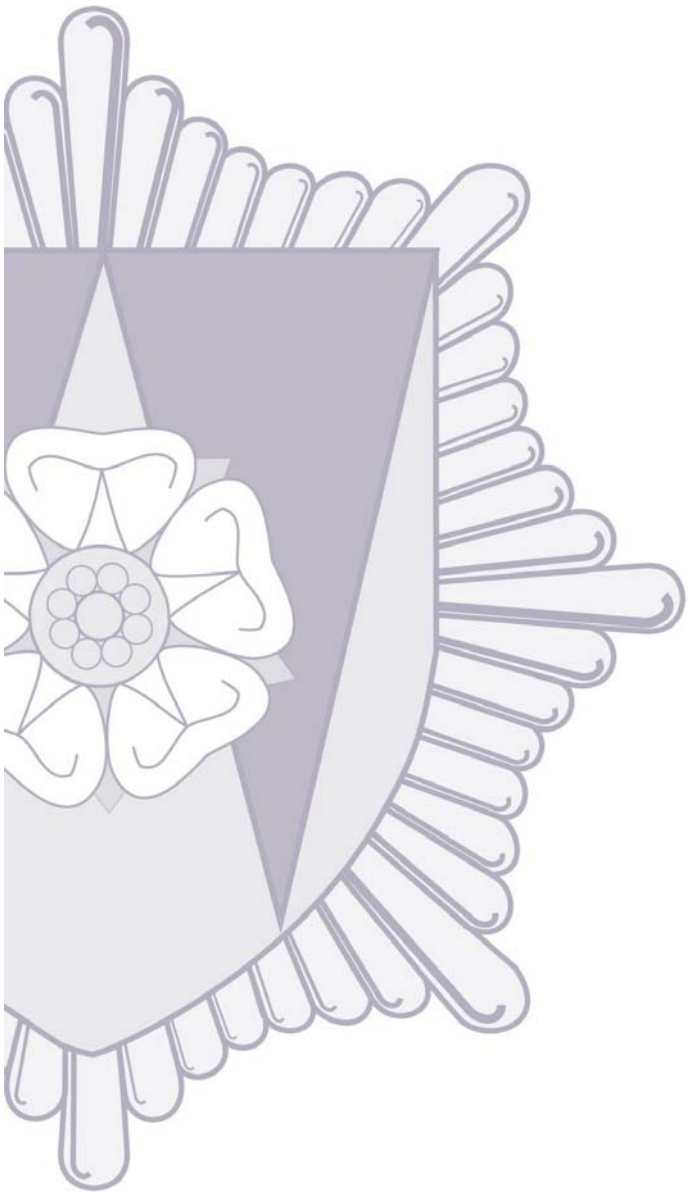
West Yorkshire Fire & Rescue Service

Fire Safety - Information Note FS-INF018

(Previously Supplementary Information Note No 5)

Petrol Filling Station Forecourts – Concrete Block Paving



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Introduction

Concrete block paving is an increasingly popular method of surfacing the forecourts (other than the road tanker standing are) of petrol filling stations.

The major advantages of concrete blocks as a forecourt surface finish are, in addition to an aesthetically pleasing appearance:-

I The ability to lift and relay the block for either access to buried pipework and other services or for layout changes.

Ii The paved forecourt can be opened to vehicular traffic immediately after construction, with no delay for curing or hardening.

iii The blocks are highly resistant to spillage of petroleum fuels.

Construction

Interlocking concrete block paving for petrol filling stations consists of 80mm thick concrete blocks, manufactured with a good standard of quality control, to a crushing strength well in excess of 55 N Pa. The blocks are manufactured to close dimensional tolerances and are typically 200mm by 100mm in size. They are normally rectangular in shape but other shapes, based on the rectangular dimensions, are available depending on the manufacturer.

The surfacing consists of the blocks, usually in herringbone pattern, laid on a layer of carefully selected bedding sand, approximately 30mm in depth after compaction. During compaction, some bedding sand is forced up into the joints between the individual pavers. These joints are approximately 3mm wide and are completely filled with jointing and compacted by vibration. The sand filled joints are an important feature of this form of surface finish, they ensure that the pavement behaves in a similar way under load to an asphalt pavement and that interlock is developed between individual pavers. Consequently when a wheel load is applied to a paver, the load is spread to adjacent pavers. Although the initial interlock is obtained by compacting the concrete blocks with a vibrating plate compactor, it develops further stability under the first few thousand vehicular imposed loads.

The block surface needs to be laid to falls to dispose of surface water or fuel spillages to the drainage system in the same way as for other forecourt surfaces, since the top sand in the joints rapidly combines with detritus and road traffic debris to form what should be, an impermeable construction.

Permeability

When concrete block paving was first introduced into the UK as a suitable forecourt surface for petrol filling stations, there was concern expressed nationally by Petroleum Officers as to the jointing sand to withstand penetration by petroleum fuels.

As a result of this concern an investigation was carried out in the London area in the early 1980's to determine whether or not permeability was an inherent weakness with this type of construction.

Sites were chosen for the investigation from a selected area with operational histories of between one and six years. LEL's of petrol vapour from 0% to 20% were measured in the bedding sand immediately alongside the pump islands with a good correlation between pump usage and product penetration.

These measurements appeared to contradict the previous reports related to the European mainland experience where this type of surface had been in use since the early 1960's. Further tests were, therefore, carried out on a number of onsite concrete slab forecourts in the same general area, which it was assumed would give some data related to an impermeable construction. This investigation produced LEL's of from 2.5% to 15% measured in the underlying construction materials in the areas of flexural cracks in the concrete slab and in the vicinity of joints, which appeared to be completely sealed with bitumastic material. In one instance, an appreciable LEL reading was obtained within the depth of concrete in an apparently undamaged and joint free area.

The investigation concluded that in areas adjacent to the most frequently used pumps, all types of surface finishes may fail to completely preclude product penetration with the failure rate for block paving being no greater than conventional surfaces.

As a consequence of the investigation many Licensing Authorities were willing to accept the block paved forecourt subject to compliance with manufacturing and layout specification.

Joint Sealing

A liquid pre-polymer has been recently developed with the specific aim of stabilising the jointing sand in block paving. It is used directly from the container and is applied evenly to the forecourt surface by a long-handled brush or foam roller. The sealant is worked into the joints so as to penetrate the jointing sand; no surplus sealant is left on the forecourt surface.

The sealant was originally formulated to prevent jointing sand loss caused by jet blast from aircraft taking off from runways surfaced with block paving. Other benefits demonstrated by the sealant are:-

i) It greatly reduces the permeability of the jointing sand thereby eliminating problems associated with surface water and fuel ingress into the underlying sand and sub-bases.

ii) Its ability to prevent sand loss caused be vacuum sweeping.

iii) It provides a protective coating to the surface of the blocks, making subsequent cleaning easier

Note – It is anticipated that the revised edition of HS(G)41 will advocate a concrete slab surface within a 3.6 metre radius of a pump.