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Report: CR-2004/45

A procedure for fit-for-purpose certification of non-traditional road additives

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TERMS OF REFERENCE

This project was commissioned by Agrément, South Africa, to initiate the development of a “fit-for-purpose” certification system for unsealed road additives.

The following terms of reference were identified:

- Categorise the unsealed road additives currently available in southern Africa.
- Define criteria that could be used by Agrément, SA to certificate unsealed road additives.
- Propose and/or develop laboratory test methods for the evaluation of the criteria and compare with field performance.
- Recommend minimum acceptance criteria for road additive performance.
- Prepare a procedure for assessment

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1. INTRODUCTION

1.1. Background

There are over 500 000 km of unsealed roads in South Africa managed by a number of different authorities. Unacceptable levels of dust, poor riding quality and/or impassability in wet weather are experienced on much of this road network.

Over the last 25 years, numerous soil additives in the form of chemical dust palliatives, compaction aids and stabilizers have been introduced to the road industry, which manufacturers claim will reduce both dust and maintenance on unsealed roads or improve the material properties to a point that the road can be sealed. The level of research and usefulness of the findings differs from additive category to additive category - numerous small ad hoc studies have been undertaken on calcium and magnesium chlorides, lignosulfonates, tars, bitumens and sulfonated oils. Very little work has been carried out on other potentially useful and cost-effective additives such as waxes, synthetic polymer emulsions, enzymes and other biological agents. In all of these investigations, including those undertaken by the South African road authorities, the methodology mostly entails an ad hoc laboratory investigation, usually on one material type using standard laboratory tests (which were not developed for treated materials), followed by a field trial. This is usually done on one road, which is subjectively monitored until the effects of the additive are no longer apparent (eg dust suppression). Rejuvenation requirements and techniques are usually not considered. Reporting is based on the observations made, the recommendations and conclusions are usually applicable only to the material and road on which the experiment was conducted, and very little, if any, scientific interpretation of the results is provided (ie what attribute caused failure or led to success). In many instances, failures that could have been related to incorrect application techniques or to application on unsuitable materials were unfairly attributed to poor performance of the additive.

No effort has been made to quantify the benefits and cost-effectiveness of additives over longer periods of time (eg five years) and only limited attempts have been made to compare the performance of treated roads with untreated roads. Only limited information on material requirements and application techniques is available, while there is little performance related information on rejuvenation. Most of the international research has been carried out in the northern United States, Canada and Europe, all of which experience short dry seasons and low winter temperatures. The results are thus not particularly suited to South African conditions.

This lack of understanding has resulted in general scepticism among the roads industry regarding the use of road additives. The situation is aggravated by poor marketing, with many sales representatives having no engineering background, little understanding of the roads industry and insufficient knowledge to provide adequate technical backup.

Discussions with road authorities and consulting engineers indicated that “fit-for-purpose” certificates for additives, issued by an independent certification body would contribute to confidence in their use. A certification system would also encourage suppliers to conduct appropriate research. Agrément South Africa initiated the development of this system. The procedure documented in this report is the culmination of the study.

1.2. Development of a Fit-for-Purpose Certification System

The fit-for-purpose certification system has been developed in four phases:

- Phase I (Report CR-2002/32)¹
 - Background to the use of additives on unsealed roads
 - A listing and discussion of the various additive categories
 - An introduction to unsealed road additive certification
- Phase II (Report CR-2002/32)¹
 - Development and validation of control tests for certification
 - Setting of tentative limits for abrasion and erosion loss and strength improvement
- Phase III (Report CR-2003/34)²
 - Comparison of control test results with field performance
 - Refinement of the limits for abrasion and erosion loss and strength improvement
- Phase IV (This report)
 - Preparation of a detailed procedure for certification

2. AGREEMENT SOUTH AFRICA

The Board of Agrément South Africa was established in 1969 by the Minister of Public Works as an objective, independent agency to serve the building and engineering communities in providing assurance to specifiers and users via technical approvals for the fitness for purpose of non-standardised and/or unconventional construction products.

Agrément South Africa is a member of the World Federation of Technical Assessment Organisations (WFTAO), to which 23 countries belong.

The word Agrément means consent in French.

2.1. Roles

2.1.1 Agrément South Africa

Agrément evaluation and certification becomes relevant during the development phase of products when, through technical evaluation of prototypes, Agrément can indicate to entrepreneurs whether their products will be fit-for-purpose.

Agrément's role is strongest during the introduction to market phase when its certificates provide entrepreneurs with the instruments they need to demonstrate their product's suitability for specified uses, while at the same time providing the user with the necessary independent, objective information and advice on the product's characteristics, benefits and limitations.

An integral part of Agrément evaluation and certification is an assessment of the manufacturer's quality management system. The application of the quality management system is monitored regularly after an Agrément certificate has been granted, either by Agrément personnel or others acting as Agrément's agent.

As the product enters the market acceptance and growth phase, Agrément's role may diminish and may be taken over by the SABS. Typically once there are several manufacturers producing a similar product, there is a growing need to develop a standard for the product covering its manufacture, materials used in production and quality procedures. The usual process followed by the SABS is to establish a committee comprising interested parties to draft such a standard. The experience and knowledge gained by the developed, research organisation and Agrément during the earlier development phases may now be used as technical input in formulating the standard.

2.1.2 South African Bureau of Standards (SABS)

As described above, the SABS's role generally starts at the market acceptance and growth phase and becomes the dominant role in the ongoing market as conventional product phase when the SABS Listing and Mark Schemes provide the entrepreneur with an image of quality and reliable source of quality assurance.

2.2. Certification

An Agrément certificate is a technical document that:

- Summarises the assessed performance of the subject
- Lists the uses for which the product's fitness for purpose has been assessed,
- Lists conditions and requirements to be met if the assessed performance in use is to be attained

2.3. Certification Process

The general Agrément certification process is illustrated in Figure 2.1.

2.4. Further Information

Further information on Agrément South Africa and the WFTAO can be obtained from the Agrément website at www.agrement.co.za

Confirmation of Certification

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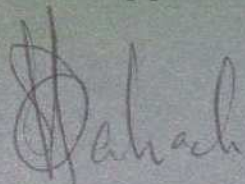
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which certificate provides detailed information on the performance in use and the uses of the subject of the certificate. When presented as proof of certification this document must be accompanied by the abovementioned certificate or by a certified copy of the typescript of the certificate approved by the Board.

A handwritten signature in black ink, appearing to read 'Mahachi'.

CHAIRPERSON

Dr Jeffrey Mahachi



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