MEASURING AND MANAGING THE LEVEL OF SLIP RESISTANCE PROVIDED BY RESIN FLOORING

FeRFA Guidance Note: No 1

1. INTRODUCTION

Correctly specified and applied synthetic resin flooring is well proven as an effective method of protecting substrates and providing excellent levels of slip resistance in wet, dry and contaminated conditions, especially within high risk areas such as food and drink processing, commercial catering and heavy industrial environments.

Pre-planning at the design stage to evaluate the environment and the use of the floor is critical. The following criteria should be examined before proceeding with the design of the floor, to ensure the causes of slips are minimised.

- Operating environment (type, concentration and frequency of likely spillage / contaminant)
- Surface regularity (i.e. does the floor 'free drain' or does standing water accumulate ?)
- Insitu drainage and / or new drainage requirements
- Regular cleaning procedures
- Safety footwear

While processes designed to avoid spillage / contamination is one essential part of any slip risk management approach, it is inevitable that occasions will arise when slippery conditions will occur and reliance will be placed on the floor finish to minimise risk. As such, it is essential that floors are designed to handle the extremes of operating conditions to minimise risk and fully meet duty of care responsibilities.

This guidance note will explain the main methods for measuring the level of slip resistance offered by a resin floor finish in line with the main methods recognised in the UK. It will then briefly cover other factors that help manage and minimise the overall risk of a slip related incident.

2. MEASURING THE LEVEL OF SLIP RESISTANCE PROVIDED BY RESIN FLOORING

As with any basic measure of performance, regardless of industry, most countries will have their own opinions and approved standards / methods by which performance should be assessed. Across Europe, there are a number of test methods that architects and specifiers refer to, but there are only 2 that are formally recognised in the UK within official standards that relate to flooring.

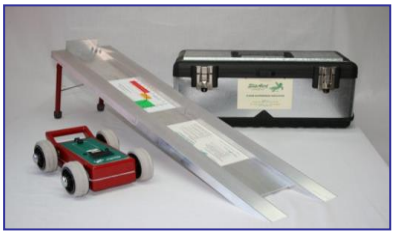
2.1 UK formally recognised methods for measuring slip resistance

The most widely recognised scientific approach for the assessment of whether a floor offers an acceptable level of slip resistance is measurement of the dynamic co-efficient of friction. This assessment is normally carried out using swinging 'pendulum' equipment, which whilst of US origin, was further developed by the Transport & Road Research Laboratory (TRRL) for assessing both the skid resistance of road surfaces, and the slip resistance of pedestrian areas. This method has since been adopted by BSI for the British Standards in the BS 8204 series dealing with in-situ floorings (BS 8204-6 relates to Synthetic Resin Flooring in particular).

The construction and use of the Pendulum is specified in BS 7976. This equipment is used widely both in the UK and overseas because it is portable and can be used to determine the slip resistance of even small areas in situ. It is the standard reference method adopted by the Health & Safety Executive (HSE) Laboratories, Sheffield.

However, whilst the TRL pendulum is portable, it is relatively difficult and time consuming to use (and requires specialist training), which has resulted in the development of a quick and easy to use device known as SlipAlert.

SlipAlert, also adopted by BS 8204, was designed to reproduce the characteristics of the lubricating film which is uniquely generated by both the TRL Pendulum and a slipping pedestrian under their heel. As a result it correlates well with Pendulum test results and has opened up the testing of floors to those who would previously never have considered such a test due to the complexities of using the Pendulum Tester.



As such, SlipAlert is increasingly being used by flooring contractors and many specifiers to measure slip resistance.

2.2 Other test methods not formally recognised within the UK

The most commonly referred to standard that is not formally recognised is the 'R' range of results from the German ramp method. This is often quoted on specification sheets from tile and vinyl sheet manufacturers, so is often mentioned by architects and specifiers when looking for alternative finishes.

The Ramp test is strictly a laboratory method and cannot be related to site measurements. It consists of an operator walking in short half steps down an incline on which a sample of the flooring is mounted. The angle of the ramp is

increased in increments until the operator slips. The lubricant used is oil and his shoes/boots are heavily profiled. The angle at which slipping occurs is translated into an 'R' number varying from 9 – 13. There is very little correlation between the Ramp 'R' numbers and the slip resistance value generated by either the Pendulum or SlipAlert, both of which use water as the normal lubricant/contaminant.

One other commonly referred to method is that of surface roughness. This simple test uses a small electronic device to assess the peak to valley depth range of any given surface and produces an average figure based on a number of readings. However extensive testing in both the UK and Australia has shown little direct correlation between Rz (the surface roughness parameter measured) and slip resistance as measured by the Pendulum or SlipAlert.

As none of these tests are detailed within any current British standards, they are not formally recognised by FeRFA.

3. ACCEPTABLE LEVELS OF SLIP RESISTANCE

The BS 8204 series of standards for in situ floorings (including BS 8204-6: Synthetic Resin Floorings), specify that any flooring should give a Pendulum Test Value (PTV) of **not less than 40 when tested wet or dry as appropriate for the anticipated service conditions, including any likely surface contamination**. There is a rider that 'in particularly wet areas, the client should be advised of the benefits of the use of special footwear with slip resistant soles, which can allow a smoother floor finish to be adopted. In such situations a PTV of not less than 33 may be acceptable'.

Other parameters and figures quoted, including PTV bands published by UKSRG are for guidance only and as they are not formalised within any relevant standards, they have not been included within this document.

4. MANAGING THE LEVEL OF SLIP RESISTANCE PROVIDED BY RESIN FLOORING

As stated in the introduction, the design and correct installation of a resin floor is an essential part of the risk management process. However, even the best of floors will not deliver the desired level of performance if daily business operations are not tailored to help minimise risk.

4.1 Regular Cleaning Procedures

The recommended method for managing slip resistance is to ensure that a regular and effective cleaning regime is implemented that complies with the resin flooring manufacturer's recommendations. If the incorrect cleaning regime is used, a build up of contaminants may quickly form, which could reduce the level of slip resistance available to an unacceptable level.

The most effective cleaning method will normally require the use of mechanical floor cleaning machines in conjunction with cleaning chemicals approved by the resin flooring manufacturer. It is essential that the cleaning chemical supplier is made fully aware of the types of contaminant that are likely to come into contact with the floor to ensure that the most effective product is specified.

The frequency of cleaning should be tailored to ensure that acceptable levels of slip resistance are available at all times. Regular monitoring of the slip resistance will provide an assurance of effective cleaning.

4.2 The importance of contaminant viscosity

Floors can become contaminated by a wide variety of elements, such as water, fats, oils or a combination of these. The only way to determine if the floor is likely to be safe in the presence of such contaminants or combinations of such contaminants is to test it with the Pendulum or SlipAlert in those conditions. Therefore, should the types of contaminant change, it is essential to re-assess the floor to ensure that it can continue to offer acceptable levels of slip resistance. Accordingly, when designing a floor or re-assessing a floor, it is paramount that the client confirms exactly which contaminants are likely to be present to enable a full assessment to be conducted.

4.3 Surface Regularity

The surface regularity and degree of fall of any floor finish will largely determine the tendency for water and other contaminants to 'pond' (sit in puddles). Ponding can result in higher than anticipated contaminant film thicknesses which can have an adverse effect on the levels of slip resistance achievable.

Due to their method of application, synthetic resin floorings will inevitably follow the profile of the underlying substrate. The degree of regularity required to minimise ponding should therefore be defined in advance both on new-build or refurbishment projects.

The straight edge method given in BS8204-1 is generally satisfactory for the majority of floor uses and the design should specify an appropriate class of local surface regularity (see table 1).

Table 1: Classification of Surface Regularity for Wearing Surfaces

Class	Maximum Permissible Departure from a 2m Straight Edge - mm	Application
SR1	3mm	High Standard: Special floors
SR2	5mm	Normal Standard: Normal use in commercial and industrial buildings
SR3	10mm	Utility Standard: Other floors where surface regularity is less critical

Where free draining floors are required in wet environments, a minimum fall of 1 in 80 should be specified. However, a textured surface may require a higher fall to allow contaminants to drain naturally.

Should ponding become an issue with an existing resin floor (and there is not the time or budget to rectify this permanently), it is recommended to periodically squeegee excess contaminants to the nearest drain.

4.4 Footwear

In certain industrial situations where floor contamination is unavoidable and there is a requirement for a less heavily textured flooring solution or the existing flooring is offering slip resistance of less than 40, specialist footwear can be employed to help achieve an acceptable solution. It must however be recognised that:

a. Only a few 'safety' shoes/boots offer true enhanced slip resistance in wet conditions
b. Not all enhanced footwear will be effective in any specific situation
c. Such footwear needs to be worn by all those who walk across the floor
d. The footwear needs to be regularly monitored by a member of staff formally trained to assess when safety
e. footwear is worn to a point at which effectiveness has declined to an unacceptable level.

5 CONCLUSION

FeRFA manufacturers and contractors should be consulted in the early stages of planning and designing a floor that requires slip resistance.

FeRFA members can produce synthetic resin floorings that meet the HSE and BSI criteria for effective slip resistance under a variety of conditions.

6. REFERENCES AND FURTHER READING

1) **FeRFA Guide to the Specification and Application of Synthetic Resin Flooring**
FeRFA, The Resin Flooring Association, 16 Edward Road, Farnham, Surrey GU9 8NP
2) **BS 8204-6: Synthetic resin floorings – Code of practice**
BSI, 389 Chiswick High Road, London W4 4AL
3) **BS 7976 Parts 1-3 2002 Pendulum Testers**
BSI, 389 Chiswick High Road, London W4 4AL

FERFA

FeRFA, the Resin Flooring Association, represents the major product manufacturers, specialist contractors and surface preparation companies, raw material suppliers and specialist service providers within the UK Resin Flooring Industry. Established in 1969, FeRFA now represents over 90 UK based companies. The Association has established Codes of Practice for full members. It takes an active role in promoting resin flooring and in developing both national and international standards.

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