

# TECHNICAL DATA SHEET

## Block paving at petrol station forecourts

By Eur. Ing. John Emery BA (Hons) C.Eng. MICE. FIHT

### Introduction:

In 1993, the author together with Prof. John Knapton of the University of Newcastle upon Tyne wrote an article entitled 'Pavers on Forecourts - are they safe?', which was published in 'The Bulletin' Volume 31 No. 2. Now, after 14 years it is perhaps appropriate to discuss the continuing use of block paving on petrol station forecourts and in particular to comment on the important issue of sealing the blocks and the need to ensure that the correct sealer is used.

### Historical background

Although perceived as a relatively modern form of surfacing, block paving has in fact emerged from an ancient tradition. Evidence of the use of small element paving for roads by ancient Greeks and Romans suggests that rather than being a modern innovative method of surfacing it may arguably be seen as a case of 'history repeating itself'. Modern block paving makes use of the attributes of rigid concrete with those of flexible asphaltic materials and synthesizes them into a surfacing having high strength, durability and aesthetic appeal.

The technology of this versatile form of paving has enabled it to be used for a wide range of applications such as at airports; tourist attractions and, of particular interest to members of APEA, at petrol station forecourts (see Figures 1, 2 & 3).



**Airport - Luton Airport**  
(still in use after 25 years)



**Tourist attraction - The Falkirk wheel**



**Forecourt Peterborough -**  
**Extension opened March 2007**

A major benefit of block paving is that each individual unit is manufactured in a factory environment where quality control ensures that specified dimensional tolerances, strength, resistance to abrasion, durability and colours are carefully monitored. Unlike asphalt and in situ concrete surfaces block paving may be put into immediate use after construction and can be laid in poor weather conditions. The superior strength of the blocks (typically in excess of 3.6 MPa) makes them suitable for pavements subject to heavy industrial applications.

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Experience has shown that block paving has the following properties:

- Durability
- Surface stability
- Good skid resistance
- Good riding surface
- Capability of rapid removal of surface water
- Ease of maintenance
- Resistance to thermal movement and thermal shock
- Resistance to fuel, oils etc.
- Resistance to jet blast

#### Sealing blocks at petrol station forecourts

As a block paving surface comprises 95% solid concrete and 5% joints, there can be problems due to ingress of water and fuels through joints leading to contamination risks and to the erosion of jointing sand which can, in turn, lead to loss of interlock, deformation and disintegration of the pavement surface. Investigations at Newcastle University into the erosion of jointing sand by Knapton and Emery revealed that these problems were overcome by sealing the blocks. If a solvented liquid urethane pre-polymer sealer was applied to the blocks and allowed to penetrate the joints, on polymerization, the jointing sand was not only stabilised but also ingress of fuels and water through joints and into the underlying pavement structure was reduced to a negligible level. Furthermore, a specifically formulated sealer retained its elastomeric properties with time, thus making it ideal for use in maintaining interlock in block paving.

The benefits of this sealer may be summarized as follows:

- Stabilises sand in joints
- Strengthens pavements
- Withstands vacuum sweeping
- Inhibits water/fuel ingress
- Inhibits weed growth in joints
- Long performance life
- Inhibits contamination risks

Following the research made by Knapton and Emery, the sealer tested was approved by APEA as being appropriate for use on block paving used at forecourts.

A summary of the main conclusions made after this research is given below:

- Providing joints are correctly sealed, forecourts surfaced with blocks are as safe as those surfaced with traditional concrete slabs.
- Those block-paved forecourts which have not been sealed may give rise to unacceptably high Lower Explosive Level (LEL) readings. In such cases the areas should be sealed retrospectively.
- Sealing of blocks with the liquid pre-polymer reduces the infiltration of spillages of the three fuels tested, i.e. Avgas, petrol and diesel to an insignificant level.

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- Sealing of blocks renders the surface virtually impermeable to water.
- Skid resistance value and slip-resistance of blocks is satisfactory after sealing.
- The equipment used for laboratory determination of infiltration rates is suitable for in-situ testing at forecourts.
- The recommended maximum permitted infiltration rates are:

Water	0.05 ml/sec
Petrol	0.02 ml/sec
Avgas	0.02 ml/sec
Diesel	0.02 ml/sec

#### Concluding comments

Block paving has successively been in use at petrol station forecourts for some thirty years. The versatility and aesthetic appeal of this form of surfacing is recognised and used by the main fuel companies at their forecourts.

It must be recognised that **there are many block paving sealers now available which are not suitable for use at petrol station forecourts.** The sealer researched was specifically developed for use on aircraft pavements and for use on forecourts, therefore, consultants and contractors should ensure that they are specifying/using the correct sealer. The research work mentioned above does not apply to 'solvent-free' sealers used for other block paving applications. Generally speaking, these sealers are not sufficiently elastomeric, durable and their resistance to infiltration of fuels and water is unproven.

For further technical information, sealer suppliers and companies specializing in the application of the sealers which meet the exacting standards required by APEA contact the writer of this article at [john@johnemery.co.uk](mailto:john@johnemery.co.uk).

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To Interpave - The Precast Concrete Kerb Association for the Photograph given in Figure 2