CUSTOM SEAL TPO ROOFING SYSTEMS

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GENERAL

1.01 DESCRIPTION

A. The Custom Seal TPO Roof Systems is composed of numerous assembly configurations to meet most any roofing need. The systems are based on providing a suitable substrate for a single-ply application of Custom Seal TPO Membrane. Securement of the Custom Seal TPO Membrane will be mechanical securement. Once installed, the membrane seams are hot air welded forming a monolithic layer of weather protection over the building structure. In the design portion of this manual you will find tables referencing minimum requirements for decks, roof substrates, fasteners and other construction aspects relating to the installation of a quality Custom Seal Roof System. The design guide will assist you in determining which roof system would best serve your needs.

B. A complete guide to the installation of the Custom Seal TPO Roof Systems can be found under the appropriate tab. The installation guide will contain information specific to the roof system as well as specialized details that supplement the standard details for completion of that particular roofing assembly.

1.02 QUALITY ASSURANCE

A. The roofing system must be installed by an authorized Custom Seal Roofing Systems Applicator in order for the project to receive a manufacturer's warranty.

B. There shall be no deviation made from this specification or the detail drawings without written approval from Custom Seal Roofing Systems 14 days prior to the start of the roofing project.

C. Upon completion of the installation, an inspection shall be conducted by a Technical Representative of Custom Seal Roofing Systems to ascertain that the roofing system has been installed according to Custom Seal Roofing Systems most current published specifications and details. This inspection is not intended to be a final inspection for the benefit of the owner but for the benefit of Custom Seal Roofing Systems to determine whether a warranty shall be issued.

D. It is the roofing applicator's responsibility to adhere to all applicable building codes (local and national) for roofing system installation requirements and limitations in their geographical areas applicable at the time of the bid.

E. For specific code and testing agency approvals achieved by Custom Seal Roofing Systems, refer to the agency's published listings or call Custom Seal Roofing Systems Technical Department.

1.03 SUBMITTALS

A. Submit a "Pre-Job Survey" form to Custom Seal Roofing Systems Technical Department for approval PRIOR to the job start to enable the Technical Department to approve and assign a job number to the project. This submittal may include "deviation request forms" and "pullout test" results.

1. The "Pre-Job Survey" MUST be filled out completely and accurately to include any prior deviations approved from this specification.
2. A roof drawing or shop drawing may be provided to the Technical Department with each "Pre-Job Survey". If provided, the drawings must show dimensions and all penetrations. Please note that roof drawings are not required in order to process the "Pre-Job Survey", however, roof drawings on file with Custom Seal do provide a certain amount of protection to the roofing contractor should the roof system be altered by other parties after installation.

B. When Material or Full Systems warranties are desired, Custom Seal Roofing Systems MUST receive the "Pre-Job Survey" or be contacted PRIOR to project bid and installation. Information may be required for the wind design of the system.

C. Upon completion of the project the roofing contractor shall submit a signed and dated "Request for Final Inspection".

D. Upon completion of the roof inspection by Custom Seal Technical Services, satisfactory completion of any punchlist items, and receipt of applicable warranty fees, the warranty will be issued to the installing contractor.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials in original, unopened containers.

B. Containers shall be labeled with manufacturer's name, brand name, installation instructions and identification of various items.

C. All materials, except membrane, must be stored between 16^{O}C (60^{O}F) and 27^{O}C (80^{O}F). If exposed to lower temperatures, restore to 16^{O}C (60^{O}F) minimum temperature before using.

D. Store all materials, including membrane, in a dry protected area. Damaged materials must not be used. Installed materials found to be damaged shall be replaced at contractor's expense.

E. Store the membrane in a manner to protect it from abrasion or puncture.

F. It is recommended that insulation is stored on skids (or insulation bunking) and completely covered with a breathable material such as a tarp or canvas if the insulation is not installed the same day as being loaded on the roof.

1.05 JOB CONDITIONS (CAUTIONS AND WARNINGS)

Prior to the use of any Custom Seal Roofing Systems product, consult Material Safety Data Sheets for applicable cautions and warnings.

A. Do not use oil base or bituminous base roof cement with Custom Seal TPO products.

B. Do not install Custom Seal TPO Membrane directly in contact with new or resaturated asphalt.

C. Do not expose membrane or accessories to a constant temperature of 82^{O}C (180 ^{O}F) or above.

D. Do not allow waste products (petroleum grease, oil or solvents, etc.,) or direct steam venting to come in contact with the Custom Seal TPO Roofing System. Any exposures not typical for normal roofing installation must be presented to Custom Seal Roofing Systems for assessment of any impact on the performance of the roofing system.

E. Do not install Custom Seal TPO Membrane directly in contact with coal tar roof surfaces.

1.06 WARRANTY

NOTE: Custom Seal fasteners and accessuries are required on all warranted projects. If the metal work (i.e. edging) is to be included in the warranty, only Custom Seal TPO Coated Metal or an approved metal manufacturer can be used. Contact Custom Seal technical department for approved manufacturers of metal components.

A. Custom Seal Roofing Systems will warrant the installation, to include workmanship for those materials supplied by Custom Seal Roofing Systems when the project is completed by an authorized Custom Seal thermoplastic roofing applicator.

B. When a fifteen year warranty is specified for a project, a complete tear off to the structural deck is required or an independent moisture survey with core cuts must be performed to identify all wet insulation and/or wet substrate that must be removed prior to roofing.

C. When a Custom Seal Roofing Systems Technical Representative has inspected the completed installation and, upon approval of the installation and payment, a warranty may be issued.

D. The warranty is available for roofing systems on commercial, industrial, or institutional buildings only and is not available for residences, walking decks, terraces, patios or areas subjected to conditions not typically found on roofing systems.

E. The warranty period is expressed on the warranty certificate which reflects the inclusive dates of coverage.

F. Contact Custom Seal Roofing Systems for additional warranty information.

G. When it is anticipated that Custom Seal thermoplastic membranes will be exposed to animal fats, petroleum grease or other grease products, the owner or owner's representative is responsible for specifying that a sacrificial sheet, sand trap or grease guard product must be used to protect the waterproofing roof membrane.

H. It shall be the owner's responsibility to expose the membrane in the event that warranty service is required when access is impaired. Such impairment includes, but is not limited to:

a. Design features, such as window washer systems, which require the installation of traffic surface units in excess of 36.3 kg (80 pounds) per unit.

b. Any equipment, ornamentation, building service units and other roof top surfacing materials which are not defined as part of this specification.

c. Rooftop equipment that does not provide Custom Seal with reasonable access to the membrane system for purposes of warranty investigation and related repairs.

d. Severely ponded water, snow and other unrelated materials.

PRODUCTS

2.01 GENERAL

A. The components of the Custom Seal TPO Roof System are to be products of Custom Seal Roofing Systems or approved by Custom Seal Roofing Systems as compatible and acceptable. Unless specifically included in the warranty coverage by Custom Seal Roofing Systems, products by others are excluded from coverage.

2.02 MEMBRANE

A. Custom Seal TPO membrane is available in the sizes, thicknesses and colors shown in the following table. Custom colors and thicknesses are available (minimum order restrictions apply). Contact the Custom Seal for availability, pricing and lead time.

TPO Membrane			
Thickness	Widths Available	Lengthes Available	Colors Available
.045 (1.1mm)	6', 8', 10', 12' (1.8m, 2.4m, 3m, 3.6m) Half Sheets available	100' Standard (30.4m)	White Charcool Black Gray
.060 (1.5mm)	6', 8', 10', 12' (1.8m, 2.4m, 3m, 3.6m) Half Sheets available	100' Standard (30.4m)	White Charcool Black Gray

2.03 RELATED MATERIALS

The following list contains the names of other Custom Seal products and accessories that could be required in order to complete the roofing system. With the exception of walkpads, which are considered maintenance items, any Custom Seal manufactured or supplied material is covered in the limited warranty provided a warranty is purchased for the project.

NOTE: Prolonged exposure of adhesives and sealants to temperatures greater than 27°C (80°F) will reduce their shelf life. Normal shelf life is approximately 9 months from date of manufacturing.

A.	Custom Seal TPO Half Sheets	95.3cm (37 1/2") x 30.5m (100')
B.	Custom Seal TPO Flashing (unreinforced)	30.5cm (12") x 15.2m (50')
C.	Custom Seal TPO Flashing (reinforced)	15.2cm (6")& 45.7cm (18") wide
D.	Custom Seal Peel & Stick RPS	15.2cm (6") x 30.5m (100')
E.	Custom Seal TPO Coated Metal	1.2m (4') x 2.4m (8') sheets
F.	Custom Seal Bonding Adhesive	1.5m²/l (60 S.F./Gal.)
G.	Custom Seal Cover Tape (Black/White)	12.7cm (5") x 30.5m (100')
H.	Custom Seal Primer	28.2m/l (350 L.F./Gal.)
I.	Custom Seal Night Seal	2.5-3.3m/l (30-40 L.F./Gal.)
J.	Custom Seal Waterstop	4.6m (15 L.F.) /Tube
K.	Custom Seal Edge Caulk (Black/White)	4.6m (15 L.F.) Tube
L.	Custom Seal Pitch Pan Sealer	.09m² (1.0 S.F./Gal.) 5.1cm (2") Thick
M.	Custom Seal Metal Bar Anchor	2.5cm (1") x 3.0m (10')
N.	Custom Seal Polymer Batten Bar	2.5cm (1") x 600cm (250")
O.	Custom Seal Termination Bar	3.2cm (1 1/4") x 3.0m (10')
P.	Custom Seal Walkway Pad	61cm (2') x 91.4cm (3') x 9.5mm (3/8")
Q.	Custom Seal Cleaner	18.9 l (5 Gal.) Pails
R.	Custom Seal Separator Sheet	As supplied by Custom Seal Roofing Systems
S.	Custom Seal 2" Seam Plates	1000 Per Box
T.	Custom Seal Thermoplastic	Outside Corners
U.	Custom Seal Thermoplastic Pipe Boots	As supplied by Custom Seal Roofing Systems
V.	Custom Seal Insulation	As required by Custom Seal Roofing Systems
W.	Custom Seal Fasteners/Insulation Plates	As required by Custom Seal Roofing Systems
X.	Approved Caulk	As authorized by Custom Seal Roofing Systems

PROJECT DESIGN AS IT PERTAINS TO THE CUSTOM SEAL ROOFING SYSTEM

Note: This portion of the manual has been sequenced in the order of construction from the deck up, Custom Seal has given a brief summary for each potential component. The actual design of the roof system is the responsibility of the appropriate design professional.

3.01 ACCEPTABLE DECKS (STRUCTURAL)

A suitable deck must provide sufficient load capacity to support the specified roof assembly, any roof top equipment and live & dead loads as determined appropriate by a design professional. Additionally, the substrate must provide a suitable surface for the installation of a Custom Seal Roof Assembly. In many cases the substrate will also be designed to faciltate drainage of the roof surface by being constructed with built-in slope. For Mechanically Attached Systems the deck must also provide acceptable pullout resistance for the fasteners used to secure the roof assembly to the structure. Listed below are the decks acceptable for use under a Custom Seal Roof System and any conditions placed on that acceptability. If a particular deck is not listed, Custom Seal will review acceptability on a case to case basis as submitted to the Custom Seal Technical Department.

NEW CONSTRUCTION OR TEAR OFF TO DECK			
Deck Type	Conditions (if any)	Deck Type	Conditions (if any)
Plywood	15/32" (1.2cm) min.	Lumber	3/4" (1.9cm) min.
Steel Deck	22 gauge min	Structural Concrete	3000 psi (20.7MPa) min
Concrete Plank*	2" (5.1cm) min	Gypsum Deck	Poured in place or plank
Cementitious Wood Fiber		Lightweight Concrete**	
* Acceptable for use under ballasted systems only. **When used as a substrate for an Adhered or Mechanically Attached System securment must be made through the lightweight concrete and into the strucural deck.			

RECOVER SYSTEMS

Refer to section 3.04 Acceptable Substrates. Please note that the deck requirements spelled out in section 3.01 apply to recover assemblies also.

3.02 VAPOR RETARDERS & AIR BARRIERS

Vapor retarders have been employed in all types of low slope roof systems when required to mitigate the effects and possible damage of vapor drive and condensation. Condensation can occur when there are significant internal / external temperature and humidity differences and also when the roof is installed over a severe atmospheric area such as over a pool or freezer. There are several methods for determining whether or not a vapor retarder should be included in a roof system but the most commor two are; conduct dew point calculations for the project or refer to the U.S. Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL) Vapor Drive Map with associated information available in the Moisture Control Section of the NRCA Low Slope Roofing Manual. In either event, if a vapor retarder is deemed appropriate it will be the responsibilty of the roof designer to determine the type, location, and the installation method.

Air barriers are occasionally utilized in roof assemblies to prevent internal / external air pressure differences from affecting the performance of the roof system. Over pressurization can occur for a number of reasons and are occasionally related to large openings in the building shell, building canapies or other features that allow air to enter a building quicker than it can be exhausted. In some cases the positive building pressure can be traced back to mechanical air handling units. In cases where air barriers are used, the barrier must be on the deck side of the insulation and be covered with a roof insulation of appropriate type and thickness to be secured to the structural deck in accordance with FM 1-90 Adhered Roof System criteria - regardless of roof assembly type installed. The use of air barriers are occasionally used in mechanically attached roof systems to minimize membrane “flutter”. In situations involving air barriers contact the Custom Seal Technical Department for assistance.

3.03 ROOF DRAINS & SCUPPERS

Low slope roofs generate vast amounts of water run off when subjected to inclement weather. Roofing drains must be designed to handle loads that in some cases may completely submerge the drain assembly therefore making it necessary to not only ensure a sound plumbing connection but also an adequate membrane seal to prevent back flow into the roof system. Roof drains must consist of a compression ring and matching bowl flange, include drain basket, and be solidly connected to the building’s storm sewer plumbing. The membrane seal to the drain assembly must be by means of a compression seal faciltated by compressing Custom Seal Waterstop between the membrane and the bowl flange by mechanical securement of the drain compression ring above the membrane. In cases where retrofit drains are required, not only does the drain need to meet the sealing criteria as stated above, but the retrofit assembly must also be mechanically sealed to the inside of the plumbing pipe. Regardless of drain type utilized, Custom Seal warranty coverage ends at the membrane to drainbowl seal.

Scuppers are typically vertically mounted exhaust flumes for water discharge. The flume is normally constructed of a suitable metal in a configuration meeting the drainage requirements of the building and is typically mounted in conjunction with a downspout leaderhead to prevent exterior wall saturation due to drainage. The actual fabrication of the scupper assembly (flume and mated flange) should be constructed according to criteria detailed in the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) Manual. The SMACNA Manual fully explains the points to be

considered when determining the appropriate size of scuppers. Custom Seal requirements regarding scuppers are as follows: the scupper assembly must be fabricated from Custom Seal brand coated metal to match the roofing membrane type; be fabricated with all joints sealed according to SMACNA standards, include a continuous 3" wide interior face flange with rounded corners; be of sufficient size to extend through the exterior wall by at least ½" and be capable of being sealed on the exterior of the building to prevent back flow into the roof system. In addition to the above, if a scupper is to be mounted at the deck to wall or parapet junction a wood nailer of equal thickness to the roofing iinsulation, if applicable, must be secured to the structural deck below the scupper flange to provide a suitable mounting surface for the scupper. Refer to the scupper detail in the general details portion of this manual.

3.04 Acceptable Roof System Substrates

An acceptable substrate will provide a smooth surface capable of fully supporting a Custom Seal Roof Assembly and anticipated roof loads. When used to support an mechanically attached or bonded insulation to the deck, the acceptable substrate must also possess sufficient structural integrity to secure the roofing membrane to the structure when the membrane is secured to it. Thermal value to the roof assembly must also be considered when choosing a substrate. When insulation is used as a roof substrate, the insulation must be capable of being supported by the structural deck, i.e. a typical steel deck would not support wood fiber alone but would support an isocyanurate insulation board with a wood fiber overlay. A suitable substrate can be an existing roof surface, a structural deck or insulation as detailed in the following list.

Substrate Type Conditions (if any)

Plywood or Custom Seal roof systems may be installed directly over plywood and wood plank decks Wood Plank provided the substrate is free of contamination, sharp edges and protrusions. Voids between boards greater than 1/4" in width must be filled with a suitable material to provide a smooth, bondable surface. It is also strongly recommended that the substrate be mechanically attached to the structural support in lieu of nailing to prevent damage caused by fastener back out as the structure moves due to expansion/contraction and settling. Damage caused by building movement is excluded from warranty coverage.

Lightweight Concrete: Custom Seal TPO may be applied directly over lightweight insulating concrete provided the substrate is trowel finished smooth and is free of protrusions and sharp edges. Securement of the membrane in mechanically attached systems must be through the lightweight substrate and into the structrual deck.

Smooth Surface BUR: Custom Seal TPO Mechancally Attached Systems may be installed directly over smooth surface BUR and Modified Bitumen roofs (smooth and granulated) in sound condition provided the substrate is free of anysharp edges or protrusions and if the smooth surfaced BUR or Modified Bitumen roof does not contained any fasteners whatsoever in the field of the roof.

Separator Sheet-When the condition of a smooth surface BUR or Modified Bitumen roof would prevent the use of the existing roof as a direct substrate for a TPO Roof System, a Custom Seal separator sheet may be used to smooth the BUR or Modified Bitumen surface to an acceptable level. Please consult the Custom Seal Technical Department regarding suitability of using a separator sheet versus insulation.

Existing PVC Roofs - All In re-roof situations that involve leaving the existing PVC membrane, or ballasted types, or Ballasted TPO EPDM or TPO in place, the existing membrane must be cut into 10'x10' pieces and then overlaid with an acceptable rigid board insulation to ensure that any contraction or shrinkage of the original roof membrane is isolated from the new Custom Seal TPO Roof System. The rigid board type and mechanical securement of the insulation must comply with the securement requirements of the new roof system being installed.

Existing TPO & EPDM -In re-roof situations that involve leaving the existing fully adhered and mechanically (MAS & Adhered)fastened TPO or EPDM roofs in place, the existing membrane must be cut in the pattern shown in the Mechanically Attached System application portion of this manual.

Acceptable Insulations			
Insulation Type	**Manufacturer Names**	**Minimum Thickness**	**Acceptable for use on these systems:**
Isocyanurate	Atlas AC Foam & AC Foam II; Celotex HyTherm AP, Top R II, Star AP; Firestone Iso 95; ManvilleE"NRG "Y I I, E"NRG"Y II Composite*; R Max MultiMax, MultiMax II	1" (2.5cm) min. *1½" (3.8cm) min.	All (1)
Wood Fiber	woodfiber; Continental; Celotex; Domtar; Georgia Pacific; Huebert; Temple Inland; USG; Milcore; International Buildrite; Building Products of Canada	1" (2.5cm) min. for Std. 1/2" (1.3cm) min. for High Density	All (1)
Perlite	Celotex Celo-Therm; Domtar Cel-U-Con; GAF Perlite Roof Insulation; Johns Manville Fesco	3/4" (2.5cm) min.	Mechanically Attached & Ballasted Only (1)
Polystyrene (Expanded or Extruded)	AMOCO Amofoam; Dow Chemical Styrofoam; Falcon Manufacturing EPS; Owens Corning Foamular, DURAPINK; Poly Foam Inc. EPS; Thermco Industries EPS	1" (2.5cm) min.	All (1 & 2)
Gypsum Board	G-P Gypsum Corporation Dens-Deck	¼" (overlay only) ½"	All

NOTES:
1. Insulation thickness must be specified minimum or minimum thickness required by manufacturer to span openings in the deck. In some cases it may be necessary to use a support layer of insulation.
2. EPS insulation must be 1 pcf minimum density and be overlaid with minimum 1/2" (2.5cm)Wood Fiberboard.

3.05 ACCEPTABLE FASTENERS

Roofing fasteners are used for two purposes in the installation of a roof system; are insulation securement and membrane securement. When the fastener is being utilized for membrane securement only those fasteners marketed by Custom Seal are acceptable for use in the assembly. Instances of membrane securement are when the fasteners penetrate the roofing membrane or when it secures the insulation that the roofing membrane is then bonded to. An example of when a fastener is not securing the membrane to the deck is when the fastener is used to secure the roof insulation to the deck in a mechanically fastened roof assembly. Only Custom Seal Fasteners are acceptable for use in the roof assembly. See Fastener Application Guide on next page.

3.06 EXPANSION JOINTS

Expansion joints allow for normal building movement without jeopardizing roof system integrity. This is accomplished by providing a point of securement and termination for the roof system on each side of a flashed opening in the building structure. Any building movement is isolated to those controlled areas thus saving the roof from having to endure the stresses related to thermal movement and settling. In the event an expansion joint is deemed appropriate, it will be the responsibilty of the roof designer to determine the type, location, and the installation method.

3.07 PENETRATION POCKETS

Penetration Pockets are used as a means to flash irregularly shaped or densely concetrated roof penetrations and are typically fabricated of metal in a configuration allowing for placement around a fixed object. Penetration pocket fabrication techniques can be found in the SMACNA manual. Field fabricated penetration pockets may be acceptable for use in a warranted assembly, contact Custom Seal Technical Department for options. The goal when creating a penetration pocket is to form a pocket at least 2” deep and of sufficient size to accomodate the roof penetration plus 1” on all sides of the penetration,. In cases of multiple penetrations, a 1” space must be maintained between all penetrations, and between the penetrations and the walls of the penetration pocket. Once this containment area is constructed, it is to be flashed with the Custom Seal flashing material with the flashing terminating inside of the pocket. Once flashed, the penetration pocket can then be filled with Custom Seal Pourable Sealer to a point that the pocket is full and mounded to shed water. In the event that a penetration pocket larger than 18” is required, the pocket must be fabricated with a continuous 3” wide base flange with rounded corners and be secured through the roofing membrane to a wood nailer of equal height to the roofing insulation in order to provide membrane securement around the penetration opening.

Custom Seal Fastener Application Guide				
Fastener Type	Approved Accessories (see accessory codes below)	Insulation Attachment (when used w/ listed plate)	Membrane Attachment (when used w/ listed plate)	Deck Types
Custom Seal #14 Screw	1,2,3,6,7,8,9	Yes	Yes	Steel, Wood
Custom Seal #15 Screw	1,2,3,6,7,8,9	Yes	Yes	Steel, Wood, Concrete
Custom Seal #15 Washer Head (WH) Screw	7, 12	No	Yes	Steel, Wood Concrete
#12Custom Seal Preassembled (Insul. Attachment)	N/A	Yes	No	Steel, Wood
#15 XHDCustom Seal Preassembled (Memb. Attachment)	N/A	No	Yes	Steel, Wood Concrete
Custom Seal CD-10 Nail	1,2,3,6,7,8	Yes	Yes	Concrete
Custom Seal Lite Deck Screw	4,9	Yes	Yes	Gypsum, Cementitious Wood Fiber
Custom Seal Purlin Screw	2,3,7	Yes	Yes	Steel Purlins
NTB Plastic Auger (with or without wire)	5,11	Yes	Yes	Gypsum, Cementitious Wood Fiber
Insulation Plate options:	1) 3" Flat Steel Insulation Plate, 2) 3" Recessed Steel Insulation Plate, 3) 3" Locking Plastic Insulation Plate, 4) 3" Lite Deck Insulation Plate, 5) 3" NTB Steel Plate			
Membrane securment options:	6) 2" Round Steel Seam Plate, 7) 2 3/8" Barbed Round Steel Seam Plate, 8) Metal Anchor Bar, 9) Poly Anchor Bar, 10) Lite Deck Anchor Bar, 11) 2" NTB Steel Plate, 12) 2 3/8" Barbed WH Pla			

NOTE: Custom Seal fasteners are required on all Warrantied installations.

1. All fasteners shall be corrosion resistant coated and comply with Factory Mutual Standard 4470.
2. Insulation fasteners shall be suitable for the insulation used.
3. All screw type fasteners shall be a minimum #14 shank diameter.
4. No hex head fasteners.

Custom Seal Roofing Systems requires a pullout test to be conducted by an independent agency on the following types of decks and the results submitted to Custom Seal Technical Department prior to project bid: Gypsum, Tectum, Oriented strand board, Lightweight Concrete, Concrete Plank Deck 1334N (300 lbs.) and any metal decks under 22 gauge.

	Roof Size	Number of Pull-Out Tests
1)	Less Than 929m² (10,000 sq. ft.)	6
2)	929m² (10,000 sq. ft.) - 4645m² (50,000 sq. ft.)	10
3)	4645m² (50,000 sq. ft.) - 9290m² (100,000 sq. ft.)	20
4)	Over 9290m² (100,000 sq. ft.)	1 per 464.5m² (5,000 sq. ft.)

CAUTION: Use appropriate fastener for substrate.

3.08 Roof Curbs

Roof curbs typically serve three purposes; they support rooftop equipment; they are designed and fabricated to level and raise the equipment to an appropriate flashing height and they provide a suitable substrate to tie-in the roof system. Curbs can be fabricated from metal, wood or in special applications, structural plastic and fiberglass. The basic components of a roof curb are the base which generally includes a flange to be mounted to the structural deck, a support surface to mount the equipment to and in some cases a woodnailer to terminate the roofing system into. If circumstances prevent mounting the curb to the structural deck, the curb must be supported on a continuous wood nailer wider than the mounting flange and equal in height to the installed roof insulation. Curbs cannot be supported by roof insulation alone due to the compressible nature of insulation.

3.09 ROOF PENETRATIONS (NON-CURB)

Roof penetrations are anything that protrudes from the roof surface that must be flashed. These include plumbing vents, structural support elements, conduit, etc. In cases where the penetration is round and with one end free of obstructions, the preferred method of flashing would be to install a pre-molded pipe boot. When a pipe boot can not be utilized, the penetration must be addressed with either a field wrap flashing or a penetration pocket around the protrusion.

3.10 WALLS & PARAPETS

Wall and parapet flashing is accomplished by securing the field membrane at the angle change of the roof and vertical substrate. A layer of field membrane is bonded to the vertical substrate, forming a counter-flashing for the base tie in detail which is then hot air welded onto the field sheet of membrane.

3.11 TIE INS TO DISSIMILAR MATERIALS, OTHER ROOF SYSTEMS, ETC.

Tie Ins to dissimiliar materials such as roof systems by others can be accomplished by installing a positive break between the two systems and then waterproofing that break. Contact Custom Seal Technical Department for assistance.

3.12 METALWORK

No roof system is complete until all the edges are terminated in such a way as to prevent water infiltration into the roofed structure. This typically involves the use of manufactured or shop fabricated metal detailing such as coping caps, gravel stops, roof edging, flashing and counter-flashing components. All metalwork should be fabricated and installed according to SMACNA and National Roofing Contractors Association (NRCA) guidelines. Unless specifically agreed to in writing prior to installation, metalwork manufactured by others is not included in warranty coverage.

3.13 WALKWAYS

1. Custom Seal Walkway Pads - TPO roll walkway material to be installed by hot air welding to the deck membrane or EPDM Molded Walkway Pads to be installed with Custom Seal Seam Tape. Refer to the walkway installation detail in the general details section of this manual.
2. Formed concrete walkway pads manufactured for use on roofing systems that do not contain any asphaltic or coal tar derivative. A membrane slip sheet extending three inches from the pads in all directions is required when using formed concrete walkway pads.

The information up to this point was intended to provide those responsible for roof design a general idea of considerations to be contemplated when designing a roof. A partial list of additional design information resources available for use are listed below (this list is by no means complete and makes no attempt to list regional code agencies):

- National Roofing Contractors Association: http://www.nrca.net/
- Single Ply Roofing Institute: http://www.spri.org/
- Sheet Metal and Air Conditioning Contractors' National Association: http://www.smacna.org/
- Roof Consultants' Institute: http://www.rci-online.org/

Mechanically Attached TPO Code Matrix 2-10-01

(This is a partial code listing for reference - contact Custom Seal Technical Department for complete code requirements)

TPO System	Fastener	#14	#15 WH	#15 XHD	#15 WH	#15 XHD	#16 SXHD
	Plate/Bar	2 in.	2-3/8 in. WH	2-3/8 in. XHD	Poly Bar	Metal Bar	2-3/8 in. XHD
	Weld	Single	Single	Single	Dual	Dual	Single
6ft.	FM 1-60	na	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.	na
	FM 1-90	6 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	na
	FM 1-105	na	na	na	6 in. o.c.	6 in. o.c.	na
	FM 1-120	na	na	na	6 in. o.c.	6 in. o.c.	na
	FM 1-150	na	na	na	6 in. o.c.	6 in. o.c.	na
	54 mph	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.
	72 mph	12 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.
	80 mph	6 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.
	90 mph	na	6 in. o.c.	6 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.
8ft	FM 1-60	na	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.	na
	FM 1-90	na	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	na
	54 mph	na	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.
	72 mph	na	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.	18 in. o.c.
	80 mph	na	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.
	90 mph	na	6 in. o.c.	6 in. o.c.	12 in. o.c.	12 in. o.c.	6 in. o.c.
10ft	FM 1-60	na	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	na
	FM 1-90	na	6 in. o.c.*	6 in. o.c.*	6 in. o.c.*	6 in. o.c.*	12 in. o.c.
	54 mph	na	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.
	72 mph	na	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.
	80 mph	na	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.	12 in. o.c.
	90 mph	na	6 in. o.c.	6 in. o.c.	12 in. o.c.	12 in. o.c.	6 in. o.c.
12ft	FM 1-60	na	na	na	12 in. o.c.	12 in. o.c.	na
	FM 1-90	na	na	na	see note G	6 in. o.c.	na
	FM 1-105	na	na	na	6 in. o.c.	6 in. o.c.	na
	FM 1-120	na	na	na	6 in. o.c.**	6 in. o.c.**	na
	54 mph	na	na	na	12 in. o.c.	12 in. o.c.	na
	72 mph	na	na	na	12 in. o.c.	12 in. o.c.	na
	80 mph	na	na	na	12 in. o.c.	12 in. o.c.	na
	90 mph	na	na	na	6 in. o.c.	6 in. o.c.	na

* - Grade C steel deck ** - Grade E deck at 5.5ft bar joist spacing

Notes:

A. 100 mph wind speed warranty fully adhered over OSB, contact Technical Department

B. For FM insured projects, contact Technical Department for deck requirements

C. Approved decks: 22 ga. Steel
Structural Concrete
3/4 in. APA certified plywood or OSB
2 in. wood plank

D. Custom Seal High Wind Design (80 & 90 mph) must be submitted to Technical Department prior to project bid Pullout data is required.

F. Contact Custom Seal Technical Department for perimeter attachment requirements

G. FM I-90 Approved at 12 in. oc. for structural concrete, Grade E metal deck FM I-90 Approved at 6 in. o.c.

INSULATION ATTACHMENT FOR FULLY ADHERED SYSTEMS					
Insulation	**Rating**	**Min. Thickness**	**Frequency # per 4'x8' bd.**	**Fastener & Plate**	**Pattern**
Iso 1	I-90	2.0"	8	#12, #14, #15 square steel or round plate	
Iso 2	I-60	1.25"	16	#12, #14, #15 square steel or round plate	
	I-60	1.5"	12		
	I-90	2.0"	12		
Iso 3	I-90	1.3"	16	#12, #14, #15 square steel or round plate	
	I-90	1.5"	11		
	I-90	2.0"	8		
Iso 5	I-75	1.4"	10	#12, #14, #15 square steel or round plate	
	I-90	1.4"	16		
	I-90	2.0"	8		
Wood Fiber Board	I-90	1.0" *	16	#12, #14, #15 square steel or round plate	
GP Dens-Deck	I-60	1/4"	16	#12, #14, #15 square steel or round plate	
	I-90	1/4"	16		
	I-60	1/2"	10		
	I-90	1/2"	12		
	I-60	5/8"	8		
	I-90	5/8"	8		
GP Dens-Deck Prime	I-60	1/4"	12	#12, #14, #15 square steel or round plate	
	I-90	1/4"	12		
	I-60	1/2"	10		
	I-90	1/2"	12		
	I-60	5/8"	8		
	I-90	5/8"	8		

* 1/2" HIGH DENSITY WOOD FIBER BOARD (ROOF RITE & WEATHER GUARD)
MANUFACTURED BY INTERNATIONAL BILDRITE APPROVED FOR FM I-90.

NOTE: FOR ALL MECHANICALLY FASTENED INSULATIONS OR THERMAL BARRIERS, THE NUMBER OF FASTENERS PER BOARD SHOULD BE INCREASED OVER THE FMRC-APPROVED FIELD OF ROOF SPACING BY:
50% IN THE ROOF PERIMETER
75% IN THE ROOF CORNERS
ROUND UP TO THE NEXT WHOLE NUMBER OF FASTENERS

THE WIDTH OF THE ROOF CORNERS AND PERIMETER IS DEFINED AS THE SMALLER OF:
0.1 TIMES THE BUILDING LESSER PLAN DIMENSION
0.4 TIMES THE EAVE HEIGHT
SUBJECT TO A MINIMUM WIDTH OF 4 FT.

ON RECOVER SYSTEMS FACTORY MUTUAL LIMITS THE INSULATION THICKNESS TO A MAXIMUM OF ONE INCH. CONTACT GENFLEX ROOFING SYSTEMS FOR APPROVALS OVER DECK TYPE OTHER THAN METAL AND CONCRETE (I.E. CEMENTITOUS WOOD FIBER, GYPSUM, ETC.)