp proof membranes such as STOPGAP F75 or F76 should be used if a fast track floor installation is required.

### Adhesive Residues

Any old adhesive residues should be removed by mechanical methods such as scraping, grit blasting and grinding etc. Certain underlayments are able to cope with only minimal traces of firmly adhered and hard adhesive residues (not water soluble). At least 75% of the floor area should be clean. This will be followed by the application of neat STOPGAP P131, allow it to dry and then proceed with the appropriate STOPGAP smoothing underlayment. Please refer to our Technical Service Department for product selection.

**Note:** 1. If in doubt remove all traces of adhesive residues back to a sound and well-prepared substrate.

2. Highly trafficked areas and those subject to high temperatures such as conservatories, should be mechanically prepared to remove all adhesive residues, primed with dilute STOPGAP P131, allowed to dry

and a high strength smoothing underlayment applied such as STOPGAP 100, 200 or 300 followed by the recommended adhesive.

Any remaining adhesive on wooden floors should be overpinned with flooring grade plywood or hardboard and thoroughly secured at 100-150mm centres (see wooden floors). Any existing underlayments should be removed.

## EXISTING FLOORCOVERINGS

Most floorcoverings such as flexible vinyl, linoleum and textile floorcoverings must be removed and the substrate thoroughly prepared before fully bonded floorcoverings can be laid. Some vinyl or similar type floor tiles can be overcoated providing they are firmly bonded to the subfloor and all traces of polish or any other contaminant which would prevent good adhesion are removed e.g. With Stycoclean C140 Floor Cleaner. If this cannot be achieved then the tiles must be removed, and the substrate suitably prepared.

Note. Certain vinyl tiles were made using asbestos, and professional advice should be taken before proceeding to remove these types of tile.

Generally with older building, these types of tiles were often laid on floors that did not contain a DPM.

## COMPOSITION FLOORS

Floors constructed of magnesium oxychloride cement or polyvinyl acetate/cement will be adversely affected by dampness rising from the ground if they are covered with an impervious layer. Unless it can be established that the composition floor is adequately protected against rising dampness, it must be removed and the base made good before floorcoverings are installed. If the floor is protected against dampness then cracks and small hollows should be patch filled and the whole area skimmed with a minimum 3mm of the appropriate STOPGAP smoothing underlayment.

## CALCIUM SULPHATE SCREEDS

In all cases, Calcium Sulphate screeds that include, Anhydrite and Alpha Hemihydrate type screeds should be sound smooth and dry. All laitance should be removed during the initial grinding stage, however, this is not always the case and checks should be made prior to proceeding with the application of any material. If laitance should still exist, this should be mechanically removed by further grinding/sanding and the dust fully vacuumed off. It is imperative that checks are also made to determine the moisture

content of the floor and this is carried out using a Hygrometer in accordance with BS8203. A reading of less than 75%RH must be obtained before priming using STOPGAP P121 and allowing to dry before the application of the appropriate STOPGAP smoothing underlayment or STYCCOBOND adhesive.

## WOODEN FLOORS

All wooden floors must be structurally sound, level, smooth, dry and clean. Adequate ventilation should be provided to suspended timber floors at ground level to ensure that the moisture content of the wood is maintained at equilibrium. Worn or uneven floorboards should either be replaced or levelled by sanding, planing or by patch filling with STOPGAP GREEN BAG/114 latex underlayment before finally covering with flooring grade plywood. Sheets should be positioned, joints staggered and nailed at 100 – 150mm centres. (See BS8203 for details).

Wood blocks are not suitable for direct application of sheet or tile flooring because of the continuous differential movement of the blocks and the risk of the wood block design transferring through the floorcovering surface. Provided the wood blocks are smooth, sound, level and securely bonded, they should be overlaid with flooring grade plywood. Any uneven areas should first be patch filled with STOPGAP GREEN BAG/114 latex smoothing underlayment. Wood blocks laid on the ground floors must have an efficient damp proof membrane incorporated in the subfloor. If there is any doubt whether these conditions can be met, then the wood blocks must be removed and the subfloor made good with flooring grade asphalt or a modified sand cement screed incorporating an effective damp proof membrane.

Wood mosaic panels require overpinning with flooring grade plywood in all cases. This is not practical on solid floors and panels should therefore be removed.

If panels laid over a flexing timber floor need patch filling, STOPGAP GREEN BAG/114 latex smoothing underlayment should be used. In all other respects wood mosaic panels should be treated as for wood block.

Chipboard should comply with BS5669 flooring grades, type, C2, C4 or C5. It is essential that floating chipboard and other composition floors are dry, as a gully may develop between the skirting board and the edge of the floorcovering as the boards shrink on drying.

In all cases Chipboard, plywood and hardboard must be primed with dilute STOPGAP P131 or STOPGAP F70 as recommended.

## RAISED ACCESS MODULAR FLOORS

These are designed to give ready access to underfloor services. All modular units must be structurally sound, level, smooth and free from contaminants. New floors should be degreased using STYCCOCLEAN C141 and allowed to dry before placing the adhesive. Backed carpet tiles secured with an tackyfyng adhesive such as STYCCOBOND F41 are suitable for this type of base. Broadloom carpets are not suitable in this type of situation.

## CONCLUSION

It must be appreciated that these recommendations are of necessity in a general nature. Modifications may be required according to the floor system used and the service conditions under which the surface has to adequately perform. If there is any doubt seek further advice from our Technical Services Department before proceeding with the application of our products. The company will be pleased to check advice given by a contractor or applicator of F. Ball products. However, because we may be unaware of every situation where our products are supplied, it is impossible to check all sites where F. Ball materials are used. This leaflet is therefore to be used only as an informed guide to floor preparation methods. The responsibility for the preparation of any substrate must remain with the installer. Because of the wide variety and uses of our materials, the Company is always more than willing to offer help and assistance with individual flooring problems (please contact our Technical Services Department for further advice).

The detail in this information sheet is given in good faith, and is based on results gained from experience and tests. However, all recommendations or suggestions are made without guarantee, since the conditions of use of the floor and the placement of materials are beyond our direct control.

To ensure this information is correct, please contact our Technical Service Department (see reverse).





For further information about F. Ball products or technical advice please contact:



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