PART 0 DESIGN STANDARDS

PART 1 GENERAL DESIGN GUIDELINES

A. Report selected insulation types and systems at DESIGN DEVELOPMENT PHASE. Roof insulation thicknesses affect design of adjacent building components (i.e. through-wall flashings, window sills, door thresholds, wall penetrations, rooftop equipment/piping, etc.). It is the intent of DPS to prevent the need to redesign major adjacent components due to roof insulation thicknesses not being accommodated.

B. All roof decks shall be numbered “001”, “002” , etc. Each distinct roof shall have a unique number. For existing roof decks, use deck numbers previously established by DPS.

C. Conduct sufficient research to specify insulation by thickness. Insulation shall not be specified by R-Value. This will ensure all bidders are basing their pricing on the same information, and eliminates the potential for interpretation-based arguments. The minimum insulating value of the roofing assembly shall be R-30.

D. Roof slope

1. Roof design shall provide 1/4” per foot roof surface slope for all roofing systems.
2. Coordinate roof framing to create slope by use of the roof framing system where possible.
3. Minimize the use of tapered insulation to provide field slope. Use tapered insulation to provide crickets/saddles and drain sumps.
4. Saddles and crickets shall be of same material as the base insulation materials.
5. Crickets/saddles shall be designed to provide ¼” per foot minimum slope on the finished roof surface.
6. Provide crickets at the upslope side of all rectangular penetrations greater than 2’-0” in width.

E. Roof drainage

1. Locate roof drains in sunny roof areas.
2. Roof drains shall discharge into the storm sewer wherever possible. If surface drainage is necessary, consult with Denver Wastewater Management.
3. Overflow drainage provisions shall be incorporated such that no more than the code-required maximum limit of ponding is possible on any portion of the roof before the overflow drainage system begins to prevent additional ponding. A/E shall engineer the entire overflow capacity in accordance with governing building codes.
4. Overflow drainage may be provided either by overflow scuppers or by separate drainage system, designed to meet building code requirements.
5. Ponding water requirements by Denver Wastewater Management may necessitate greater water depths prior to overflow drainage mechanisms becoming operational. These requirements would also require an increase in the roof structure’s load carrying capacity. Avoid ponding of water on roof unless it is unavoidable. Utilize site ponding where practical if retention of water is required. No roof ponding of water for retention purposes shall be permitted without the prior written approval of the DPS Project Manager.
6. Sump pans shall not be used for roof drains. Drain bowl rim and underdeck clamp shall bear directly on the roof deck. A neat, round opening of the minimum size needed shall be cut in the steel deck at each roof drain location. Circular openings in roof deck shall be supported by the roof structure.

7. Primary drain and overflow drain shall both be located within a common rectangular flat area (4' x 4' square recommended), with tapered insulation on all four sides to provide a smooth transition to the primary roof insulation system. Tapered insulation within drain areas shall be factory fabricated, not field cut. Slope on sides of transition shall not exceed 1" per foot. Minimum insulation thickness at drain rim shall be 1". Ponding is not allowed adjacent to drains.
8. Overflow drain clamping ring shall be set level with roof surface elevation, in same 4' x 4' flat area as primary roof drain. In no case shall overflow drains be sumped below the surrounding roof elevation unless the primary roof drain is contained within the same sump area..
9. Top of overflow standpipe shall be no more than the code-required elevation above roof level and no less than 2" above roof level. Top of overflow standpipe elevation shall be measured from roof elevation at top of drain sump, not flat area within bottom of drain sump.
10. Overflow drainage may be provided at roof edges where roof slopes and layout permit. Gravel stop edges or perimeter parapets less than 4" in height, located along the perimeter of lowest roof elevation, may be used to provide all or part of the necessary overflow drainage provision. Provide adequate detailing to assure that roof edge overflows operate only under overflow conditions.
11. Where upper roofs drain onto lower roofs, provide splash blocks.

F. Use multiple layers of insulation as opposed to a single layer. Joints between layers shall be staggered.

G. Under-deck roof insulation is not recommended. If use is allowed by the DPS Project Manager, the A/E shall design the roofing system to prevent condensation.

H. Insulation for built-up roof systems

1. Insulation shall be mechanically fastened to steel decks, and fully mopped with hot asphalt to primed concrete decks.
2. Insulation shall be covered with cover board.
3. Over all deck types, cover board shall be fully mopped in hot asphalt.
4. Cover board shall not be mechanically fastened through insulation into steel decks.

I. Insulation for single-ply roof systems

1. Insulation shall be covered with cover board.
2. Insulation shall be loose laid and cover board shall be mechanically fastened over steel decks.
3. Avoid insulation thicknesses over six inches (6") thick where possible. Where additional thickness is required, provide alternate fastening system.
4. All layers shall be fully mopped over primed concrete decks.

J. 4' x 8' insulation boards shall be used for all mechanically fastened product, and 4' x 4' maximum insulation boards shall be used for all adhered (fully mopped) installations. Use of 4' x 8' boards is strictly prohibited for adhered applications.

K. All field cut edges shall abut parapets or other roof edge termination conditions.

L. Determine insulation fastening rates; zones at perimeters, corners, and ridges to receive increased insulation fastening rates; and insulation fastening patterns to be used. Insulation attachment shall meet current building code, and ensure roof system meets FM Global 1-90 wind uplift requirements, whichever is more stringent.

M. Determine whether current building code requires gypsum board within the roof insulation assembly.

N. Specify demolition, removal and disposal requirements where re-roofing is required.

PART 2 GENERAL

2.01 WARRANTY

A. Warranty: See roof membrane standards.

PART 3 PRODUCTS

3.01 INSULATION

A. Cover board for built-up roofing: Perlite or wood fiberboard, flat stock, minimum 3/4" thick

B. Cover board for EPDM roofing: Gypsum board ("Densglas" or equivalent), minimum ¼" thick

C. Base insulation layer: Polyisocyanurate foam board, tapered and flat

D. Crickets and saddles: Polyisocyanurate foam board, tapered

E. Tapered Edge Strip: Perlite or wood fiber insulation

F. Cant Strip: Perlite or wood fiber insulation

G. Gypsum Board

3.02 INSULATION FASTENERS

A. Coated type fasteners are prohibited.

PART 4 EXECUTION

4.01 INSTALLATION

A. At start of each workday, drains located within daily work area shall be temporarily plugged to prevent debris from falling into the drains. Plugs shall be removed at the end of each workday.

B. Ensure that fasteners do not penetrate conduit or other miscellaneous items located on the underside of the roof deck.

C. Fasteners shall not penetrate bottom rib of steel deck where deck is exposed to view in the finished construction. Fasteners shall not protrude below the bottom rib of steel deck.

D. Do not install insulation when water in any form (i.e. rain, dew, ice, frost, snow, etc.) is present.

E. All field insulation, tapered insulation and crickets shall be installed with tight side and end joints. Butt joints in succeeding rows of insulation shall be staggered. Butt and course joints in adjacent layers of insulation shall be offset in both directions a minimum of 12".

F. Insulation gaps in excess of ¼" in width shall be filled with fitted pieces of material.

G. Insulation shall fit tightly around projections.

H. At the start of each day's work, ensure joint in top insulation layer is offset a minimum of 12" from joint in bottom layer across removed temporary tie-offs. Continuous joints between all layers of insulation at tie-off locations will be rejected and will be grounds for removal and replacement of adjacent roofing.

I. Insulation shall be installed to prevent ponding water in the finished roof system.

END OF SECTION 07240