

April, 2003

Technical Bulletin No. 1011

Installation of Modified Bitumen Membranes Using Cold Applied Adhesives

BITEC SBS modified bitumen membranes having "H" as an ending (such as SPM-3.5H) may be installed using approved cold adhesives. BITEC recommends the use of PMA-186, or PMA-2000 adhesives to install these membranes; which are manufactured by BITEC. No cold adhesive is recommended for use with APP modified bitumen membranes, or any membrane having a film backing or surface.

PRECAUTIONS

- 1) Cold adhesives may not be used to install multi-ply membrane systems.
- 2) Positive drainage must be provided. A min. roof slope of 1/4" in 12" is recommended.
- 3) Do not use cold adhesives in any area suspected of ponding water.
- 4) Do not over-apply cold adhesives. Follow the manufacturer's application instructions. Over application can cause the membrane to blister, and the mineral surfacing may dislodge.
- 5) If application of membrane is over decks with slopes greater than or equal to 1" in 12", backnailing of the membrane is recommended. Backnailing can be accomplished by using suitable fasteners installed 8"

o.c. through 1" minimum tin disks.

- 6) Cold adhesives contain petroleum distillates. Avoid excessive heat and flame. Do not use open flame installation devices around membranes being installed by this method.
- 7) Do not use cold adhesives when the ambient temperature is below 55 degrees F.
- 8) Traffic over newly-applied membrane shall be kept to a minimum.

APPLICATION

The selected/approved adhesive manufacturer's application instructions shall be followed when using these adhesives.

Thoroughly stir the contents before and during use. Some cold adhesives can be applied using brush, roller and spray equipment, or by the use of a notched squeegee or trowel. Squeegee shall have notches 1/4" long, 1/8" deep and spaced 1" o.c. This configuration will provide sufficient adhesive application for most smooth surfaces being adhered to. Irregular surfaces will require the depth of notch to be 1/4" deep.

SURFACE PREPARATION

All surfaces to be adhered to

must be dry, swept clean, free from oil, grease, rust, scale, loose paint, dirt or any other debris. Average application rate is approximately 1.5 gallons per 100 square feet. Sufficient adhesive shall be applied at laps to result in a visible bead of adhesive at the completed lap edge.

The modified bitumen cap sheet should be cut in maximum lengths of 18 feet and allowed to relax before installation begins. All laps must be weighted or rolled after application. This should help insure positive adhesion and even distribution of the adhesive for a smooth appearance.

It is highly recommended to aluminum coat or embed roofing granules in the exposed adhesive for UV protection.

Spray equipment, capable of delivering 3 to 5 gallons per minute of a mastic coating-type material is suitable. A pole gun with suitable spray orifice (usually 0.060") is recommended. Material hose should be heavy duty: 3/4" i.d. air hose from pump to gun. However, any adhesive should be used in strict accordance with the manufacturer's instruction as printed on the can, label or other documentation.



BITEC
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TECHNICAL MEMO
January 5, 2001

TO: ALL BITEC REGIONAL MANAGERS
ALL BITEC SALESMEN
ALL BITEC AGENTS

FROM: Myles Adams

RE: Technical Bulletin #1012-1
Coatings & Adhesives Approval Update

Enclosed is the revised list of tested and approved coatings and adhesives. This information replaces Technical Bulletins 1003, 1004, 1006, 1007 and now 1012.

Please pay attention to the text of General Information and the footnotes. This information may change from time to time as some products disappear from the market and as we may have occasion to test or otherwise approve additional coatings or adhesives. Also, remember that BITEC discontinued the sale of BITEC MAC200 & MAC300 coatings in January of 1998.

Cold adhesives MAY NOT be used for multiply applications using BITEC membranes. Only a cap sheet may be applied over a previously installed fiberglass base sheet.

Manufacturer's installation requirements and specifications must be strictly adhered to when using these products. If these requirements are not followed, the following may result:

- 1) Membrane blistering and modified compound destruction.
- 2) Seam failure.
- 3) Fishmouthing and wrinkles of membrane.
- 4) Detachment of membrane under high wind conditions.

Positive drainage ($1/4:12$ minimum) is required and becomes a critical issue with cold process systems. Ponding water will accelerate destruction of the modified roofing membrane and result in product failure during adhesive cure time.

Maximum warranty period for cold applied systems is ten (10) years.

Best regards,
BITEC, INC.

E. Myles Adams
Technical Representative

Enclosure

MANUFACTURERS OF ADVANCED TECHNOLOGY WATERPROOFING MEMBRANES



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Jan. 5, 2001 **Technical Bulletin** No. 1012-1

Coatings and Adhesives Approval Update: 1/01

The following is a revised list of tested and approved coatings and adhesives. This information replaces Tech Bulletins 1003, 1004, 1006, 1007 and now 1012.

Cold adhesives MAY NOT be used for multi-ply applications. Only the cap sheet may be cold applied over a previously installed fiber-glass base sheet.

Manufacturer's installation requirements and specifications must be strictly adhered to when using these products. If these requirements are not followed, the following may result:

- 1) Membrane blistering and modified compound destruction.
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Positive drainage is required when using cold process systems. Ponding water will accelerate destruction of the modified roofing membrane and result in product failure during adhesive cure time.

Maximum warranty period for cold applied systems is ten (10) years.

At this date we still do not know of any cold adhesive compatible with BITEC APP products.

As a reminder, "plastic cement" products are not totally compatible with modified bitumen, have a limited life span, and ARE NOT acceptable for use with BITEC products.

Coatings other than BITEC's MAC 200 and MAC 300 are not covered by BITEC warranties.

Refer to UL individual listings for the UL approved coatings.

Product;	Use with:	APP	SBS	Product;	Use with:	APP	SBS
ABC #401 Alum. Coating		◆	◆	Monsey 5171		◆	◆
ABC #403 Fibrated Alum. Coating		◆	◆	Monsey 5177		◆	◆
ACM - No Fiber		◆	◆	Monsey Pro Grade		◆	◆
ACM - Fibrated		◆	◆	Monsey Aluma Guard		◆	◆
Alumination 7122-136		◆	◆	Perma Seal Aluminum Coating		◆	◆
APOC 212 Fibr. Alum. Coating		◆	◆	Roof Kote		◆	na
Cerami Coat		◆	◆	Stabond X47105		◆	◆
Flexx Aluminum Coating		◆	◆	TAPCO #110 *		◆	◆
GAF Fibered Alum. Roof Coating		◆	◆	TAPCO #120 *		◆	◆
Gardner Asbestos Free		◆	p	TAPCO Sun Brite		◆	na
Gardner Pro Grade		◆	◆	TAPCO Alumna Brite		◆	na
GATEPRO Fibered Aluminum		◆	◆	TCC		◆	◆
Gibson-Homans 5188		◆	◆	Uniflex Alum. #100		◆	◆
Gibson-Homans 5350-777		◆	na	Uniflex Alum. #500		◆	◆
Groco-Gro Mast-White		◆	◆	Uniflex Alum. #20-480-300		◆	◆
Grundy al MB		◆	◆	Unocal White Acrylic		◆	◆
Grundy Fibrated Alum. (2#)		◆	◆	Wilflex-White Acrylic		◆	◆
Grundy Pro Grade		◆	◆	Wilflex-White Aluminum		◆	◆
Grundy 20F Emulsion		◆	◆				
Gulf States-Gulf Seal #410 (Alum)		◆	◆	ADHESIVE PRODUCTS			
Gulf States-Gulf Seal #411 (Alum)		◆	◆	BITEC PMA 186 Adhesive		na	◆
Henry #120		◆	◆	BITEC PMA 2000 Flash. Cement		na	◆
Henry #220		◆	◆	GATEPRO SBS Adhesive		na	◆
Henry #229 - Water Base		◆	◆	GATEPRO Flashing Mastic		na	◆
Henry #280 - White Acrylic		◆	◆	KARNAK #81 Mod. Bit. (all grades)		na	◆
Henry #520		◆	◆	Monsey MBA Gold Adhesive		na	◆
Karnak #97		◆	◆	Monsey MBA Flashing Cement		na	◆
Karnak Alumin-R (Elastom. Alum.)		◆	◆	TAPCO #216 Adhesive		na	◆
Lion AL-Kote		◆	◆	TAPCO #2100 Flashing Cement		na	◆
Lion AL-Kote #103		◆	◆				
Lucas #348		◆	◆				

◆ = approved na = not approved for use with product at this time p= pending
 * See TAPCO listing in UL Roofing Materials and Systems directory.

Oct., 2003 **Technical Bulletin** No. 1013

Moisture Vents - Recover Situations

As a matter of clarifying BITEC policy, one-way moisture vents are required on all recover situations whether or not a Retrofit Board or recover insulation of any type is used. Even though this practice has been considered an industry standard for years now, it appears that some persons in the industry are unaware of it.

To further clarify the BITEC policy, these vents are also required over all types of concrete decks, insulating fills of all types and various combinations of both, for new and existing construction. Over long periods of time, these decks can absorb and release moisture which collectively can blister roof membranes, among other damage, if not allowed some method of venting the vapor pressure which can be created.

Don't misunderstand the purpose of these vents; they are not for the purpose of drying out wet situations or wet fill decks, but only to allow some venting of vapor pressure created below the new roof membranes. Concrete and wet fill type decks can retain moisture for years which can be detrimental to any roof membrane. Wet material should not be recovered, but must be removed and replaced with new dry materials; both

insulation and membrane.

Wet insulation loses its insulation value, as the moisture absorbs heat energy, mostly from solar radiation. The wet insulation should be replaced for energy efficiency in addition to providing a suitable substrate for a recover assembly. Wet insulation encapsulated by a recover membrane will not dry out, but in most instances will deteriorate to the point of losing its compressive strength (especially fiberglass insulation) which in turn will allow mechanical fasteners to work up and down against the new membrane under roof traffic. This could eventually cause penetration of the new roof membrane resulting in leaks.

Even recover situations over existing membranes without insulation should have vents, due to the possibility of residual moisture in the old membrane. For the same reason, recover membranes using mechanically fastened base sheets of all types without recover insulation should also incorporate moisture vents. Only when approved by the Technical Department, may vents be omitted due to specific project conditions.

As a matter of good roofing practice, NRCA recommends installation of moisture vents when recovering with insulation

boards, when vapor retarders are used and over all types of wet fill decks. (The NRCA recommendation can be found in the Appendix of the Roofing and Waterproofing Manual, page 1) BITEC believes existing roof membranes should be considered as a vapor retarder when recovered, with or without an insulation board.

Additionally, BITEC recommends the use of spun aluminum vents with one-way valves. Flanges of these units should be primed and dry before installation. Installation should be done in accordance with Detail #21 in the back of our Specification and Detail Manual. Since BITEC warranties do not cover roof accessory items such as these vents, the plastic type vents are acceptable with SBS membranes but not preferred, and should not be used with torch applied membranes for obvious reasons.

When the BITEC Specification and Detail Manual is revised for the next reprinting, this matter will be addressed in the General Requirements.

Jan., 2001

Technical Bulletin No. 1014

- PITCH PANS -

Pitch pans are not a preferred method of sealing roof penetrations but quite often are used and accepted by most manufacturers for warranty situations, BITEC, INC. included.

Since pitch pans are a sheet metal accessory item not manufactured by BITEC, INC. they are not covered by our warranties.

When pitch pans are used they should meet the following requirements as a guide to provide an adequate seal:

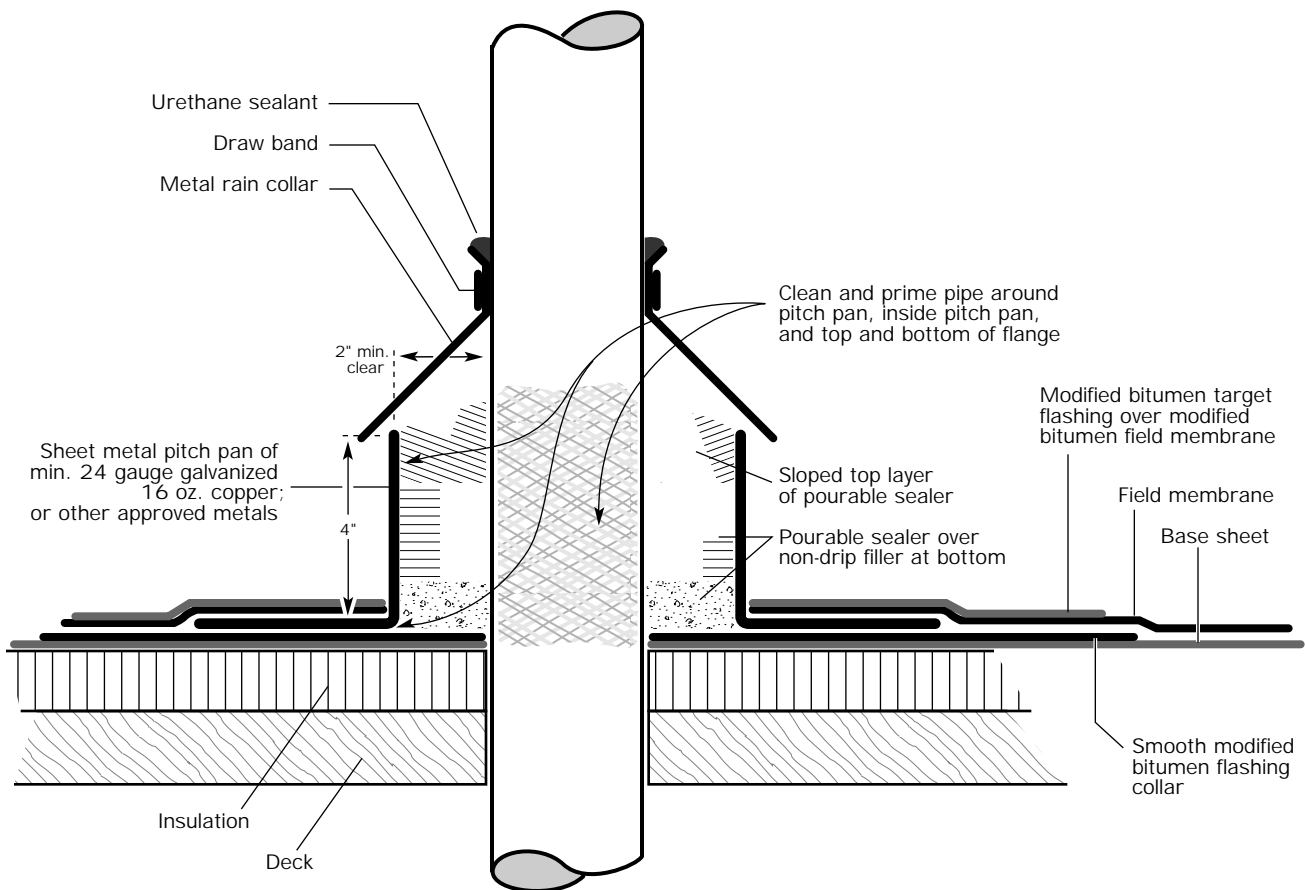
- 1) Only one item should be allowed to pass through each pitch pan. Multiple penetrations should be avoided if at all possible.
- 2) Rain collars or storm collars should always be installed.
- 3) Provide a minimum of 2" clearance between the sides of the pitch pan and the penetration item. When multiple penetrations are an absolute necessity, maintain the same 2" clearance between penetrations.
- 4) Using ASTM D-41 Asphalt Primer, pitch pan flanges must be primed top and bottom. Also the inside of the pitch pan must be primed as well as the penetration item after it has been properly cleaned of oil, old mastics and asphalt, scale, rust, etc. The primer should be allowed to dry thoroughly, preferably 24 hours or at least overnight, or adhesion may be compromised. Different primers may be required with certain pourable sealers.
- 5) When insulated refrigerant lines are run through pitch pans the insulation must be removed where it passes through the pitch pan filler. The insulation can be continued above the rain collar and below the deck.
- 6) Roof flanges should be set in modified bitumen mastic on a smooth surface flashing collar before an SBS cap sheet membrane is installed. For APP applications where mastic may not be used, the flange can be set on the smooth surface collar flashing after heating the collar enough to soften it, providing in effect the same seal as setting it in mastic. This same heating technique can also be used with SBS products but the heat application must be used sparingly. After the cap sheet membrane is installed around the pitch pan on top of the flange, a target flashing of the field membrane previously fitted dry, must be installed to cover all the seams and joints adjacent to the pitch pan.
- 7) The deck opening around the penetration may need to be initially closed with a metal closure. At the deck and/or insulation levels, the pan should be sealed with; a cementitious mixture, plastic cement, BITEC PMA 2000 or similar product, or a combination of the above. The pan should then be filled approximately 2/3 to 3/4 full with BITEC PMA 186, PMA 2000 or other similar or suitable pourable elastomeric fillers. **DO NOT USE PLASTIC CEMENT.** After the first layer has settled, finish filling the pan with the same filler, mounding the filler up around the penetration to provide a sloped top surface that will not hold water.
- 8) No matter who furnishes the pitch pans, they must be properly fabricated and there are several different designs that are acceptable but the following basic design principles should be followed for the best results:
 - a) Pitch pan material can be 24 to 20 gauge galvanized metal, 16 oz. to 24 oz. copper or 26 ga. stainless steel. Softer materials like lead should be avoided as should aluminum and prefinished materials unless there is an absolute necessary requirement for them. These less desirable materials should be preap-

(continued) →

Technical Bulletin No. 1014, continued

proved when necessary.

- b) Depth of the pan should be a minimum of 4" unless there is a special detail requirement for a shorter pan. Special conditions may require preapproval.
 - c) Roof flanges should be 4" wide and continuous with corner pieces either spot welded or soldered in. All but one vertical corner should be solid with the fourth corner formed so as to be opened for fitting around the penetration item. After installation the open corner can be locked tight by a folded tab and or soldered. Round pitch pans can also be used when the pan can be installed down over an item without having to be opened. Oversize lead jacks should never be used for pitch pans.
 - d) Two piece or otherwise multiple piece pitch
- pan should be avoided and screw or pop rivet fasteners should not be allowed. Only soldering of lock formed corners or pieces should be used for joining when multiple part pans are needed.
- e) Rain collars can be installed with or without draw bands. Forming collars with a flat area for the band and a sealant receiver at the top is not easy and requires special equipment. Simple collars tightly fitted around the penetration, lapped and screwed together are acceptable when properly installed and sealed to the penetration with a urethane type sealant. These collars are easily removed to check the pan for need of maintenance and can easily be reinstated. Only urethane type sealants should be used.



TYPICAL PITCH PAN DETAIL

March, 2004

Technical Bulletin No. 1015-2

UL CLASSIFICATION LISTINGS

UL Classification Listings need not be hard to interpret. The Listings only cover what tests have been run on specific assemblies and do not cover many other possibilities. The chart on the back of this page divides listing into various categories for easier comparison than is possible in the *UL Roofing Material and Systems Directory*.

The chart does not contain all listing information due to space constraints, so it is important to always refer to the actual listing for the entire content of items like approved insulations, minimum or maximum thickness, all SBS or APP products approved and approved coatings. Also, the chart does not include Maintenance and repair listings because there are so many "gray areas". The latter we prefer to discuss on specific job to job basis.

Another point is that not all of the assemblies, as listed, are warrantable by BITEC. For example, going over an existing smooth membrane without a base sheet or over a gravel surfaced roof without removing the gravel and not using insulation as a divorcement layer. These are not warrantable systems with BITEC.

It is important to remember that modified bitumens differ considerably compared to similar BUR listings using cap sheet membranes, which use oxidized asphalt, and fiberglass reinforcement mats; i.e., G3 sheets. In general modified bitumens give greater fuel contribution in fire test than built up items, therefore usually requiring additional coatings to resist flame spread. Some membranes are formulated with fire retardant chemical and inert fillers that make the additional coatings unnecessary. These fire resistant membranes are usually referred to as "FR" membranes, but the "FR" name means nothing to UL. For instance, a manufacturer does not have to label a sheet "FR" just because it meets certain fire test requirements. The "FR" designation is nothing

more than a marketing term that should only, in our opinion, be used to designate a membrane that does not require additional coatings to meet UL Fire Resistance Classification "A".

For example, In one of BITEC's tests at UL, we received Class "A" approval for using APM-4T and APM-4.5T without the use of insulation or a coating, but without insulation, the listing is restricted to non-combustible decks such as structural concrete, lightweight insulating concrete or gypsum. Steel decks would require the use of insulation, but the insulation is limited to a maximum thickness of 3/4" perlite, fiberglass or wood fiber. If any other insulation were used, it would require a layer of minimum 1/4" Dens-Deck over the insulation to provide a non-combustible substrate for the installation of the membrane assembly. In this assembly the slope is limited to 1" per foot. The point is, in these systems, the result is a Class "A" assembly without the use of a "FR" membrane. Also, those same two membranes used over combustible decks without insulation has been approved as Class "B" without a coating, but the slope is limited to 1/4" per foot.

APM-4T and APM-4.5T provide situations where "non-FR" membranes will meet the requirements for UL Class "A" or "B" without the use of FR membrane or additional coatings.

Questions are often asked if a certain product is Class "A". That question cannot be answered without knowing how the product is used in assembly with other materials; what type deck is used, what insulation is used, if any, and what the maximum incline or slope is.

In addition to the preamble at the front of the *UL Roofing Materials and Systems Directory* and the preamble that precedes the BITEC Listings, it is important to remember the following information when selecting BITEC products for specific

assemblies.

1. The UL preamble information is copied in your Technical Binder.
2. EPS insulation, any thickness, can be used on non-combustible decks only, with minimum 1/2" wood fiber or 3/4" perlite barrier, but not for combustible decks.
3. For combustible decks, minimum 1/4" Dens-Deck can be used over EPS or polyISOcyanurate insulations and the assembly changes to a noncombustible substrate.
4. PS-2H is UL Classified and is an acceptable alternate for a G2 base sheet in non-combustible assemblies only, where perlite or wood fiber is used as a barrier or on lightweight and concrete type decks. (Not for combustible decks)
5. Where two plies of G2 base sheet are required, one ply of inverted G3 base sheet may be substituted.
6. BITEC FA-2T, FS-2H and FS-25 may be used wherever a G2 base sheet is specified.
7. Two plies of Type G1 fiberglass ply sheets may be used in lieu of a Type G2 fiberglass base sheet.

In addition to the above, there are several other provisions in the preamble that allow for BITEC products to be used, that are not specifically clear in the individual listings.

In conclusion, we reiterate that UL Listings need not be hard to understand, but be specific and **DO NOT MAKE ASSUMPTIONS**, especially in "gray areas". If you have any doubts or questions please contact BITEC's Technical Services Dept. at 800-535-8597.

See the UL Listings Chart on the back of this page.

UL LISTINGS & REQUIREMENTS

For more specific information, check latest specific UL Listings, 2004 RMSD

Revised MARCH 2004

For Warranty Information contact BITEC Technical Services Dept. @ 1-800-535-8597. Not all listings are warrantable .

UL Listing Number	Class	Deck	Slope	Insulation requirements	Base Ply Requirements	Interply	SBS	APP	Surfacing Requirements	
#1	Ballasted	A	NC	3"	Opt'l; Almost any; Any thickness.	1 or more G2; fasten or mop	Optional	YES	YES	Flood coat & Gravel; Loose gravel up to 2:12 max incline.
#2	Ballasted	A	COMB	1/2"	Opt'l; 1.5" min. See UL Listing.	Same	Optional	YES	YES	Flood coat & gravel or loose gravel.
#1	Fully Adhered	A	NC	1-1/2"	Almost any insulation; any thickness.	1 or more G2; Fasten or mop	Optional	NO	YES	APOC #212; HENRY 520; KARNAK #97; MONSEY PRO GRADE
#2	Fully Adhered	A	NC	3/4"	Almost any insul; 4.5" max. thickness	Same	Optional	YES	NO	KARNAK #97 or AF; Grundy al MB.
#3	Fully Adhered	A	NC	3/4"	Almost any insulation; any thickness.	Same	Optional	SPM-4.5Tonly	NO	SAME
#4	Fully Adhered	A	NC	1/2"	NONE	2 ply G2 or 1 ply G3	Optional	SPM-4.5Tonly	YES	APOC #212; HENRY 520; K#97or AF; MONSEY PG; MAC 200
#5	Fully Adhered	A	NC	1/2"	NONE	3 ply G2 or 1ply G3&1plyG2	Optional	YES	NO	KARNAK #97 or AF; Grundy al MB
#6	Fully Adhered	A	NC	1"	Almost any insulation; any thickness.	1or more G2; fasten or mop	Optional	NO	YES	APOC#212; HENRY 520; KARNAK #97 or AF; MONSEY PRO GRADE
#7	Fully Adhered	A	NC	3/4"	Almost any insulation; any thickness.	SAME	Optional	YES	NO	KARNAK #97 or AF; Grundy al MB
#8	Fully Adhered	A	COMB	1/2"	Optional; almost any insul; Any thickness	3 ply G2 or 1ply G3&1plyG2	Optional	SPM-4.5Tonly	YES	APOC #212; HENRY 520; K#97; MONSEY PG; Gravel or loose gr.
#9	Fully Adhered	A	COMB	1/4"	2 or more layers almost any; min. 3" thick.	1 or more G2; fasten or mop	Optional	YES	YES	APOC #212; HENRY 520; K#97; MONSEY PG; Grundy al MB
#10	Fully Adhered	A	NC	1"	Conc. Deck or insulating type deck fills;lt.wt.	SAME	Optional	NO	YES	APOC#212;Henry 520; K#97 or AF; Monsey PG; Grundy al MB; MAC 200
#11	Fully Adhered	A	NC	1"	Optional; almost any insul; Any thickness	1 or more G2; fasten or mop	Optional	YES	YES	Grundy al MB only; This is a Grundy test and listing!
#16	DELETED									
#17	Fully Adhered	A	NC	1/2"	Optional; * 4" maximum thickness	SAME	Optional	YES	NO	KARNAK #97 or AF; Gravel or loose gravel.
#18	DELETED									
#19	Fully Adhered	A	COMB	1"	Optional; any insul; any thk; req. barrier board.	1 Ply G2 fasten or mop	Optional	SPM-4.5Tonly	YES	KARNAK #97 or AF; See UL Listings for App Coatings.
#22	Fully Adhered	A	NC	1"	Optional; See listings for approved insulations	1 ply G2 fastened or mopped	Optional	NO	YES	APOC #212; HENRY 520; KARNAK #97; MONSEY PRO GRADE (PG)
#23	Fully Adhered	A	NC	1/4"	NONE; Conc type decks; Lt.Wt. & Gypsum	1 ply G2 fastened or mopped	Optional	NO	APM-4T&4.5T only	!!!NONE REQUIRED!!! Includes Tectum w/ Barrier Board
#24	Fully Adhered	A	NC	1"	Optional; Almost any insulation any thickness	1 or more G1 or G2	Optional	NO	YES	FIELDS F530 HEAT SHIELD OR F630
#25	Fully Adhered	A	NC	1"	Optional; Only perlite,WF or F'G; 3/4"max.thick.	1 or more G1 or G2	Optional	NO	APM-4T&4.5T only	!!! NO COATING REQUIRED !!!
#26	Fully Adhered	A	NC	1/2"	Optional; Only perlite,WF or F'G; 3/4"max.thick.	1 or more G1 or G2	Optional	**YES**	NO	!!! NO COATING REQUIRED !!!
#12	Fully Adhered FR	A	NC	3/4"	Almost any insulation, any thickness.	1 or more G2; fasten or mop	Optional	FR	NO	FR - NONE REQUIRED !!!!!
#12	Alt. Insulation FR	A	NC	3/4"	EPS w/1/2" WF or 3/4" Perlite insulation	SAME	Optional	FR	NO	SAME
#13	Fully Adhered FR	A	COMB	1/4"	Almost any; 1.5" Perlite or 3/4" wood fiber insul.	SAME	Optional	FR	NO	SAME
#14	Fully Adhered FR	A	NC	3/4"	Optional; Any insulation, any thickness	1 G1 or G2, fastened or mop	Optional	FR	NO	SAME
#15	Fully Adhered FR	A	COMB	3/4"	Almost any; 1.5" perlite or 3/4" WF; offset joints	1 ply G2, fasten or mop	Optional	FR	NO	SAME
#21	Fully Adhered FR	A	COMB	1" (03)	Opt'l; Any; Any thk; requires bar'r bd.w/offset jts.	SAME	Optional	SFM-3.5H-FR only	NO	SAME
#1	Fully Adhered	B	COMB	1/2"	Almost any; any thickness; 3" min. thickness	1 or more G2; fasten or mop	Optional	YES	YES	KARNAK #97 or AF; GRUNDY al MB; See listing for APP coatings
#2	Fully Adhered	B	COMB	1/2"	NONE ALLOWED; See actual listing !!!	2 ply G2 or 1 ply G3	Optional	YES	YES	KARNAK #97; APOC #212; HENRY 520; MONSEY PRO GRADE
#3	Fully Adhered	B	COMB	1/2"	NONE ALLOWED; See actual listing !!!	SAME	Optional	FR only	NO	FR - NONE REQUIRED
#4	Fully Adhered	B	COMB	1/2"	OPTIONAL; 1"min. most; 3/4"min.perlite; 1" WF	1 ply G2 fastened or mopped	Optional	NO	APM-4T&4.5Tonly	APOC #212; HENRY 520; KARNAK #97; MONSEY PRO GRADE
#5	Fully Adhered	B	COMB	1/4"	NONE	SAME	Optional	NO	SAME	!!! NONE REQUIRED !!!
#6	Fully Adhered	B	COMB	1/2"	NONE	1 or more G2; fasten or mop	Optional	FR only	NO	FR - NONE REQUIRED
#7	Fully Adhered	B	COMB	1/2"	OPTIONAL ; "Most insulation" any thickness	1 or more G2; fasten or mop	Optional	NO	YES	FIELDS 530 OR 630 only! FIELDS LISTING !
#1	Fully Adhered	C	COMB	1.5"	Optional; Any; Any thickness	1 or more G2; fasten or mop	Optional	NO	YES	NONE REQUIRED
#2&3	NOT USABLE									
#4	Fully Adhered	C	NC	1/2"	Almost any; Any thickness	1ply G2 fastened or mopped	Optional	YES	NO	NONE REQUIRED
#5	Fully Adhered	C	Comb	UNL	NONE	1 ply G2 Beta Base	Optional	MDS	MDA	NONE REQUIRED

May, 2003

Technical Bulletin No. 1016

Roof Insulation Fastening/Attachment

Effective immediately, the following fastener and plate quantities are required for the various size insulation boards, regardless of thickness, as the minimum for BITEC warranty issuance:

2' x 4' boards:

4 fasteners & plates per board

3' x 4' boards:

6 fasteners & plates per board

4' x 4' boards:

9 fasteners & plates per board

4' x 8' boards:

15 fasteners & plates per board

These **minimum quantities** are required, regardless of the specification, FM, UL or other requirements. Obviously, additional fasteners may be required for some situations, to meet certain UL or FM requirements.

While the fasteners noted in UL and FM approvals for various insulations may be adequate for wind uplift resistance, the forces created by building movement can be much greater and require more restraint. Adequate but reasonable restraint with more fasteners will provide a more stable substrate for any roofing membrane and therefore allow less chance for movement and stress buildup where insulation joints interface with the roof membrane.

Multiple layers of insulation provide additional stress planes to transfer and/or absorb building movement and can reduce the possibility of membranes being over-

stressed.

When two layers of insulation are installed with one set of fasteners through both layers, the bottom layer should be pre-secured to insure that joints do not open up before both layers are permanently fastened. Bottom layer boards of maximum size 4' x 4' need only two fasteners for pre-securement, but boards over 4' x 4' such as 4' x 8' need 4 fasteners per board. Top layer boards require the quantity as shown in the chart above.

BITEC does not recommend fastening both the base sheet and insulation together, especially over foamed plastic type insulations, however on the occasion where it is prohibitive to use hot asphalt for installing the base sheet and such mechanical fastening is necessary and receives pre-approval from BITEC's Technical Services Department, fasteners should be installed as follows for minimum warranty requirements:

- When **screw and plate type fasteners** are used, install fasteners 12" on center at the base sheet laps and 12" on center down the center of the sheet in a staggered pattern, so as not to be in a straight line. **This pattern is not acceptable for nails.**
- When insulation thickness does not exceed 1/2" and nails with caps are used, install fasteners 9" on center at the base sheet laps with two rows down the center of the sheet, each row

18" on center and each row staggered from the other row. These two center rows should be approximately 11" apart. The nails must be ring shank or spiral shank; **smooth shank nails are not acceptable.**

- Additional fasteners may be required to insure that no loose corners or edges of boards occur.

When UL, FM or other code requirements exist, it is the responsibility of the design professional, owner, contractor or others to insure that all minimum requirements are met.

When possible or feasible, BITEC recommends that a layer of insulation be installed over the mechanically fastened layer with hot asphalt; maximum board size 4' x 4'.

Plastic type plates are not acceptable for use with torch applied systems.

Cap nails are not acceptable for fastening insulation over 1/2" thick.

The maximum board size for hot asphalt application should be 4' x 4'. All 4' x 8' insulation products should be mechanically fastened. Any deviations must be pre-approved by BITEC Technical Service Dept.

For any information on situations not covered by this Technical Bulletin or the General Requirements section of the BITEC Roofing Material Specifications and Details manual, contact the BITEC Technical Services Department.

Feb., 2003

Technical Bulletin No. 1017

Recover Boards and Approved Roof Insulations

RECOVER BOARDS

Industry studies and follow up reports consistently indicate that under certain conditions, asphalt applied 1/2" thicknesses of perlite and standard density wood fiber will either curl at the edges or blister, and maybe both, which can be disastrous to any roof membrane system. For the last several years many technical articles and reports have been written warning of these concerns and stating that 1/2" perlite (Retro-Fit Board) or 1/2" standard density wood fiber should not be encapsulated in asphalt. This is especially important when installed over non-vented situations like concrete deck, vapor retarders, existing roof systems, etc.

The use of 1/2" Retro-Fit Board and standard density wood fiber insulation should be limited to situations which allow mechanical fastening of the insulation. BITEC recommends the use of HIGH DENSITY wood fiber insulation when a minimum layer of 1/2" thickness is required to be applied in hot asphalt and it is always recommended that a thicker layer be used when possible. Also, board size for asphalt attachment should be limited to 2' x 4' board size.

When divorcement board

insulations are to be applied in hot asphalt over polyisocyanurate (ISO), urethane, other foamed plastic insulations or any of the other various substrates previously mentioned, they should be a minimum thickness of 3/4" perlite, wood fiber, fiberglass, mineral wool or a layer of iso/composite insulation. When applied in hot asphalt, regardless of insulation thickness, it is important to watch for "frying" or "foaming" which is an indication of the presence of moisture and possibly degassing. Work should be terminated until dry materials are available. Close attention to asphalt application temperatures may prevent or help control excessive degassing from the foamed plastic type insulations or moisture release from the facer sheets.

In any situation, the degassing or moisture release may interfere with proper attachment of the divorcement layer and diminish the necessary wind uplift resistance. This lack of proper attachment can also cause inadequate restraint at the interface between material layers, allowing stress to build up in the roof membrane from building movement due to settlement, wind loading or expansion and contraction. The result of such problems could

be to overstress the roof membrane, even beyond the superior elongation capabilities of modified bitumen membranes.

If each incremental square foot of roof area is properly restrained and the stresses of building movement are evenly distributed and not allowed to concentrate in areas of inadequate restraint, there is less possibility that building movement will accumulate in one area which causes over-stressing. The bottom line is that the roof can not hold the building together and that warranties do not cover damage due to building movement. It is in the best interest of all concerned, to insure that known good construction and roofing practices be used to get the best results.

Cold asphalt (reduced temperature) application of EPS type insulations is not recommended, but should be discouraged and avoided. When possible, EPS boards should be mechanically fastened together with an overlayment of some other type insulation which the roof membrane can be adhered to. The use of EPS type insulations and installation methods requires special approval from BITEC Manager of Technical Services.

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Any insulation used over an existing roof as a "recover board" or "Retro-Fit" insulation, should always be mechanically fastened when possible. When situations occur which require installing the insulation to an existing membrane with hot asphalt the following criteria must be met:

- 1) All existing wet materials must be removed and replaced.
- 2) Gravel surfacing must be spudded down to a reasonably clean smooth surface. Merely sweeping the loose gravel is not acceptable for this application.
- 3) Prime the surface with approximately 1/2 gallon of asphalt primer and allow to thoroughly dry.
- 4) Spot mop, strip mop or solid mop the recover insulation as previously approved by BITEC Technical Services Department.

APPROVED INSULATIONS

The following generic classes of insulations are approved for use with BITEC warranted roof systems:

- Cellular Glass
- Glass Fiber
- Mineral Wool
- Perlite
- Polyisocyanurate (ISO) and composites
- Wood Fiber

Other insulations may be approved only on a project to project basis by Manager of Technical Services. Such approval shall not be construed to establish a precedent for continued use by anyone.

Fastener approvals vary from manufacturer to manufacturer and for various thicknesses of insulations. Please refer to Technical Bulletin #1016 for more information regarding fastener requirements.



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April, 2002 **Technical Bulletin** No. 1018

Extended Warranty Requirements

Warranties for periods over the standard ten (10) years are considered EXTENDED WARRANTIES and require some additional provisions for approval.

All EXTENDED WARRANTIES require pre-approval by BITEC's Manager of Technical Services.

All Warranty Requests for extended periods should receive pre-approval by the Manager of Technical Services before the project begins and preferably before the project is offered or bid.

12 YEAR SYSTEMS

- 1) Systems over most wood decks and structural wood fiber type decks such as Tectum, will require a 1/2" minimum layer of insulation. Some other decks, on a job-to-job basis, may also have this requirement.
- 2) SBS systems with mechanically fastened base sheets will require an additional ply sheet (Type IV minimum) mopped over the fastened base sheet. For example:
 - a. Lightweight and wood type decks with fastened base sheets and no additional insulation,
 - b. Recover "situations" where a base sheet is fastened over an existing smooth roof without any additional insulation.
- 3) 12 Year systems must either be specified or otherwise required for competitive purposes and will require some type of documentation of the requirement for our records. 12 year "system" warranties should not be offered when not required or when 10 year warranties will suffice.
- 4) Also see Items #1 through #8 below for 15 and 20 year systems.

15 and 20 YEAR SYSTEMS

- 1) Must be either new construction or in the case of reroofing, the existing roof and insulation assembly must be removed down to the deck. Recovers or overlays are not acceptable.
- 2) Systems over new or old concrete decks will usually require a layer of insulation and one way moisture vents.
- 3) Base flashing methods are different than with two ply systems and must include at least a two ply base flashing system, properly interleaved as shown on detail drawings for High Parapet Walls or Multi-Ply Base Flashings. Refer to Details #29, 30, 31 & 32 for graphic explanation.
- 4) Base flashings may necessarily consist of a combination of detail requirements, as in the case of a "high" parapet wall which may have a parapet cap, coping, wall covering, built in thru-wall type counterflashings and/or a termination bar.
- 5) Base flashings should be limited to 24" in height. Over 24" is normally considered a wall covering and is not covered by the warranty. However, in some "situations" BITEC may consider a small amount of additional height for base flashings, but only when pre-approved by our Technical Services Department.
- 6) Any non-standard or specialized system will require pre-approval by BITEC's Manager of Technical Services and pre-approval for such system is granted on a job-to-job basis and must not be considered to have set a precedent.
- 7) All details of membrane assembly and construction details on extended warranty systems will be more closely scrutinized before approval is granted, or warranty issuance, for obvious reasons.
- 8) Make no assumptions... ASK!

Dec., 2002 **Technical Bulletin** No. 1019-1

Roof Maintenance Recommendations

All roofs, no matter what their composition is, need periodic inspections to insure that they have not been damaged by accident or weather. The following industry accepted guidelines should be implemented to protect and maintain a roof for its maximum life and trouble-free durability.

- 1) Restrict roof traffic to a minimum, keep a log of everyone going on the roof. Inform necessary trades requiring access to be very careful to protect the roof membrane from falling objects or solvent spills. Have a responsible person check the roof area when others have been working on the roof. Keeping records of rooftop activity can be an invaluable aid in finding leaks at later dates and historical records will help determine the leak history for future repairs and replacements.
 - 2) Do not allow materials or equipment to be stored on the roof.
 - 3) When equipment or materials must be transported over the roof, protect the affected area with plywood runways.
 - 4) If roof membrane was surfaced with a reflective coating, a periodic re-coating will protect the membrane and reduce energy cost.
 - 5) Provide a roof inspection at least twice a year. The more often a roof is inspected, the more likely that any problems will be discovered before they cause extensive damage. Some roofs will inherently require inspections more often to insure that drains, scuppers and gutters are kept clear and open for maximum drainage. Additional inspections should be made after any major storms or when other conditions may have allowed the roof to be affected. Discuss the possibility of an inspection and maintenance program with your roofing contractor or general contractor.
- Other items to check for damage or necessary maintenance are as follows:
- a. Roof penetrations: Pitch pans need to be kept full and should have protective rain collars. Use only durable filler products compatible with the original filler.
 - b. Metal flashing joints will require periodic replacement of sealant and fasteners may need replacement or tightening. Joints at gravel guards and fascias built into the roof membrane are a particularly troublesome detail which generally need periodic maintenance.

Metal and tile copings and fascias are often prone to wind damage which can cause leaks.
 - c. Reglets along walls, parapets or equipment will need periodic replacement of sealant and fasteners may need replacement or tightening.
 - d. Roof drain clamp rings may need periodic tightening.
 - e. Base flashing may come loose from fastenings at top and corners and need repair. At parapets and some walls, base flashings are generally subject to differential movement which causes diagonal wrinkling and in turn can cause damage to the base flashing.
 - f. Termination bars or compression fittings must be kept securely fastened and any associated sealants must be kept in

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good condition.

g. All roof membrane seams should be inspected for open seams, fishmouths, wrinkles, etc.

h. All roof areas should be inspected for blisters, splits, loose areas, ponding water, and debris accumulation.

i. Expansion joints and control joints should be inspected for open joints, splits and loose fastenings.

6) Roofs that are under warranty by either a specific contractor or manufacturer should not be repaired or altered by another contractor without express permission from that contractor and only a manufacturer's authorized or approved contractor should perform work on roofs covered by manufacturer's warranties. Otherwise, a warranty may be voided.

7) When roofs are to be altered by the addition

of any rooftop equipment or penetrations the original installer and/or membrane manufacturer should be consulted first to insure that only the proper materials are used for compatibility. Complete information regarding the alterations or repairs should be kept on file and provided to the manufacturer of record.

8) Any apparent damage to the roof should be reported whether or not any leaks have been noticed. Repairs should be made promptly.

As a reminder, all additions of equipment, deck penetrations or any change requiring cutting through the BITEC membrane and any change which may alter the proper drainage of the roof must have prior approval of BITEC, INC. and the work must be completed by a BITEC Authorized Roofing Contractor to maintain the validity of the Warranty.



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Abbreviated Metric Practice Guide for the Roofing Industry

GENERAL

This abbreviated metric practice guide provides a table of conversion factors for expressing units of measure peculiar to the roofing industry as exact metric units. This guide is based on Standard E 380. Relationships that are exact in terms of the base unit are followed by an asterisk. Relationships that are not followed by an asterisk are either the results of physical measurements or are only approximate

APPLICABLE DOCUMENTS (ASTM Standards):

D5 Test Method for Penetration of Bituminous Materials²

D113 Test Method for Ductility of Bituminous Materials²

E380 Standard for Metric Practice³

ROUNDING RULES

Converted values should be rounded to the minimum number of significant digits that will maintain the required precision, but do not indicate greater precision than justified by the measuring method used. If the first significant digit of the converted number is smaller than the first digit of the original number, carry one additional significant figure. For example, 7.5 in. should be converted to 191 mm, but 2.5 in. should be converted to 64 mm.

PREFERRED UNITS FOR ROOFING MATERIALS

The preferred units for roofing materials are as follows:

- mm** for width of rolls, shingles; thickness of Insulation etc.
- g/m²** for mass (weight) per unit area (felts and moppings)
- m** for dimension over ~4 ft
- µm** for thickness of felt, flashing etc.
- kg** for gross mass (weight)
- kN/m** for breaking strength
- cm** for ductility of bituminous materials (see test Method D113)
- 0.1 mm** for penetration units (use test Method D5)

¹This guide is under the jurisdiction of ASTM Committee D-8 on Roofing, Waterproofing, and Bituminous Materials.

Published as information only April 1977.

²Annual Book of ASTM Standards, Vol 04.03.

³Annual Book of ASTM Standards, Vol 14.02.

Property	To convert from	Symbol	To	Symbol	Multiply by	Remarks
Application rate	U.S. gallon per square	gal (U.S.)/100 ft ²	litre per square metre	litre/m ²	0.4075	= 0.4075 mm thick
	U.K. gallon per square	gal (U.K.)/100 ft ²	litre per square metre	litre/m ²	0.4893	= 0.4893 mm thick
Area	square inch	in. ²	square millimetre	mm ²	645.2	1,000,000 mm ² = 1m ²
	square foot	ft ²	square metre	m ²	0.092 90	-
	square	100ft ²	square metre	m ²	9.290	-
Breaking strength	pound force per in. width	lbf/in.	kilonewton per metre width	kN/m	0.175	-
Coverage	sq. foot per U.S. gal.	ft ² /gal	square metre per litre	m ² /litre	0.024 54	-
	sq. foot per U.K. gallon	ft ² /gal	square metre per litre	m ² /litre	0.020 44	-
Density, or mass per unit volume	pound per cubic foot	lb/ft ³	kilogram per cubic metre	kg/m ³	16.02	water ≅ 1000 kg/m ³
Energy or work	kilowatt-hour	kWh	megajoule	MJ	3.600*	J = W • s = N • m
	British thermal unit	Btu	joule	J	1055	-

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MANUFACTURERS OF ADVANCED TECHNOLOGY WATERPROOFING MEMBRANES

Property	To convert from	Symbol	To	Symbol	Multiply by	Remarks
Flow, or volume per unit time	U.S. gallon per minute	gpm	cubic centimetre per sec.	cm ³ /s	63.09	or 0.0631 litre/s
	U.K. gallon per minute	gpm	cubic centimetre per sec.	cm ³ /s	75.77	or 0.0758 litre/s
Force	pound force	lbf	newton	N	4.448	-
	kilogram force	kgf	newton	N	9.807	N = kg • m/s ²
Heat flow	thermal conductance, C	Btu/h • ft ² • °F	watt per sq. metre kelvin	W/(m ² • K)	5.678	-
	thermal conductivity, k	Btu • in./h • ft ² • °F	watt per metre kelvin	W/(m • K)	0.1442	-
Incline	inch per foot	in./ft	percent	%	8.333	3 in./ft = 25 %
Length, width, thickness	mil	0.001 in.	micrometre	µm	25.40*	1000 µm = 1 mm
	inch (up to ~48 in.)	in.	millimetre	mm	25.40*	1000 mm = 1 m
	foot (~4 ft. and above)	ft.	metre	m	0.3048*	-
Mass (weight)	ounce	oz	gram	g	28.35	1000g = 1 kg
	pound	lb	kilogram	kg	0.4536	1000kg = 1 Mg
	short ton	2000 lb	megagram	Mg	0.9072	-
Mass per unit area	pound per square foot	lb/ft ²	kilogram per sq. metre	kg/m ²	4.882	-
	pound per square foot	lb/ft ²	gram per square metre	g/m ²	4882	-
	pound per square	lb/100 ft ²	gram per square metre	g/m ²	48.82	-
	ounce per square yard	oz/yd ²	gram per square metre	g/m ²	33.91	-
Permeability at 23°C	perm inch	grain • in./ft ² • h • in. Hg	nanogram/pascal second metre	ng/(Pa • s • m)	1.459	ng = 10 ⁻¹² kg
Permeance at 23°C	perm	grain/ft ² • h • in. Hg	nanogram/pascal second square metre	ng/(Pa • s • m ²)	57.45	1 grain = 64.8 mg
Power	horsepower	hp	watt	W	746	W = N • m/s = J/s
Pressure or stress	pound force per sq. in.	lbf/in ² or psi	kilopascal	kPa	6.895	Pa = N/m ²
	pound force per sq. ft.	lbf/ft ² or psf	pascal	Pa	47.88	-
Temperature	degree Fahrenheit	°F	degree Celsius	°C	(t °F - 32)/1.8*	32°F = 0°C
	degree Celsius	°C	kelvin	K	t °F + 273.15*	273.15K = 0°C
Thread count (fabric)	threads per inch width	threads/in.	threads per centimetre width	threads/cm	0.394	-
Velocity (speed)	foot per minute	ft/min or fpm	metre per second	m/s	0.005 080*	-
	mile per hour	mile/h or mph	kilometre per hour	km/h	1.609	-
Volume	U.S. gallon	gal (U.S.)	cubic metre	m ³	0.003 785	or 3.785 litres
	U.K. gallon	gal (U.K.)	cubic metre	m ³	0.004 546	or 4.546 litres
	cubic foot	ft. ³	cubic metre	m ³	0.028 32	-
	cubic yard	yd ³	cubic metre	m ³	0.764 6	-

* Exact conversion factor.