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In addition to the above it is necessary to be aware of the bond strength of ks143 in relation to the particular substrate, this can only be achieved by prototype or on-site testing, when these details are established, computer analysis will provide the percentage of adhesive required for each zone. Where the result is less than 50%, partial bonding is required however, at least 50% of the surface are must be bonded. If the result is greater than 50% but less than 90% then the entire surface area should be bonded. When the result is over 90% then a bonded system should not be used.

Technical notes: Bonded Systems

- When partial bonding, the ks143 should be applied in lines at fixed centres of max 80mm, or in accordance with the pendulum method.
- When using the pendulum method, prevent the inclusion of air.
- To minimise rippling it is advisable to spread the ks143 with a comb type spreader.
- When the deck is timber, always take into account expansion and contraction of the material, the ***hertalan*** should not be adhered at the joints in the timber substrate.
- ks143 is only suitable for use on concrete if the concrete is completely dry.
- Fully bonded means that the entire surface is bonded!

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Mechanical Fixing through the Membrane [hertalan easy.cover FtS]

hertalan easy.cover membranes can be fixed through with mechanical fasteners, which are then sealed with ***hertalan*** easy.weld strips. This system is particularly suited to large membranes and allows a reduction in the number of fixings required due to symmetrical loadings.

In principle there is no maximum size of membrane with the fix through system, the membrane size will be determined by the size of the roof and the maximum permissible point loading i.e. a 1.2mm membrane of 600m2 will weigh 900kg.

Application of the Fix through System:

- ✓ Roll the membrane out on the roof and after orientation allow it to relax for at least 45 minutes.
- ✓ All edge fixings are to be in accordance with Chapter 5.
- ✓ Take note of the fastener layout in each roof zone and adopt the simplest method of installing the ***hertalan*** easy.weld strips.
- ✓ A concentration of fasteners is likely in the edge and corner zones spacing should be determined by a computer programme for wind loadings.
- ✓ Fasteners should always be spaced at equal centres.
- ✓ Fasteners should be covered/sealed with ***hertalan*** easy.weld at least 150mm wide.

Technical Notes: Fix through System

- At "T" junctions between **hertalan** easy.weld strips and hot bonded joints an extra strip of TPE (see chapter 13) should be installed to give added security.
- All ***hertalan*** membranes used in roofing works are to be min 1.2mm thick.
- All fixings should be symmetrical and in the centre of the ***hertalan*** easy.weld strips to avoid adverse wind effects.

Bonded Roof Systems

With this type of roof system wind loadings should be calculated to comply with BS6339: Part 2: 1997 and in particular:

- ✓ The geometry of the structure
- ✓ Height of the roof edge and parapets
- ✓ The location of the structure in the UK

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- Systems manufactured by SFS, Buildex and Hardocan be used with a good quality roof screw and a flat countersunk fastening plate, only plates without sharp edges should be used however these fixings must be approved by the ***hertalan*** technical department prior to use.

Mechanical Fixing with secret flaps [hertalan easy.cover MF]

It is recommended that membranes using this system are restricted to a maximum of 20m long and 10m wide, the procedure for fixing is as follows:

- ✓ Unfold the membrane and lay out in orientation with the roof and allow the membrane to relax for a minimum of 45 minutes.

- ✓ After 45 minutes, (starting with the end to be fixed last) roll the membrane onto a tube of a suitable diameter and up to the point of initial fixing. Tube diameters can vary and we recommend 70mm for lengths of 10m and 50mm for lengths of 20m.

- ✓ Unroll the membrane towards the final fixing point, this will reveal the secret flaps, which should be fixed as specified.

- ✓ Fixings should always be placed as near as possible to the hot bonded joint (this is not common with other systems particularly PVC). All edges must always be adhered as described elsewhere.

- ✓ Where it is necessary to join the membrane, the edges should be butted up to each other, the joint should then be covered with either a 200mm wide adhered ***hertalan*** strip or a 150mm wide ***hertalan*** easy.weld strip. Either method will provide a secure and waterproof joint.

- ✓ Form all edge details in full accordance with Chapter 5.

Technical Notes: Mechanical Fixed System

- Ensure that the membrane is always rolled on and off in the direction of the slope.
- Always start at the high point.
- Fixings should always be as close as possible to the hot bonded joint.
- Select the best tube diameter to minimise creasing.
- Ensure that all butt joints are covered with ***hertalan*** S at least 200mm wide or ***hertalan*** easy.weld at least 150mm wide. Take particular care at "T" junctions.
- This system can only be supplied in ***hertalan*** of 1.2mm thickness.
- Some creasing may be apparent from factory production, these are of no detriment to the membrane and will decrease in time, and no attempt should be made to stretch them whilst fitting.

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Mechanically Fixed Roofing Systems

In principle, there are two approved mechanically fixed ***hertalan*** roofing systems, one with secret flaps welded to the underside of the membrane and another, which utilises cover fastening strips applied to the top of the membrane. With these systems the spacing and number of flaps/fixings can be calculated accurately with the use of wind load programmes.

To enable accurate calculations the following information is required:

- ✓ The geometry of the building (height, width and length)
- ✓ The height of the roof parapet
- ✓ The location of the building
- ✓ The type of supporting structure
- ✓ Orientation of the building

A combination of these factors will be used to determine the number of fasteners per m^2 in each roof zone.

Fasteners

Note: There are many types of fasteners available for use with ***hertalan*** roofing systems, it is common for contractors to use round ribbed disc fasteners with nominal thickness of less than 0.8mm and cheap self tapping or roof screws. **Such fasteners are not approved by *hertalan* and should be avoided at all costs.**

Approved Fastening Systems

hertalan currently approve the following systems:

- A polymer batten bar and HRG fasteners manufactured by Buildex. This system consists of a nylon strip/bar 25mm wide in lengths of 76m. The HRG fasteners are 6.3mm in diameter and have a silver coloured clima-seal coating.

- Heavy-duty fasteners manufactured by Olympic can also be used in conjunction with a nylon/ steel disc. The fastener has a diameter of 6.3mm and is supplied with a coating of more than 25 cycles of "kersternich" and has product accreditation. The use of the nylon/steel disc prevents deterioration of the membrane due to friction, this cannot be guaranteed when using other nylon/metal fixing plates.

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Chapter 9 Wind Load

Ballasted Roof Systems

To calculate the wind loading to be considered with ***hertalan*** Ballasted Roofing Systems it is essential to consider the following:

- ✓ The geometry of the building (height, width, length)
- ✓ The height of the parapet
- ✓ The location of the building in the UK
- ✓ The type of support structure
- ✓ The effective load that the roof is able to support, excluding standard snow load allowances.

A combination of the above factors will indicate whether a load can be placed on a roof and/or thickness of tiles and other forms of ballast i.e. gravel required.

The calculation should be determined on the basis of a computer programme in consideration of BS 6399:Part 2: 1997. Where required, ***hertalan*** can make this calculation on behalf of clients.

Ballast Layer

Where buildings are exposed to high winds (coastal regions etc.) the weight and diameter of the gravel is critical, it is established that the gravel will roll given excessive wind force, as an example gravel with an average grain diameter of 24mm will start to roll at wind speeds in excess of 14.7m/sec. this equates to force 7 on the Beaufort scale.

Where the roof is to be tiled or ballasted with slabs the same programme can be used to determine the thickness of the tiles/slabs. In situations where exposure is high, consideration should be given to placing slabs directly onto the ***hertalan*** rather than using supports, with this method the slabs should be placed with the bevelled edge and smooth side down, this should prevent wind lift, please also consider a suitable water discharge design.

Where slabs are laid directly to ***hertalan***, foot traffic should be prohibited, if it is necessary to walk on the roof then 2mm thick strips of ***hertalan*** should be placed under the slabs, this will also help to give minimal water discharge/distribution.