DESIGN GUIDE

Optimized structural performance

All Weather Insulated Panels

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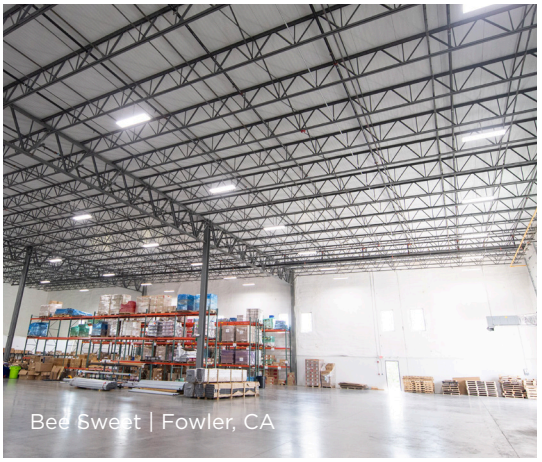
ONEDEK®
INSULATED ROOF DECK


Bee Sweet | Fowler, CA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Procedure for Diaphragm Systems

OBJECTIVE

This design guide will highlight the steps required to determine wind uplift design loads and diaphragm shear for all membrane and tapered insulation attachment types on OneDek projects.

BACKGROUND

OneDek is a roofing system that includes RD1 and RD1-M insulated roof decks. The insulated roof deck systems are used with TPO or PVC single ply membranes as well as tapered polyiso boards for optimized counterslope drainage. The attachment of single ply membranes and tapered polyiso board systems are either fully adhered (FA) or mechanically attached (MA).

The OneDek roofing system can be designed into a roof system with or without diaphragm. Each design assembly will have implications on fastening and attachment of the roof panels to the structural members. If the diaphragm design is built into the roof framing, the insulated roof decks do not need to act as a diaphragm. In this case, the insulated roof deck can be fastened using the concealed clip fastening system at the side joints. If diaphragm design is required, the insulated roof recks will require a specific fastening pattern based on diaphragm load requirements.

It is important to take consideration of each component of the system when evaluating the performance of the assembly. These components, such as deck thickness, insulation values, steel gauge, slope, membrane type, tapered systems, and attachment methods, each may have an effect in determining the correct wind uplift requirements, diaphragm requirements, and fire rating for the project. Note that allowable panel spans may be governed by diaphragm or wind uplift, and wind uplift may limit the membrane or tapered insulation attachment type.

PROCEDURE

1. Deck Diaphragm and Wind Uplift Capacity

The deck diaphragm and wind uplift capacity is the maximum load allowed when diaphragm resistance is required. This is based on diaphragm shear values specified, the diaphragm pattern on the RD1 and RD1-M panels and its wind uplift capacity. This Deck Diaphragm and Wind Uplift Capacity only needs to be checked when diaphragm is required for the project. If diaphragm resistance is not required, proceed to Step 2.

The maximum span of the panel is determined by the required design load for diaphragm shear. The table requires the shear design safety or resistance factors to be applied depending on if it is based on Seismic or Wind and if the load is given in ASD or LRFD.

1.1 Verify that diaphragm performance from the panel is required for the project.

1.2 If diaphragm resistance is not required, proceed to step 2 to calculate wind uplift based on concealed clip fastening or through fastening. If diaphragm is required, refer to OneDek/RD1/RD1-M Diaphragm Shear Load Table. Note the maximum span, fastening pattern and panel gauge required to meet diaphragm and proceed to the next step.

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PROCEDURE CONT.

1.3 To determine the maximum wind uplift pressure for diaphragm applications, take the information obtained from step 1.2 and reference OneDek/RD1/RD1-M Wind Uplift and Bending Strength Tables. Note the lowest allowable load between wind uplift connection strength and out-of-plane bending strength in PSF and verify against the maximum span determined in Step 1.2 Proceed to Step 3.

2. Deck Non-Diaphragm Wind Uplift Capacity

The Non-Diaphragm wind uplift capacity is the maximum pressure allowed for the RD1 and RD1-M panels when no diaphragm is required.

The load tables include connection and panel strength depending on the fastening pattern, panel span and panel thickness. There are two types of fastening methods for Non-Diaphragm applications. Only one type of fastening method is required for an application.

2.1 For applications with a hidden clip, reference RD1 Hidden Clip Load Span Table for maximum wind uplift of the panel. Note the maximum allowable design in PSF and span for these parameters and proceed to the next step.

2.2 For applications with through fastening, reference Through Fastening Load Span Table for maximum wind uplift of the panel. Note the maximum allowable design in PSF and span for these parameters and proceed to the next step.

3. Tapered Insulation and Membrane Wind Uplift Capacity

The tapered insulation and membrane wind uplift capacity is the maximum pressure allowed for the tapered insulation and membrane system. The attachment method, material, slope, and inclusion of tapered insulation factor into performance.

Please note that inclusion of tapered insulation for crickets may limit the slope applications. Ensure that building slope and loading are within the allowable parameters.

3.1 Refer to the Membrane Attachment Methods table for the applicable mechanically fastened or fully adhered systems. Note the attachment group and proceed to the next step.

3.2 Refer to the table for Wind Uplift for OneDek Roof Systems. Note the maximum slope and allowable wind uplift ratings in PSF required for these parameters and proceed to the next step. For roofs that include tapered insulation, evaluate step 3.2 for both Deck and Tapered Insulation as Membrane Substrate conditions.

4. Conclusion

The lowest span/allowable load from the wind uplift connection, wind uplift bending strength, membrane uplift, and diaphragm tables, if applicable, will govern the design for the OneDek roof system. Snow loads are not considered in this design guide. Contact AWIP Technical Services for snow load calculations.

4.1 For Diaphragm applications, note the calculated Diaphragm Wind Uplift Capacity obtained from Step 1 and compare to the Membrane Wind Uplift Capacity obtained from Step 3. The lower capacity is the value that should be used to determine panel, membrane, and attachment requirements for the specific application.

4.2 For Non-diaphragm applications, note the calculated Non-Diaphragm Wind Uplift Capacity obtained from Step 2 and compare to the Membrane Wind Uplift Capacity obtained from Step 3. The lower capacity is the value that should be used to determine panel, membrane, and attachement requirements for the specific application.

Procedure for Diaphragm Systems

Membrane Attachment Methods

Attachment Group	Attachment Type	Attachment Method
A	#15 Trufast w/2.4" Metal Seam Plates	6" O.C. at laps (72" spacing)
B	#15 Trufast w/2.4" Metal Seam Plates	6" O.C. at laps and center of laps (33" spacing)
C	#15 Trufast w/2.4" Metal Seam Plates	4" O.C. at laps and center of laps (36" spacing)
D	#15 Trufast w/2.4" Metal Seam Plates	6" O.C. at laps and center of laps (36" spacing)
E	Holcim LA505 Adhesive	200 sf/gal per surface
F	Holcim LA432M Adhesive	120 sf/gal per surface

Notes:

1. Fully adhered systems with tapered insulation also require roofing adhesive in 12" Max O.C ribbons between tapered insulation and roof deck. Mechanically fastened systems require additional fastening between tapered insulation and roof deck.

2. Consult OneDek General Installation Guide for additional information on tapered insulation attachment.

Wind Uplift for OneDek Roof Systems

OneDek Panel	Membrane Substrate	Membrane	Membrane Width (in)	Attachment Group	Max Slope	Allowable Design Pressure (PSF)
RD1-M	Deck	CSP TPO 60 MIL	78	A	½ (2*)	45
RD1-M		CSP TPO 60 MIL	39	B	½ (2*)	75
RD1-M		C3 Plus PVC 60 MIL	78	A	1-1/2 (2*)	45
RD1-M		C3 Plus PVC 60 MIL	39	B	1-1/2 (2*)	75
RD1		CSP TPO 60 MIL	120	E	½ (2*)	67.5
RD1		C3 Plus PVC 60 MIL	120	F	1 (2*)	67.5
RD1		C3 PVC Fleeceback 60 MIL	120	E	1 (2*)	67.5
RD1-M	Tapered Insulation	CSP TPO 60 MIL	78	D	½	120
RD1-M		C3 Plus PVC 60 or 80 MIL	78	C	½	120
RD1		C3 Plus PVC 60 or 80 MIL	120	F	½	60
RD1		C3 PVC Fleeceback 60 MIL	120	E	½	60

*Slope available up to 2:12 for FM non-tapered Assemblies – consult your AWIP representative for FM Global projects.

Notes:

1. A design safety factor of 2 has been applied.

2. Allowable Design Pressures are based on wind uplift resistance and uniform static pressure testing per FM 4474.

Notes

All Weather Insulated Panels

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