



**ARTIFICIAL SURFACE SPECIFICATION AND
BRITISH HORSERACING AUTHORITY PROTOCOL**
February 2011

INTRODUCTION

- 1 A British Horseracing Authority approved Artificial material must provide a racing surface which allows horses to run to their full potential with no additional injury risk than that which would be expected on Good to Firm Flat turf.

KEY SPECIFICATION REQUIREMENTS

- 2 Manufacturers/suppliers of Artificial materials who are seeking approval need to ensure that their product complies in the following key areas:

SAFETY ASSESSMENT

PHYSICAL PROPERTIES

DURABILITY

DRAINAGE

DETAIL OF KEY REQUIREMENTS

3. Potential Artificial surfaces must comply with the following requirements within each of the four key specification areas:

3.1 **SAFETY ASSESSMENT**

Health and Safety Legislation

An Artificial surface must comply with the relevant Health and Safety legislation before approval ie:-

- Control of Substances Hazardous to Health Regulations; or
- Health and Safety at Work Regulations: (1992 SI 1992/2051 Reg. 3(1)(b))

Composition of Material/Safety Assessment

In addition, the BHA requires details of the following:

- Chemical composition of the product
- X-ray review of product to identify metal components (costs of x-ray borne by manufacturer/ supplier)
- Details of Safety Assessment (see Appendix)

The costs of any Safety Assessment are to be borne by the manufacturer/supplier.

3.2 PHYSICAL PROPERTIES

Tests need to be carried out on potential Artificial surfaces (at the manufacturer's/supplier's expense) to establish the physical properties of the material. These tests can be carried out by the Centre for Sports Technology, the Sports Turf Research Institute and Cranfield University at the following addresses:

Centre for Sports Technology Ltd
Unit 3
Greenwich Centre Business Park
53 Norman Road
London
SE10 9QF

Sports Turf Research Institute
St. Ives Estate
Bingley
West Yorkshire
BD16 1AU

Telephone number: 0208 2936655

Telephone number: 01274 565131

Cranfield Centre for Sports Surfaces
Cranfield University
Silsoe

Telephone number: 01525 863381

The following key properties of the material need to be established:

3.2.1 Resilience

The surface should provide the correct degree of resilience (proportion of impact energy returned to the hoof expressed as a percentage). Too high a proportion of energy return results in a very springy surface. Too low a proportion results in a dead surface.

3.2.2 Depth

Depth is the maximum penetration of the impact hoof into the surface.

3.2.3 Footing

By measuring the footing of the surface (ie. the further compaction of the surface which occurs after the peak force is recorded) the stability of the compacted pad of material beneath the hoof can be gauged.

3.2.4 Hardness

Hardness is the maximum force experienced by the test hoof during the impact. A low level of hardness is desirable but not at the expense of increased depth.

3.2.5 Surface Stiffness

Surface Stiffness is the initial rate of deflection of the surface with increasing force. Stiffness will increase as the surface becomes more compacted.

3.2.6 Harmonic Stiffness

By measuring the contact time of the test hoof with the ground, the harmonic stiffness – a measure of the elastic stiffness – is obtained for the surface. This should correspond closely with Surface Stiffness.

3.2.7 Shock Absorbtion

The degree of cushioning measured in relation to eg. concrete provides the shock absorption level of the surface. High jarring peak forces should be minimised so as to provide an adequate shock absorption.

3.2.8 Cohesion & Traction

The cohesion of the surface should be such that kickback is minimal. The propulsive force or traction of a surface depends in part on its cohesion.

All of the above properties should be as near as possible to results on good to firm flat racing turf. *However, if one or more of the properties differs considerably from the results of good to firm flat racing turf the proposed surface will not necessarily automatically fail the approval protocol.

3.3 DURABILITY

The physical and chemical properties of an approved surface should remain constant over such a period of time that major programmes of rejuvenation are not required annually. The surface must also maintain its properties within a temperature range of –10 degrees celsius to +40 degrees celsius (104 degrees F) and should not be susceptible to significant change or breakdown caused by ultra violet light or frost shearing.

3.4 DRAINAGE

Any material which has been worked in the “cushion” should be free draining and allow rapid percolation of water through it. It is vital that the top of the pad follows the gradient of the base to allow unimpeded shedding of water to the perimeter drains. Water permeability rates need to be a minimum of 100mm per hour.

APPROVAL PROTOCOL

4. Approval of an Artificial surface for use on racecourses licensed by the British Horseracing Authority should be sought in the following manner:

STEP 1

1kg sample of the material and details of its chemical composition to be sent to the Racecourse Department at the British Horseracing Authority for evaluation by the Chief Medical Adviser (CMA) and Director Equine Science and Welfare (Dir ESW) at High Holborn. Material will also be x-rayed (x-rays at manufacturers/ suppliers expense) to identify potentially dangerous metal components (if any).

STEP 2

Further samples to be sent to the British Horseracing Authority Inspectorate (all ex professional jockeys) for initial visual examination of product.

STEP 3

Assuming CMA, Dir ESW and BHA Inspectorate are satisfied with the material, the manufacturer/supplier needs to have the product tested at his own expense in terms of its safety to jockeys and/or horses. (See SAFETY ASSESSMENT section 3.1 above). Data-sheets to be supplied to Racecourse Department for review by CMA & Dir ESW.

STEP 4

Assuming the material does not pose an unacceptable health risk, details of the physical properties and performance, (ie: Durability and Drainage) of the material need to be assessed through laboratory simulation tests (again at the manufacturer's expense – see sections 3.2, 3.3 and 3.4 above).

STEP 5

Assuming CMA, Dir ESW and Racecourse Department are satisfied with physical properties and performance (Durability & Drainage), field trials would be overseen by the British Horseracing Authority. The nature and duration of these will depend upon what knowledge already exists concerning the use of the material under racing or simulated racing conditions including available feedback from riders and trainers who have experienced it. Also relevant will be how much physical similarity there is in the content to the product with existing approved surfaces. It could be that field trials of up to six to nine months including a winter season could be required on a gallops sufficiently long and wide for sufficient use/wear and to make "race scenario" comparisons. Applicants seeking approval for materials should therefore discuss with the British Horseracing Authority at an early stage what the anticipated requirements for field trials may be.

It is possible that it may be considered that there is sufficient experience on gallops in the UK, and at other training centres worldwide for trainers, riders and racecourses to have confidence in the product and to make a judgement as to the suitability of a surface. Approvals may be given subject to caveat or condition.

STEP 6

Assuming the British Horseracing Authority Inspectorate, trainers and jockeys were happy with the trials the proposed Artificial surface would then be approved by the British Horseracing Authority.

Appendix: Safety Assessment of New Artificial Surfaces

Background

Approval of new artificial surfaces for horseracing requires, *inter alia*, that novel or modified materials satisfy Health and Safety legislation and are without significant health risk to humans, or to horses. The purpose of this appendix is to outline what potential health issues warrant consideration and what information must be supplied. Where the information does not exist appropriate tests are described to assess relevant toxicological properties. In accordance with regulations and responsible practice tests that do not involve the use of live animals are required wherever possible and are specified below. If tests involving live animals are required these are specified below and we promote the reduction of animal numbers and refinement of the procedures. The costs of these tests are borne by the applicant.

Exposure

Relevant routes of exposure to materials in all-weather racetrack surfaces are skin and eye contact and via inhalation. It is acknowledged, however, that eye contact is probably a relevant route of exposure for horses only as jockeys wear goggles. Oral exposure is relatively minimal with limited opportunity for systemic exposure.

Safety Assessment

Based upon considerations of exposure, there is a need to assess the potential of novel racetrack materials to cause skin irritation, eye irritation, and acute inhalation toxicity. Inclusion of an assessment of skin sensitisation may be required – see below. A risk assessment must be conducted to review the likelihood of systemic adverse health effects resulting from oral exposure to the novel racetrack materials. If such a risk assessment proves impossible, or insufficiently reassuring, then it may prove necessary to conduct a repeat dose (oral) systemic exposure study.

Recommended approaches:

Skin irritation

It is recommended that for the purposes of assessing skin irritant potential a reconstructed human epidermis model (RhE) is employed. This approach is described in *OECD Guideline 439 for the Testing of Chemicals: In Vitro Skin Irritation: Reconstructed Human Epidermis Test Methods; (Adopted July 2010)*. The above test guideline embraces 3 validated test methods: EpiSkinTM, EpiDermTM and SkinEthicTM. The first of these, EpiSkinTM is regarded as the Validated Reference Method and it is this particular RhE assay that is recommended in this instance (Portes et al., 2002; EC-ECVAM 2008)

EC-ECVAM (2008) Statement on the scientific validity of *in vitro* tests for skin irritation testing, issued by the ECVAM Scientific Advisory Committee (ESAC 29), November 5 2008. Available at: [<http://ecvam.jrc.ec.europa.eu>].

Portes, P., Grandidier, M-H., Cohen, C. and Roguet, R. (2002) Refinement of the EPISKIN protocol for the assessment of acute skin irritation of chemicals: follow-up to the ECVAM prevalidation study. *Toxicology in Vitro* 16: 765-770.

Skin corrosivity

It is very unlikely that this would be required. A case could be made for exploring the potential of a new material to cause skin corrosion only if a strong positive result was obtained in the *in vitro* test for skin irritation detailed above. However use of material that was a strong positive the *in vitro* test for in skin irritation is likely to exclude the use of the material. If an assessment of skin corrosivity were deemed necessary then the approach of choice would be the *Transcutaneous Electrical Resistance Test (TER) for Skin Corrosion*, an *in vitro* method described in *OECD Guideline 430 (Adopted April 2004)*.

Eye irritation

For this endpoint, primarily required to protect horses and accidental human exposure, the recommended approach is that described in *OECD Guideline 437 (Adopted September 2009): Bovine Corneal Opacity and Permeability Test Method for Identifying Ocular Corrosives and Severe Irritants* (Gautheron et al., 1992; ICCVAM, 2006).

Gautheron, P., Dukic, M., Alix, D. and Sina, F. (1992) Bovine corneal opacity and permeability test: an *in vitro* assay of ocular irritancy. *Fundamental and Applied Toxicology* 18: 442-449.

ICCVAM (2006) Background review document. Current status of In Vitro Test Methods for Identifying Ocular Corrosives and Severe Irritants: Bovine Corneal Opacity and Permeability (BCOP) Test Method. Available at:

[http://iccvam.niehs.nih.gov/methods/ocutox/ivocutox/ocu_brd_bcop.htm].

Acute inhalation toxicity

Currently there are not available any validated or recognised methods for the assessment *in vitro* of the potential for acute inhalation toxicity. For this reason the recommendation is to use *OECD Guideline 403 Acute Inhalation Toxicity (Adopted September 2009)*. This is a revised version of the original OECD 403 Guideline that was adopted in 1981 that has been designed to provide for greater flexibility, and to reduce animal numbers. The preferred test species is the rat. This OECD 403 Guideline involves the testing of 6 rats (3Male/3Female) over four dose ranges, plus a control group, a total of 30 rats.

Skin sensitisation

For this endpoint there is no thoroughly evaluated or validated *in vitro* alternative. The preferred approach is, therefore, to employ the murine local lymph node assay (LLNA). This was originally adopted by the OECD in 2002 as Guideline 429. The current, updated *OECD Guideline 429 Skin Sensitization: Local Lymph Node Assay* was adopted in July 2010. This method determines the skin sensitising potential of chemicals as a function of responses provoked in skin draining lymph nodes, and, compared with previously used guinea pig assays, offers important animal welfare benefits (Kimber et al., 2002). The July 2010 OECD Guideline 429 also makes provision for a 'reduced' LLNA that can be used for the confirmation negative predictions of skin sensitisation activity, and allows for a further reduction in the number of animals required (Kimber et al., 2006). This OECD 429 Guideline involves the testing of 4 mice (2Male/2Female) over five dose ranges plus control, total of 24 mice.

Kimber, I., Dearman, R.J., Basketter, D.A., Ryan, C.A. and Gerberick, G.F. (2002) The local lymph node assay: past, present and future. *Contact Dermatitis* 47: 315-328.

Kimber, I., Dearman, R.J., Betts, C.J., Gerberick, G.F., Ryan, C.A., Kern, P.S., Patlewicz, G.Y. and Basketter, D.A. (2006) The local lymph node assay and skin sensitization: a cut-down screen to reduce animal requirements? *Contact Dermatitis* 54: 181-185.

Oral exposure and systemic toxicity

The opportunities for oral exposure appear to be relatively limited, but cannot be discounted. Therefore a risk assessment must be conducted to establish the likelihood of systemic (or local)

adverse health effects resulting from oral exposure. Such a risk assessment should be based upon estimated levels of exposure, in tandem with a consideration of the composition of novel racetrack materials. Whether a risk assessment of this type will provide the necessary reassurance will be dependent upon the quality and quantity of information available. If an appropriate risk assessment cannot be performed then it may prove necessary to consider conduct of a standard repeat dose toxicity study. It is suggested that a 28 day repeat oral exposure study in rats would suffice (and that there would not be a need for a more protracted 90 repeat dose oral exposure study). The preferred approach is described in *OECD 407 Guideline for the Testing of Chemicals: Repeated Dose 28 Day Oral Toxicity Study in Rodents; (Adopted July 1998)*. This OECD 407 Guideline involves the testing of 20 rats (10Male/10Female) over 3 dose ranges plus a control group, repeated for 28 days. A total of 70 rats)

Testing Laboratories:

The Authority can supply contact details of suitable laboratories.